



Energy Safety

**NEW ZEALAND ELECTRICAL CODE OF PRACTICE FOR
MANAGING ELECTRICAL RISKS ASSOCIATED WITH
ELECTRICALLY CONDUCTIVE THERMAL INSULATION
NZECP 55:2016**

FOREWORD

As the Chief Executive of WorkSafe New Zealand, I am pleased to issue this new electrical code of practice for *Managing Electrical Risks Associated with Electrically Conductive Thermal Insulation*. This Code complements new requirements for residential tenancies to be insulated and have working smoke alarms.

The risk with working with or near conductive thermal insulation occurs when the insulating foil becomes live, for instance from accidental stapling into wiring. Improperly installed conductive thermal insulation has resulted in fatalities in both New Zealand and Australia in recent years.

The Code sets out good practice applying to licensed electrical workers, people carrying out electrical work in reliance on the domestic wiring exemption, and professional insulation installers. It will also help residential property owners and industry to manage electrical safety risks associated with new electrical installations and fittings where conductive thermal insulation is present, and with working safely in the presence of existing installed conductive thermal insulation.

I would like to acknowledge and thank everyone who has contributed to the development of this guidance material which supports a range of Government priorities, and that not only everyone who goes to work comes home healthy and safe, but while at home is also protected from harm.



Gordon MacDonald

Chief Executive, WorkSafe New Zealand

1 July 2016

APPROVAL

Approval of the New Zealand Electrical Code of Practice for Managing Electrical Risks Associated with Electrically Conductive Thermal Insulation (NZECP 55:2016).

In accordance with section 38 of the Electricity Act 1992, I approve the New Zealand Electrical Code of Practice for Managing Electrical Risks Associated with Electrically Conductive Thermal Insulation (NZECP 55:2016).

Dated this 16th day June 2016.

A handwritten signature in blue ink, appearing to read 'SABR', with a long horizontal flourish extending to the right.

Minister Bridges
Minister of Energy and Resources

COMMITTEE REPRESENTATION

The Electrical Code of Practice (this Code) was prepared by WorkSafe New Zealand in consultation with the following organisations:

Central Region Electrical Inspectors Association
Electrical Contractors Association of New Zealand
Electrical Safety New Zealand
Energy Efficiency and Conservation Authority
Independent Property Managers' Association
Industry representatives from both Foil and Plastic manufacturers
Insulation Association of New Zealand Inc. (IAONZ)
New Zealand Council of Elders
New Zealand Electrical Institute

WorkSafe New Zealand wishes to acknowledge the significant contribution of Alan Cuthbert in drafting this Code, in terms of gifting both his time and expertise.

REVIEW

This Code will be revised as occasions arise. Suggestions for improvements of this Code are welcomed. They should be sent to the Manager, Energy Safety, Worksafe New Zealand, PO Box 165, WELLINGTON, 6140.

ACKNOWLEDGEMENTS

The following organisations are acknowledged for providing information and assistance to develop this Code:

Australian Royal Commission of Inquiry into the Home Insulation Program
Electrical Regulatory Authorities Council – Australia and New Zealand
Ministry of Business, Innovation and Employment
Workplace Health and Safety Electrical Safety Office – Queensland

DISCLAIMER

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INTRODUCTION

Regulations detailing new insulation and smoke alarm requirements to implement changes to the Residential Tenancies Act 1986 were announced by the New Zealand Government in April 2016. This gives effect to a package of amendments intended to improve the quality of residential rental properties, including changes to the minimum insulation standards of tenanted residential properties, effective from 1 July 2016 onwards. This Code anticipates other planned changes will occur. These changes include:

- From 1 July 2016 it is not permitted to retrofit conductive thermal insulation in ceilings or under floors in residential rental properties
- Insulation retrofitted or installed in residential rental properties after 1 July 2016 must be installed in accordance with the New Zealand Standard NZS 4246: 2006 *Energy Efficiency – Installing insulation in residential buildings* (currently under revision and planned for publication in August 2016)
- As a building method, installing foil insulation into a residential building with an existing electrical installation (including repairing any existing fitted foil insulation) is banned from 1 July 2016.

These changes, which are intended to improve the quality of residential rental properties, have the potential to affect the overall electrical safety risk profile when installing new conductive thermal insulation, or when working wherever conductive thermal insulation is already fitted. Such insulation could become electrically live when coming into contact with electrical wiring.

Improperly installed conductive thermal insulation has resulted in fatalities in New Zealand over recent years.

As part of its functions as regulator of electrical safety under the Electricity Act 1992, WorkSafe New Zealand is setting out good practice in the form of a new Electrical Code of Practice for domestic installations (including residential rental properties). The intent is to protect persons and property from electric shock, physical injury, and fire resulting from conductive thermal insulation becoming electrically live.

The requirements for all domestic installations set out in this Code will enable property owners and industry to manage electrical safety risks associated with installing new, and working with fitted, conductive thermal insulation in a number of settings.

The Australian Royal Commission of Inquiry into the Home Insulation Program¹ findings were drawn on by WorkSafe New Zealand in the development of this Code.

Provisions in this Code require:

- the following controls:
 - (a) the physical separation of electrical cabling measured from the conductive foil covering of the thermal insulation by a minimum distance of 100 mm,
 - (b) the provision of a mechanical barrier, such as heavy-duty grade plastic conduit or trunking,

¹ <http://homeinsulationroyalcommission.gov.au>

(c) the provision of RCD protection not exceeding 30 mA residual current rating on final sub circuits located near the conductive thermal insulation being an additional control.

- The fitting of a warning sign/signs adjacent to the access point(s) containing conductive thermal insulation
- A record of assessment form provided for verification purposes completed at the conclusion of prescribed electrical work.

In the event of doubt concerning the requirements of this Code the services of a *licensed electrical worker* should be sought.

SECTION 1

SCOPE, PURPOSE, REFERENCES, INTERPRETATION, DEFINITIONS, LEGISLATION AND GLOSSARY

1.1 SCOPE

The use of conductive thermal insulation (due to its ability to conduct electricity) requires the provision of additional controls to minimise the potential for the conductive thermal insulation to become electrically live.

