



BEST PRACTICE GUIDE FOR PROCUREMENT, OVERSIGHT AND DELIVERY OF RESIDENTIAL INSULATION PROGRAMS

**Published by Insulation Australasia in collaboration with the Insulation
Council of Australia and New Zealand (ICANZ)**

Foreword

This guide, developed by Insulation Australasia (IA) in collaboration with the Insulation Council of Australia and New Zealand (ICANZ), provides a practical, technically grounded reference for government procurement teams, program administrators, energy efficiency agencies, and insulation businesses engaged in or seeking to participate in government-funded residential insulation programs. It is intended for use from the earliest stages of program design through delivery and audit.

The Australian insulation industry has a long and, at times, difficult relationship with government programs. The collapse of the Commonwealth Home Insulation Program (HIP) in 2010, which resulted in **four worker deaths**, more than 200 house fires, and a subsequent Royal Commission, remains the defining cautionary example of what can go wrong when installation programs are designed primarily around economic stimulus objectives rather than safety, quality and capability. The Royal Commissioner, Ian Hanger AM QC, concluded that *"each death would, and should, not have occurred had the HIP been properly designed and implemented."* This guide exists in part to ensure those lessons are not forgotten.

Australia still has an estimated **eight million homes with insufficient insulation**. As State and Territory governments, and the Commonwealth, continue to invest in energy efficiency programs, insulation upgrades will form a central component of those efforts. The scale of this opportunity and the risk that poorly designed programs will repeat past failures, makes it essential that the industry speaks with a clear, unified and technically authoritative voice.

This guide complements and operationalises the **Insulation Installation Roadmap** released by the Affiliated Insulation Industry Coalition (AIIC) and the Energy Efficiency Council (EEC) in September 2024, which sets out the recommended framework for safe and high-quality insulation delivery across Australia. Where the Roadmap articulates strategic priorities, this guide translates those priorities into practical procurement and delivery requirements.

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1. Purpose of This Guide

1.1 Executive Summary

Government-funded insulation programs represent a high-impact opportunity to improve energy efficiency, household comfort, and emissions outcomes across Australia's housing stock. However, these outcomes depend on programs being designed with safety, quality, and performance as primary objectives, rather than installation volume or lowest cost.

This guide provides a practical framework for procurement and delivery to ensure insulation upgrades are implemented safely, consistently, and at scale. It reflects industry expertise and incorporates the lessons of past failures, demonstrating that poorly designed programs create predictable safety and quality risks.

Insulation retrofit is not a simple installation activity. It involves electrical systems, existing building conditions, and work health and safety risks. Programs that treat insulation as a commodity and define scope solely by an R-value and unit rate will incentivise incomplete or unsafe work.

Accordingly, effective programs must:

- Embed safety in program design, including mandatory electrical inspection and hazard management
- Require pre-installation assessment, with scope based on actual site conditions
- Structure procurement around defined, funded activities, not bundled rates
- Ensure installer capability and accountability
- Include independent inspection to verify real-world outcomes
- Apply risk-based decision-making rather than blanket restrictions, so that requirements target genuine risk without imposing unnecessary cost, delay or waste where robust, documented assessment demonstrates a safe and effective alternative

Electrical safety is a critical consideration, as insulation changes the thermal conditions affecting existing wiring and can introduce significant risk if not properly managed.

Programs must also account for the variability of existing homes, with mechanisms for site-specific conditions and unexpected findings. Failure to do so will either delay delivery or drive unsafe practices in the field.

In summary, this guide supports a shift from volume-driven delivery to outcomes-based program design. When these principles are applied, insulation programs can deliver safe, durable, and cost-effective improvements at scale.

1.2 What This Guide Is for and Who Should Read It

This guide is primarily intended for two audiences essential to the success of any insulation program, who may have limited prior exposure to the technical realities of residential insulation retrofit work:

- **Public servants and program administrators**, including those in energy efficiency agencies, state and territory government departments, housing authorities, and community housing providers, who are responsible for designing, procuring and overseeing insulation programs but who may not have industry-specific backgrounds.
- **Insulation businesses seeking to deliver best-practice services**, especially companies new to government insulation retrofit programs or looking to professionalise their operations and understand the requirements of a compliant, high-quality retrofit.

In addition to these primary audiences, secondary audiences for this guide include electrical contractors who work alongside insulation installers, building inspectors and auditors, and policy advisors contributing to the design of energy efficiency incentive frameworks.

1.3 Why Insulation Retrofit Programs Are Complex

Residential insulation retrofits are often perceived as simple works, with a product generally installed into a ceiling space. In practice, they are multi-disciplinary activities that intersect with **electrical systems, structural access, occupational health and safety, building science, and existing construction defects**. Procurement teams who are unfamiliar with these complexities may unintentionally design programs that reward incomplete or unsafe work.

A ceiling insulation upgrade in an existing home regularly involves some or all of the following:

- Assessment of the condition, type and effective thermal performance of any existing insulation
- Identification of electrical hazards including aged or deteriorated wiring, non-compliant components, and recessed lighting that requires clearances
- Determination of whether existing insulation must be removed or revitalised before new insulation can be safely installed
- Electrical inspection and potentially rectification works before installation can proceed
- Safe management of roof access, including working-at-heights risks
- Treatment of difficult areas including narrow spaces, service penetrations, and obstructions
- Post-installation quality assurance and inspection

If procurement frameworks are overly simplified, for example by specifying only a target R-value and a rate per square metre, contractors are assessed against those metrics and are therefore incentivised to minimise scope. This can result in skipped inspections, unaddressed electrical risks, insulation installed over defective or contaminated material, and poor thermal outcomes despite apparent compliance.

1.4 The Regulatory and Policy Context

This guide sits within the broader Australian insulation industry policy framework established through the AIIC Insulation Installation Roadmap (2024) and its predecessor, the 2021 Roadmap for Quality Control and Safety in Insulation Installation. These documents were developed collaboratively by more than 40 organisations representing the insulation supply chain, manufacturers, installers, electricians, and building sector bodies.

