

The logo for ICANZ, featuring the letters 'ICANZ' in a bold, white, sans-serif font on a green rectangular background.

ICANZ

THE RIGHT INSULATION MATTERS
SUPPORTING LOCAL PRODUCTS & JOBS

A vertical strip of three black and white photographs showing construction workers installing insulation. The top photo shows a worker kneeling on a roof or ceiling, the middle photo shows a worker standing and installing a large panel, and the bottom photo shows a worker kneeling and installing insulation on a wall or ceiling.

INSULATION HANDBOOK

Part 2: Professional Installation Guide - Version 6

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
- Pliable Building Membranes Association of Australia

Version	Date	Description
1	Feb 2012	Initial release
2	Nov 2013	Revised Edition
3	Oct 2015	Revised Edition
4	Oct 2016	Revised Edition
5	Dec 2019	Revised Edition
6	Dec 2020	Revised Edition

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

www.icanz.org.au

BEFORE READING THIS GUIDE PLEASE NOTE

The contents of this document is intended to provide professional installers with practical guidance in the installation of insulation. It should be read in conjunction with technical or safety instructions, product information and guidance material provided by the product manufacturer and any applicable laws and standards. The information provided is general in nature and the user should establish its applicability to any specific circumstances.

Images are provided by way of illustration only.

When referring to this document you should check the ICANZ website for additions, revisions or updates.

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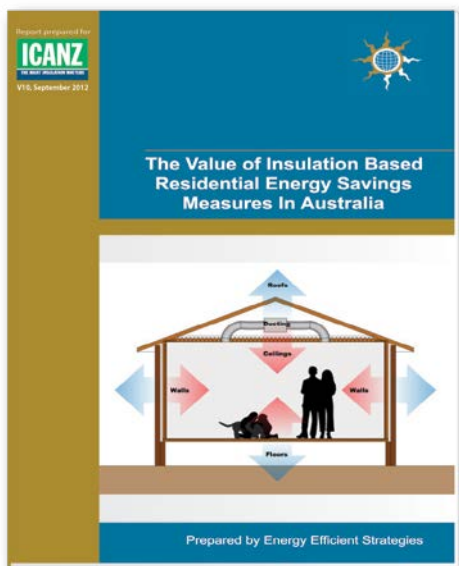


INSULATION HANDBOOK

Part 2: Professional Installation Guide - Version 6

Insulation installation for ceilings, walls & floors

Foreword



Insulation Matters!

Climate change and the challenge of reducing carbon emissions and reducing household and business energy costs 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.

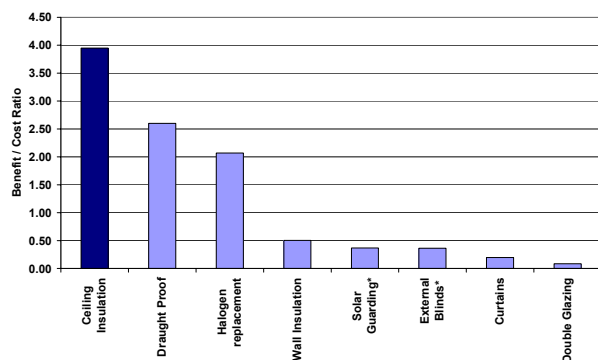
Of all the energy efficiency measures available for buildings, insulation is amongst the most immediate and cost effective. Insulation is not just about reducing greenhouse gas emissions.

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 transmission through buildings
- by using less energy, reduces green house gass emissions
- often reduces the size and cost of air conditioning eqiptment needed for heating and cooling.



Comparative National Average Benefit Cost Ratios for Various ESMs



Source:
The Value of Insulation Based Residential Energy Savings Measures in Australia - Pge 25.

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.

Insulation and solar panels are complimentary

Insulation, correctly installed, reduces the amount of energy needed to heat and cool homes and to improve comfort and amenity. So when solar panels are installed, the power solar panels generate will provide a greater proportion of the reduced energy needed from mains power.

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-benefits 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.

Professional Insulation Handbook Part 2 - Version 6: 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
- Reference to 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
- Installation of insulation under metal and tiled roofs.

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 insulation chosen must be fit-for-purpose and installed correctly.

The Right Installation Matters!

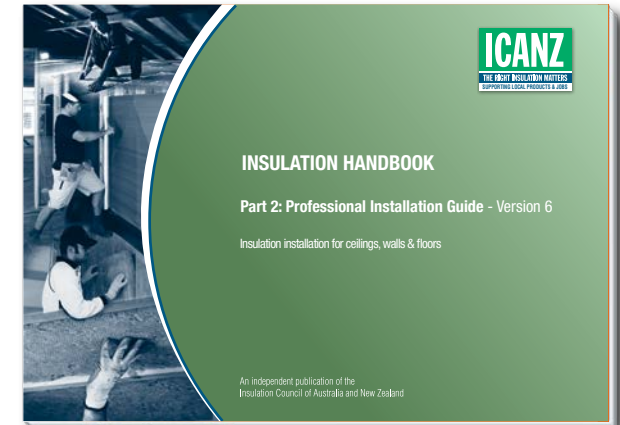
How to use this Handbook

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



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.
7. 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.
8. Some DIY insulation products are available for DIY renovators. ICANZ and ICANZ members provide information on their packaging and websites to assist DIYers to choose the right insulation and install it safely and correctly.
9. **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.

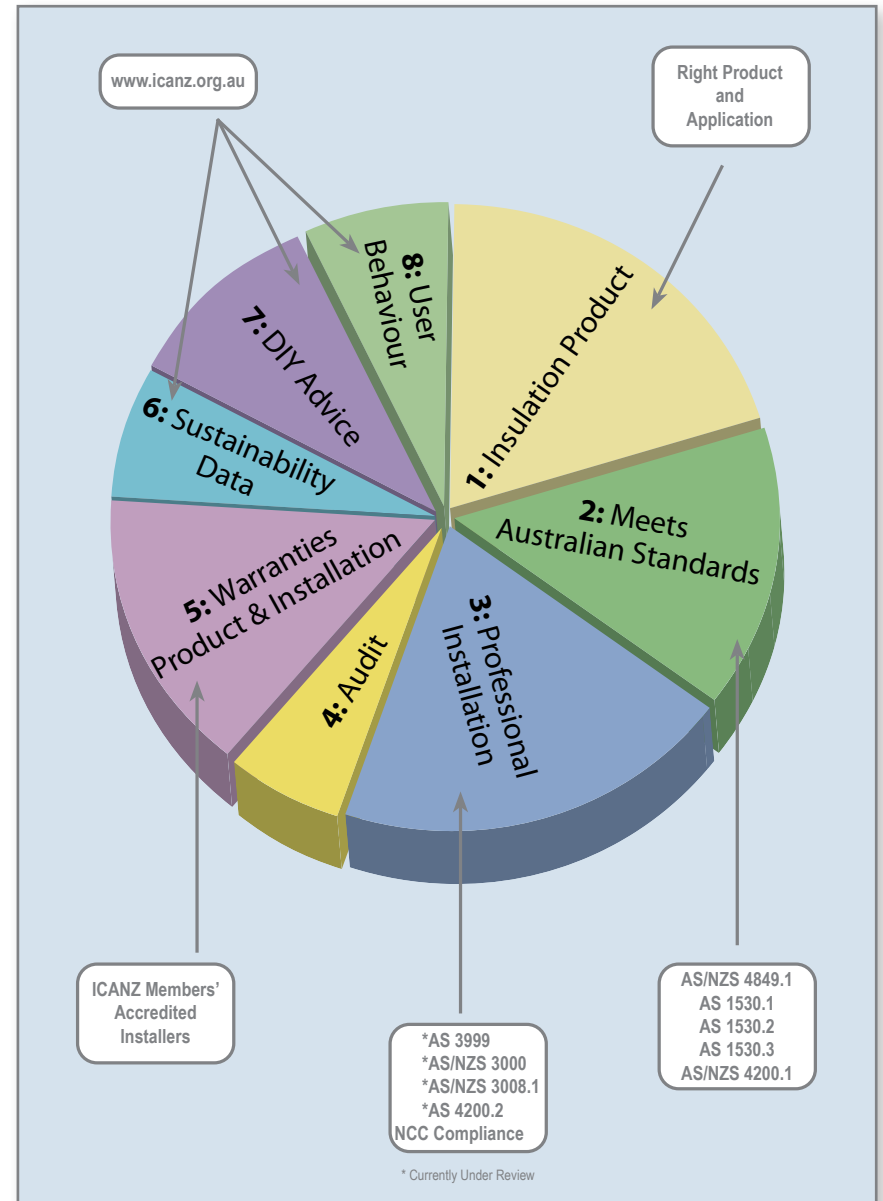
Adopting good practice will substantially help save energy costs, improve comfort and reduce greenhouse gas emissions. Helpful information is widely available from State and Federal Government websites and from ICANZ and its member companies.

* Australian Sustainable Built Environment Council (ASBEC) (2016). *Low Carbon, High Performance*, p.27.

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CLEAN ENERGY COUNCIL
**ACCREDITED
INSULATION
INSTALLER**

STATEMENT OF ATTAINMENT

A STATEMENT OF ATTAINMENT IS ISSUED BY A REGISTERED TRAINING ORGANISATION WHEN AN INDIVIDUAL HAS COMPLETED ONE OR MORE ACCREDITED UNITS

**Association of Wall and Ceiling
Industries of Aust & NZ Inc
(AWCIANZ)
RTO No: 70212**

This is a statement that

has attained

CPCCCM1015A – Carry out measurements and calculations
CPCCCM2010B – Work safely at heights
CPCCOHS2001A – Apply OHS requirements, policies and
procedures in the construction industry
CPCCPB3014A – Install bats insulation products
CPCCPB3027A – Install ceiling insulation

These competencies have been identified as meeting the
knowledge and skills for industry insulation installers as
defined by the Association of Wall and Ceilings Industries of
Aust NZ Inc (AWCIANZ)

Statement number: 00499
Date:

Mrs Tanya Chudasko
Chief Executive Officer

Association of Wall & Ceiling Industries of Aust & NZ Inc
451 Warrigal Road, Moorabbin VIC 3189
www.awci.org.au
03 95 995 998 702



BE A LEADER – become a registered, accredited insulation installer

About insulation

Insulation plays a fundamental role in good building design, efficient use of energy and provides comfort, protection and better health outcomes for building occupants.

Installing insulation should be a once only cost. Selecting the right insulation for the application and installing it correctly will provide the significant benefits for the life of the building. However if the insulation is not fit for purpose or is installed incorrectly up to 50% of the potential life-long benefits could be wasted.

So the insulation installer plays at least as important a role as the product itself in achieving the potential benefits of installed insulation.

About accredited training

The insulation industry, along with a Registered Training Organisation (RTO) and a Registered Certifying Body have combined and developed a professional training program that includes classroom course work covering how different insulation products work, calculating how much insulation is needed, and provides actual practice work installing insulation according to the latest requirements. The course provides details of the latest Australian Standards, Work Health and Safety requirements, duty of care, identifying, assessing and management of risks.

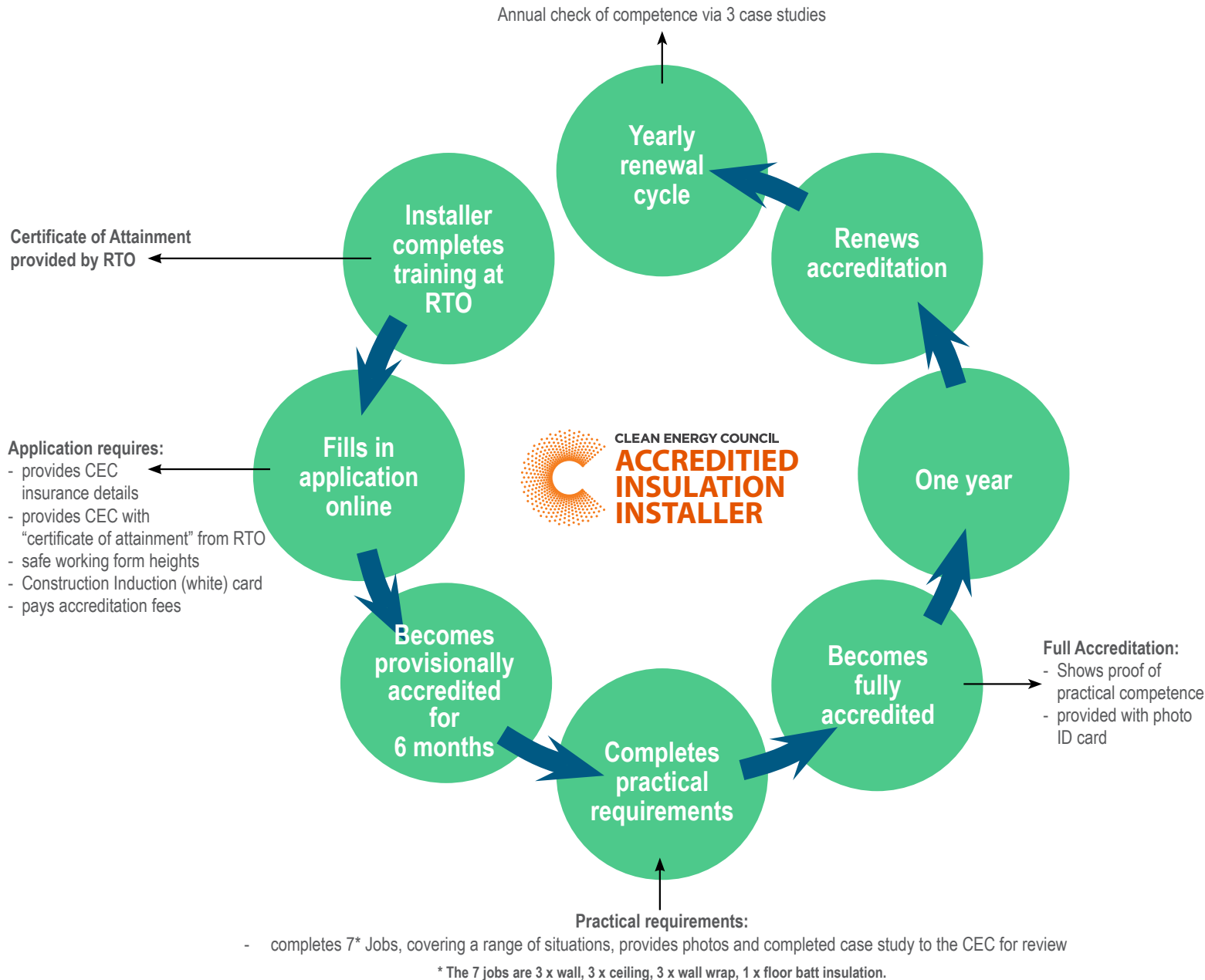
For further information, email: insulation@cleanenergycouncil.org.au or phone 03 9929 4141.