This Code specifies procedures for:

- working with electrically conductive thermal insulation when installing a new electrical installation
- safe working conditions when adding and repairing electrical fittings and appliances, including recessed luminaires and electrical cabling in the presence of existing conductive thermal insulation
- the removal or alteration of existing conductive building services fitted adjacent to existing conductive thermal insulation
- accessing confined spaces safely where conductive thermal insulation is already fitted
- the safe assessment and/or removal of existing fitted conductive thermal insulation.

NOTE: This Code does not apply if joint Australian/New Zealand Standard AS/NZS 3000 – *Australian/New Zealand Wiring Rules Part 1* is being used.

1.2 PURPOSE

This Code includes requirements and guidance in domestic installations for electrical safety when working near electrically conductive thermal insulation when installing a new electrical installation and when working in the presence of existing fitted conductive thermal insulation, including the removal of the insulation material.

While this Code contains provisions applying to licensed electrical workers, people relying on the domestic wiring exemption, and insulation contractors and installers, it is also intended to assist others manage the electrical safety risks associated with accessing and working in areas in which conductive thermal insulation is fitted. This includes professional builders, building owners, property managers, homeowners (including DIY), building supply retailers, and insulation manufacturers.

Workplace health and safety legislation places additional duties on workers and persons conducting businesses or undertakings (PCBU). In some circumstances these may apply to DIY installers. Persons having duties under the Health and Safety at Work Act 2015 may find this Code relevant and useful. However, the electrical safety obligations specified in this Code are not a legal substitute for compliance with workplace health and safety legislation.

1.3 REFERENCES

The following publications are either directly cited in this Code or else contain content that is relevant to the purpose of this Code. Reference should be made to such publications for additional background and information.

AUSTRALIAN STANDARD

AS 3999:2015 Bulk thermal insulation–Installation

NEW ZEALAND STANDARD

NZS 4246:2006 Energy efficiency–Installing insulation in residential buildings

JOINT AUSTRALIAN AND NEW ZEALAND STANDARDS

AS/NZS 2053.5:2001 Conduits and fittings for electrical installations–Corrugated conduits and fittings of insulating material (to be superseded by AS/NZS 61386 after 5 years)

AS/NZS 3000:2007 Australian/New Zealand Wiring Rules

AS/NZS 3019:2007 Electrical installations–Periodic verification

AS/NZS 4296:1995 Cable trunking systems

AS/NZS 5033:2014 Installation and safety requirement for photovoltaic (PV) arrays

AS/NZS 60598.2.2:2016 Luminaires Part 2.2: Particular requirements–Recessed luminaires

AS/NZS 61386.1:2015 Conduit systems for cable management–parts 1, 21 to 23

NEW ZEALAND ELECTRICAL CODES OF PRACTICE

NZECP 51:2004 New Zealand Electrical Code of Practice for Homeowners/Occupier's Electrical Wiring Work in Domestic Installations

NZECP 54:2001 New Zealand Electrical Code of Practice for the Installation of Recessed Luminaires and Auxiliary Equipment

INTERNATIONAL PUBLICATIONS

Australian Royal Commission of Inquiry into the Home Insulation Program was established on 12 December 2013, with the final report tabled in the Australian Parliament 1 September 2014.

Worksafe Tasmania – *Safe installation of insulation material*: July 2014².

Workplace Health and Safety Electrical Safety Office Queensland – *Stay safer up there, switch off down here*: March 2015³.

1.4 INTERPRETATION

For the purposes of this Code the word 'must' refers to practices that are essential for compliance with this Code. Words in the singular include the plural and words in the plural include the singular. Clauses prefixed by 'NOTE' are intended as additional guidance or clarification. They do not form part of the controls and should not be relied upon for the purposes of determining what is required by this Code.

The term 'Normative' has been used in this Code to define the application of the Appendix to which it applies. A 'Normative' Appendix is an integral part of this Code.

² http://www.justice.tas.gov.au/_data/assets/pdf_file/0007/289564/Safe_installation_of_insulation_materials_-_July_2014.pdf

³ <https://www.worksafe.qld.gov.au/staysaferswitchoff>

1.5 DEFINITIONS

For the purposes of this Code, the words and expressions used bear the meaning they have in the Electricity Act 1992, the Electricity (Safety) Regulations 2010 and AS/NZS 3000 – *Australian/New Zealand Wiring Rules* including the following:

1.5.1 Domestic installation(s) – means an electrical installation in a dwelling or portion of an electrical installation that is associated solely with an individual flat or living unit.

1.5.2 Electrical fittings – means everything used, or designed or intended for use, in or in connection with the generation, conversion, transformation, conveyance or use of electricity.

1.5.3 Electrical installation –
(a) means:

(i) in relation to a property with a point of supply, all fittings beyond the point of supply that form part of a system that is used to convey electricity to a point of consumption, or used to generate or store electricity; and

(ii) in relation to a property without a point of supply, all fittings that form part of a system that is used to convey electricity to a point of consumption, or used to generate or store electricity.

(b) does not include any of the following:

(i) an electrical appliance

(ii) any fittings that are owned or operated by an electricity generator and that are used designed, or intended for use in or in association with the generation of electricity, or used to convey electricity from a source of generation to distribution or transmission lines;

(iii) any fittings that are used, designed or intended for use in or in association with the conversion, transformation, or conveyance of electricity by distribution or transmission lines.

1.5.4 Licensed electrical worker – means registered electrician or electrical inspector licensed by the Electrical Workers Registration Board to carry out prescribed electrical work.

1.5.5 Person(s) – means the individual completing the installation work, including the site inspection.

1.5.6 Recessed luminaire – means a light fitting intended by the manufacturer to be fully or partly recessed into a mounting surface such as a floor, wall or ceiling, commonly known as recessed downlights.

In addition, the Code uses the following defined terms:

1.5.7 Adjacent – means next to or adjoining without obstruction and in any case no more than 500 mm away.

1.5.8 Conductive building services – means:

- metallic pipes or tubes used to convey any of the following: potable water, natural or LPG gas, and waste water within a building structure.
- metallic ducts used to transport treated air to and from an air treatment unit to delivery grilles in the ceiling or wall of the building structure.
- metallic ducts or flues from a gas appliance or wood burner to the outside of the building structure.

1.5.9 Conductive thermal insulation – means in the form of sheeting, used as a type of insulating material. The sheets have a thin layer of reflective (usually aluminium) on one or both sides.

1.5.10 PEN conductor – means a conductor of the submain to an outbuilding providing a neutral and protective earth connection for a switchboard in the outbuilding.