The 2024 Roadmap sets out recommended actions across four areas:

- Enhanced compliance for new buildings and major renovations
- Increased education, training and certification for installers
- Stronger government support for insulation installation requirements
- A holistic approach integrating insulation with other building efficiency improvements

This guide provides the technical foundation for procurement teams to implement those recommendations in practice.

Relevant Australian Standards include **AS/NZS 3000:2018** (Wiring Rules), **AS/NZS 3008.1** (Selection of Cables), **AS 3999** (Thermal Insulation of Dwellings, Bulk Insulation Installation Requirements), and the **National Construction Code (NCC)**, which since 2022 has substantially raised minimum energy performance requirements for new residential construction. Programs targeting existing dwellings must be understood against the NCC baseline. The gap between current stock performance and modern minimum standards is large, and the opportunity is significant.

2. Program Design Principles

2.1 Safety-Led Program Architecture

Retrofit insulation work takes place in environments where hazards are common rather than exceptional. Roof spaces regularly contain ageing wiring, undocumented electrical modifications, restricted access areas, extreme temperatures, vermin and fall risks and potentially hazardous materials. Installers typically work under time and cost pressures that increase the likelihood of unsafe shortcuts if safety is not structurally embedded in the program design.

The fundamental conundrum is this: **if identifying a hazard is commercially disadvantageous under the contract, installers will not identify it.** If there is no line item for electrical rectification, contractors who discover a problem face a choice between doing unpaid remediation work, reporting the issue and pausing the job, or proceeding unsafely. A well-designed program removes that dilemma by making safe, complete work the only viable way to deliver the contract.

Procurement frameworks should assume that hazards will be present and should define in the contract documents how those hazards are to be identified, assessed and managed before installation proceeds. This requires clear separation between:

- **Standard installation scope** (the insulation itself and routine preparation)
- **Assessment and inspection scope** (identification of existing conditions before installation begins)
- **Additional works scope** (electrical rectification, insulation removal, specialist access) which must be defined, priced and triggered by site conditions and not excluded or left undefined

✓ Why This Matters

The Royal Commission into the Home Insulation Program (2014) found that the program's primary failure was structural: safety requirements were not designed in. The Royal Commissioner found that four worker deaths "would, and should, not have occurred had the HIP been properly designed and implemented." The lesson is not that insulation programs are inherently dangerous. Rather, the programs that prioritise volume and speed over structured safety requirements create conditions where harm becomes predictable.

2.2 Retrofit-Specific Requirements

In new construction, insulation, electrical systems and building elements are coordinated as part of a controlled design process. Walls are open, cables are freshly run, lighting is selected for compatibility with insulation, and conditions are known and accessible. In existing homes, by contrast, these elements have evolved over decades and may include:

- Electrical wiring installed under earlier standards with lower temperature ratings
- Cables run in positions that will be compromised by the addition of insulation
- Recessed lighting designed and installed without provision for insulation contact
- Undocumented modifications and additions to the original wiring
- Previous insulation that is damaged, contaminated, incorrectly specified or incomplete

- Access constraints that would not exist during original construction

Procurement documents should therefore require **site-specific assessment prior to installation** and should not assume that all homes can be treated uniformly. A standard specification such as "install R5.0 ceiling insulation" does not account for existing conditions and will routinely result in installations that are unsafe, ineffective or both.

Programs should adopt a **retrofit-first mindset**: each dwelling should be treated as requiring a fresh assessment, with the scope of work determined by actual site conditions rather than assumed from a standard specification.

2.3 The Importance of Product-Agnostic Procurement

Insulation products come in many forms, including glasswool batts and blankets, cellulose fibre, polyester, rigid foam boards, and spray foam, among others. Each product type has characteristics that make it more or less suited to particular applications, existing conditions, and access constraints. A glasswool batt may be optimal in a well-accessible, clean ceiling space, while loose-fill cellulose may better suit tight or irregular spaces where batt installation would leave gaps.

Prescriptive product specifications in procurement documents can inadvertently prevent installers from choosing the most appropriate solution for a given dwelling. The AIIIC policy position, reflected in submissions to state governments, is that programs should take a **product-agnostic approach** by specifying the **thermal performance outcome** required (e.g., achieve a minimum in-place effective R-value) and allowing installers to select appropriate products, provided those products meet relevant Australian Standards and carry appropriate compliance and safety documentation.

Critical Safety Exception: Reflective Foil Laminate (RFL)

Reflective foil laminate (RFL) insulation must be explicitly prohibited in all horizontal ceiling applications. This prohibition is non-negotiable.

The installation of RFL requires metal staples which, if they contact live electrical cables, create a direct electrocution hazard. Two of the four deaths in the 2009-10 HIP were directly attributable to RFL installation. The Royal Commissioner found that the decision to permit RFL was "fundamentally flawed" and that it directly contributed to two deaths. This prohibition is non-negotiable.

✗ Hard Rule

Reflective foil laminate (RFL) insulation must be explicitly prohibited in all horizontal ceiling applications. Non-negotiable. Two workers died during the 2009-10 HIP as a direct result of RFL installation. The Royal Commission found this product type should never have been permitted.

2.4 Installer Certification as a Program Requirement

One of the clearest findings from the HIP Royal Commission and subsequent industry analysis was that the entry of large numbers of uncertified, inexperienced operators into the insulation market was a direct contributor to poor quality and safety outcomes. Legitimate, long-

established insulation businesses were undercut by operators with no training, no equipment and no understanding of the work involved.

The Energy Efficiency Council's (EEC) **Certified Insulation Installer (CII) program** was developed specifically to address this gap. It provides a nationally recognised certification administered by the EEC that demonstrates that an installer has the knowledge and skills to safely and effectively install insulation to best practice standards. Programs that require CII certification as a condition of eligibility create a meaningful barrier to entry for unqualified operators while giving homeowners and program administrators confidence in the capability of participating businesses.