Benefits of being an accredited and registered insulation installer

There is a growing requirement within the building industry to have all work done by qualified personnel. This is already mandatory for government funded building work. This course is the only current accredited course available for insulation installers. No matter how long you have been an installer, you will learn many things from this course and be brought up to date with all relevant standards, regulations and responsibilities you may not realise you have to comply with.



INSULATION INSTALLER ACCREDITATION



See Our Insulation installation videos

ICANZ has been working with the Victorian State Government and Building Industry Associations to create a series of insulation installation videos for installers and other associated trades who regularly handle insulation.

The link <https://youtu.be/jsVWwC8fQeU> will give you a good summary walk through of the content and use of the video series

Please click below to go to ICANZ videos:



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 Promotes basic emergency life support	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.
Asbestos Awareness			Recommend		
Confined Spaces			Recommend		
Construction Industry Safety Induction	CPCCWHS2001	This unit of competency specifies the mandatory work health and safety training required prior to undertaking construction work. The unit requires the person to demonstrate personal awareness and knowledge of health and safety legislative requirements in order to work safely and prevent injury or harm to self and others. It covers identifying and orally reporting common construction hazards, understanding basic risk control measures, and identifying procedures for responding to potential incidents and emergencies. It also covers correctly selecting and fitting common personal protective equipment (PPE) used for construction work.	Mandatory	1 2 3 4	Identify health and safety legislative requirements. Identify construction hazards and control measures. Identify health and safety communication and reporting processes. Identify health and safety incident response 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	CPCCWHS2001 + ICANZ supplementary information	Overview of work health and safety requirements when installing insulation. Apply health and safety requirements, policies and procedures in the construction industry.	Mandatory	1 2 3 4	Storage and handling. PPE. Composition. High risk hazards.
Install Ceiling Insulation Products	CPCCPB3027	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 Bulk Insulation and Pliable Building Membranes	CPCCPB3014 equivalent + ICANZ supplementary information				
Work Safely at Heights	CPCCM2012	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 health and safety requirements, policies & procedures in the construction industry	CPCCWHS2001	This unit of competency specifies the outcomes required to carry out health and safety 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.
	CPCCCM1015	Carry out measurement and calculation.			Installers rarely do this unless they are also the leading contractor.

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. Pliable Building Membranes. 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.
Air Tightness	Air Tightness is the fundamental building property that impacts infiltration and exfiltration (the uncontrolled inward and outward leakage of outdoor air through cracks, interstices or other unintentional openings of a building, caused by pressure effects of the wind and/or stack effect).
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 or metal 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/NCC	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 energy efficiency, 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.
Competent Person	A person who has acquired through training, qualification or experience – or a combination of these – the know how and skill enabling that person to perform the required task correctly
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 pliable membrane.
Double Sided Anti Glare	Reflective foil on both faces of reflective pliable 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 (WES)	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™ Glasswool	Insulation composed of bio-soluble glass fibres that comply with test requirements of Note Q (refer SafeWork Australia).
FBS-1™ Rockwool	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 foil membranes.

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-load bearing.
Legislation	Law passed by an Act of Parliament.
Lintel	A lintel (or lintel) is a structural horizontal block that spans the space or opening between two vertical supports. It can be a decorative architectural element, or a combined ornamented structural item. It is often found over portals, doors, windows and fireplaces.
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.
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 un-sarked tiled roof).
Near Miss	An accident that does not produce an injury or disease.
Noggin/Nogging	horizontal bracing pieces used between wall studs or floor joists to give rigidity to the wall or floor frames of a building. Noggings may be made of timber, steel, or aluminium. If made of timber they are cut slightly longer than the space they fit into, and are driven into place so they fit tightly or are rebated into the wall stud.

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.
Health and safety	Occupational 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.
PBM	Pliable Building Membranes. Flexible, durable rolls of material used to wrap walls or sark roofs. These can be made from material that is reflective or non reflective, permeable or non permeable.
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	A still air space between two surfaces - with at least one surface being reflective.
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 absorption qualities.
R_m	Material R-value.
R_t	Total R-value.
R_{sys}	System R-value.
R_w	The Weighted Sound Reduction Index (R_w) is a number used to rate the effectiveness of a soundproofing system or material. Increasing the R_w by one translates to a reduction of approximately 1db in noise level. Therefore, the higher the R_w number, the better a sound insulator it will be.
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.
Safe Use Instruction Sheet (SUIS)	Summary of relevant properties of product components and chemicals which include safety, health, storage, handling and emergency information.
SDS	Safety Data Sheet – summary of relevant properties of a hazardous- chemical or proprietary product and which includes safety, health, storage, handling and emergency information.
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 cross arms for posts are examples of structural timbers.

Term	Definition
Stud	A wall stud is a vertical framing member in a building's wall of smaller cross section than a post. They are a fundamental element in frame building.
SUIS	Safe use information sheet - summary of relevant properties or proprietary product and which includes safety, health, storage, handling and emergency information.
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.
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.
Thermal Imaging	An advanced, non-invasive technology that identifies details of construction, materials and moisture in buildings that can't be revealed using conventional inspection methods.
Total R-value	Thermal resistance associated with a material or system, including surface air film resistances.
Truss	A building a truss is a connected combination of framing members (usually in a triangular configuration) used in in roof space to support the roof. By connecting the framing members in this way individual members are not subjected to bending moments and shear forces but are subjected to only axial forces that is either compression or tension.
U - Value	A measure of the heat transmission through a building part (such as a wall or window) or a given thickness of a material (such as insulation) with lower numbers indicating better insulating properties. The units of measurement are W/m^2K .
Ventilated	An air space bounded by surfaces allowing a degree of air movement through opening(s) having a 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. Under typical conditions Glasswool and Rockwool batts should last the lifetime of a home. Glasswool and Rockwool batts are safe to use and provide energy savings 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 and under floor 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
- are manufactured from renewable resources (sand and basalt rock) and recycled content (Up to 80%)
- are correctly installed, batts should, under typical conditions, last the life of the building
- require no maintenance
- reduce sound transmission through building structure.

Reflective foil laminate insulation, correctly installed, will:

- reduce greenhouse gas emissions
- has a long life
- require no maintenance
- **it is strongly recommended that electrically conductive membranes are not used on top of ceiling joists or attached to underfloor joists.**

Pliable Building Membranes

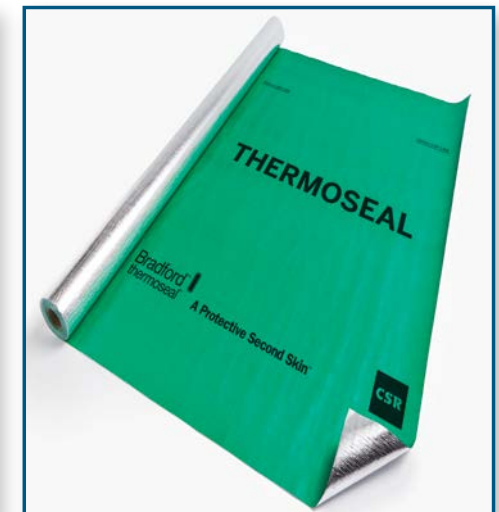
- acts as water and dust barrier
- allows transmission of water vapour.

→ Save energy → Save money
Save the environment

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
Glasswool and Rockwool are safe due to superior fire performance – non combustible
Glasswool and Rockwool are safe to use with down-lights (when installed as per manufacturer's instructions) because they are non-conductive.
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
Quality Certified

Pliable Building Membranes
General Benefits
Provides weather proofing - water control - air tightness
Provides dust proofing
Gives temporary shelter during construction process
Reflective Wraps
Provides incremental thermal performance
Can improve performance of bulk insulation by adding air movement contro Reflective foils are electrically conductive. Use with extra caution when working near live cabling
Permeable Membranes
Provides a water barrier and is vapour permeable
Reduces the risk of condensation forming
Helps provide healthier outcomes



Bulk Insulation Products to use

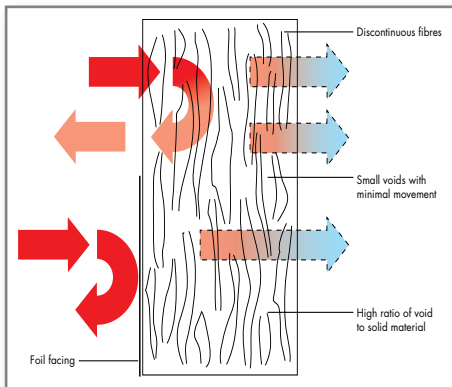
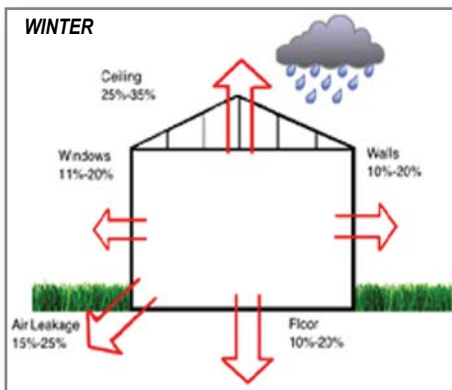
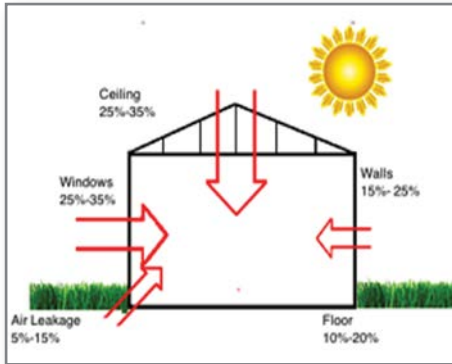
- ✓ compliant with the current Australian Standards AS/NZS4859.1:2018
- ✓ Made from predominantly recycled materials
- ✓ When properly installed, will last for the life of the home

Selecting Insulation Products

- ✓ Is it easy and safe to install and use
- ✓ What is its fire rating performance?
- ✓ Will it remain in place after it's installed?
- ✓ Does the manufacturer state that it meets Australian Standards?
- ✓ Will the insulation increase the fuel load in a fire?
- ✓ Once it's installed is it easy to handle, move and replace?
- ✓ Is it guaranteed to maintain a long performance life?

New Builds - Typical Applications

Bulk Insulation	Under Roof Line	Ceilings	Walls	Floors	Air Con Ducts
• Glasswool	✓	✓	✓	✓	✓
• Mineral Wool	✗	✓	✓	✓	
• Polyester	✓	✓	✓	✓	✓
• Sheepswool Batts	✗	✓	✓	✗	✗
• Foam Sheets	✓	✓	✓	✓	✗
Loose Fill Insulation					
• Mineral Wool	✗	✓	✗	✗	✗
• Cellulous Fibre	✗	✓	✗	✗	✗
• Sheepswool	✗	✓			
Pliable Building Membranes					
• Non - permeable	✓	✗	✓	✗	✓
• Permeable	✓	✗	✓	✗	✓



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 Glasswool and Rockwool batts are non-combustible and non-conductive 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 a Thermal '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:

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

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 (R_t) 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**.

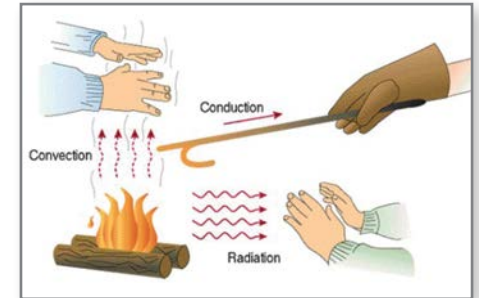
Reflective insulation thermal resistance is expressed in terms of **Total R-value** based on an application. An R_t -value is given for both Summer and Winter performance (as per BCA). Refer to ([ICANZ Handbook Part 1: Thermal Performance](#)), www.icanz.org.au. The BCA/NCC sets out performance targets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

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 (What is an Acoustic 'R' Value (RW).

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

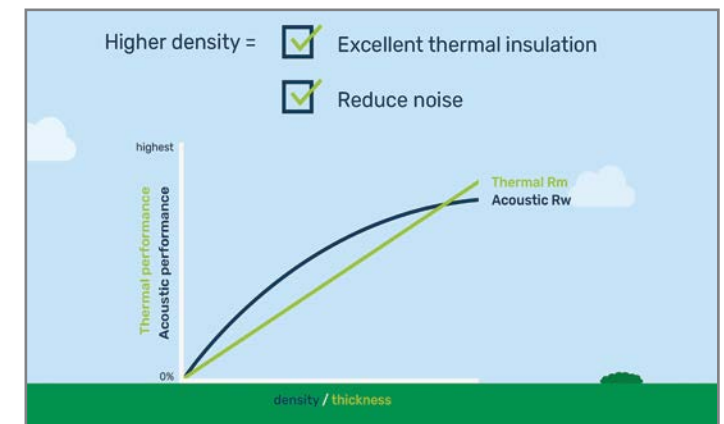
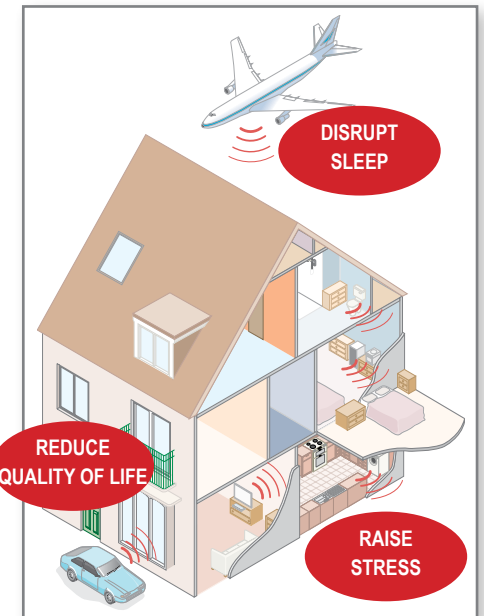
Bulk insulation materials such as glasswool and rockwool act like a sponge to help soak up sound energy. When the sound waves encounter the insulation they are partially deflected by the density of the product and partially absorbed due to the millions of interconnecting air pockets.

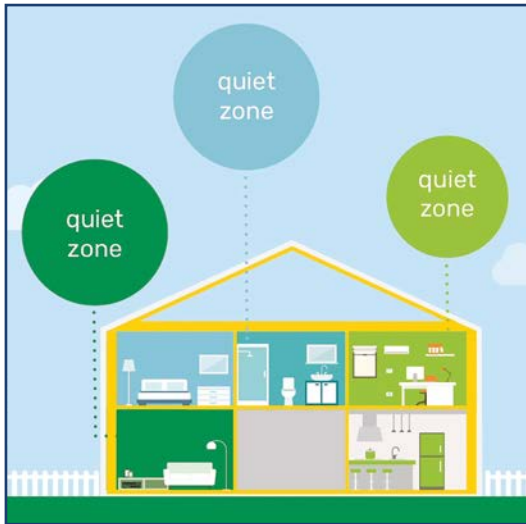
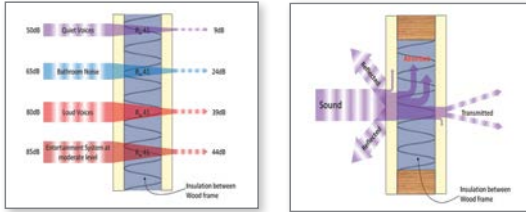
As a general rule, insulation products such as reflective foil or foams with hard surfaces are poor noise insulators.