1.5.11 PV array – means an assembly of photo-voltaic panels to convert solar energy into electrical energy.

1.5.12 Separation – means the clear distance between two individual items.

1.5.13 Tool – means a device or implement used to carry out a particular function, and includes portable or hand – held lighting appliances to provide adequate illumination when work is carried out.

1.6 NEW ZEALAND LEGISLATION AND WEBSITES

Electricity Act 1992

Electricity (Safety) Regulations 2010

Health and Safety at Work Act 2015

www.business.govt.nz/worksafe/

www.eeca.govt.nz

www.energysafety.govt.nz

www.energywise.govt.nz

www.ewrb.govt.nz

www.legislation.govt.nz

www.mbie.govt.nz

www.standards.govt.nz

1.7 GLOSSARY OF ABBREVIATIONS USED IN THIS CODE

AC	Alternating current
AS	Australian Standard
AS/NZS	Joint Australian/New Zealand Standard
DC	Direct current
DIY	Do it your self
mA	Milliampere
mm	Millimetres
MΩ	Meg – ohm (1,000,000 Ω)
NZECP	New Zealand Electrical Code of Practice
NZS	New Zealand Standard
PEN	Protective earth neutral (combined conductor)
PV array	Photo voltaic array
RCD	Residual current device

SECTION 2 STANDARDS AND SPECIFICATIONS

2.1 GENERAL SPECIFICATIONS

2.1.1 Electrical installations must be installed, tested, inspected and connected in accordance with the Electricity (Safety) Regulations 2010, the joint Australian/New Zealand Standard AS/NZS 3000 – *Australian/New Zealand Wiring Rules* and this Code.

2.2 ELECTRICAL SAFETY PROVISIONS

2.2.1 In order to achieve the required electrical safety outcomes, the following additional measures apply to new electrical installations for: fittings; electrical appliances; cabling; and associated equipment where conductive thermal insulation is fitted.

Separation or protection of cabling

- (a) Every electrical Low Voltage and Extra Low Voltage electrical cable used as installation wiring must:
- (i) have a minimum of 100 mm separation from the conductive thermal insulation in all locations; or
 - (ii) be mechanically protected in one or more of the following ways:
 - (A) all cabling must be fully contained in earthed metallic conduit
 - (B) all cabling must be fully contained in heavy-duty plastic conduit (plain and/or corrugated types);
 - (C) all cabling must be fully contained in heavy-duty trunking securely fixed to the building structure.

Separation or protection of fittings and appliances

- (b) All Low Voltage electrical fittings, including the wiring of terminal blocks; recessed luminaires, including associated transformer or LED control gear drivers and all appliances must have a minimum of 100 mm separation from the conductive thermal insulation.

Additional RCD protection

- (c) Subject to subparagraphs (f) and (g) below, all final sub circuits of the electrical installation that are located in the same building structure area as conductive thermal insulation must be protected by a RCD that:
- (i) protects against electric shocks and has a residual current rating not exceeding 30 mA, and operates on a.c residual current and pulsating d.c residual currents;
 - (ii) is fitted at the point of supply to the final sub circuit; and
 - (iii) is installed in accordance with AS/NZS 3000 *Australian/New Zealand Wiring Rules* requirements for the maximum number of final sub circuits able to be protected by a single RCD.

NOTE: A Type B RCD may be necessary where supply is to a high power electronic power supply.

- (d) To provide RCD protection on all of the final sub circuit electrical cabling, the RCD must be mounted on the switchboard providing the supply. The fitting of an RCD at a mid-point of the electrical cable run is not permitted.

- (e) Where a 30 mA RCD is required for a fixed or stationary electrical appliance that contains a sheathed heating element and is supplied by a dedicated final sub circuit, either connected by installation wiring, or by a plug and socket – outlet (exceeding 30 amps rating), or by an installation coupler, and has an earth leakage current value which may cause a 30 mA RCD to trip in normal operation, then a 100 mA Type A RCD with no intentional delay (not Type S) may be used in lieu of a 30 mA RCD.
- (f) The RCD protection requirements in paragraph (c) do not apply to the following electrical cables provided that, in addition to meeting the requirements of clause 2.2.1(a)(i) they are mechanically protected by being fully contained in one or more of the ways specified in clause 2.2.1(a)(ii):
 - (i) consumer mains including the revenue meter to main switchboard cabling
 - (ii) submain electrical cabling from the main switchboard to distribution switchboard
 - (iii) submains containing a PEN conductor (supply to out buildings), and
 - (iv) electrical cabling from PV arrays to the inverter location.

NOTE: PV array cabling is required by AS/NZS 5033 to be run in heavy duty plastic conduit (plain or corrugated) inside a building structure.

- (g) The RCD protection requirements in paragraph (c) do not apply to final sub circuits for equipment connected by installation wiring and located at greater than 500 mm from conductive thermal insulation in the same building structure.

Warning signs

- (h) A warning sign must be fixed at every entry point to the area where conductive thermal insulation is fitted. The warning sign is specified in **Appendix A**.

Connection to conductive thermal insulation

- (i) Conductive thermal insulation should be unearthed as this will ensure safer working conditions than if it is earthed, even if entry is made to the area(s) containing earthed conductive thermal insulation without first turning OFF the power at the main switch on the main switchboard as required by this Code.

2.3 ADDITIONAL PROVISIONS FOR SAFETY OF PERSONS OR PROPERTY

2.3.1 Before and during the carrying out of any work where there is an existing electrical installation in an area that has conductive thermal insulation fitted, the power supply on all accessible electrical cabling in the area must be removed before any work is carried out in that area to prevent electrocution. This can be achieved by the operation of the main switch of the electrical installation to the OFF position. This also applies to the temporary power supply switchboards used by builders.

SECTION 3 PROCEDURES

3.1 CONTROLS FOR ELECTRICAL SAFETY RISKS

3.1.1 The ability of conductive thermal insulation to conduct electricity requires the provision of additional controls to minimise the potential electrical hazards of the conductive thermal insulation becoming live.

3.1.2 For domestic installations, the controls adopted by this Code involve the physical separation of electrical cabling from the conductive thermal insulation or the provision of a mechanical barrier, and the provision of RCD protection, except as otherwise specified.