Procurement documents should:

- Require that all participating installation businesses engage or employ Installers with current EEC Certified Insulation Installer (CII) certification or equivalent.
- Ensure that, ideally, every individual installer who enters a roof space or installs insulation holds current EEC Certified Insulation Installer certification but at a minimum, that all suitably trained installers will be overseen by a supervisor with this certification and that the supervisor must always be on site during installation of the insulation.
- Require evidence of current certification and training of installers to be submitted as part of the tender or application process, and maintained throughout the program
- Include provisions for suspension or termination of participation where certification lapses or is withdrawn

Certification requirements complement, but do not replace, the requirement for independent inspection and business auditing. Certification establishes capability; inspection verifies that the installation has been performed in a compliant manner, whilst auditing ensures that the business applies their quality assurance practices consistently in the field.

2.5 Non-Conforming Products and Program Risk

Insulation products sold in Australia are required to meet applicable Australian Standards, including those covering thermal resistance, fire performance and mechanical properties. However, **non-conforming product, meaning product that does not meet the standards it claims to meet, is a known and documented problem in the Australian insulation market.** This includes: imported products that carry false or misleading certification, domestic products that have been tested to lower standards than claimed, and products where the stated R-value does not reflect actual thermal performance.

Non-conforming products present risks at multiple levels:

- **Health and safety:** products with inadequate fire resistance or hazardous binder chemicals can harm occupants and installers. Products that lack identification of potentially hazardous material content can put the health of both occupants and installers at risk. Products with underperforming thermal performance can lead to condensation and mould growth with potential severe impacts on the building occupier.
- **Thermal performance:** products with overstated R-values will not deliver the program's energy performance objectives and may fail to provide the intended energy savings to the household.

- **Program integrity:** government funding spent on non-conforming products produces no real public benefit and may expose the administering agency to legal and reputational risk.

Procurement documents should require:

- All insulation products must meet applicable Australian Standards (relevant standards vary by product type, for example AS/NZS 4859.1 for thermal insulation materials).
- Products must carry current third-party compliance certification from a JAS-ANZ accredited certification body. CodeMark certification (administered through the Australian Building Codes Board) is the preferred mechanism for insulation products used in building applications and provides strong evidence of fitness for purpose, and guards against false and misleading claims from unscrupulous manufacturers or distributors. Other JAS-ANZ governed third-party product certification schemes are acceptable equivalents where CodeMark is not available for the relevant product type.
- Contractors must provide current evidence of product compliance as part of the installation documentation for each dwelling.
- Programs should maintain an approved or accepted products list, reviewed and updated regularly.
- Installers must provide an industry accepted insulation installation certificate.

i Note for Program Designers

Specifying compliant products does not require specifying particular brands. A product-agnostic approach is compatible with product compliance requirements, as the program specifies the standard the product must meet, not which manufacturer must supply it. This preserves competitive tension in procurement while protecting against non-conforming imports and sub-standard domestic product.

3. Assessment of Existing Insulation

3.1 Why Assessment Matters: Nominal vs Effective R-Value

Understanding R-value: R-value is a measure of a material's resistance to heat flow. A higher R-value means greater resistance, meaning less heat passes through the material. R-values are additive. Two layers of R2.0 insulation achieve a combined R4.0, provided neither layer is compressed or defective.

Nominal R-values describe the performance of insulation under idealised laboratory conditions. In existing homes, those conditions rarely exist. The actual, **effective R-value** of installed insulation, being the thermal resistance actually being provided, can be substantially lower than the nominal value due to a range of degradation factors:

- **Gaps and incomplete coverage:** even small gaps in insulation coverage have a disproportionate effect on overall thermal performance. A ceiling with 5% gap coverage can lose up to 50% of its thermal effectiveness, due to the non-linear relationship

between heat flow and insulation coverage. Gaps created by cables, services, structural members and ceiling lights are common in existing homes.

- **Compression:** glasswool and polyester batts rely on trapped air for their insulating properties. If these materials are compressed by heavy objects, previous work in the ceiling, or installation under other materials, their effective R-value falls proportionally.
- **Displacement:** insulation that has been disturbed by tradespeople, pest inspections or previous roof access may no longer cover the areas it was originally designed to cover.
- **Moisture damage:** wet or moisture-affected insulation loses its thermal performance and may present health risks. Roof leaks, condensation, and plumbing failures can all cause moisture ingress to insulation.
- **Degradation over time:** some insulation types, particularly older loose-fill cellulose and some early polyester products, can settle or degrade over time, reducing installed thickness and effective R-value.
- **Age-related deterioration:** very old insulation (pre-1990s) may have been installed to standards substantially below current requirements and may have used materials or installation methods now known to be unsuitable.

The practical implication is significant. **A ceiling may appear to have insulation installed and yet perform at a fraction of its nominal R-value.** AICC analysis has demonstrated that the actual in-place R-value of existing residential ceiling insulation in Australia is often around R0.8, far below the original nominal rating and far below what would be required to assess upgrade benefit using standard assumptions.

3.2 A Standardised Assessment Method

Without a standardised assessment approach, different contractors may reach different conclusions about the same ceiling, leading to inconsistent program decisions about eligibility, required scope, and reported outcomes. This inconsistency makes auditing difficult and creates opportunities for gaming, whether through over-reporting of existing performance (to reduce scope) or under-reporting (to maximise subsidy).

The **Guide to Assessing Ceiling Insulation R-Values in Existing Homes**, developed by ICANZ and endorsed by AICC, provides the recommended methodology for this assessment. Programs should adopt this methodology as the required standard. Key elements of the assessment process include:

- **Visual inspection and documentation:** the assessor accesses the ceiling space and documents the type, product, and nominal thickness of existing insulation; the proportion of the ceiling area with acceptable coverage; areas affected by gaps, compression, displacement or damage; and the location and type of electrical components that may affect installation
- **Effective R-value calculation:** the assessment converts observed conditions into an estimated effective R-value using the ICANZ Guide. This involves apportioning the ceiling into areas of acceptable performance, partial performance and no performance, and calculating a weighted average effective R-value across the whole ceiling
- **Documentation and reporting:** results are recorded in a standardised format that can be audited. The documentation should include photographs, ceiling plan markings, and the calculated effective R-value

- **Scope determination:** the assessment output is used to determine what work is required, including whether installation can proceed directly, whether existing insulation must be removed first, whether electrical rectification is needed, and what target R-value is achievable

Adopting a consistent methodology across all participating contractors ensures that program decisions are based on comparable data, that audit findings are meaningful, and that reported performance improvements reflect real-world conditions rather than theoretical product specifications.

