THALES
Building a future we can all trust

Inadvertent Contact with Electricity

Guide and Critical Risk Standard

hse
HEALTH SAFETY ENVIRONMENT

SCAN BEFORE YOU BEGIN

ELECTRICAL SAFETY

Inadvertent Contact with Electricity Guide

Safety is everyone's responsibility

GENERAL ELECTRICAL SAFETY **FOR ALL**

- **Do your tools & equipment meet electrical safety standards?** Are they tested and tagged? Can you see any damage?
- **Only use mains-powered hand tools where cordless alternatives are unsuitable**
- **Does the facility have residual current devices (RCDs)?** If not, use portable residual current devices. (Portable RCDs are used to protect power tools and other electrical equipment)
- **Do you have the correct safeguards in place?** Are circuits and electrical equipment protected from contact with water?
- Elevate electrical leads if needed to protect them from surface water or traffic.

GENERAL ELECTRICAL SAFETY **FOR ALL**

Underground or risk of concealed electrical services

- Confirm and mark the location for any excavation greater than 300mm depth
- **DO NOT** use mechanical diggers within 300mm of a known service
- Check for concealed electrical services before penetrating walls, floors or ceilings.

If you are working near overhead electrical services

- Consult the electricity service provider to identify the recommended safety approach and separation distances, bearing in mind the maximum reach of mobile plant. Document your approach, including separation distances, in procedures or SWMS
- Maintain the required separation distance using barriers (fencing) where practical – or physical markers (cones or flags). Use spotters if only using physical markers.

GENERAL ELECTRICAL SAFETY **ELECTRICAL WORKERS**

Check before you begin electrical work

- **Are you a competent person authorised to do this work?** **DO NOT** start work until a Supervisor has validated you are a **competent person** to work safely in this area and documented the work you are doing
- **Do you know who is responsible for electrical safety in the area you're working in?** If it's not you, check in with them before you start work
- If you are not sure whether it is safe – **DO NOT** touch or work on any electrical items.

If possible, only work on isolated equipment

- **DO NOT** start work until plant, equipment and circuits are isolated and stored energy dissipated. Isolate as far upstream as you can
- For simple isolations, use a JSEA, "Take 5" or similar process. For complex isolations, use a documented isolation plan, procedure or SWMS. All isolation procedures must be independently checked and authorised
- Verify the isolation has been effective by making sure each exposed part is de-energised. Test circuits for dead following the "prove, test, prove" process
- Isolate nearby equipment if there's a chance you might accidently touch it
- Make sure any exposed conductors in your immediate work area are separated and insulated
- Attach your personal lock to the isolator, hasp, lock box, or group lockout board
- **DO NOT** re-energise circuits until all personal locks have been removed.

> **Only work live if there is no reasonable alternative. Attempt fault finding first in a de-energised environment.**

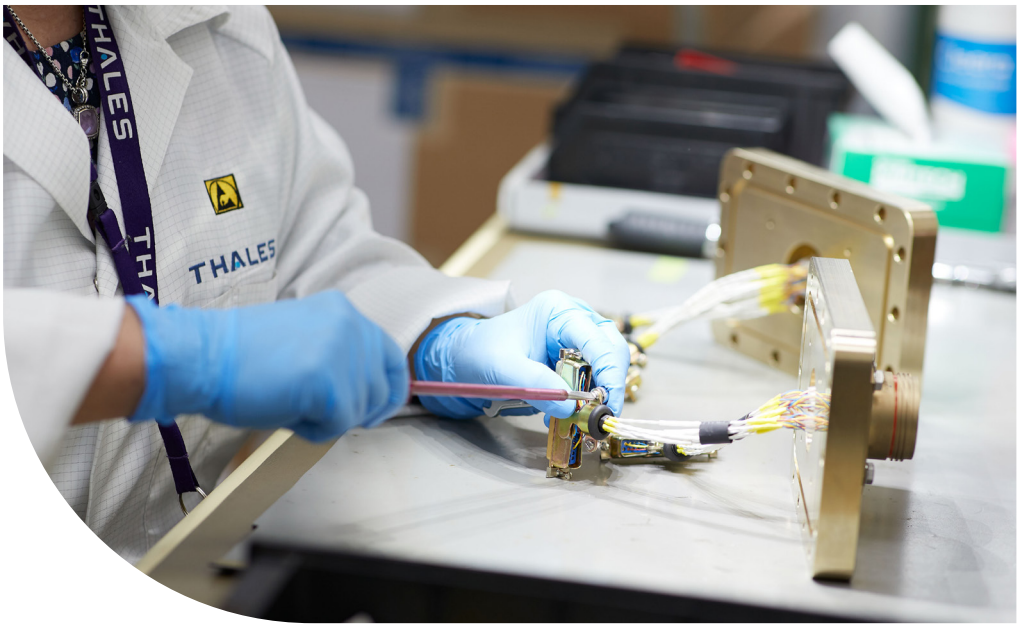
GENERAL ELECTRICAL SAFETY **ELECTRICAL WORKERS**