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 R_w 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.

Quiet Zones

Through effectively installing insulation reduce noise levels to selected areas within the building.

3.8.6 Condensation

What is Condensation?

Air contains invisible water vapour. The higher the temperature the more water vapour it can hold. The lower the air temperature the less water. Condensation occurs in buildings where the air temperature rises and becomes warmer and then contacts a cold surface. The air cools and produces visible water droplets on the cold surface. The water formed is known as 'condensate' and the process is called 'condensation'. If more water vapour (warm air) is present, further condensation will occur.

The occurrence of condensation in buildings is the result of complex interactions between the environment, construction methods and occupant behaviour. The process of condensation is reversible. Where construction material surfaces are warmer or ventilated, condensate may evaporate.

Some facts and figures

- An adult releases up to 3 litres/3kg of water vapour per day into the home environment.
- Normal household activities for a family of 4 (showers/bath, clothes drying, cooking, dish washer) release up to 15 litres/15kg per day of water vapour into the home environment.
- An unflued gas heater can release up to 5 litres/5kg of water vapour in a single night.

Mould, mildew, fungus growth and timber rot

Prolonged condensation in buildings can lead to the development of mould, mildew and fungus growth - the perfect conditions for dust mites and mould spores. These can have detrimental respiratory and other effects on occupants.

Structural decay of building components and fabric can develop as a result of persistent damp conditions.

Insulation and Condensation.

Installing insulation can help reduce the risk of condensation. However if insulation is installed incorrectly it may contribute to creating the conditions needed for condensation.

Building designers have the key role in determining the selection and placement of building materials – including insulation – to ensure conditions such as potential condensation are controlled.

It is most important that insulation installers follow the directions detailed on building plans.

Permeable building membranes are often specified to reduce the risk of condensation.

Further references

Australian Building Codes Board www.abcb.gov.au/condensation

Australian Standard AS 3999 Bulk Thermal Insulation - Installation

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 consumers' 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.
- Breach of Construction Work Code of Practice requirements.

4.2 National Construction Code (NCC)

The National Construction Code (NCC) communicates the minimum necessary requirements for new buildings (and new work in existing buildings) throughout Australia. Where these regulations are adopted by each state or territory, they become enforceable by law.

The NCC includes mandatory minimum energy efficiency performance standards for residential and commercial buildings.

One of the most cost effective ways for buildings to meet those mandatory standards is by installing insulation effectively. The NCC is now available FREE on-line (ncc.abcd.gov.au).



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 by 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 luminaires, including downlights, electrical equipment and cables.
AS/NZS 3008.1 Electrical Installations	Covers the selection of cables and recessed luminaires.
AS4254 part 1&2 Ductwork air handling systems	Includes insulation requirements for flexible and rigid ducting systems.
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

<p>AS/NZS 5110 Recessed luminaire barriers</p>	<p>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.</p>
<p>AS 1530.1 Methods for fire tests on building materials, components and structures – Combustibility test for materials</p>	<p>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</p>
<p>AS 1530.2 Methods for fire tests on building materials, components and structures – Test for flammability of materials</p>	<p>Specifies the apparatus and test method for determining the flammability index of a material.</p>
<p>AS 1530.3 Methods for fire tests on building materials, components and structures- simultaneous determination of ignitability, flame propagation, heat release and smoke release</p>	<p>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.</p>
<p>AS 3959 Bushfire Safety Requirements</p>	<p>For bushfire prone areas. Includes sarking requirements and installation.</p>

Pliable Building Membranes

<p>AS/NZS 4200.1 Pliable building membranes and underlays - materials</p>	<p>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.</p>
<p>AS 4200.2 Pliable building membranes and underlays - Installation requirements</p>	<p>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.</p>

Other Insulations

<p>AS 1366.1 Rigid cellular plastic sheets for thermal insulation – Rigid cellular polyurethane (RC/PUR)</p>	<p>Specifies requirements for rigid cellular polyurethane in the form of sheets, board, blocks and cut shapes for thermal insulation.</p>
<p>AS 1366.2 Rigid cellular plastic sheets for thermal insulation – Rigid cellular polyisocyanurate (RC/PIR)</p>	<p>Specifies requirements for rigid cellular polyisocyanurate (RC/PIR) in the form of sheets, board, blocks and cut shapes for thermal insulation purposes.</p>

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.

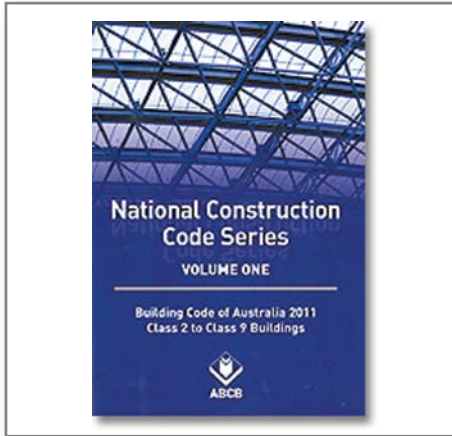
Dust and Respirators

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 selection, 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 minimum energy efficiency requirements.**

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.

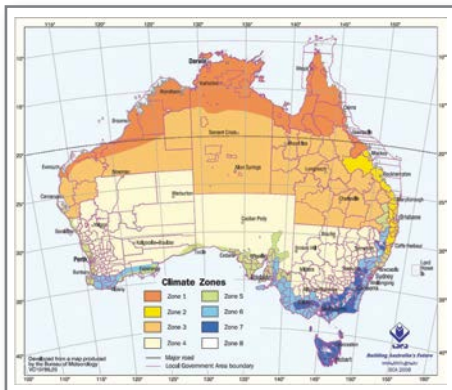
4.3.1 Complying with Electrical Safety Regulations

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



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 practicable 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 practicable, 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)
- 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 labelling 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
- check work orders for correct product R values and correct applications.

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 or accreditation?

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.
- working at heights



For example of SWMF documents, see Appendix 14





Typical Installer working kit



Checking details with client



Removing off-cuts from site

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), Safety Data Sheets (SDSs), and/or Safe Use Information Sheets (SIUS) 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 **Working in an occupied building**

Your company may already have some common sense guidelines for working in occupied buildings. Here are some tips for consideration to help avoid potentially difficult situations:

- park considerably
- present your ID to occupier
- enter property only with permission
- when faced with an angry customer adopt a passive stance
- ask occupier to lock up pets if they present a potential hazard
- do not smoke on site
- work as quietly as is practicable
- keep job site tidy
- remove any job related rubbish and leave site at least as tidy as you found you on arrival

5.3.3 **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 of debris and litter does not create a risk to the environment.

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

5.3.4 **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 four basic principles of risk management:

- **Identify** hazards – Find or See.
- **Assess** the risks involved – Think About and Check.
- **Control** the hazard – Stop or Prevent.
- **Review** to identify change or improvement – Check and Reflect.



Likelihood ↑	Very likely	Acceptable risk Medium 2	Unacceptable risk High 3	Unacceptable risk Extreme 5
	Likely	Acceptable risk Low 1	Acceptable risk Medium 2	Unacceptable risk High 3
	Unlikely	Acceptable risk Low 1	Acceptable risk Low 1	Acceptable risk Medium 2
What is the chance it will happen?	Minor	Moderate	Major	
	Impact How likely is the risk →			

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.

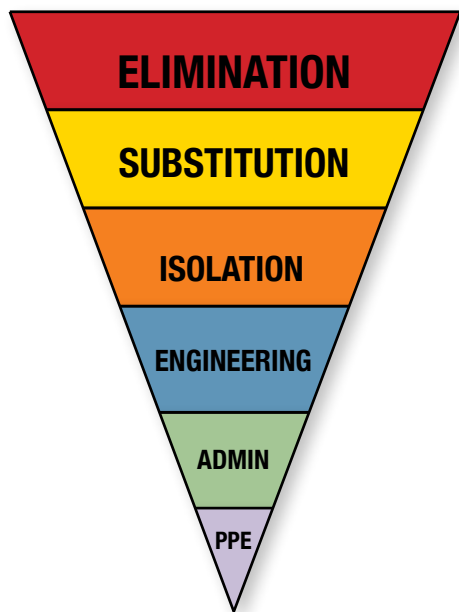
Once you have completed this, you will be able to make an accurate decision about which controls (if any) will be needed. This is an important part of risk management.

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

1: 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 working 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:

- an industrial grade ladder is used
- ensure the ladder is in good working condition prior to use
- 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. Edge protection is used where a person is likely to fall (e.g. externally loading insulation into roof cavity while standing in roof). Check state regulations for details
- check for void spaces in the ceiling cavity (e.g. over stairs, air-conditioning shafts, built in robes)
- 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 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.

Replace second paragraph with: Working in hot and/or humid environments such as on a roof or in a ceiling cavity can be uncomfortable but more importantly lead to a heat related illness which can be fatal. Workplace safety legislation requires employers to assess the risks associated with heat stress and apply adequate controls to safely manage the risk so far is reasonably practicable. Some examples of these are:

- Rest breaks
- Accessible cold drinking water
- Recovery/Rest area available
- Training

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. Remain hydrated. Always carry sufficient drinking water.

Heat strain: is more serious and can lead to death. It is more likely to occur in conditions of high humidity.

Heat strain definition: Is how the body responds to heat stress. These responses are focussed on removing heat from the body.

Heat stress definition: is the total heat load on the body from all sources including:

- Ambient air temperature
- Radiant heat from other sources
- Air movement
- Relative humidity
- Individual task requirements

Roof spaces can become very hot 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.



Hazard

23: Restricted Access Areas

Many roof and underfloor spaces pose potential hazards as they are cramped, maybe poorly ventilated, dark, dusty and may restrict movement.

All of these potential hazards need to be taken into account when reviewing safe work methods statements and job plans.

You will need to:

- turn off mains power before entering attic or floor spaces

Before entering these spaces

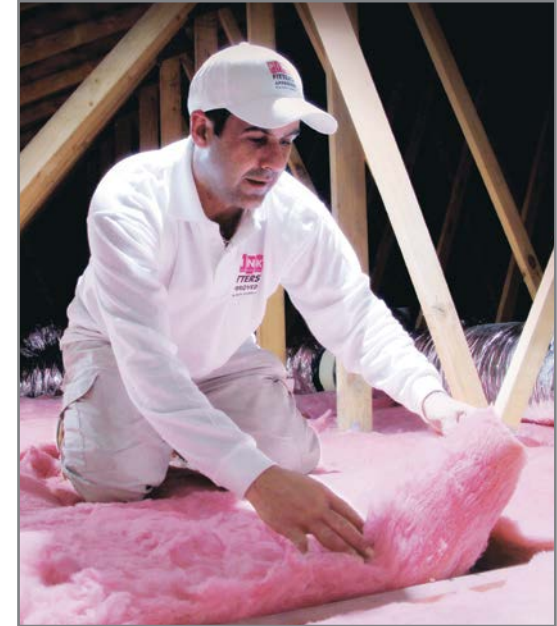
- warm up, loosen up, stretch
- wear appropriate and safe footwear

When inside spaces

- do not force your body to conform to uncomfortable positions
- keep items needed as close as practicable to your working position
- never walk on plasterboard ceilings




Have available

- adequate independent lighting
- dust masks
- gloves
- kneeling board
- sufficient drinking water
- non conductive tools to help shape and place insulation material correctly
- mobile phone with appropriate contact numbers programmed.



Using floor joists for safe footing

Hazard

<p>4: General Dust</p>	<p>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.</p> <p>Wearing a P2 dust mask will prevent such discomfort allowing you to proceed with the job.</p>	
<p>5: Asbestos</p>	<p>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.</p>	
<p>6: Nails and sharp edges</p>	<p>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.</p>	
<p>7: Falling Objects</p>	<p>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.</p> <p>IT IS IMPORTANT THAT:</p> <ul style="list-style-type: none"> • 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. 	
<p>8: Electricity</p>	<p>Requirements for installing insulation around or near electrical cabling, heat generating appliances and recessed lighting are addressed in AS 3999 in the following sections:</p> <ul style="list-style-type: none"> • Section 2: Pre-Installation considerations and inspections • Section 4.3: Electrical safety requirements • Appendix A: Recessed Luminaries. <p>Ensure any electrical leads use for portable power equipment are test tagged. Keep leads off the ground. Use a portable RCD where ever an RCD is not present on the electrical circuit.</p>	
<p>9: Fire</p>	<p>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 combustable loose insulation.</p>	



Typical Installer working kit

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.

Where PPE is considered necessary and if you are feeling hot, don't shed items of PPE. For example, PPE can prevent direct skin contact with hazards such as exposed wiring and can reduce the severity of electrical 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

1: 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.

2: Eye Protection

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



3: 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.



4: 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.



4: 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.

5: 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'. Consider wearing cut resistant gloves.

6: 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.

7: 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.

8: Height Safety PPE

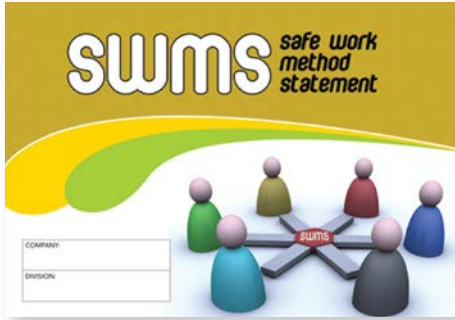
In circumstances deemed necessary, working at heights requires you to use some additional PPE for fall prevention. Depending on the job, this can include temporary anchorage points, static lines, shock absorbing lanyards and full body harnesses.

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 spilled 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 awareness')*

Requirements for installing insulation around or near electrical 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 fixing insulation in position and providing appropriate 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		
<p>1: Lead Sheathed Cables</p>	<p>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.</p> <p>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.</p>	
<p>2: Tough Rubber Sheathed Cables (TRS Cables)</p>	<p>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.</p> <p>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.</p>	
<p>3: Infinity and Olsent electric cables</p>	<p>During 2010 – 2013 a large quantity of Infinity and Olsent branded electric cables were sold into the Australian building industry. These cables have now been assessed as failing to meet minimum performance and safety standards and may present a threat now or in the future. Although remaining unsold stocks have been withdrawn from sale, up to 40,000 buildings may have these cables already installed. If these cables are present on your job, do not continue to work. Inform the occupant and request they arrange an inspection by a licenced electrician or electrical engineer. Do not recommence work until cleared to do so in writing by a licenced electrician or electrical engineer</p>	

Hazard

4: 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.**



5: 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 many 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.