4. Removal vs Installation Over Existing Insulation

4.1 When Removal Is Required

Where assessment under Section 3 shows that existing insulation is in good condition, free of contamination or damage and compatible with the proposed new product, topping up remains an appropriate and often preferable outcome, delivering equivalent thermal performance while reducing material use and waste. The key objective is a robust, evidence-based assessment and decision-making process, not a blanket preference for removal over top-up. Some program administrators and procurement teams nonetheless assume that any existing insulation, regardless of its assessed condition, can simply be "topped up" with new product; that assumption does not hold in every case. Where the Section 3 assessment identifies removal as necessary, it must be funded and specified as a distinct scope item, reflecting that removal is warranted in a range of circumstances, including:

- **Contamination:** insulation affected by vermin (rat or mouse urine and faeces are common in Australian roof spaces), mould, asbestos-containing materials, lead-contaminated dust or significant moisture damage cannot remain in place. It presents ongoing health risks, and its thermal performance has been destroyed. Installers and homeowners alike must not be exposed to contaminated material during or after installation.
- **Incompatibility with safe electrical work:** in many cases, the electrical inspection and rectification required before insulation installation can proceed requires clear access to cables and connections that would be impossible with insulation in place. Removal creates a working environment in which safe electrical work can be completed, after which new insulation is installed.
- **Structural or installation incompatibility:** some existing insulation types, particularly older loose-fill products, cannot form a reliable base for new batt insulation. The new batts will not sit level, will create air gaps underneath, and the composite installation will not achieve a consistent or predictable R-value.
- **Product types that are unsafe to leave in place:** older aluminium foil sarking or reflective foil products that have become loose, damaged or electrically hazardous must be removed.
- **Fire risk materials:** insulation materials identified as fire risks in previous audit programs (e.g., some materials such as untreated recycled cellulose installed under the HIP were found in subsequent inspections to present fire risks) must be removed.

Procurement frameworks must treat removal as a defined, funded and legitimate component of retrofit scope. Where it is not explicitly included and priced, contractors face a commercial

disincentive to identify circumstances where removal is warranted. Equally, procurement frameworks should not create a presumption in favour of removal over topping up: where the Section 3 assessment confirms that existing insulation is fit for purpose, retaining and topping it up is a legitimate outcome that supports waste minimisation without compromising safety or performance.

i Note on Asbestos

Homes built prior to 1990 may contain asbestos-containing materials in the ceiling space or on components adjacent to the ceiling. While thermal insulation itself was not made from asbestos, asbestos cement sheeting, pipe insulation, and other products may be present. Where there is any indication of asbestos-containing material, a licensed asbestos assessor must conduct a formal assessment before any ceiling work proceeds. Program procurement documents should require contractors to have documented procedures for identifying and managing asbestos risks, including immediate work cessation if previously unknown asbestos is encountered.

4.2 Unexpected Finds Protocol

Unexpected finds that trigger the protocol include, but are not limited to: suspected asbestos-containing materials in or adjacent to the ceiling space; unsafe or deteriorated electrical wiring not identified during the pre-installation inspection; evidence of active vermin infestation or biological contamination not identified in the pre-installation assessment; structural damage or instability that creates an unsafe working environment; undocumented or non-compliant electrical modifications; and any other condition that poses an immediate risk to the installer or occupant.

The required response is to immediately stop work, followed by documentation and notification. Work must not recommence until the hazard has been assessed and cleared by an appropriately qualified person. Specifically:

- **Stop working immediately:** The installer must cease all work in the affected area as soon as the unexpected condition is identified. The ceiling space must not be re-entered until the hazard has been formally assessed. This applies even if work is partially complete and even if it is commercially inconvenient to stop.
- **Document the finding:** Where it is safe to do so without further exposure or entry into a hazardous area, the installer should photograph the condition. This documentation serves multiple purposes: it supports the variation claim, protects the installer from dispute about what was found, allows the relevant specialist to assess the hazard remotely before attending, and creates an auditable record for the program. Photographs must be taken from a safe position. The installer should not re-enter a roof space specifically to document a hazard.
- **Notify the program administrator and homeowner:** The contractor must notify the program administrator and the homeowner of the finding, the stop-work decision, and the proposed next steps. The notification must be made promptly on the same day where practicable and must be documented in writing.
- **Engage the appropriate specialist:** The nature of the hazard determines who must assess and clear it before work recommences. For suspected asbestos, a licensed

asbestos assessor must attend, sample if required, and provide written clearance. For unsafe electrical conditions, a licensed electrician must inspect, rectify, and certify the work before the insulation installation proceeds. For vermin or biological contamination, a pest management professional or hygienist must assess and specify the appropriate remediation. Work recommences only after written clearance from the relevant specialist is received and lodged with the program administrator.

- **Claim through the variation process:** The costs of specialist assessment, any remediation required, and the return visit to complete the installation must be claimable through the program's variation process (see Section 8.3). A program that does not fund unexpected findings will create pressure on contractors to proceed unsafely rather than stop and claim. The variation process must be fast enough to not leave homeowners in an unresolvable situation for extended periods.

Programs should include Unexpected Findings as a named line item in the tender schedule, with a defined variation rate and a clearly documented process. The existence of a funded, well-defined protocol removes the commercial incentive to overlook or work around hazards, and ensures that homeowners, installers, and program administrators all know exactly what happens when something unexpected is found.

4.3 Avoiding Unsafe Over-Installation Practices

Where procurement frameworks do not explicitly prohibit unsafe practices, those practices will occur, not because installers are willfully negligent but because program payment structures reward speed and volume, not quality and completeness.