If you have to work on live circuits

- Get documented approval before you start
- For live fault finding, prepare and implement a task-specific JSEA or SWMS
- Use approved, insulated tools and PPE
- Put up barriers and/or signage
- Make sure a **safety observer** trained in Low Voltage Rescue is present at all times, with a Low Voltage Rescue kit immediately available.

While you are carrying out electrical work

- If you walk away (even for a moment) – **DO NOT** leave energised items or work unattended. Either de-energise ***OR*** put a safeguard in place
- As the job progresses, or after you've left it unattended, test circuits for dead following the "prove, test, prove" process
- If you are concerned about safety – stop work and report the issue to the work area manager and/or your HSE team.



GENERAL ELECTRICAL SAFETY **ELECTRICAL WORKERS**

If you are working in damp conditions

- Use de-humidifiers in high humidity
- Prevent water-generating activities, such as water-jetting or concrete-cutting, and electrical work, including welding, occurring at the same time
- **On a ship:** if possible, ship staff must remove bilge water prior to electrical work
- **Outdoors:** Use “stop work” protocols if rain or lightning could occur.

Inadvertent Contact with Electricity

Critical Risk Standard

Safety is everyone's responsibility

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Introduction

The Thales Australia Critical Risk Standards describe the minimum requirements for controlling each of the critical work health and safety risks that are common to our operations and workplaces. The Critical Risk Standards provide a high level framework for managing health and safety hazards (Figure 1).

Figure 1: Critical Risk Safety Management Framework

As shown in Figure 2, each Critical Risk Standard comprises a set of Critical Controls. For each Critical Control there are:

1. Minimum requirements that must be applied in all Thales Australia controlled operations, and
2. Additional requirements that may be applied based on a site-specific or task-specific risk assessment.

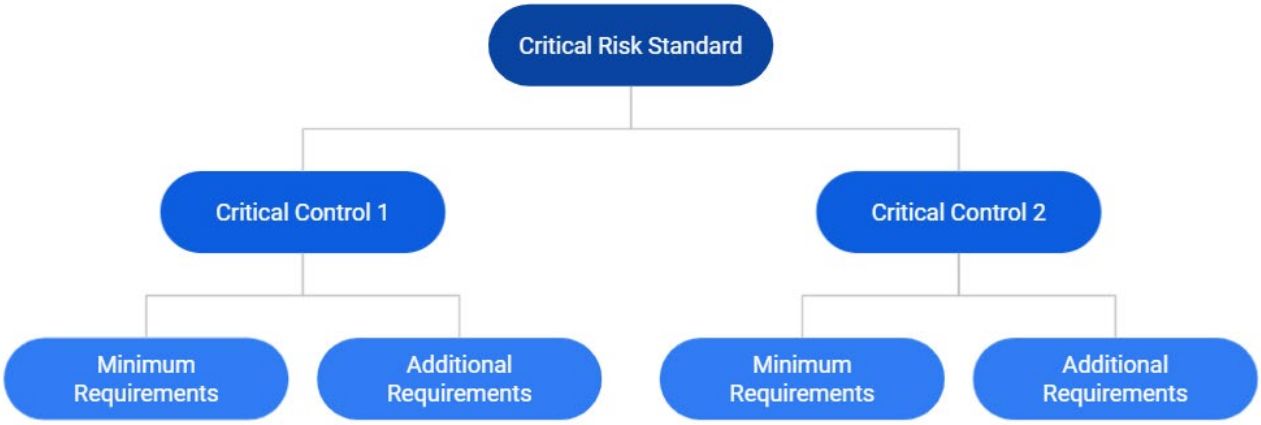

Figure 2 Format of Critical Risk Standards

Scope

This Critical Risk Standard describes the Critical Controls for electrical work and applies to all Thales sites and operations.