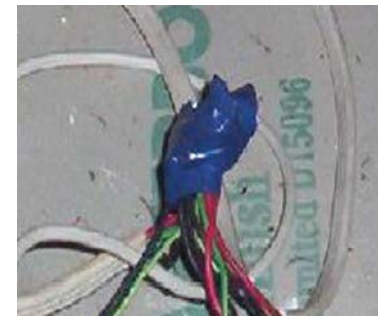
If the following are found, no work should proceed until the area has been assessed as electrically safe by a licensed electrical contractor.

- cracked or split sheaths of TPS cables
- exposed inner cores of TPS cables (usually red, black, white and green)
- exposed copper wire is visible at terminations, electrical accessories or equipment.




6: 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

<p>7: Corrosive Effects of Thermal Insulation</p>	<p>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.</p> <p>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.</p>
<p>8: Vermin present or vermin damaged wiring</p>	<p>Check for:</p> <ul style="list-style-type: none"> • presence of vermin (e.g. rodents, bees, spiders, wasps, snakes) • vermin waste <p>Vermin damage to electrical cables in ceiling spaces can result in live bare conductors being exposed. Wiring should be checked for such damage.</p> <p>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.</p> 
<p>9: Derating of Electrical Cables and Wiring Systems</p>	<p>The addition of 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.</p> <p>Insulation must not be fitted so as to totally enclose a cable for more than 300mm. Insulation must not be arranged where total enclosure may result from a cable sinking into loosefill.</p> <p>The following arrangements are satisfactory:</p> <ul style="list-style-type: none"> • 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.
<p>10: Cables Subject to Damage from Insulation Fixing Methods</p>	<p>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.</p> <p>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.</p>
<p>11: When installing Insulation</p>	<ul style="list-style-type: none"> ✓ Never use metal or conductive tools ✓ Never use metal or conductive tools ✓ Don't tread on, abrade, cut or crush cables ✓ Don't put cables under tension ✓ If damaged, contact electrician immediately

Hazard

11: Recessed Luminaires/Downlights

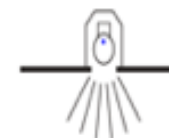
Recessed luminaires (or downlights) are common in houses today. There are detailed requirements in AS 3999 and AS/NZS 3000:2018 (wiring rules) for the precautions that must be in place to ensure that the installation arrangements for these, and their auxiliary equipment, ensure that the risk of fire is prevented.

Thermal insulation on or near recessed luminaires can cause excessive temperature rise and has the potential to cause fires

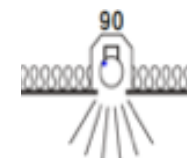
Note: an increasing number of available recessed luminaires are now manufactured to allow insulation to abut or cover them. This will be clearly shown on the packaging and also on the light fitting. If there is no clear instructions to this affect, or any doubt, refer back to the default clearances given in AS 3000 2018 wiring rules (repeated in AS 3999 2015)

If a ceiling has a recessed luminaire, one of the following precautions derived from AS /NZS 3000:2018 Wiring rules must be used before thermal insulation is installed:

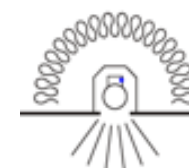
- **it must be verified that the luminaire has been specifically designed and certified by the manufacturer to permit contact with combustible materials or enclosure or covering by thermal insulation, or**
- the luminaire must be installed within a suitable fireproof enclosure or
- there must be provision 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 3000:2018 (wiring rules).



CA-90 rated. Abut insulation but do not cover light.



IC rated. Abut and cover light with insulation.



12: Electrical Conductive Insulation and Conductive Fasteners

Aluminium 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.



13: Other Electrical Appliances

Electrical appliances other than recessed luminaires in ceiling spaces may include air conditioning equipment, exhaust fans, combination bathroom fan/ light/heaters and luminaires 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 3000:2018 (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

14: Other Electrical Equipment

Recessed luminaries (or downlights) are common in houses today. There are detailed requirements in AS/NZS 3000:2018

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 3000:2018, 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.



15: 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.





Circuit board



Tagged circuit board



Fuse and circuit breaker



Voltage detector



6.2 Performing the Electrical Isolation

Electrical isolation must always be carried out when retrofitting insulation to an existing building. However, with construction of new buildings insulation is mostly fitted prior to power being energised to the building. In this circumstance, electrical isolation is not required.

Always check if power is connected and energised.

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 99).
- 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.

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 Electrician.
- 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

- There are two types of electrical current: direct and alternating. In a direct current, abbreviated DC, the electrons move in one direction. The unit of current is the ampere, which is defined as one coulomb of charge passing a given point in one second.

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.**



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



Exposed cables - not compliant



Solar Installations after 16th October 2012 using conduit to enclose wires.

6.3 Solar Isolations

6.3.1 Solar Power

- Solar cables running through the roof space from solar panels to the inverter are live. If cables are exposed (not enclosed in conduit) do not touch when installing insulation.
- The process of working in close proximity to solar cables must be covered in work methods statement and job plan.

6.3.2 Solar Installations prior to 16th October 2012

- Installations that took place prior to October 2012 may have white or black TPS cable used for DC supply from the solar array.
- The DC cable should be identified as "Solar DC".

6.3.3 Solar Installations after 16th October 2012

- After 16th October 2012 DC Cable within the roof cavity should be enclosed in HD conduit and marked "Solar".
- The HD conduit may be orange, grey or even black in colour.

6.3.4 Insulation proximity to cables in conduit

- Requirements for insulation and cabling AS/NZS 3000: 2018 equally apply to cables in conduit.

Note: Requirements for insulation in proximity to electrical cabling (see page) equally apply to cable running through conduit.



6.3.4 To Shut Down a rooftop solar installation, prior to entering the ceiling:

When returning Mains power the installer is required to:

- Switch off the AC electricity in the switch box with the breaker marked “Solar Supply Main Switch”.
- Switch off the DC isolation breaker. This is usually a separate small box next to the inverter and will be marked “PV array DC Isolator”. The inverter should shut down and the LED panel is left blank.
- Continue with normal shutdown procedure and lockout of the standard AC power as you would in your everyday work. (Refer to 6.2.3 Isolate Mains Power).

6.3.5 To restart the system on completion in the roof:

- Switch the DC “PV array DC Isolator” back on. It may need some force as it is a mechanical isolator.
- Switch on the AC breaker marked “Solar Supply Main Switch”.
- The startup process can take around 120 seconds. The system needs to do a number of checks before it re-connects to the grid.
- Lights and a LED display will indicate the system is working.



Solar Power Board



Installer consulting with client.



Electrician checking power board.

6.4 Reactivating the Power

6.4.1 Old style ceramic fuses

When returning Mains power, the installer is required to:

- Before reactivating power be sure to advise the client and all trades on site that power will now be reactivated
- 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.

6.4.2 Modern circuit board

When returning Mains power the installer is required to:

- Before reactivating power be sure to advise the client and all trades on site that power will now be reactivated
- 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.

6.4.3 Electrical Safety Check

When returning Mains power the installer is required to:

- Before reactivating power be sure to advise the client and all trades on site that power will now be reactivated
- 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 **Safe Use Information Sheet (SUIS)** 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-1™ 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.

An ICANZ SUIS (Safe Use Instruction Sheet) is a comprehensive guide and can be downloaded from: www.icanz.org.au (refer Health and Safety).

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.

Advice on safe product handling can be found at on the following web sites:

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



Model SDS for MMVF Wool Insulation Page 1 of 5

SAFE USE INSTRUCTION SHEET (SUIS)
FBS-1 MMVF WOOL INSULATION

Non-Hazardous Non-Dangerous Goods

SECTION 1: IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Product Name:	MMVF WOOL INSULATION
Other Names:	FBS-1 Man-made Vitreous Fibre products, including FBS-1 glasswool, rockwool, and slagwool. FBS-1 MMVF Wool Insulation is made up into many insulation products having individual trade names. Typically it is supplied in the form of batts, slabs, rolls, tiles or sheets.
Recommended Use:	Thermal and acoustic insulation, and energy conservation. Used in homes, public and commercial buildings, warehouses, industrial and petrochemical plants, motor vehicles, ships, public transport, power stations and white goods.
Supplier:	Member companies of Insulation Council of Australia and New Zealand (ICANZ)
Address:	(ICANZ), Suite 201, Level 2, 18 Kavanagh St, Southbank VIC 3006
Telephone:	1300 363 742 (within Australia only), or 61 3 9929 4150
Email address:	info@icanz.org.au
Website:	www.icanz.org.au
Emergency contact:	000 Fire Brigade and Police or 13 11 26 Poisons Information Centre (available in Australia only)

Because certified FBS-1 MMVF Wool insulation products manufactured in Australia and New Zealand by member companies of ICANZ are classified as NON-HAZARDOUS, a Safety Data Sheet (SDS) is not required under Australian Regulations. This information sheet is issued by ICANZ for the information of users, installers and the community. It has been formatted as required by the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), as adopted by Safe Work Australia (SWA - formerly ASCC/NOHSC). The suppliers of these products also issue their own information sheets which reflect the health & safety information in this sheet and contain other product-specific information. These information sheets are available from suppliers' websites, or on request. The health & safety information for these products must not be altered, deleted or added to.

SECTION 2: HAZARDS IDENTIFICATION

FBS-1 certified MMVF Wool insulation products are classified as **Non-Hazardous** according to the GHS. They are classified as **Non-Dangerous Goods** according to the Australian Code for the Transport of Dangerous Goods by Road and Rail. No GHS signal words, hazard statements or pictograms/symbols are applicable. In typical home, commercial and industrial installations there will be no identifiable risk to health from these products. Any work area presents hazards, and general safety risks. Some ICANZ information and advice regarding the general work risks is included for installers and their supervisors, and persons in charge of business units.

SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

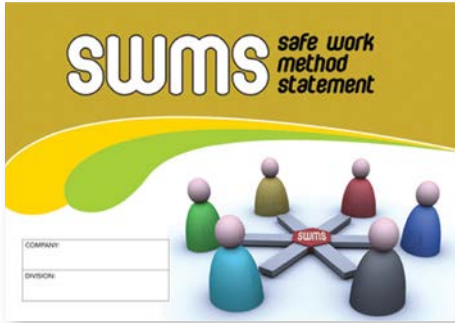
Chemical Name:	Proportion:
Man-made vitreous fibre (glasswool, rockwool) wool of low bicarbonate	>90%
fibre coating and binding agents, dust suppression agents.	<10%

Note: Traces (<0.1%) of volatile original components may remain in recently manufactured product.

SECTION 4: FIRST AID MEASURES

Swallowed:	Rinse lips and mouth with water.
Eye:	Flush with clean water. If discomfort persists, seek medical attention.
Skin:	Flush off with water, preferably running. If any rash or discomfort persists, seek medical attention.
Inhaled:	Remove to fresh air. If symptoms persist, seek medical attention.
Advice to doctor:	Any symptoms and signs of ill-health are likely to be due to other causes. Can be slightly itchy on prolonged contact with skin. Does not cause any acute or chronic health effects. Treatment should be directed toward cleaning the skin and symptomatic treatment as necessary.





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 (WHS)

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. (Refer 14.0 Appendices).

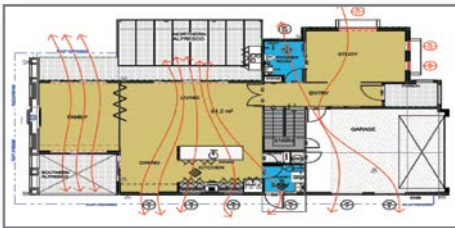
8.2.2 Confirm the scope of work

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.



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 manufacturer's 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

$$\text{Area A: } 3.0 \times 4.5 = 13.5 \text{ m}^2$$

$$\text{Area B: } 10.5 \times 6.0 = 63.0 \text{ m}^2$$

$$\text{Area C: } 8.5 \times 9.0 = 76.5 \text{ m}^2$$

$$\text{Area D: } 6.0 \times 5.5 = \underline{33.0 \text{ m}^2}$$

$$\text{Total } \quad \quad \quad \mathbf{186 \text{ m}^2}$$

Joist Spacing - 600mm: batt width 580mm

Required R Value – R3.5

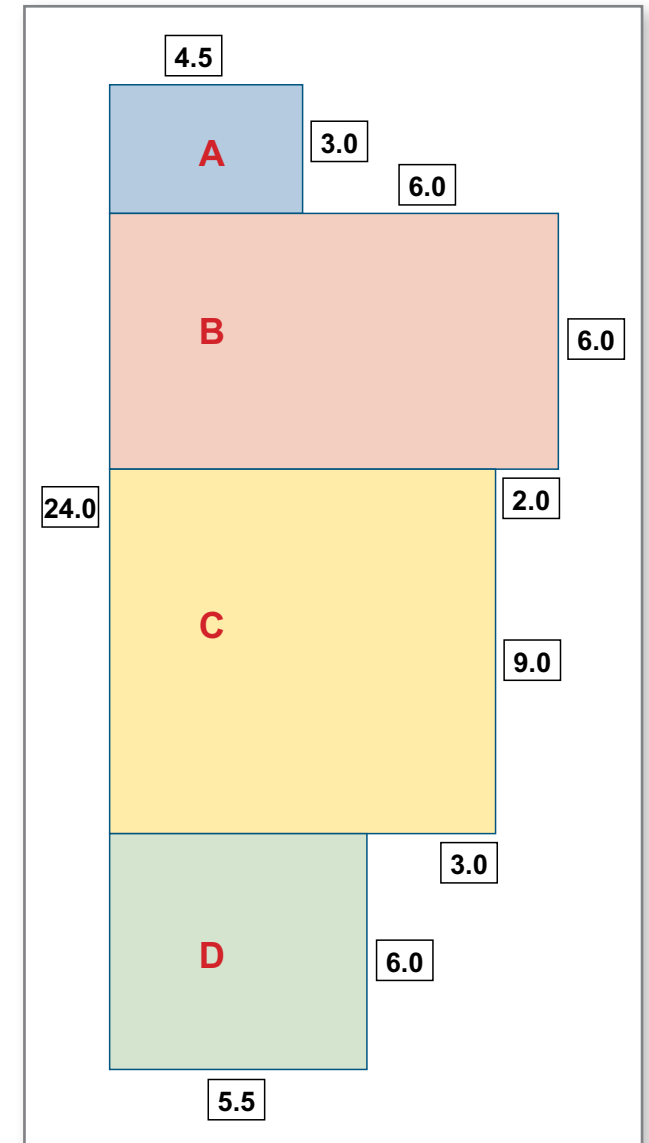
Nominal pack coverage – 7.6 m^2

Packs - $186 \text{ m}^2 / 7.6 \text{ m}^2 = 24.5$ packs.

Require 25 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 to the manufacturer's advice for available insulation sizes.

Example of calculation for ceiling and floor insulation



* All measurements are in metres.