The following practices must be explicitly prohibited in program documentation:

- **Installing new insulation over existing insulation without inspection:** adding insulation without first assessing the existing material risks concealing contamination, damage or electrical hazards. The assessment must occur before installation, not to be assumed unnecessary.
- **Installing new insulation over gaps without rectifying them:** gaps in existing insulation that are visible from above will often be concealed when new insulation is placed over them, making them impossible to detect in post-installation inspections. Program documentation should require that all gaps in existing insulation are filled or treated before new material is installed on top.
- **Leaving insulation disturbed after access:** any access to the ceiling space for inspection, electrical work, or other purposes must be followed by reinstatement of insulation to its prior condition or better. This must be documented.
- **Cutting insulation to fit around live cables in ways that create thermal risk:** slitting insulation and wrapping it around cables is specifically called out in Australian electrical standards as a practice that creates a "completely surrounded" condition, triggering the most stringent electrical circuit derating requirements. Program documents should prohibit this practice and require that cable routing is assessed by an electrician before insulation is installed around it.
- **Installing insulation against or over non-IC-rated downlights:** this creates a fire risk. IC-rated downlight replacement must be completed before insulation can cover those ceiling areas.

5. Electrical Safety Requirements

5.1 Why Electrical Safety Is Central to Insulation Retrofit

Of all the technical complexities in residential insulation retrofit, electrical safety is the most consequential and the most frequently underestimated by procurement teams and installers without electrical training. Two of the four deaths in the 2009-10 HIP were electrocutions. Electrical issues led to 200 fires recorded after the program. The Royal Commission found that the program failed to appropriately manage electrical risks.

Understanding electrical safety requirements is not optional for those involved in designing or delivering insulation programs. The guidance in this section is intended to give procurement teams and insulation businesses a working understanding of why electrical inspection and rectification must be embedded in the program before installation proceeds.

5.2 Pre-Installation Electrical Inspection

The pre-installation electrical inspection serves several essential purposes:

- **Identifying existing unsafe conditions:** many Australian homes contain electrical wiring and components that are non-compliant or deteriorated. This includes perished cable insulation (the plastic or rubber sheathing around the copper conductor), inadequate earth connections, overloaded circuits, and components operating outside their rated parameters. These conditions exist independently of the insulation work and may not have caused a problem to date, but the addition of thermal insulation can precipitate failure by changing the thermal environment in which the cable operates.
- **Identifying cables that require derating assessment:** the inspector must identify all cables that will be affected by the installation of insulation (see Section 5.3 for detail on derating) and determine what protective action is required.
- **Identifying non-IC-rated downlights and other fittings requiring clearance:** the inspector must document all recessed lighting in the ceiling space, determine whether each fitting is IC-rated (safe for insulation contact) or non-IC-rated (requires clearance from insulation), and specify what action is required.
- **Identifying foil or reflective products that must be removed:** where existing reflective foil insulation or sarking is present, the inspector must determine whether it creates electrocution risk and whether removal is required before new insulation is installed.
- **Identifying roof space hazards:** the pre-installation inspection also provides an opportunity to identify working-at-heights risks, structural hazards in the ceiling space, and other conditions that affect the safe conduct of the installation such as PV and battery storage.
- **Identifying solar PV and battery storage systems:** where solar PV, battery storage or associated electrical equipment is present, the inspection must identify any risks associated with insulation installation and specify any precautions required. Homeowners should be advised that PV and battery systems may need to be isolated or shut down by a suitably qualified person before installation work commences. Insulation installers should not be expected to operate or isolate PV or battery systems unless appropriately licensed and authorised to do so.

The inspection must be conducted by a **licensed electrician** and not by the insulation installer, even if the installer has some electrical knowledge. The outcome of the inspection must be

documented in a formal report that becomes part of the installation record, and which drives the scope of any rectification work required before installation.

Note that the 2023 update to AS/NZS 3000:2018 (the Australian/New Zealand Wiring Rules) includes updated guidance on installations with thermal insulation, making clear that wiring systems must be assessed for their thermal environment. Programs should reference compliance with AS/NZS 3000:2018 as the minimum standard for all electrical work within the program.

5.3 Circuit Derating and the Impact of Insulation on Electrical Cables

Why Cables Derate: The Technical Explanation

Electrical cables carry current, and the flow of current through a conductor generates heat. Under normal conditions, heat dissipates into the surrounding environment, including the air in the ceiling space and the structural materials the cable is in contact with. This heat dissipation is what prevents the cable from overheating.

When insulation is installed around or over a cable, the **heat dissipation path is reduced or eliminated**. The cable runs hotter for the same current. If the temperature of the cable's plastic or rubber sheathing exceeds its rated limit, typically 75° C for PVC-insulated cable, the sheathing can soften, crack, or melt, creating a risk of short circuit, fire, or electrocution.

To manage this, Australian Standard AS/NZS 3008.1 (Selection of Cables) specifies how the maximum allowable current through a cable must be **reduced (derated)** when that cable is installed in contact with or surrounded by thermal insulation. The extent of derating depends on the installation condition:

Installation Condition	Effect on Cable
Partially surrounded by insulation	Cable has insulation on one or more sides but remains exposed to at least one side. Moderate derating required.
Completely surrounded by insulation (length ≤ 400mm)	Cable is enclosed by insulation on all sides for a short run. Significant derating is required.
Completely surrounded by insulation (length > 400mm)	Cable is fully enclosed on all sides for more than 400mm. Most significant derating required as this condition can reduce allowable current by 40–50% or more for common cable types.

As a practical example: a 2.5mm² TPS (twin and earth) cable, the most common type used in Australian domestic wiring has a standard current-carrying capacity of approximately 20A when installed in an enclosed space. When that same cable is completely surrounded by thermal insulation for a run longer than 400mm, its allowable current may reduce to 10–12A. If that circuit was originally protected by a 20A circuit breaker, the breaker will no longer protect the cable from overheating, as it will only trip at a current far above what the cable can now safely carry.

The critical point for procurement teams and program administrators is this: **adding insulation to an existing home changes the electrical safety environment, and that change must be assessed, calculated, and where determined, be rectified before installation proceeds**. This is not a recommendation; it is a requirement of AS/NZS 3000:2018. Clause 3.3.2.13 of the

standard specifically requires that the current-carrying capacity of cables passing through bulk thermal insulation be calculated in accordance with AS/NZS 3008.1.