3.2 NEW ELECTRICAL INSTALLATION – LICENSED ELECTRICAL WORKER AND PROFESSIONAL INSULATION INSTALLER

3.2.1 This subsection contains provisions applying when installing a new electrical installation adjacent to conductive thermal insulation that is being fitted in a residential property, where the work is being done by a **Licensed Electrical Worker** and a **Professional Insulation Installer**⁴.

This guidance is also intended to assist owners and occupiers of residential properties (DIYers) who choose not to engage the services of a **Professional Insulation Installer** and complete the fitting of new conductive thermal insulation themselves.

3.2.2 In the case of a new domestic electrical installation the **Licensed Electrical Worker** must check the approved building consent documentation to verify whether the use of conductive thermal insulation is proposed. If it is, then the requirements of this Code apply.

3.2.3 Every installer of an electrical installation and conductive thermal insulation entering a new building site should before beginning the installation work:

- (a) review the site's hazard board; and
- (b) conduct their own site-specific hazard identification process.

3.2.4 Fitting conductive thermal insulation in a new electrical installation including electrical cabling, fittings, recessed luminaires and electrical appliances should be scheduled in a way that minimises the risk of damage to any previously completed work on the work site.

3.2.5 The **Licensed Electrical Worker** and the **Professional Insulation Installer**, or **DIYer** must maintain contact regularly during the installation of new conductive thermal insulation in a new electrical installation to ensure they have a shared understanding of the operating environment.

3.2.6 The installation of electrical cabling, and fittings must be done in accordance with Part 2 of AS/NZS 3000 *Australian/New Zealand Wiring Rules*, as required by the Electricity (Safety) Regulations 2010 and not Part 1 of AS/NZS 3000 *Australian/New Zealand Wiring Rules*.

3.2.7 Further provisions apply as follows:

⁴ See www.iaonz.co.nz, www.ewrb.govt.nz and www.energywise.govt.nz

Step	Action
1.	<p>The Licensed Electrical Worker must carry out and verify the installation in accordance with the following provisions.</p> <p>a) All electrical cabling and fittings must be separated from the conductive thermal insulation by 100 mm minimum measured from the conductive thermal insulation; OR</p> <p>b) All electrical cabling and fittings must be completely surrounded by additional mechanical protection by use of one or more of the following :</p> <ul style="list-style-type: none"> (i) earthed metallic conduit (ii) heavy duty plastic conduit (plain or corrugated) (iii) earthed metal or heavy duty plastic trunking.
2.	<p>RCD protection with a maximum residual rating of 30 mA must be provided for all final sub circuits on the switchboard providing the supply. The provision of RCD protection in any other location on the sub circuits is not permitted.</p> <p>Exception: Final sub circuits for equipment connected by installation wiring located greater than 500 mm from conductive thermal insulation in the same building structure are not required to have this RCD protection.</p>
3.	<p>For consumer mains and submains only, in addition to step 1 a) above, the provision of additional mechanical protection as detailed in step 1 b) above must be provided for all consumer mains and submain cabling installed within 500 mm of conductive thermal insulation.</p> <p>NOTE: The provision of additional protection by RCD is not possible and increased mechanical protection is to be used in lieu of this.</p>
4.	<p>The Professional Insulation Installer (or DIYer) should fit the conductive thermal insulation in accordance with the following expectations.</p>
5.	<p>Install the new conductive thermal insulation in accordance with the manufacturer's instructions and, in the case of a Professional Insulation Installer, your professional judgement. If staples are being used for the fixing of new conductive thermal insulation, then non-metallic staples are to be used.</p>
6.	<p>Professional Insulation Installer (or DIYer) must fit warning signs at the entry points of area(s) containing conductive thermal insulation. The warning signs may also contain details of the insulation type, R value, installation date, etc. as required by NZS 4246:2006. The warning sign is specified in Appendix A.</p>
7.	<p>When the verification by the Licensed Electrical Worker of the installation is complete, the Certificate of Compliance must include:</p> <ul style="list-style-type: none"> a) additional verification that all wiring adjacent to the conductive thermal insulation is separated by 100 mm and/or mechanical screening is fitted and meets NZECP 55:2016 requirements b) a completed Record of Assessment, in the form specified in Appendix B c) the result of an insulation resistance measurement at 500 volts d.c. between the conductive thermal insulation and the live conductors of the electrical installation when no mains supply is connected. The minimum insulation resistance is 1 MΩ. <p>NOTE: It is expected that the insulation resistance test obtained should be considerably higher than 1 MΩ with a result of 50 MΩ being typical.</p>

3.3 NEW ELECTRICAL INSTALLATION – PERSON USING DOMESTIC ELECTRICAL WIRING EXEMPTION

3.3.1 This subsection contains provisions applying when installing a new electrical installation adjacent to conductive thermal insulation that is being fitted in a residential property, where the work is to be done by a person relying on the domestic electrical wiring exemption (**DIYer**) and a **Professional Insulation Installer**. It also contains provisions applying to a **Licensed Electrical Worker** engaged to inspect and verify the prescribed electrical work (the 'licensed electrical inspector') carried out at the same time.

This guidance is also intended to assist owners and occupiers of residential properties (**DIYer**) who choose not to engage the services of a **Professional Insulation Installer** and complete the fitting of new conductive thermal insulation themselves.

3.3.2 It is strongly recommended however that a **Licensed Electrical Worker**⁵ and a **Professional Insulation Installer** are engaged to complete the installation of electrical cabling and fittings located adjacent to conductive thermal insulation in a new electrical installation.

3.3.3 The installation of electrical cabling and fittings must be done in accordance with Part 2 (Sections 2 to 8) of AS/NZS 3000 – *Australian/New Zealand Wiring Rules*, and NZECP 51:2004 as required by the Electricity (Safety) Regulations 2010. Part 1 of AS/NZS 3000 *Australian/New Zealand Wiring Rules* must not be used.

3.3.4 Consult with the licensed electrical inspector (who will be verifying the work for the owner of the residential property at the completion of the work) for any additional assistance before and during the work.

3.3.5 The **Licensed Electrical Worker**, **the person using the exemption for domestic wiring work**, and the **Professional Insulation Installer (or DIYer)** need to be in regular contact during this highly complex electrical installation to ensure all parties have a shared understanding of the new construction environment.

⁵ To check if an electrical worker is licensed, contact Electrical Workers Registration Board on 0800 661 000, or search online at www.ewrb.govt.nz in the public register of electrical workers.