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.
- Insulation batts must not be in direct contact with roofing material (clearance ≥ 20 mm).
- 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. In new construction, a preload is undertaken during the wall batt installation. In new construction it is recommended that a preload of insulation is undertaken during the wall installation and prior the ceiling being installed.

Hint: For homes that are not secure (e.g. from theft), 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:

- air-conditioning ducting
- truss timber work
- cabling for TV aerials
- plumbing and electrical services
- platforms for service equipment located in ceilings

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.



Electrician checking power board.



Installing ceiling batts from underneath before ceiling linings are fitted.



New build - Installing ceiling insulation prior to ceiling installation.



New build - Installing ceiling insulation with limited access due to ducting.



New build - perimeter batts installed.



Roof edge fall protection.

8.3.3 Inaccessible areas

Low pitch corners inaccessible

The floor plan below 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.

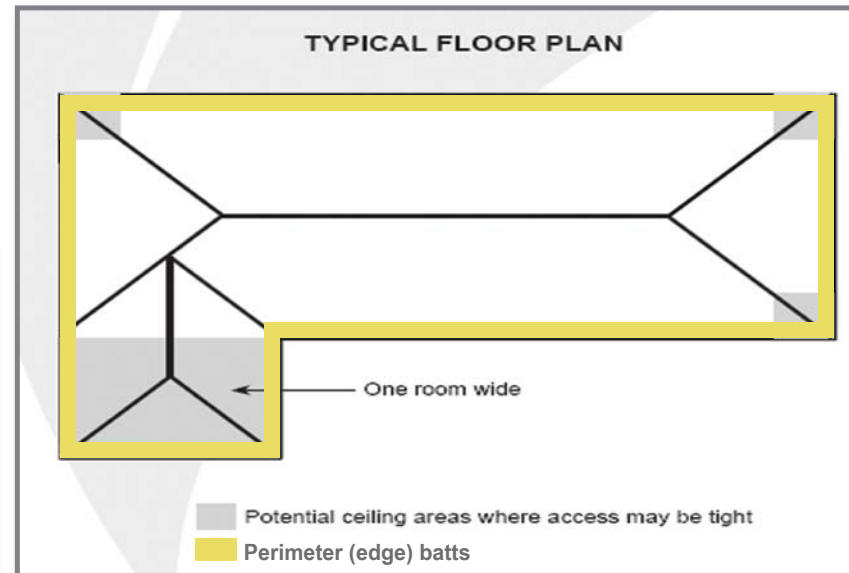
8.3.4 Part of a roof space is inaccessible

The floor plan below 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 internal access point into the ceiling
- when an internal access point is located near the external wall of the home thus restricting access
- obstruction near the internal access point
- restrictive internal access point dimensions
- if using roof as access point, recommend using roof edge protection
- refer Working at Heights Risks – see 5.4.8.



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.

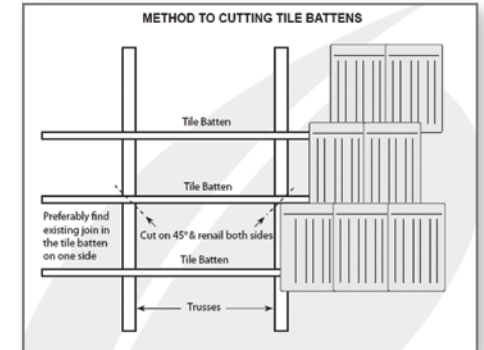
- Open up one or more access points.
- The opening in the tiles should be approximately 1200mm above ceiling height where possible.
- For a roof with a 22° pitch with no eaves, measure an approximate distance of 3400mm from the gutter fascia towards the ridge. The first and second row of tiles from the 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 internal access point, 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.



Tiled roof



Metal roof

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.

May Require:

- wear High Vis clothing
- industrial box cutter with retractable blade and non-conductive handle.
- industrial strength ladder
- non-conductive batt poker: 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
- hammer Tacker
- knee pads
- hand saw
- tape measure
- safety eye wear
- standard duty gloves
- independent lighting – e.g. torch and spare batteries, LED head lamp
- suitable safety shoes (walking across joists etc)
- sufficient drinking water
- accessible first aid kit
- mobile phone (fully charged, programmed contact numbers)
- portable fire extinguisher.



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.** Refer to steps outlined 6.2 - Performing Electrical Isolation.

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 ceilings. When required to be in a kneeling position the use of a kneeling board will allow you to keep balance whilst in the ceiling.

- check to ensure you have correct batts (correct R value and fit for proposed application)
- 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 internal access point in the ceiling. This is to provide information in the future to anyone wishing to know which product has been installed.
- Ensure the access point 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.



Preload packs and distribute in ceiling space



Install batts under services



Measure - right sized batts



Safety: use joists for footing support



Snug fit

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.

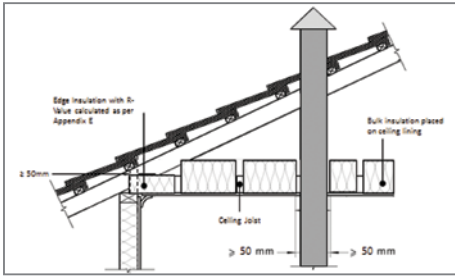
Hint: At the end of the job it is easier to load another pack into the ceiling than it is to take a full pack out of the ceiling.



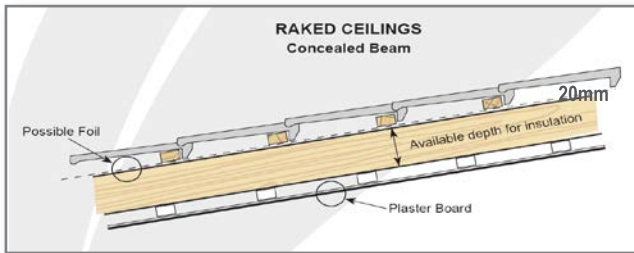
Fitting insulation snugly around ducting



Installing perimeter batts over top plate



Schematic - keep space between insulation and roofing



Raked ceiling - maintain 20mm air gap between insulation and roofing

8.7.2 Perimeter Batt (edge batts)

- For bulk insulation to deliver its stated R-value it must not be compressed (e.g. at eaves).
- The thickness of many specified ceiling batts will not fit freely out to the eaves and over the top plate unless forced and compressed between the ceiling and roofing material. This is bad installation practice and could lead to issues such as restricted ventilation and moisture build-up.
- **Where the roofing structure will not accommodate the thickness of the batt at the eaves, it is recommended a thinner batt (perimeter batt) be used where necessary**
- The overall ceiling R value can still be maintained by using a higher R-value batt across the majority of the ceiling. Refer AS 3999 2015 Appendix F – Edge Batt

8.7.3 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. Before commencing work advise client and all on site power is to be deactivated.

Raked Ceilings with enclosed rafters

- Install batts prior to plaster being installed
- Refer to 5.4.8 – working at heights. Consider the need for a mobile scaffold to install insulation at apex of the roof apex
- 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; whichever 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/m³ 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 not be an effective water barrier and 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.

8.7.4 Bulkheads or split ceiling levels

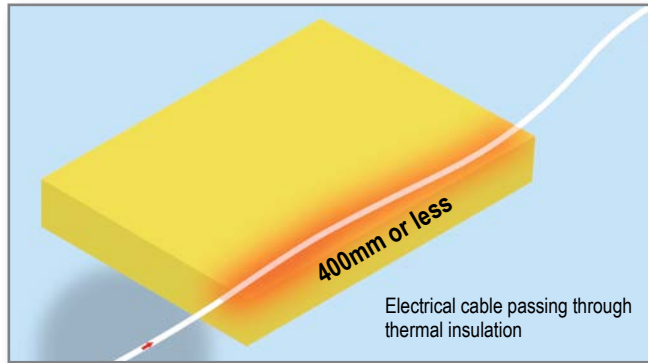
If the ceiling is split in any way, this will generally result in a bulkhead. A bulkhead is a vertical section of wall in the ceiling void that is a division between the internal living space and the ceiling void. It is important that this surface be installed in conjunction with the ceiling. This can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

8.7.5 Electrical cabling and equipment

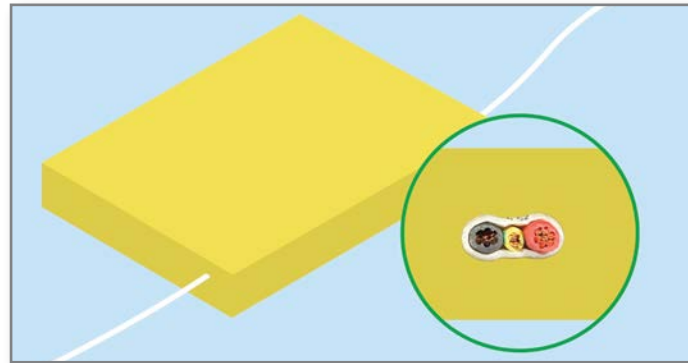
When in operation, the flow of electricity through cabling generates heat. Unobstructed, this heat is released. However in some circumstances where insulation and electric cabling are in contact, the heat generated cannot be dissipated quickly enough and can cause cables to overheat and exceed its rated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

1. Cabling installed after AS/NZS 2018 – can only be fully surrounded by bulk insulation for up to 400mm.

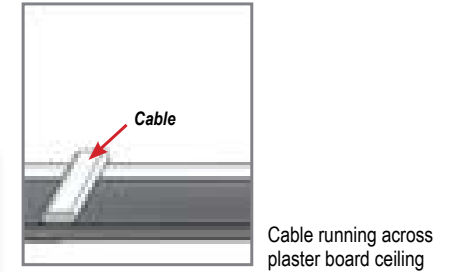
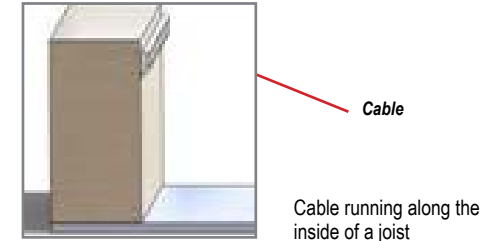
2. Completely surrounded by insulation on all sides.



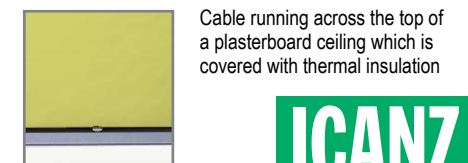
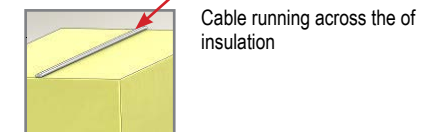
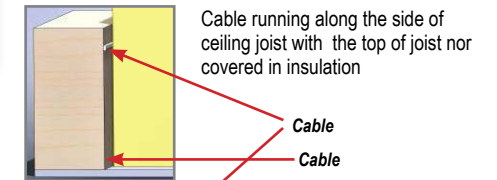
Electrical cable running between layers of thermal insulation




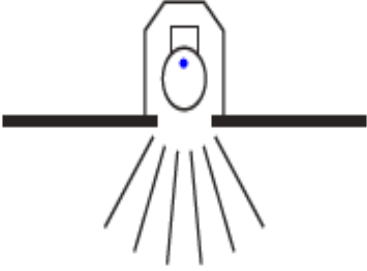

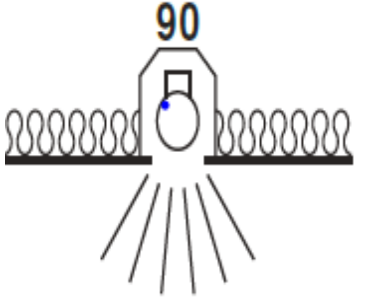

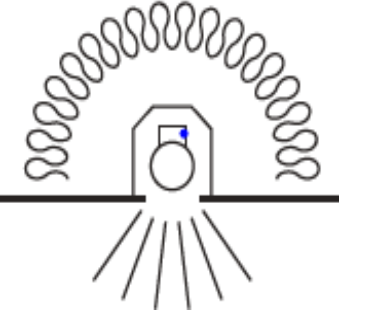
1. unsurrounded electrical cable.

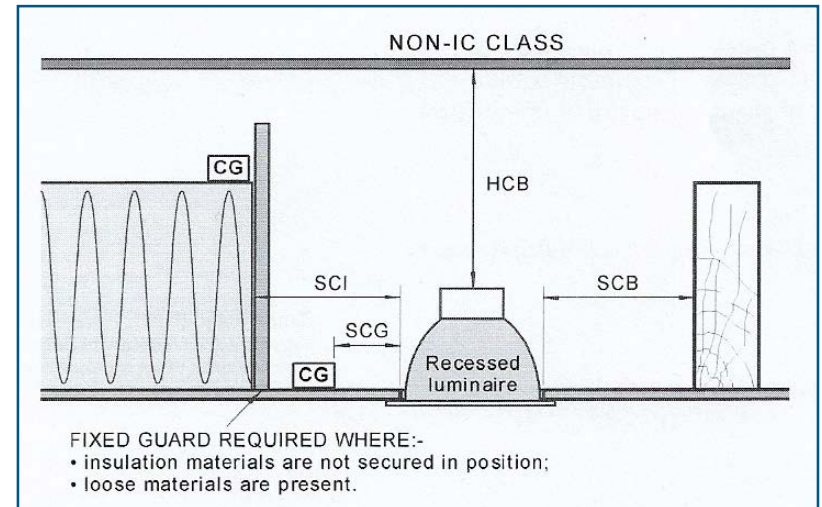
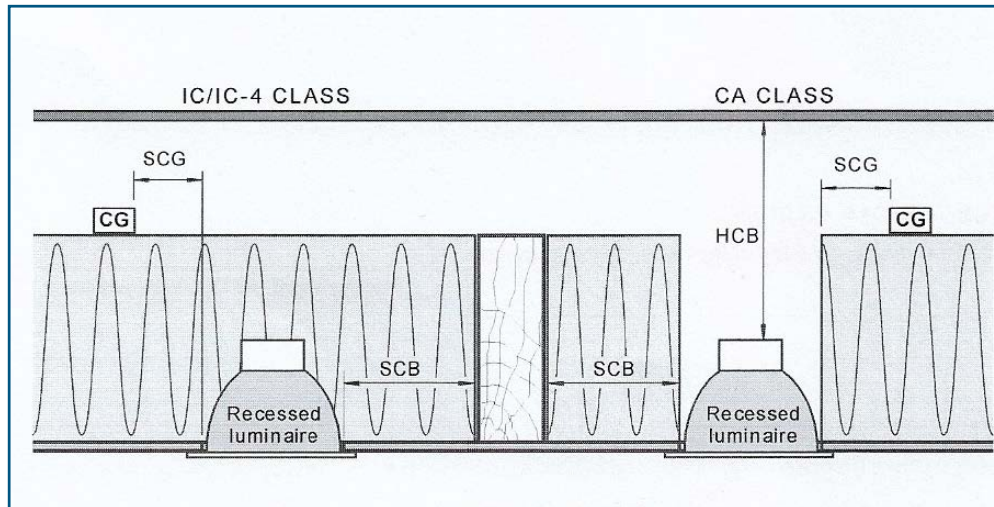


2. Partially surrounded electrical cable.



MARKINGS AND CLASSIFICATIONS OF RECESSED LUMINAIRES

		<ul style="list-style-type: none"> • No marking on light • Not classified • Do not abut or cover with insulation • Use default clearances
		<ul style="list-style-type: none"> • Light fitting is CA-90 rated • Abut insulation but do not cover
		<ul style="list-style-type: none"> • Light fitting is IC rated (IC, IC-4, IC-F) • Insulation can abut and cover light fitting



If in any doubt regarding classification of light fittings - use default clearances.