⚠ Common Mistake

A common assumption is that if the existing wiring has not caused a problem before the insulation was installed, it will not cause a problem after. This is incorrect. The thermal environment of the cable changes when insulation is added, and the risk of overheating is created by the insulation installation itself. The pre-installation state of the wiring is not a reliable guide to post-installation safety.

5.4 Electrical Rectification Works

In homes where derating assessment identifies that cables cannot carry their existing loads safely with insulation in place, one or more of the following rectification measures may be required:

- **Reducing circuit breaker sizes:** in some cases, the simplest and least disruptive rectification is to reduce the rating of the circuit breaker protecting an affected circuit. For example, if a cable on a 20A circuit is derated to 14A by the presence of insulation, replacing the 20A breaker with a 10A breaker (the nearest lower standard size) will ensure the protective device operates before the cable reaches its temperature limit. This is a relatively low-cost measure when it is required.
- **Consequences of breaker reduction, including nuisance tripping:** reducing a circuit breaker size can cause the circuit to trip under loads that were previously normal for that circuit. For example, if a 20A circuit services several power outlets and was commonly used for high-draw appliances, reducing to a 10A breaker may cause frequent nuisance tripping. In these cases, simply reducing the breaker is not a practical solution and additional work is required.
- **Circuit splitting or additional circuits:** where a circuit carries multiple outlet or lighting loads that together exceed the derated capacity, the solution is to split the circuit, reducing the number of points and therefore the maximum load on each circuit, or to run an additional circuit from the switchboard. This is more costly but may be necessary to maintain usability.
- **Cable replacement or rerouting:** in some cases, particularly where cables have insufficient temperature ratings or where their routing means they cannot avoid being completely surrounded by insulation, it may be necessary to replace the cable with one of a higher temperature rating or reroute it to avoid the worst thermal conditions. XLPE-insulated cable, for example, has a higher temperature rating than PVC and can carry more current in the same thermal conditions.
- **RCD installation:** AS/NZS 3000:2018 now requires RCD (residual current device) protection on all final subcircuits in residential installations, including alterations and repairs. Where insulation installation triggers a requirement to alter the electrical installation, this may create an obligation to install or upgrade RCD protection. Programs should ensure that RCD requirements are assessed as part of the pre-installation inspection.

Procurement frameworks that do not provide for electrical rectification will result in one of two outcomes: installers who do not conduct the required assessment and proceed unsafely, or installers who identify the need but have no mechanism to carry out the work and so cannot proceed at all. Neither outcome serves the program's objectives. **Electrical rectification must be a defined, funded scope item**, with clear decision rules for when it is required and how it is to be authorised and priced.

5.5 IC-Rated Downlights: The Thermal Envelope Problem

What is a downlight? A recessed downlight is a luminaire (light fitting) that is installed into the ceiling, with the body of the fitting partially or fully in the ceiling space and the face of the fitting flush with the ceiling surface. Downlights are extremely common in Australian homes, particularly those built or renovated from the 1990s onwards.

IC rating and its meaning: "IC" stands for "insulation contact." An IC-rated fitting is specifically designed and tested to operate safely when insulation is in direct contact with the body of the fitting. A non-IC-rated fitting is not, and it requires a minimum clearance of insulation on all sides and above. In a typical residential ceiling, a non-IC-rated downlight must be kept free of insulation for at least 50–200mm in all directions (the specific requirement varies by product).

Why non-IC-rated fittings are a problem: when a non-IC-rated downlight is installed in a ceiling, it creates an area where insulation cannot be placed. This is not just a gap, it is a **thermal hole in the ceiling**, through which heat passes freely. In homes with multiple downlights (10–20 fittings are not unusual in a modern open-plan home), the aggregate thermal loss through these uninsulated areas can substantially reduce the effectiveness of the insulation installation.

The fire risk: a downlight that is covered by insulation, whether accidentally or due to incomplete compliance will retain the heat it generates. Older halogen downlights can reach surface temperatures of 200–300°C. If insulation is in contact with a hot non-IC-rated fitting, the insulation can ignite, creating a house fire risk. This is a well-documented cause of residential fires.

The solution - IC-rated LED replacement: replacing non-IC-rated fittings with IC-rated LED downlights achieves multiple benefits simultaneously. LED technology generates significantly less heat than halogen, so even if a fitting is not perfectly covered, the risk of overheating is much lower. IC-rated LED downlights allow insulation to be placed directly over the fitting, restoring continuous thermal coverage across the ceiling. They also reduce ongoing electricity consumption substantially.

Procurement frameworks should:

- Require the pre-installation inspection to identify and document all non-IC-rated downlights
- Require replacement of all non-IC-rated downlights with IC-rated LED fittings as a condition of completing the insulation installation in those ceiling areas
- Include downlight replacement as a defined, funded line item in the program scope
- Not permit insulation to be installed in the vicinity of non-IC-rated downlights unless those fittings have been replaced

6. Working at Heights and Roof Access

6.1 Understanding Roof Access Risks

Working at height is one of the leading causes of serious injury and death in the construction industry in Australia. Insulation retrofit work frequently requires access to roof spaces, and in some cases requires workers to access or work on roof surfaces. This must be managed as a controlled risk, not left to individual installers to work out on the day.

Not all insulation work requires external roof access. Many buildings are more safely and effectively accessed internally through a ceiling access point. Internal access is generally preferred where it is safe and practically feasible. However, internal access is not always appropriate, for example where existing insulation or contamination must be removed (which requires material to be passed out through the roof), or where the installation method requires access from above.