3.3.6 Further provisions apply as follows:

Step	Action
1.	The DIYer must carry out the installation work in accordance with the following provision NZECP 51:2004 and AS/NZS 3000– <i>Australian/New Zealand Wiring Rules</i> .
2.	<p>a) All electrical cabling and fittings must be separated from the conductive thermal insulation by 100 mm minimum, measured from the conductive thermal insulation; OR</p> <p>b) All electric cabling and fittings must be completely surrounded by additional mechanical protection by use of one or more of the following:</p> <ul style="list-style-type: none"> (i) earthed metallic conduit (ii) heavy duty plastic conduit (plain or corrugated) (iii) earthed metal or heavy duty plastic trunking.
3.	<p>RCD protection with a maximum residual rating of 30 mA must be provided for all final sub circuits on the switchboard providing the supply. The provision of RCD protection in any other location is not permitted.</p> <p>Exception: All final sub circuits for equipment connected by installation wiring located greater than 500 mm from conductive thermal insulation in the same building structure are not required to have this RCD protection.</p>
4.	<p>For consumer mains, and submains only, the provision of additional mechanical protection as detailed in step 2 above, must be provided for all consumer mains and submain cabling installed within 500 mm of conductive thermal insulation.</p> <p>NOTE: The provision of additional protection by RCD is not possible and increased mechanical protection is to be used in lieu of this.</p>
5.	The Professional Insulation Installer (or DIYer) installs the new conductive thermal insulation to the manufacturer's instructions including in the case of a Professional Insulation Installer using your professional judgment. If staples are being used for fixing of conductive thermal insulation, then use non-metallic staples.
6.	The Professional Insulation Installer (or DIYer) must fit warning signs at the entry points of area(s) containing conductive thermal insulation. The warning signs may also contain details of the insulation type, R value, installation date, etc as required by NZS 4246:2006. The warning sign is specified in Appendix A .
7.	<p>The Licensed Electrical Worker is to inspect and verify the work as set out below:</p> <p>To verify that all electrical work has been done in accordance with NZECP 51:2004 and the additional work required by this Code (NZECP 55:2016) by a Licensed Electrical Worker authorised to inspect mains work must carry out an inspection of the completed installation for verification including completing a Record of Inspection required to permit a power supply connection to be made to the electrical installation.</p> <p>In addition, the Certificate of Compliance must:</p> <ul style="list-style-type: none"> (i) Verify that all wiring adjacent to conductive thermal insulation is separated by 100 mm and/or mechanical screening has been provided to NZECP 55:2016 requirements and detail the areas in which conductive thermal insulation is installed; (ii) Record the result of an insulation resistance measurement at 500 volts d.c. between the conductive thermal insulation and the live conductors of the electrical installation when no mains supply is connected. The minimum insulation resistance is 1 MΩ. <p>NOTE: It is expected that the insulation resistance test obtained should be considerably higher than 1 MΩ with a result of 50M Ω being typical.</p>

3.4 WORKING SAFELY IN THE PRESENCE OF EXISTING CONDUCTIVE THERMAL INSULATION – LICENSED ELECTRICAL WORKER AND OTHER TRADESPEOPLE

3.4.1 This subsection contains provisions applying when carrying out electrical work at a residential property that is fitted with existing conductive thermal insulation, where the work is to be done by **Licensed Electrical Worker**. It is also intended to assist other tradespeople such as **Builders, Professional Insulation Installers, Plumbers and Gasfitters** to manage the electrical safety risks associated with accessing and working in areas in which conductive thermal insulation is fitted.

3.4.2 To ensure electrical safety at work the use of a risk management process including a safe system of work and implementing suitable control measures is prudent.

3.4.3 The only safe course of action to take to achieve safe working conditions where conductive thermal insulation is present is to eliminate the hazard – that is removing the source of the power supply from the existing electrical installation. This can be achieved by operation of the main switch(es) of the electrical installation to the OFF position while working in the area where the conductive thermal insulation is fitted.

3.4.4 The power OFF approach is considered best practice as a means to protect all tradespeople and house occupants from injuries and the risk to life through coming into contact with a live electrical cable or metal. This is particularly the case when the location of electrical conductors and metal surfaces cannot be determined.

3.4.5 In addition to the provisions in this Code, it should be noted that the Health and Safety at Work Act 2015 requires risks to health and safety to be eliminated, so far as is reasonably practicable, or if it is not reasonably practicable to do that, to be minimised so far as is reasonably practicable. This includes the risk of electrocution.

3.4.6 **Licensed Electrical Workers** need to familiarise themselves with section 3.2 and be aware that some electrical installations installed before this Code took effect may have been fitted without adopting the additional safety measures specified in this Code. In these electrical installations, it is essential that additional steps be taken in all cases of repair, removal, alterations and additions of electrical fittings, appliances and electrical cabling, including conductive building services where conductive thermal insulation is already fitted.

3.4.7 Final sub circuits for equipment connected by installation wiring located at greater than 500 mm from conductive thermal insulation are not required to be RCD protected.

3.4.8 The key additional control required is the removal of the power supply by the operation of the main switch of the electrical installation before accessing spaces where conductive thermal insulation is already fitted, as further detailed below.

Step	Action
1.	Prior to turning off the power at the main switch or switches, check the operation of several light fittings contained inside the electrical installation before accessing the work area.
2.	<p>Advise the occupier that the power to the house is being turned off at the main switch or switches to allow the site assessment and to ultimately carry out the required work in a safe manner as classified in step 7. Advise the occupier not to restore the main switch or switches to the 'on' position. Fit warning labels to the main switches to avoid unauthorised restoration of power by others.</p> <p>NOTES:</p> <p>a) The house occupier should also be advised to keep the opening of refrigerators and freezers to an absolute minimum to protect food contained within from spoiling during the power shut down period required for the site assessment and the installation for the electrical fitting extensions and alterations.</p> <p>b) Turning off the power supply to the electrical installation should be delayed until alternative arrangements off site can be made for person(s) who are dependent on a continuous power supply for critical medical support and treatment.</p>
3.	Switch OFF the power supply to the electrical installation and verify this by testing the operation of several light fittings previously tested in step 1 contained inside the electrical installation, before accessing the work area.
4.	On entry to the access to the work area verify that no power is present on all accessible electrical cable(s) and any conductive thermal insulation covering that may be present in the work area. Use a non-contact voltage tester in close proximity to the electrical cable and all sections of conductive thermal insulation being tested to do this.
5.	If the testing shows that a power supply is still connected, investigate the cause and make suitable repairs.
6	Ensure that all power-operated tools to be used in the work area are cordless battery operated tools.
7.	<p>Work classification: this work could include the repair, removal or alteration of existing conductive building services or adding and repairing electrical fittings and appliances, including recessed luminaries and electrical cabling.</p> <p>Repair work – Carry out the repair work required. A Licensed Electrical Worker should, where possible, increase the separation of electrical cabling or fittings to 100 mm minimum from any existing conductive thermal insulation covering, or fit a mechanical barrier to the electric cabling or fitting.</p> <p>Removal work – Carry out the required removal of electrical fittings, conductive building services or appliances. If only existing conductive thermal insulation is being removed, take care to ensure that electrical cables are not damaged during the removal of the insulation material. If an electrical cable is or has been damaged, the damaged cable needs to be repaired by a Licensed Electrical Worker before the power supply to the electrical installation is restored. See NZS 4246:2006 Appendix B for further Health and Safety information.</p>