DEFAULT MINIMUM CLEARANCES FOR RECESSED LUMINAIRES

Dimension	Any lamp up to 100 W
HCB – height clearance to building element	100 mm
SCB – side clearance to building element	100 mm
SCI – side clearance to insulation	100 mm
SCG – side clearance to auxiliary equipment [control gear (CG)]	50 mm

**These diagrams have been reproduced from pages 231 and 232 of AS/NZS 3000 (2018) with the permission of Standards Australia.*

Installation of recessed luminaires (downlights)



Recessed lights have been installed in this roof space. To reduce the risk of fire DO NOT COVER the light fittings with thermal insulation or any other material unless in accordance with instructions provided by the light fittings or barrier manufacturer.

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 contain words shown in AS/NZS 3000: 2018, 4.5.2.3.2 – figure 4.10' with minimum sized lettering of 10mm.

A warning sign is required where the installed recessed luminaires are not classified as CA-90 or IC fittings

**This diagram has been reproduced from pages 231 and 232 of AS/NZS 3000 (2018) with the permission of Standards Australia.*

8.7.6 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 rd 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 materials 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.

8.7.7 Luminaire (down light) Barriers Standard (AS/NZS 5110)

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).

8.7.8 Insulating around downlights or where recessed ceiling fixtures are present

When using glasswool and rockwool ceiling batts:

- if the light fitting is not classified as IC or CA-90, leave default clearance of 100mm 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
- resistance to movement – 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 C)
- 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. $\geq 150\text{mm}$).

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.

8.7.9 Installing insulation in tight areas

- Tight areas include over top plate, bulkheads, underneath piping and services, underneath appliance platforms in the ceiling space, underneath ductwork.
- Where possible install insulation in these areas before ceiling are applied
- Start installing insulation at the far corners of the home and work back towards the tile opening or internal access point.
- 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 20mm should be maintained to allow ventilation. This may require: the use of lower R_m -value batts around the perimeter (see perimeter batts page 62). 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 of equal or greater than 20mm from 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 plat

Using non conductive Batt Poker for inaccessible areas.

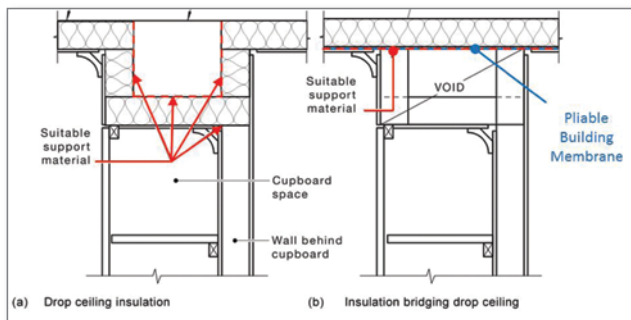


Ensure electrical cables are left on top of insulation along the roof edge. If the tension in the cable does not permit the cable to rest on the top of the ceiling joist if needed use a lesser R-value batt for edge trim.



Check table minimum clearances for recessed lumen.





- 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 20mm clearance above the batt is maintained.

- Ceiling voids can occur over stairwells, atriums, ducting channels and wardrobes. String-in is used to install insulation
- Falls through these areas could be fatal. When covered with insulation these areas are not visible from above.

8.7.10 Topping-up ceiling insulation

- Assess that the condition of roof space and the pre-existing insulation are in adequate condition and have suitable space to receive additional insulation
- If there is evidence of moisture damage or wood rot – do not proceed.
- Notify home owner of initial inspection concerns and recommend they arrange to have the ceiling condition inspected by a building engineer.
- Only proceed with work if the ceiling is assessed by the building engineer as suitable to do so
- Some of what needs to be determined for current insulation
 - * Condition of insulation
 - * Is there any leaves, dust debris needing to be removed
 - * Thickness and evenness of spread across the ceiling
 - * Is the insulation in contact with downlights, ceiling exhaust fans, vents, hot flues etc.
 - * Will topping up cover electrical cabling
 - * Will the ceiling cope with the weight of topping up.

Although it costs more, we advise consumers to vacuum out the ceiling space and install batts in accordance to Australian Standard AS 3999 to current energy efficiency levels.

- **Before proceeding with adding new insulation to old insulation, assess if old insulation is in a suitable condition. In many cases completely replacing the existing insulation may prove the better option.**
- The method of installing top-up insulation 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.
 - achieving '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 achieve 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 original insulation is loose-fill it is recommended to entirely remove the loose-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 8.7.5). 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 immediately around downlights should be replaced completely with one full batt of thicker insulation.
 - eave-edge insulation: ensure insulation has a least 20mm clearance from overhead roofing material. Insulation of a lower 'R' value may 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 to at least 50mm over external top wall plate.
- Ensure Batt's are kept 50mm away from exhaust fans and hot gas flues.
- Recessed downlights – check classification of downlights. If no classification instructions are printed on downlights, the default clearance of 100mm must apply (refer 8.7.8).
- 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 internal access point 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.
- Advise client and all on site power is about to be reactivated.
- **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.



Check insulation installed over attic access cover



Typical Installer working kit



Fully installed ceiling insulation batts - no gaps

Examples of Installed Ceiling Insulation

Good Installs



- Neatly fitted
- Strung into position
- No gaps
- Recommend 3 strings per batt



- Neatly fitted between joists
- No protrusions between joists or stubs
- Fitted over top plate
- No gaps in stud or joist spacings



- Cut neatly to fit around flexible ducting
- No gaps

Bad Installs

- Poorly fitted between ceiling joists
- Hanging below and incorrectly fitted above ceiling joists
- Inadequate stringing to hold insulation in place
- No insulation above windows and gaps above ceiling batts



- Inadequate number of batts for ceiling insulation
- Batts in very poor condition - uneven thickness - inconsistent or no R-value
- Would appear insulation has been displaced to install wiring and insulation not reinstalled correctly



- Poorly fitted batts - compressed and bulging below joists
- Batts incorrectly installed above joists leaving gaps
- Would impede the installation of ceiling linings



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 (WHS)

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:

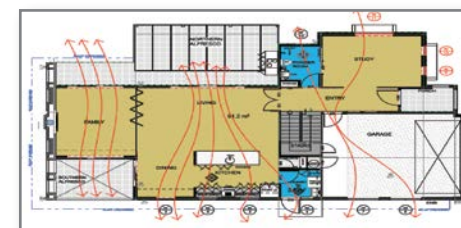
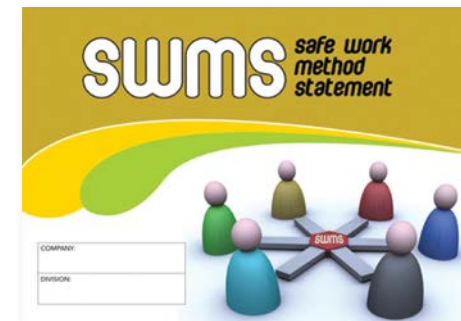
- a purchase order
- job sheet instructions
- energy rating reports
- architect drawings and their respective notes
- client specific instructions
- builder specific installations.

Basic information required includes:

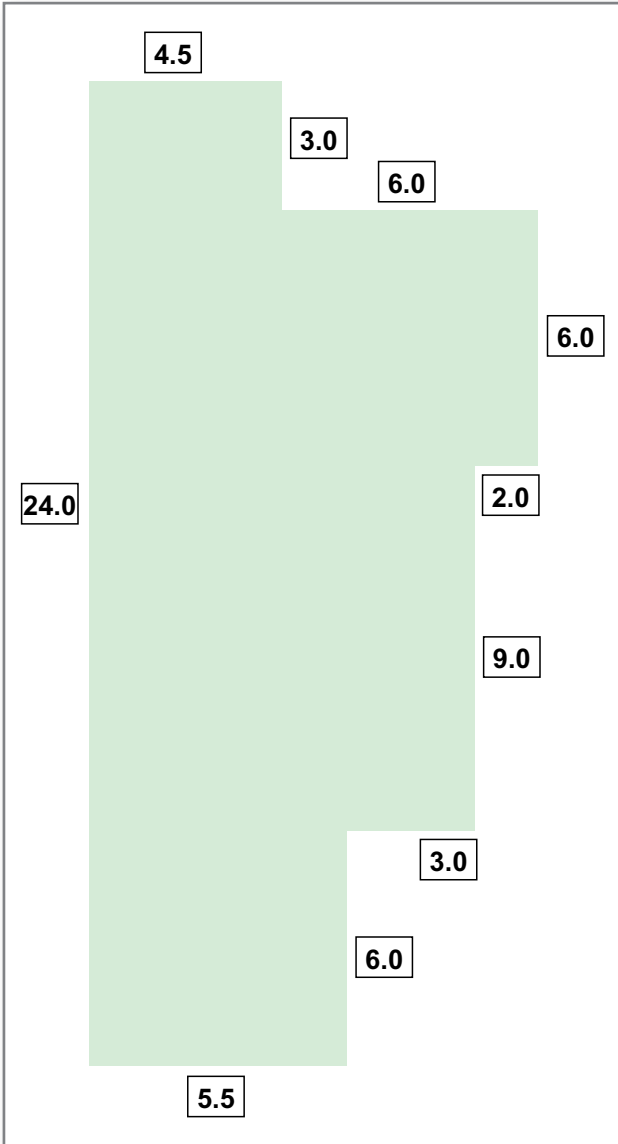
- material R-value of batts required
- batt width to match stud centres
- number of packs required for the job
- locations of the walls to be insulated including any special areas
- for claims of thermal performance from a reflective wall wrap, you must provide a physical restraint between the batt and 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

- 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)
- Calculate the gross wall area of this perimeter
Perimeter of living area (lineal metres) X wall height (1m) = Gross wall area (m²)
- Calculate the total area of all wall openings (doors + glazing)
- To determine the INSULATABLE wall area (m²) - deduct the total of all wall openings (m²) from the Gross wall area (m²).
- Check the stud spacings and stud thickness to ensure the width and thickness of batt is supplied
- Check the R value on the packaging to ensure the correct thermal value and thickness is supplied.
- Check the labelling for the 'nominal pack coverage'.
- To determine the number of packs needed, divide the INSULATABLE wall area by the nominal pack coverage
- 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 = 176m²

Openings in the walls (doors and glazing)

- 3 external doors : 5.02m²
- 15 windows and glass doors 45.9m²

TOTAL wall openings 50.92m²

Insulatable wall area calculation:

- Gross wall area 176.0 m²
- Minus wall openings 50.92 m²

INSULATABLE wall area 125.04 m²

* Stud spacings: 580mm, depth 90mm

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

* Nominal pack coverage: 4.5m²

* Pack calculation: 125.04m²/4.5m² = 27.8 packs

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

Calculating wall openings

Doors		m2
3	2.04 X 0.82	<u>5.02</u>
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	1.93
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	6.59
1	1.80 X 2. 10	3.78
1	1.25 X 0.57	0.71
Total Glazing		<u>45.90</u>
Total wall openings		<u>50.96</u>

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 to the manufacturer's advice for available insulation sizes.

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 elevation diagram below) 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:

- ducting/plumbing/wiring
- crossbeams resulting from roof pitch
- void/cavity restrictions or space too small

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.



Example of ceiling insulation in progress using stringing



Examples of well installed wall batts



Example of fitting edge batts



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.

May Require:

- wear High Vis clothing
- industrial box cutter with retractable blade and non-conductive handle.
- industrial strength ladder
- non-conductive batt poker: 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
- hammer Tacker
- knee pads
- hand saw
- tape measure
- safety eye wear
- standard duty gloves
- independent lighting – e.g. torch and spare batteries, LED head lamp
- suitable safety shoes (walking across joists etc)
- sufficient drinking water
- accessible first aid kit
- mobile phone (fully charged, programmed contact numbers)
- portable fire extinguisher.



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 manufacturers' advice regarding **Density of Batts** for dimensions applicable.

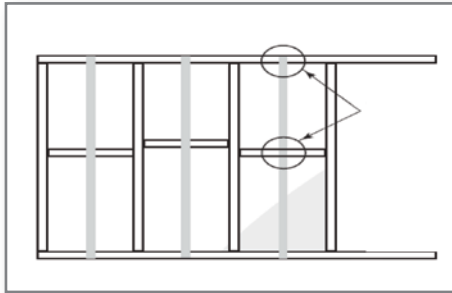
Method 1: Using a cutting board as a base, measure the stud opening and cut the batts width to suit. This method is recommended when installing batts in steel frame construction because you could damage the cutting blade edge if cutting on the steel frame.

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 etc.) 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.



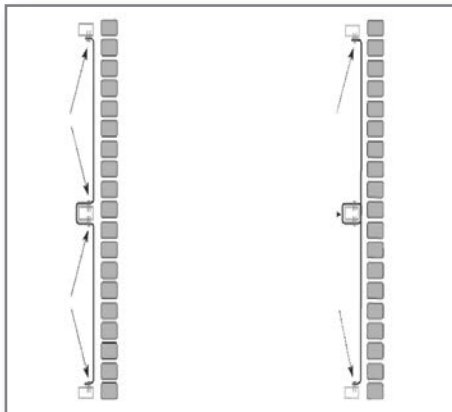
Examples of fitting wall batts



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 batt 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.

If plumbing or electrical services are yet to be installed it is recommended the installer take picture evidence of the finished insulation installation as proof the work has been completed satisfactorily.

Install the wall batts into the frame. **The insulation must be kept within the frame and must not be pushed into any wall cavity.** Batt 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.

It is not acceptable to use damaged or use a large number of small off cut pieces to fill a stud bay of an external wall (no more than four offcuts should be used in one space. Where four offcuts are used the smaller offcuts should be positioned at the top of the space being insulated). 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.

Hint: Left overs and off cuts may be placed in internal walls with the biggest pieces at the base and smaller pieces at the top.



Bracing studs for internal walls and stringing in wall batts



Installing insulation from underneath - note batts cut to fit above windows and over top plate



Installing insulation behind services

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 $>90^{\circ}\text{C}$ 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 insulation 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 400mm. In runs greater than 400mm, 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.