The hierarchy of controls requires that hazards are managed first through elimination or engineering controls, and only where those are not practicable should the risk be managed through administrative controls (procedures, supervision) or personal protective equipment (PPE). For working-at-heights risks, this hierarchy means:

- **Elimination (preferred):** use internal access where practicable, avoiding external roof work entirely
- **Engineering controls:** install edge protection, scaffolding, or elevated work platforms (EWPs), where external roof access exists. Edge protection that prevents falls off roof edges is the preferred engineered control for external roof access. Modern edge protection systems can be installed on nearly all residential roof types including tiles, corrugated metal and flat roofs.
- **Administrative controls:** implement safe work method statements (SWMS), buddy systems, restricted roof access time limits in extreme heat, and documented supervision requirements.
- **PPE (least preferred, last resort):** fall-arrest harness systems attached to certified roof anchors. Harness systems are frequently misused, mis-rigged or simply not worn. They should not be the primary control measure for working at heights in an insulation retrofit program

Procurement documents should require contractors to:

- Submit a written working-at-heights risk assessment for each installation type they propose to conduct.
- Specify which access method will be used and how risks will be controlled.
- Demonstrate that edge protection or equivalent engineering controls will be used for all external roof access, with harness-only approaches reserved for exceptional circumstances with documented justification.
- Comply with relevant Safe Work Australia guidance on working at heights and applicable state/territory WHS regulations

Where a program already requires an equivalent standard of control through its contractor management framework, for example documented Safe Work Method Statements, licensing, supervision arrangements and compliance monitoring, these requirements can generally be satisfied through those existing mechanisms rather than through separate or duplicative procurement documentation, provided the program administrator can demonstrate that the existing framework achieves an equivalent outcome.

i Jurisdiction-Specific Restrictions

Some jurisdictions restrict or regulate the removal of roofing materials (e.g., metal roofing, tiles) to create access points. Procurement documents should confirm that the selected access method is lawful in the jurisdiction of operation. Where removal of tiles or other roofing materials is required to create internal access, this must be carried out by suitably qualified people, and the roof must be reinstated to its original condition or better.

7. Quality Assurance and Inspection

7.1 Why Documentation and Certification Alone Are Not Sufficient

A consistent pattern in poorly designed insulation programs is an over-reliance on documentation as a proxy for quality. Contractors are required to submit completion certificates, R-value declarations or similar paperwork, and these documents are treated as evidence of compliant installation. They are not.

Documentation confirms what a contractor *says* was done. Inspection confirms what was *actually* done. In a large-scale program, even a moderate gap between these two things represents a substantial volume of non-compliant installations delivered at public expense. The 2010 ANAO audit of HIP found that "a significant delay in implementing the [compliance and audit] program meant that risks were not adequately addressed." Physical inspections carried out after the HIP closed found that nearly 30% of inspected roofs contained safety or quality concerns.

7.2 Real-Time (In-Progress) Inspection

Many aspects of an insulation installation cannot be verified after the work is done. Whether electrical inspection was conducted, whether removed insulation was properly disposed of, whether cables were correctly treated, and whether the full ceiling area was covered are all difficult or impossible to assess from a post-installation inspection. Real-time inspection, where an independent inspector is present during the installation or arrives while work is still in progress, captures these elements.

Real-time inspection requirements should specify:

- A minimum proportion of installations to be inspected in real-time (industry practice suggests a minimum of 10%, with higher rates for new contractors and where performance indicators identify concerns)
- That inspections are conducted by inspectors with no commercial relationship with the installer being inspected
- That inspectors are empowered to direct the contractor to stop work, correct deficiencies, and document non-compliant practices
- That inspection results are reported to the program administrator and used to manage contractor performance, including escalation and suspension where appropriate

7.3 Post-Installation Inspection

Post-installation inspection should be conducted by independent inspectors, using thermal imaging where practicable, to verify that:

- Insulation has been installed across the full ceiling area at the correct density and thickness
- No significant gaps, compressions or disturbances are present
- Downlight clearances have been appropriately managed (or IC-rated replacements confirmed)
- The installation matches the documentation submitted by the contractor

Thermal imaging is a particularly effective post-installation verification tool. Infrared cameras can identify areas of heat loss through the ceiling that indicate gaps, thin coverage, or displaced insulation. This technology is widely available, cost-effective on a scale, and provides objective, recordable evidence of installation quality. Programs should consider requiring thermal imaging as part of the post-installation inspection process for a proportion of completed installations.

Independence of inspection: the independence of the inspecting function is critical to its value. Inspectors must have no commercial relationship with the contractors they inspect. They must not be employed by the same business, be in a subcontracting arrangement or have any financial interest in the contractor's performance. Programs should define "independence" explicitly in their procurement documents and require inspectors to declare any potential conflicts of interest.

✓ Why This Matters

Independent inspection is not only a quality assurance process, but also a deterrence mechanism. Contractors who know that a proportion of their work will be independently inspected, and that deficiencies will have consequences, are less likely to cut corners. Inspection that is known to be cursory or ineffective does not have this deterrence effect.

8. Recommended Tender Line-Item Categories

8.1 Why Bundled Rates Undermine Program Outcomes

As outlined in Section 2 and 5, procurement frameworks that price all insulation work as a single rate per square metre, regardless of the actual scope required at each dwelling, create structural incentives for installers to minimise the work they actually do.

Structuring tenders around discrete, defined line items solves this problem.

8.2 Recommended Line-Item Structure

Line-Item Category	Description and Key Inclusions
Assessment & Pre-Installation Inspection	Physical assessment of existing insulation condition, type, thickness and coverage; calculation of effective in-place R-value using the ICANZ methodology; electrical pre-installation inspection by licensed electrician; identification of removal requirements, rectification scope, and access risks; production of site report and scope specification. This item should be priced per dwelling as a fixed assessment fee.
Insulation Removal	Removal of existing insulation where required, including contaminated, damaged or incompatible material; safe handling and disposal in accordance with waste regulations (including requirements for asbestos-containing materials where identified); reinstatement of surfaces after removal; documentation of removed volume and disposal method.
New Insulation Installation	Supply and installation of conforming insulation products; treatment of service penetrations, structural members and difficult access areas; continuous coverage across all available ceiling areas; photographic documentation of installed products, coverage and thickness.
Electrical Rectification	Pre-installation electrical inspection (see above); derating calculations and circuit breaker adjustments; RCD installation or upgrading where required; IC-rated downlight supply and installation; cable assessment and rectification work; certification of electrical works by licensed electrician. This item may be priced as a schedule of rates for individual works rather than a fixed fee.
Roof & Access Safety Controls	Working-at-heights risk assessment; edge protection installation and removal; scaffolding or EWP hire where required; internal access preparation; reinstatement of tiles or access points. Priced per dwelling with allowance for site-specific variations.
Unexpected Findings: Stop Work & Specialist Clearance	Triggered when an unexpected hazard is identified during installation (e.g. suspected asbestos, unsafe wiring, active

	vermin infestation, structural instability). Covers: immediate stop-work and safe exit from roof space; photographic documentation where safe; written notification to program administrator and homeowner; attendance and written clearance by appropriate specialist (licensed asbestos assessor, licensed electrician, pest management professional, or other as required); return visit to complete installation once clearance is received. Priced as a schedule of rates covering specialist attendance, remediation works and return visit. No work recommences without written specialist clearance lodged with the program administrator.
QA, Documentation & Closeout	Completion certificate and R-value declaration; photographic documentation package; participation in real-time and post-installation inspections; defect rectification within defined timeframes; submission of records in program-required format.