	<p>NOTE: If electrical equipment is being removed, for example a light fitting, the electrical supply should be permanently removed and made electrically safe.</p> <p>Alteration work – Carry out the required alteration work. A Licensed Electrical Worker should, if possible, increase the separation of electrical cabling or fittings to 100 mm minimum from any fitted conductive thermal insulation. Otherwise, fit a mechanical barrier to electric cabling or fitting.</p> <p>If an extension to the electrical installation is involved, for example a new socket outlet, all new work is required to comply with the additional requirements in clause 2.2. The use of plastic heavy duty conduit or trunking may be required instead of the minimum 100 mm separation of the additional electrical cabling from the existing fitted conductive thermal insulation. The new electrical cabling must be protected by a RCD not exceeding 30 mA residual current rating at the supply source (switchboard mounted).</p> <p>For terminal blocks (including associated transformers or LED drivers) and other electrical fittings and appliances, a minimum separation distance of 100 mm is required from any edge of the conductive thermal insulation material to any part of the electrical fitting.</p>
8.	<p>For recessed luminaires, exhaust or air circulation fans, the minimum clearance of 100 mm from the conductive thermal insulation edge to the outer profile of the luminaire or fan housing needs to be maintained to allow for the cooling of the luminaire and for the easy passage of air by the fan.</p> <p>This applies to all types of recessed luminaires, all of which must comply with the Electricity (Safety) Regulations and are marked CA 80, CA 135, IC ,IC-F or 'Do not cover' symbols. NOTE: AS/NZS 3000, NZECP 54:2001 and AS/NZS 60598.2.2 detail the symbols or luminaire coding used.</p>
9.	<p>If no warning signs are present at the entry points of area(s) containing existing conductive thermal insulation, provide and fit warning signs at the entry points. The warning sign is specified in Appendix A.</p>
10.	<p>Once the work is finished and tested, the Licensed Electrical Worker must complete a Certificate of Compliance for any prescribed electrical work that has been carried out.</p> <p>Then restore the power supply at the main switchboard.</p>

3.5 WORKING SAFELY IN THE PRESENCE OF EXISTING CONDUCTIVE THERMAL INSULATION – PERSON USING DOMESTIC ELECTRICAL WIRING EXEMPTION AND OTHER TRADESPEOPLE

3.5.1 This subsection contains provisions applying when carrying out work at a residential property that is fitted with existing conductive thermal insulation where the work is to be done by a person relying on the domestic electrical wiring work exemption (**DIYer**). It is also intended to assist other tradespeople, such as **Builders**, **Professional Insulation Installers** and **Plumbers and Gasfitters** to manage the electrical safety risks associated with accessing and working in areas fitted with existing conductive thermal insulation.

3.5.2 To ensure electrical safety at work and at home the use of a risk management process, including a safe system of work and implementing suitable control measures, is prudent.

3.5.3 The only safe course of action to take to achieve safe working conditions where conductive thermal insulation is present is to eliminate the hazard – that is removing the source of the power supply from the existing electrical installation. This can be achieved by operation of the main switch of the electrical installation to the OFF position while working in the area where the conductive thermal insulation is fitted.

3.5.4 The power OFF approach is considered best practice as a means to protect all persons and house occupants from injuries and risk to life through coming into contact with an electrical circuit or metal. This is particularly the case when the location of electrical conductors and metal surfaces cannot be determined.

3.5.5 In addition to the provisions in this Code it should be noted that the Health and Safety at Work Act 2015 requires risks to health and safety to be eliminated, so far as is reasonably practicable, or if it is not reasonably practicable to do that, to be minimised so far as is reasonably practicable. This includes the risk of electrocution.

3.5.6 People relying on a domestic electrical work exemption to carry out electrical work should familiarise themselves with section 3.2 and be aware that some electrical installations installed before this Code took effect may have been fitted without adopting the additional safety measures specified of this Code. It is therefore essential that additional controls be adopted whenever the repair, removal, alterations or additions of electrical fittings, appliances, and electrical cabling including conductive building services is carried out in the presence of conductive thermal insulation.

3.5.7 Final sub circuits for equipment connected by installation wiring located at greater than 500 mm from conductive thermal insulation are not required to be RCD protected.

3.5.8 The key additional controls required is the removal of power supply by the operation of the main switch of the electrical installation before accessing spaces where conductive thermal insulations is already fitted, as further detailed below.