Insulation cut-outs for power points



Using off-cuts to fill spaces above and below noggings



Typical Installer working kit

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.
- Generally ensure that the batts do not protrude past of the stud surface area and fit snugly.
- 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.
- 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.
- Advise client and all on site power is about to be reactivated
- **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.



Examples of Installed Wall Insulation

Good Installs



- Well installed around windows
- Snug fit to top and bottom plate
- Snug fit to wall studs - no bulges that would impede fitting of wall linings
- Well installed batts will conceal and wall wrap from view



- Example of stringing in wall batts to ensure no protrusions or barriers to fitting wall linings
- Bracing and stringing of wall batts prevents batts being dislodged on windy days

Bad Installs

- Oversized batts compressed into stud space
- Gaps left above and below noggings

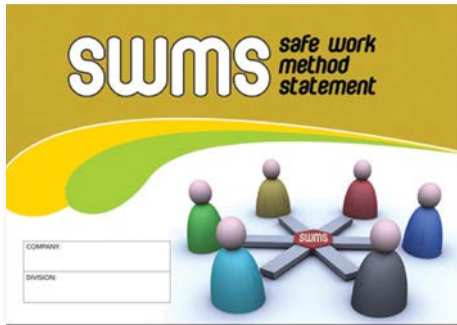


- Over-use of off-cuts for filling wall stud space- recommend maximum of four pieces with the smallest piece at the top and smallest piece at the bottom



- Insulation gaps left above and below noggings





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 (WHS)

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.

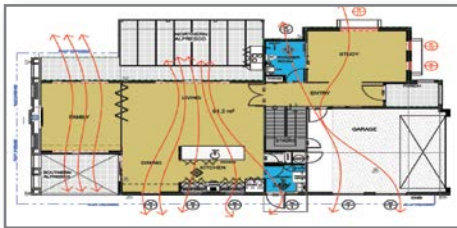
10.2.2 Confirm the scope of work

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.

As an example of how to calculate area coverage and the number of packs required 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 to the 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.

May Require:

- wear High Vis clothing
- industrial box cutter with retractable blade and non-conductive handle.
- industrial strength ladder
- non-conductive batt poker: 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
- hammer Tacker
- knee pads
- hand saw
- tape measure
- safety eye wear
- standard duty gloves
- independent lighting – e.g. torch and spare batteries, LED head lamp
- suitable safety shoes (walking across joists etc)
- sufficient drinking water
- accessible first aid kit
- mobile phone (fully charged, programmed contact numbers)
- portable fire extinguisher.



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.

- Start 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.**
- Use designed support fixings and/or strapping (strapping by stapling to the floor joist maintaining the position of batt/blanket).
- Provide support (e.g. cross-strapping) when 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, fixings and 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 Cantilevered Floors

- Installers can often overlook insulating under cantilevered floors
- Check this has also been installed correctly before leaving job.

10.5.3 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.



Butterfly clip holding insulation in place



Cutting insulation around under floor services



Elevated floor- installing insulation between floor joists



Stringing under floor insulation in place



Cutting insulation to install around plumbing services



Typical Installer working kit



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
- Advise client and all on site power is about to be reactivated
- **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.



Examples of Installed Floor Insulation

Good Installs



- Stringing in insulation between floor joists



- Partially completed installation of floor insulation
- Batts cut to fit snugly between floor joists
- Example of fixing floor insulation in place - timber block fixed to hold insulation in place



- Butterfly fixing to hold insulation between floor joists

Bad Installs

- Poorly fitted insulation between floor joists
- Risk of batts falling out of place over time
- No stringing or fixing clips appear to be installed

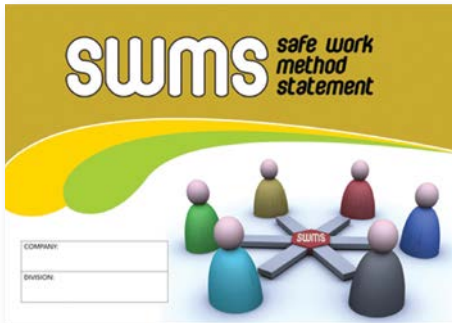


- Gaps left
- Batts sagging - need stringing



- Gaps left
- Uneven install
- Batts sagging
- need stringing or fixing clamps support





11.0 Installation of Pliable Building Membranes

11.1 Application

Wall membranes for weather protection moisture control and thermal efficiency.

11.2 Types of wall wraps commonly specified

11.2 Selecting the correct wall wrap.

The selection and provision of the wall wrap material to be installed is mostly pre-determined by the designer, builder or client. Where this is not specified the following should be noted. For assistance selecting the correct wall wrap for the climate conditions and application consult your cladding or wall wrap product manufacture for advice.

11.2.1 Some of the product requirements to consider are:

- strength (duty classification)
- weather resistance (water barrier classification)
- condensation control (vapour barrier or vapour permeable classification)
- contribution to thermal energy efficiency (reflective or non-reflective)
- contribution to draft proofing (air tightness)
- durability to direct sunlight (UV stability)
- fire resistance (flammability).

11.2.2 Types of wall wraps now commonly specified.

1. Vapour Barrier Wall Wraps

Commonly specified for use in warmer climates where more moisture (humidity) is part of the outside climate conditions and cooling predominately used for building comfort (Northern Australia).

2. Vapour Permeable Wall Wraps

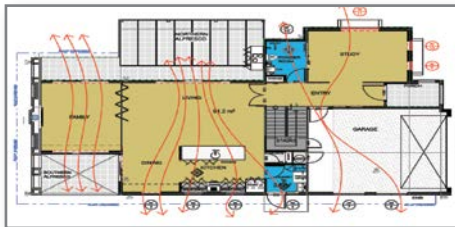
Often specified for use in cooler climates where more moisture (humidity) is part of the internal climate conditions due to heating the building comfort (climate zones 6, 7 & 8).

11.3 Planning before the job

11.3.1 Safety (WHS)

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



Suitable for timber frame



Suitable for metal frame

Foil tape

11.3.2 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 membrane. Where brace board is installed and bulk insulation is specified, the bulk insulation must be installed prior to fixing the membrane. 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.

11.3.3 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 m² (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
- Staples
- UV stable, non shrink tapes e.g. foil tape for reflective foil wall wraps
- wall wrap fasteners and/or staples.

11.4 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.

May Require:

- Retractable knife with non conductive handle.



Using Hammer tacker to fix pliable building membrane to frame



Wall wrap fixing fastener



Fixing wall wrap neatly around windows



11.5 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.

May Require:

- wear High Vis clothing
- industrial box cutter with retractable blade and non-conductive handle.
- industrial strength ladder
- non-conductive batt poker: 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
- hammer Tacker
- knee pads
- hand saw
- tape measure
- safety eye wear
- standard duty gloves
- independent lighting – e.g. torch and spare batteries, LED head lamp
- suitable safety shoes (walking across joists etc)
- sufficient drinking water
- accessible first aid kit
- mobile phone (fully charged, programmed contact numbers)
- portable fire extinguisher.



11.6 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
- check if power is activated to site
- if activated - advise client and all on site that power is about to be deactivated
- **isolate and tag power.**

11.7 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

11.7.1 General Requirements and Timber Framing

- 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 terminated by edge of timber window
- 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.

- When stapling, 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 window and door frames
- 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 minimize creases in the wall wrap.
- Affix staples at approximately 150mm per stud including the top plate
- Install the next run of wall wrap leaving 150mm overlap on the layer of wall wrap below
- If an overlap of 150 mm cannot be achieved, provide a minimal overlap. This must be taped and sealed using UV stable, non-shrink tape.
- When wall wrap does not reach the top plate, cut a strip of wall wrap inclusive of the 150mm overlap to ensure the top plate is covered
- When stapling wrap to structure with hammer tacker, be careful not to pierce services, piping or cables
- When a service penetrates the wall wrap, use UV stable, non-shrink tape to create a weather tight seal.

11.7.2 Special Requirements for Metal Framing

If the wall wrap is being installed onto a steel frame.....

- If the wall wrap is being installed onto a steel frame, use double sided tape and button head screw to fix wall wrap to metal 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.
- Where a pliable building membrane is installed onto a steel frame it shall be fixed to the steel studs using -
 - (a) adhesive when cladding is directly fixed to the stud work; or
 - (b) mechanical fixings with broad headed washer at 300mm centres for cavity walls, prior to cladding
- 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

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.



Taping and sealing membrane overlaps



Wall wrap installed prior to windows being fitted





11.6 After Completion

Safety rails fitted for working at heights



Typical Installer working kit



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.

Examples of Installed Wall Wrap

Good Installs



- Example of full membrane wall installation
- Correct overlapping of top sheet to bottom sheet
- Taping and smoothing out joints



- Correct overlapping of top sheet to bottom sheet
- Taping and smoothing out joints



- Correct sealing off protrusions through membrane (protection against water and air ingress)

Bad Installs

- Membrane not continuous to stud
- Large gaps left between membrane and stud
- Seriously undermines the purpose and effectiveness of the membrane



- Poorly installed around edges, joins and overlaps
- Membrane does not extend fully to bottom plate
- Gaps and tears significantly decrease membrane performance



- Holes punched through membrane for cabling
- Holes significantly decrease membrane performance



12.0 Installing Insulation Under Roofing Material



Fixing power sign to meter box



Check that you have all the appropriate tools for the job



12.1 Application

Installing faced insulation under metal roofs.

12.2 Before you commence work:

12.2.1 Work safety

If the electrical wiring is connected to the meter box, make sure you inform other trades and then isolate the power sign onto your SWMS and carry out a site risk assessment, paying special attention to working safely on a roof.

12.2.2 Planning the job

Before starting work, make sure you check the following:

- Check the job plans to make sure you follow their insulation installation instructions
- Confirm that the insulation material that has been delivered (both insulation and facing material) matches those specified for the job, making sure that the B.A.L. classification is appropriate

12.2.3 Tools and equipment required

Check that you have all the appropriate tools for the job ready, which may include:

- roof railing restraint
- wear High Viz clothing
- sun glasses
- tape measure
- a hammer,
- clips,
- a retractable knife with a non-conductive handle, and
- cut resistant gloves
- knee pads
- suitable safety shoes
- UV stabilized non-stick tape
- accessible first aid kit
- Mobile phone (fully charged, programmed contact numbers)

12.3 Installation

12.3.1 Installing faced building blanket under a metal roof on a domestic dwelling

There are 3 methods for installing faced building blanket onto a domestic roof:

1. Vertical roll out over the battens
2. Horizontal roll out over battens, and
3. Horizontal roll out under battens.

Whichever method you use, always make sure the blanket faces up and the facing material faces down. These instructions cover Method 1 because it's the most common method used by roofing installers

12.3.2 Cutting preparation

Measure the main roof plan rafter length, and then mark and pre-cut lengths in quantities as needed

Position the start of the blanket roll nearest the roof ridge batten with the facing side lap pointed in the direction of the uninsulated roof area. Roll the faced blanket away from the ridge batten towards the fascia or gutter and use clips to temporarily hold the blanket in position.

12.3.3 Position

Position the start of the blanket roll nearest the roof ridge batten with the facing side lap pointed in the direction of the uninsulated roof area. Roll the faced blanket away from the ridge batten towards the fascia or gutter and use clips to temporarily hold the blanket in position.

12.3.4 Allow for sag

Adjust the length and width at each crossing of the batten or rafter to allow sufficient blanket to recover to its advertised thickness and for the blanket to remain in touch with the underside of the metal roof.

12.3.5 Roll out the next blanket

Repeat until you reach the end of roof, then repeat, once again, from the other side of the roof.

- begin from the opposite starting end of the roof
- start the roll out from the end lap, over the ridge and down to the fascia
- make sure that the earlier exposed facing lap (150mm or less) is below the adjacent roll, and that the bulk insulation of both rolls abut, leaving no gaps.

NOTE: For high risk condensation zones, or where a vapour control layer (or VCL) is required, use a foil facing that has a vapour barrier classification as HIGH under the Australian Standard.

12.3.6 End Joins

The end and start of a new blanket must overlap by 1 batten crossing.

- remove bulk insulation from the lower portion of the roll width to expose the facing
- trim and peel away the bulk insulation where it crosses the batten to expose the facing from the blanket roll that is being positioned
- abut the ends of both blankets over their respective exposed facing laps to make sure there are no exposed gaps between the insulation blankets



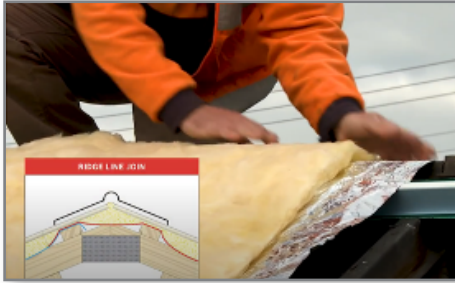
Vertical roll out over horizontal battens



Cutting Preparation



Rolling out next blanket



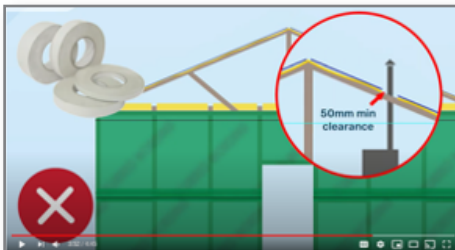
Overlap insulation at ridge line



Fixing anti-ponding board



Trim back bulk insulation. Only overlap sarking into gutter



Minimum 50mm clearance of insulation/ sarking from hot flues

12.3.7 Ridge / hip line join

When starting to lay faced blanket from the other side of the ridge, extend the faced blanket over the ridge and make sure it abuts an existing installed faced blanket on the other side.

- check that the facing portion of the blanket extends at least 150mm crossing over a batten
- peel and trim off 150mm of blanket, and
- then make sure that the facing edges are lapped in a cascading manner while abutting the blanket insulation, leaving no gaps.

Note: If ventilation is specified in the design, allow for a gap at the ridge or hip join.

12.3.8 Fascia, valleys and gutters

- The roofing material faced building blanket and fascia should all meet at the gutter line.
- Often an anti-ponding board is installed between the last roofing batten and the fascia to help drain any water that may have been captured on the facing material.
- It's important to strip back the building blanket to the top edge of the fascia and leave approximately 25mm of facing material draped into the gutter.
- Do not leave bulk insulation attached to this section of facing as it can wick moisture back through the insulation to the under-side of the roofing material.
- Similarly, in valleys, make sure that the excess bulk insulation blanket abutting a valley flashing is trimmed back to exclude the risk of the bulk insulation edge coming into contact with the valley water path. You could also peel back the bulk insulation away from the facing material and the water path, and fold back any exposed facing material at the flashing edge, to make sure that it's not in the water way.

12.3.9 Hot Flue penetrations

Tapes should not be stuck around hot flues, so always leave at least 50 mm clearance between faced building blanket and any hot surface such as a hot flue chimney pipe.

The roofing material faced building blanket and fascia should all meet at the gutter line.