8.3 Managing Variations and Site-Specific Conditions

Even with a well-structured line-item schedule, some dwellings will present conditions that were not anticipated at the time of initial assessment or tender. Programs should include a clear, pre-approved variation process that allows contractors to claim for additional work discovered during installation, without having to choose between doing unpaid work and not completing the job safely.

Variation claims should be supported by site evidence (photographs, electrician's report), be approved by the program administrator before the additional work is conducted (where practicable) and be subject to the same inspection and verification processes as the base scope.

Conclusion

Australia's insulation retrofit opportunity is large, long-recognised, and increasingly urgent. More than eight million homes remain under-insulated relative to current standards. The health, comfort and energy efficiency benefits of upgrading those homes are well-established and significant. Insulation is the most cost-effective energy efficiency intervention available, and it is durable as a well-installed retrofit will continue to deliver benefits for decades.

But the scale of this opportunity does not diminish the risks of poor program design. The lessons of the 2009-10 Home Insulation Program, which resulted in four deaths, hundreds of house fires, and a Royal Commission, remain relevant fifteen years on. The core lesson is not that insulation is dangerous, it is that programs designed primarily around volume, speed and low cost, without structural provisions for safety, quality and capability, will predictably produce unsafe outcomes.

This is not an argument for delaying delivery or limiting its scale. Given the number of homes still affected, both urgency and scale are needed and nothing in this guide should be read as counselling a slow or small-scale approach. The point is that speed and volume have not, historically, been achieved safely without the structural safeguards this guide sets out. A program built on genuine assessment, funded scope items, certified installers and independent inspection can be delivered urgently and at the scale required, precisely because it removes the commercial pressures that have previously driven installers toward unsafe shortcuts.

Programs designed in accordance with this guide, incorporating genuine pre-installation assessment, mandatory electrical inspection and rectification, explicit prohibitions on unsafe materials and practices, certified installer requirements, independent inspection, and transparent line-item procurement, will deliver safer installations, more consistent thermal performance, and better long-term public value.

Insulation Australasia and the Insulation Council of Australia and New Zealand encourage program administrators and procurement teams to treat this guide as a starting point for engagement with the industry. The insulation sector has deep practical knowledge of what works in the field, what creates risk, and how programs can be designed to produce good outcomes. Engaging with industry, including through Insulation Australasia and the AIIIC, during program design is one of the most effective investments a program administrator can make.

Appendix A: Key Standards and References

Document	Relevance to Insulation Programs
AS/NZS 3000:2018: Wiring Rules	Primary Australian/NZ electrical installation standard. Governs all electrical work in existing homes including requirements for cable current-carrying capacity in the presence of thermal insulation (Clause 3.3.2.13) and requirements for RCD protection.
AS/NZS 3008.1: Selection of Cables	Specifies current-carrying capacities and derating factors for cables under various installation conditions including partial and complete surrounding by thermal insulation.
AS/NZS 4859.1: Thermal Insulation Materials	Covers performance requirements for thermal insulation materials used in building and construction. Products should carry certification against this standard.
AS 3999: Thermal Insulation of Dwellings: Bulk Insulation: Installation Requirements	The primary Australian Standard governing the installation of bulk thermal insulation in residential dwellings. Specifies minimum requirements for installation quality, coverage, clearances, and treatment of penetrations. Programs should require contractor compliance with AS 3999 as a baseline installation standard for all participating installers.
National Construction Code (NCC) 2022	Sets minimum energy performance requirements for new residential construction. Provides the benchmark against which existing dwelling performance should be assessed.
AIIC Insulation Installation Roadmap (2024)	The industry's strategic framework for quality and safety in insulation installation. Published by the AIIC and Energy Efficiency Council.
Guide to Assessing Ceiling Insulation R-Values in Existing Homes (ICANZ)	The endorsed methodology for calculating effective in-place R-values in existing residential ceilings. Should be specified as the required assessment method in program documentation.
Safe Work Australia: Working at Heights	National guidance on managing working-at-heights risks. Relevant to all insulation programs requiring external roof access.

Appendix B: Common Mistakes and How to Avoid Them

Common Program Design Mistake	Best Practice Approach
Specifying only an R-value without defining scope of work	Define scope as a series of line items including assessment, removal, electrical inspection, installation, and closeout. R-value is an outcome specification, not a scope of work.
Not requiring installer certification	Require current Certified Insulation Installer (CII) certification or equivalent as a condition of program participation.
Use of non-conforming products	Requiring third-party verification of products ensures promised performance is delivered and that only consistent, reliable products are used.
Not funding or scoping electrical inspection and rectification	Include pre-installation electrical inspection as a mandatory, funded line item. Include electrical rectification as a funded schedule of rates.
Permitting reflective foil laminate (RFL) in ceiling spaces	Explicitly prohibit RFL in all horizontal ceiling applications - non-negotiable
Relying on contractor documentation as evidence of quality	Require independent real-time and post-installation inspection. Documentation confirms intent; inspection confirms outcome.
Specifying particular product types rather than performance outcomes	Take a product-agnostic approach. Specify the performance standard (effective R-value) and compliance requirement (Australian Standard), not the brand or product type.
Not providing for removal of existing insulation	Include removal as a defined, funded scope item triggered by assessment findings. Assuming top-up is always appropriate is incorrect.
Inspection is not genuinely independent	Define independence explicitly. Inspectors must have no commercial relationship with the contractor being inspected.