Step	Action
1.	Prior to turning off the power at the main switch or switches, check the operation of several light fittings contained inside the electrical installation before accessing the work area.
2.	<p>Advise the occupier that the power to the house is being turned off at the main switch or switches to allow the site assessment and to ultimately carry out the required work in a safe manner as classified in step 7. Advise the occupier not to restore the main switch or switches to the 'on' position. Fit warning labels to the main switches to avoid unauthorised restoration of power by others.</p> <p>NOTES:</p> <p>a) The house occupier should also be advised to keep opening of refrigerators and freezers to an absolute minimum to protect food contained within from spoiling during the power shut down period required for the site assessment and the installation for the electrical fitting extensions and alterations.</p> <p>b) Turning off the power supply to the electrical installation should be delayed until alternative arrangements off site can be made for person(s) who are dependent on a continuous power supply for critical medical support and treatment.</p>
3.	Switch OFF the power supply to the electrical installation and verify this by testing the operation of several light fittings previously tested in step 1, contained inside the electrical installation before accessing the work area.
4.	On entry to the access to the work area verify that no power is present on all accessible electrical cable(s) and any conductive thermal insulation covering that may be present in the work area. Use a non-contact voltage tester in close proximity to the electrical cable and all sections of conductive thermal insulation being tested to do this.
5.	If the testing shows that a power supply is still connected, seek assistance from a Licensed Electrical Worker and ensure no entry is made into the work area.
6.	Ensure that all power-operated tools to be used in the work area are cordless battery operated tools.
7.	<p>Work classification: this work could include the repair, removal or alteration of existing conductive building services, or adding and repairing electrical fittings and appliances, including recessed luminaries and electrical cabling.</p> <p>Repair work – Carry out the repair work required. The DIYer should, where possible, increase the separation of electrical cabling or fittings to 100 mm minimum from any existing conductive thermal insulation covering, or fit a mechanical barrier to the electric cabling or fitting.</p> <p>Removal work – Carry out the required removal of electrical fittings, conductive building services or appliances. If only existing conductive thermal insulation is being removed, take care to ensure that electrical cables are not damaged during the removal of the insulation material. If an electrical cable is, or has been damaged, the damaged cable needs to be repaired by the DIYer before the power supply to the electrical installation is restored. See NZS 4246:2006 Appendix B for further Health and Safety information.</p>

	<p>NOTE: For all electrical equipment being removed, for example a light fitting, the electrical supply should be permanently removed and made electrically safe.</p> <p>Alteration work – Carry out the required alteration work. The DIYer should, if possible, increase the separation of electrical cabling or fittings to 100 mm minimum from any fitted conductive thermal insulation. Otherwise fit a mechanical barrier to electric cabling or fitting.</p> <p>If an extension to the electrical installation is involved, for example a new socket outlet, all new work is required to comply with NZECP 51:2004 and the additional requirements of this Code clause 2.2. The use of plastic heavy duty conduit or trunking may be required instead of the minimum 100 mm separation of the additional electrical cabling from the existing fitted conductive thermal insulation. The new electrical cabling must be protected by an RCD not exceeding 30 mA residual current rating at the supply source (switchboard mounted).</p>
8.	<p>Provide warning signs at the entry points of area(s) containing existing conductive thermal insulation. The warning sign is specified in Appendix A.</p>
9.	<p>Once the work is finished and tested then the certification of any prescribed electrical work that has been carried out, as detailed in Electricity (Safety) Regulations 2010 and NZECP 51:2004 must be completed by a Licensed Electrical Worker before restoring the power supply.</p> <p>Then restore the power supply at the main switchboard.</p>

3.6 ASSESSING OR REMOVING EXISTING CONDUCTIVE THERMAL INSULATION

3.6.1 This subsection contains provisions applying at a domestic installation when assessing or removing existing fitted conductive thermal insulation. These provisions apply, for example, when existing fitted conductive thermal insulation is checked to determine whether it meets the requirements of the new regulations for residential rental properties, or before installing alternative insulation material adjacent to existing fitted conductive thermal insulation.

This guidance is intended to assist a broad range of users, including licensed electrical workers, professional installation installers, home owners, and DIYers. It is strongly recommended that owners and occupiers of residential properties engage the services of a [Licensed Electrical Worker](#) if they have any concerns about any existing insulation.

3.6.2 To ensure electrical safety at work and at home the use of a risk management process, including a safe system of work and implementing suitable control measures, is prudent.

3.6.3 The only safe course of action to take to achieve safe working conditions where conductive thermal insulation is present is to eliminate the hazard – that is removing the source of the power supply from the electrical installation. This can be achieved by operation of the main switch(es) of the electrical installation to the OFF position while working in the area where the conductive thermal insulation is fitted.

3.6.4 The power OFF approach is considered best practice as a means to protect all persons and house occupants from injuries and risk to life through coming into contact with an electrical circuit or metal. This is particularly the case when the location of electrical conductors and metal surfaces cannot be determined.

3.6.5 In addition to the provisions in this Code, it should be noted that the Health and Safety at Work Act 2015 requires risks to health and safety to be eliminated, so far as is reasonably practicable, or if it is not reasonably practicable to do that, to be minimised so far as is reasonably practicable. This includes the risk of electrocution.

3.6.6 Some electrical installations installed before this Code took effect may have been fitted without adopting the additional safety measures specified in this Code. In these electrical installations it is essential that additional controls be taken in all cases when assessing or removing existing conductive thermal insulation. There could be cases in existing buildings where existing insulation is electrically live in all, or parts, of the underfloor area of a building. For example, conductive thermal insulation may have been installed previously with the power off and not tested for safety once power was restored.

3.6.7 The key control required is the removal of the power supply by the operation of the main switch of the electrical installation, as further detailed below.

Step	Action
1.	Prior to turning off the power at the main switch or switches, check the operation of several light fittings contained inside the electrical installation before accessing the work area.
2.	<p>Advise the occupier that the power to the house is being turned off at the main switch or switches to allow the site assessment and to ultimately carry out the required work in a safe manner as classified in step 7. Advise the occupier not to restore the main switch or switches to the 'on' position. Fit warning labels to the main switches to avoid unauthorised restoration of power by others.</p> <p>NOTES:</p> <p>a) The house occupier should also be advised to keep opening of refrigerators and freezers to an absolute minimum to protect food contained within from spoiling during the power shut down period required for the site assessment.</p> <p>b) Turning off the power supply to the electrical installation should be delayed until alternative arrangements off site can be made for person(s) who are dependent on a continuous power supply for critical medical support and treatment.</p>
3.	Switch OFF the power supply to the electrical installation and verify this by testing the operation of several light fittings previously tested in step 1, contained inside the electrical installation before accessing the work area.
4.	On entry to the access to the work area, verify that no power is present on all accessible electrical cable(s) and any conductive thermal insulation covering that may be present in the work area. Use a non-contact voltage tester in close proximity to the electrical cable and all sections of conductive thermal insulation being tested to do this.
5.	If the testing shows that a power supply is still connected, seek assistance from a Licensed Electrical Worker and ensure no entry is made into the work area.
6.	Ensure that all power-operated tools to be used in the work area are cordless battery operated tools.
7.	Work classification: Carry out the work required. The services of a Professional Insulation Installer are recommended when removing existing conductive thermal insulation.
8.	At completion of the work, restore the power supply at the main switchboard.