- Often an anti-ponding board is installed between the last roofing batten and the fascia to help drain any water that may have been captured on the facing material.
- It's important to strip back the building blanket to the top edge of the fascia and leave approximately 25mm of facing material draped into the gutter.
- Do not leave bulk insulation attached to this section of facing as it can wick moisture back through the insulation to the under-side of the roofing material.
- Similarly, in valleys, make sure that the excess bulk insulation blanket abutting a valley flashing is trimmed back to exclude the risk of the bulk insulation edge coming into contact with the valley water path. You could also peel back the bulk insulation away from the facing material and the water path, and fold back any exposed facing material at the flashing edge, to make sure that it's not in the water way.

12.4

Common mistakes seen:

- Forgetting to make sure that facing material and blanket are laid square and overlap by at least 150mm
- Not abutting building blanket so no gaps are left.
- Forgetting to make sure that faced blanket is installed correctly over the ridge
- Not properly taping gaps, cuts and unsealed penetrations in the facing material leaving an entry point for water, and - leaving building blanket exposed in gutters and valleys that could cause moisture to wick back under the roof

12.5

After completion

- Ensure the entire roof has been insulated– no gaps
- Ensure all penetrations are sealed appropriately
- Check all overlaps are 150mm or taped with long life UV resistant sealing tape
- take and store photos of completed work
- Clear all off cut material and disused packaging to site rubbish collection or if not available remove these items from site
- Check tools and equipment are located, cleaned and taken from site
- If power has been de-activated, notify all on site power is to be activated. And remove isolation tags from switchboard.
- Notify relevant people (site supervisor, client etc) that job is completed
- Complete all necessary documents and forms
- Evaluate your work quality and processes to identify any improvements for future work
- Follow up, report and resolve outstanding issues such as non-compliance, client complaints, property damage, faulty material and material returns.



Don't leave gaps - abut blankets together so no facing is visible



Do not let insulation blanket overhang into gutter

13.0 Installing Sarking Under Tiled Roofs



Tiled roof - lay membrane over rafters then apply tile battens



Start apply membrane from gutter line and work up to ridge



Typical tools for sarking tied roofs



Examples of aids to have when working in a roof

13.1 Application

Installing sarking under tiled Roofs.

The main benefits of installing sarking under tiled roofs are for one or a combination of the following

- Water control
- Thermal control
- Vapour control
- Air Control

The building design specification will have already determined the benefit needed and accordingly the type of sarking to be used. But in all cases of using sarking the correct installation is equally as important as the specified product.

13.2 Before you commence work:

13.2.1 Work safety

- If the electrical wiring is connected to the meter box, sign onto your SWMS and carry out a site risk assessment, paying special attention to working safely on a roof. Also,
- if the sarking is electrically conductive, ensure SWMS and work assessments
- If the electrical wiring is connected to the meter box, make sure it's been isolated

13.2.2 Planning the job

Before starting work, make sure you check the following:

- Confirm that the specified sarking material that has been delivered matches those specified for the job, making sure that the B.A.L. classification is appropriate
- Check the job plans to make sure you follow their sarking installation instructions.

13.2.3 Tools and equipment required

Check that you have all the appropriate tools for the job ready, which may include:

- roof railing restraint
- wear High Viz clothing
- sun glasses
- tape measure
- a hammer,
- clips,
- a retractable knife with a non-conductive handle, and
- cut resistant gloves
- knee pads
- suitable safety shoes
- UV stabilized non-stick tape
- accessible first aid kit
- Mobile phone (fully charged, programmed contact numbers)

13.3 Installation

13.3.1 Valleys

The sarking membrane is to be carried beyond the inside vertical face of the valley raking batten and turned down into the edge of the valley gutter drip so as it does not impede water running down the valley gutter.

Whichever method you use, always make sure the blanket faces up and the facing material faces down.

These instructions cover Method 1 because it's the most common method used by roofing installers

13.3.2 Ridge / hip line join

In all cases sarking membranes are to be installed over the ridge by not less than 150mm unless specific ventilation requirements have been specified.

13.3.3 Penetration, cuts, tears to sarking

Penetrations are needed for chimneys, flues, vents, pipes cables and other services. The role of sarking is to preserve a barrier control.

Therefore, penetrations need to be fixed and resealed with long-life UV stable tape.

Tapes should not be stuck around hot flues, so always leave at least 50mm clearance between faced building blanket and any hot surface.

13.3.4 Down lights and electrical cabling and equipment

In rare cases where the construction has already installed cathedral or raked ceilings - recessed downlights and other electrical equipment and cabling could come into close contact with reflective roof sarking. In these circumstances either

- Maintain safety distances in accordance with AS/NZS 3000
- Consult a licensed electrician

13.4. Common mistakes seen:

Environmental conditions should form part of the pre-start check and hazard identification. High winds can make installing sarking difficult and or high risk. Additional workers or methods may be required.

13.5 After completion

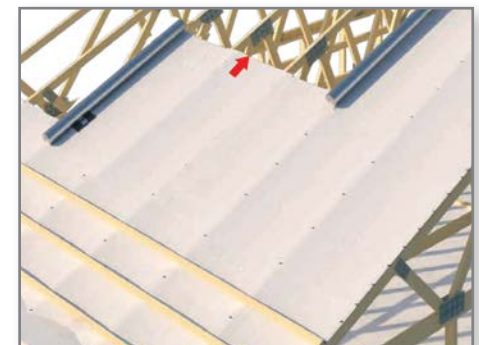
- Ensure the entire roof has been sarked – no gaps
- Ensure all penetrations are sealed appropriately
- Check all overlaps are 150mm or taped with long life UV resistant sealing tape
- Take and store photos of completed work
- Clear all off cut material and disused packaging to site rubbish collection or if not available remove these items from site
- Check tools and equipment are located, cleaned and taken from site
- If power has been de-activated, notify all on site power is to be activated. And remove isolation tags from switchboard.
- Notify relevant people (site supervisor, client etc) that job is completed
- Complete all necessary documents and forms
- Evaluate your work quality and processes to identify any improvements for future work
- Follow up, report and resolve outstanding issues such as non-compliance, client complaints, property damage, faulty material and material returns.



Overlap roof sarking into gutter by up to 25mm



Apply UV stabilized sealing tap if overlap less than 150mm

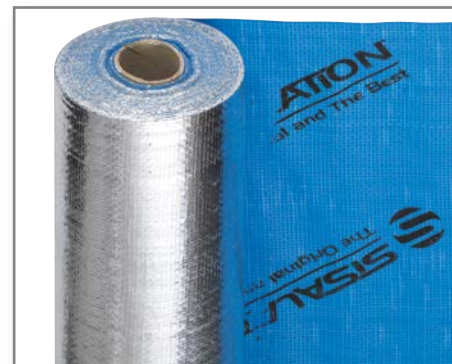
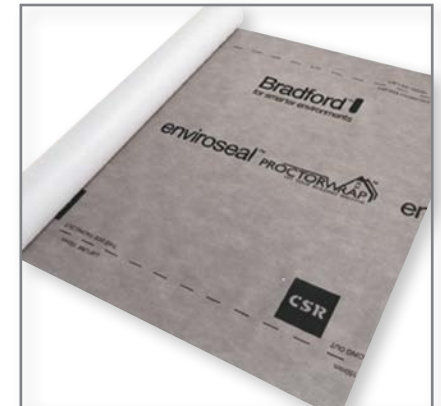
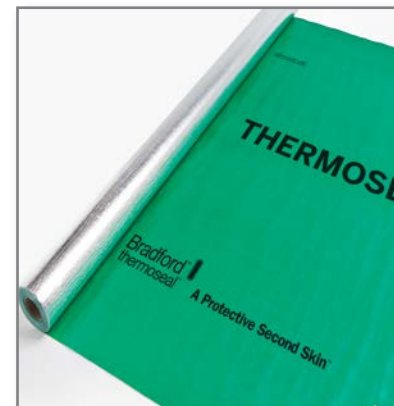


Install sarking from gutter to ridge

14.0 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



14.0 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 accreditation, Installers should undertake the following pre-requisite training units of national competencies with a Registered Training Organisation (RTO).

National Competency	Module Name
HLTAID002 - <i>(Optional)</i>	Emergency First Aid (Workplace level 1)
CPCCOHS1001A - <i>(Compulsory)</i>	Construction industry safety induction

13.2 Training and assessment

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 a Statement of Attainment from the RTO (see page 8). Installers must demonstrate their achieved competency by passing a comprehensive assessment.

The assessment will be based on a combination of;

1. **Written assessment:** The RTO will devise a list of questions which the candidate must answer to demonstrate their understanding of the content contained within the guide. The RTO will set a minimum percentage score which will determine whether the candidate has passed or failed each component.
2. **Practical Assessment:** The RTO 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 RTO's 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	1	
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.

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.

[PCBU Name, ABN, Office Address and Phone]		Principal Contractor (PC)	[Name, ABN, Office Address]
Works Manager: Contact phone:		Date SWMS provided to PC:	
Work activity:	[Job description]	Workplace location:	
High risk construction work:	<input type="checkbox"/> Risk of a person falling more than 2 metres	<input type="checkbox"/> Work on a telecommunication tower	<input type="checkbox"/> Demolition of load-bearing structure
	<input type="checkbox"/> Likely to involve disturbing asbestos	<input type="checkbox"/> Temporary load-bearing support for structural alterations or repairs	<input type="checkbox"/> Work in or near a confined space
	<input type="checkbox"/> Work in or near a shaft or trench deeper than 1.5 m or a tunnel	<input type="checkbox"/> Use of explosives	<input type="checkbox"/> Work on or near pressurised gas mains or piping
	<input type="checkbox"/> Work on or near chemical, fuel or refrigerant lines	<input type="checkbox"/> Work on or near energised electrical installations or services	<input type="checkbox"/> Work in an area that may have a contaminated or flammable atmosphere
	<input type="checkbox"/> Tilt-up or precast concrete elements	<input type="checkbox"/> Work on, in or adjacent to a road, railway, shipping lane or other traffic corridor in use by traffic other	<input type="checkbox"/> Work in an area with movement of powered mobile plant
	<input type="checkbox"/> Work in areas with artificial extremes of temperature	<input type="checkbox"/> Work in or near water or other liquid that involves a risk of drowning	<input type="checkbox"/> Diving work
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	<input type="checkbox"/> YES <input type="checkbox"/> NO		
Person responsible for ensuring compliance with SWMS:		Date SWMS received:	
What measures are in place to ensure compliance with the SWMS?			
Person responsible for reviewing SWMS control measures:		Date SWMS received by reviewer:	
How will the SWMS control measures be reviewed?			
Review date:		Reviewer's signature:	

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 <u>Note:</u> Design and Item Registration for certain plant	Certificates of Competency as required by WorkCover
	General health and safety 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)
	Health and safety Regulation 2001 (NSW)
	Health and safety Regulation 2001 (NSW)
	Health and safety 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	<input type="checkbox"/>	Fall from ladder	
Boom Lift/EWP	Asbestos fibre	Safety Boots	<input type="checkbox"/>	Fall from heights	
Extension ladder		HI-Viz Safety Vest	<input type="checkbox"/>	Fall from scaffold	
Step ladder		Fluoro Shirt	<input type="checkbox"/>	Contact with electricity	
Trestles		Hearing Protection	<input type="checkbox"/>	Falling objects	
Harness		Safety Glasses	<input type="checkbox"/>	Foreign Body (eye)	
Retractable knife		UV Cream	<input type="checkbox"/>	Slip, trips and falls	
Blade Knife		Safety Line / Lanyard	<input type="checkbox"/>	Manual handling	
Light		Safety Harness	<input type="checkbox"/>	Exposure to noise	
Ramset Gun		Dust Masks if required	<input type="checkbox"/>	Struck by moving plant	
		Drinking Water	<input type="checkbox"/>	Inhalation of dust or fumes	
		Overalls/ Long sleeved shirt and pants	<input type="checkbox"/>	Cuts	
			<input type="checkbox"/>	Heat Exhaustion	
			<input type="checkbox"/>		
			<input type="checkbox"/>		

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 barricade 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

EXAMPLE ONLY

↖ Installer/Contractor to complete ↗

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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?

EXAMPLE ONLY

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 activity.

Note: Copies of all training certificates should be made available to your Manager

INSTALLERS NAME	INDUCTION HEALTH AND SAFETY 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 HEALTH AND SAFETY CARD #		POSITION	LOCATION	



CONSUMERS



GOVERNMENT



INDUSTRY

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.

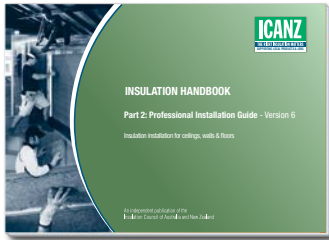
ICANZ recognises that insulation is the most fundamental step in improving the energy efficiency of Australian buildings and is committed to working with other organisations to identify the most effective regulatory pathways for delivering better buildings which will help protect Australian households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

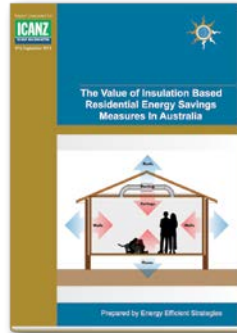
Visit [ICANZ website:](http://www.icanz.org.au)

www.icanz.org.au

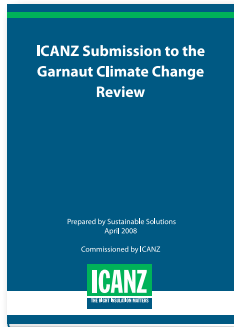
FURTHER REFERENCE STUDIES



Insulation Handbook - Part 2: Version 6
Professional Installation Guide
Prepared by ICANZ: Oct 2020



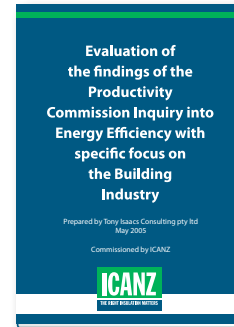
The Value of Residential
Ceiling Insulation In Australia
Prepared by Energy Efficient
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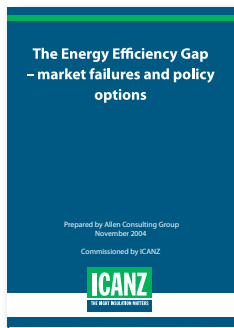
ICANZ Submission to the
Garnaut Climate Change
Review
Prepared by Sustainable
Solutions: April 2008



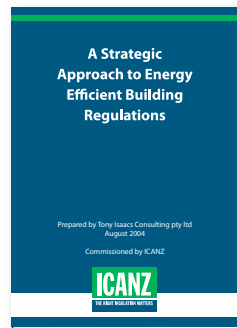
An economic assessment
of the benefits of retrofitting
some of the remaining
stock of uninsulated homes
in Australia
Prepared by Deloitte Insight Economics
June 2007
Commissioned by ICANZ



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

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**For more information visit our website at:
www.icanz.org.au**