APPENDIX A – ACCESS POINTS WARNING SIGNS (Normative)

A1 INTRODUCTION

Fit warning signs adjacent to the access point or points to the ceiling space or crawl space under the floors when:

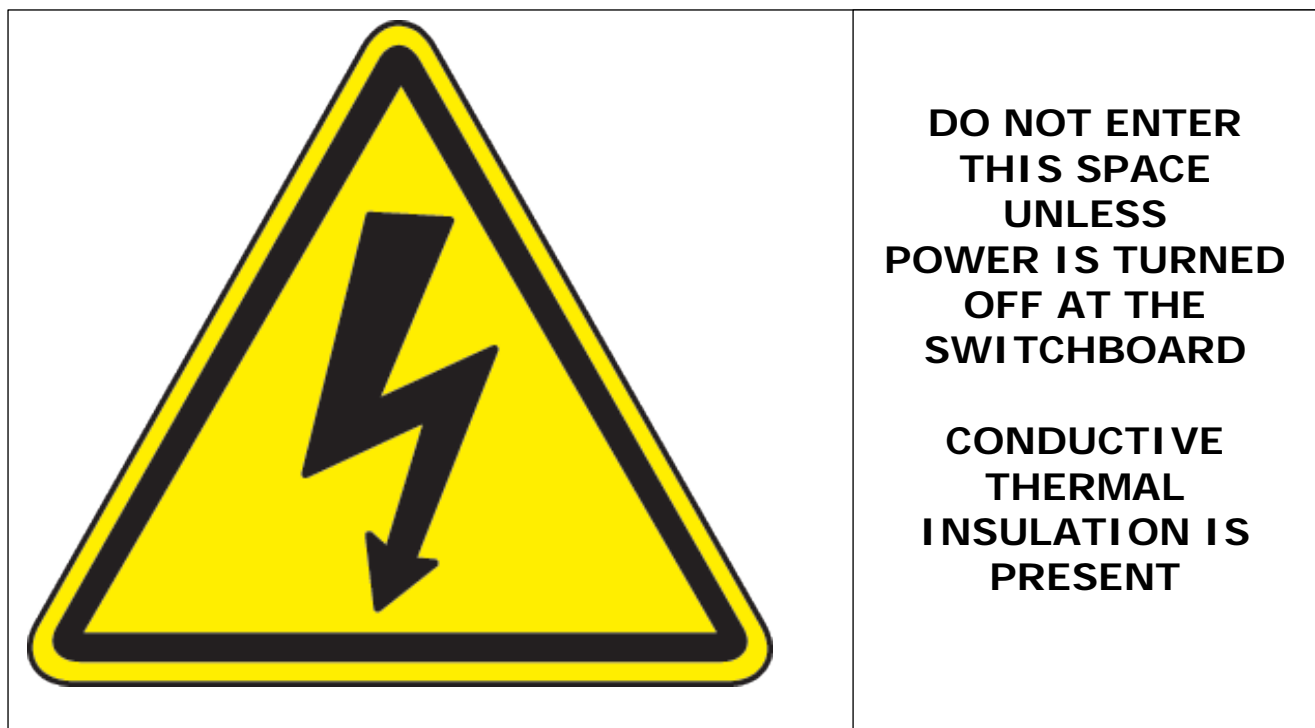
- a) new conductive thermal insulation is fitted in a new electrical installation;
- b) any new electrical fittings and electrical cabling are installed adjacent to any existing conductive thermal insulation.

The form of the warning sign is specified in Figure A1 and must contain the following wording or substance of the words, 'DO NOT enter this space unless the power is turned off at the switchboard'.

NOTE: The inclusion of insulation details required by NZS 4246: 2006 may also be included on this warning label.

Figure A1 – Warning label

NOTE: Letter size 8 mm minimum Capital letters 6 mm minimum or lower case letters




APPENDIX B – RECORD OF ASSESSMENT (Normative)

B1 INTRODUCTION

The form for a Record of Assessment for use following an assessment made in accordance with the requirements detailed in clause 3.2 of NZECP 55:2016 *Managing Electrical Risks Associated with Electrically Conductive Thermal Insulation* is set out in Figure B1. This form may be copied for production of forms.

A Record of Assessment is required when prescribed electrical work has been carried out and must be verified on a Certificate of Compliance as detailed in the requirements of Electricity (Safety) Regulations 2010.

Figure B1 – Record of Assessment

	<p>RECORD OF ASSESSMENT</p> <p>REFERENCE/CERTIFICATE ID No.:.....</p>
<p><i>This form has been designed to be used by licensed electrical workers as record of assessment of domestic electrical installations that contain conductive thermal insulation following an assessment as detailed in NZECP 55:2016 Managing Electrical Risks Associated with Electrically Conductive Thermal Insulation.</i></p>	
<p>Location of installation:</p>	
<p>Name and address of owner(or client):</p>	
<p>Name of electrical worker:</p>	<p>Registration/practising licensing No.</p>
<p>Phone and Email:</p>	
<p>Location(s) or areas of conductive thermal insulation assessed, or details on attached photos or drawing(s):</p>	
<p>Select those that apply:</p> <p><i>There is/There is not: Electrical cabling, fittings or appliances in the areas listed above</i></p> <p><i>Yes/No: Additional RCDs have been fitted to protect the unprotected cabling, fittings or appliances in the areas listed above</i></p> <p><i>Yes/No: Conduit, trunking or physical separation has been used to protect cabling in the areas listed above</i></p> <p><i>Yes/No: Warning signs fitted to access points to areas containing conductive thermal insulation (supply details)</i></p>	
<p>Conductive thermal insulation resistance test Ω</p>	
<p><i>I have carried out an assessment of the above site in accordance with NZECP 55:2016 and verify that the installation meets the requirements of clause 3.2 for the issue of a Record of Assessment.</i></p>	
<p>Verifier's signature:</p>	
<p>Date of verification:</p>	
<p>CUSTOMER COPY: THIS IS AN IMPORTANT DOCUMENT AND SHOULD BE RETAINED FOR A MINIMUM OF SEVEN YEARS</p>	

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MORE INFORMATION

Information, examples and answers to your questions about the topics covered here can be found on our website www.energysafety.govt.nz or by calling us free on 0800 030 040 Option four.