Where Thales Australia does not have control of the worksite or is working under a client's safety management system, then:

- The client's standards shall be applied if they are equal or higher, and
- The Thales Australia Standard shall be applied for aspects where the client's system is "silent".

If the client's standards are lower and this presents a material risk then this must be escalated with the Thales Australia Contract Manager.

What if a Critical Control Cannot Be Applied?

If for any reason a Minimum Requirement for a Critical Control cannot be met, then this must be escalated to the Site Manager who must lead a review of the task and risk assessment.

If a Minimum Requirement for a Critical Control has been ignored and omitted, an Incident Report must be created.

Contracted Electrical Work

Contracted electrical workers and their Supervision must be inducted in this Critical Risk Standard.

Contractors are required to meet or exceed this Standard when undertaking work for Thales Australia where there is a risk of inadvertent contact with electricity.

Thales must provide contractors sufficient information to effectively isolate the electrical circuits, including adjacent circuits where required, within their scope of work.

Definitions

The following terms are used in this Risk Standard. Additional definitions can be found in the reference documents.

Critical Risk	A risk where there is potential for a fatality or life-altering injury.
Critical Control	A control that is crucial to preventing the event or mitigating the consequences of the event. The absence or failure of a critical control would significantly increase the risk despite the existence of the other controls.
Minimum Requirements	Aspects of the Critical Control that must be applied in all Thales Australia controlled operations.
Additional Requirements	Aspects of the Critical Control that may be applied based on a site-specific or task-specific risk assessment.
Electrical work	Electrical work is defined as any work that exposes any person or people to a risk category above Risk Class 1 under normal or fault conditions as specified in AS/NZS62368.1:2018. Risk Class 1 (RC1) is specified as: A condition where a risk of exposure to electricity is possible in excess of the identified values below in normal or fault conditions, with normal or exceptional use - 60 Volts and 2 milli Amperes, Direct Current - 30 Volts RMS and 0.5 milli Amperes Alternating Current Risk Categories above RC 1 also extends to work being conducted on energised and non – energised equipment of all types and is not limited to the person conducting the work and can include bystanders. Electrical Risks are further into six categories 1. EL1, EL2, EL3 = Electrical energy 2. PS1, PS2, PS3 = Stored energy or wattage 3. CS1, CS2, CS3 = energy from or that can make a Chemical reaction 4. MS1, MS2,MS3 = Kinetic energy, energy stored in the rotation of a fan for instance 5. TS1, TS2,TS3 = heat stored or generated (things that get hot, also where the heat might remain after power is removed) 6. RS1, RS2, RS3 = Radiated energy All of these are considered “Electrical Safety” Issues and have legal standard as such. They are generated by an electrical energy source or present in electrical equipment. A risk category is assessed at the highest level of risk category present. Examples of electrical work above RC1 can include but not limited to - Disassembly/Reassembly/Repair of a device that is powered from Mains supply - Fault Finding & Testing equipment and devices above the RC1 threshold - Assembly of electrical devices above the RC1 threshold - Product design of electrical equipment in excess of the RC1 threshold - Temporary and Permanent connections/disconnections to any supply in excess of the RC1 threshold Any work that meets the description of Electrical work is to be only carried out by an Electrical worker.

Electrical workers	Includes the following groups: • Thales Australia employees who are licensed electrical workers • Supervisors and managers of licensed electrical workers • Electrical Contractors • All other electrical licence holders conducting electrical work on behalf of Thales Australia. • All electrical associated trades (e.g.: trades undertaken or where a risk assessment refers to this requirement)
Working Live	Working live (energised electrical work) is electrical work carried out in circumstances where the part of electrical equipment being worked on is connected to electricity or 'energised'
Fault Finding	Fault finding means the testing of the operation of electrical equipment to determine if that electrical equipment is safe and working correctly.
Like for like	Replacement of part with the same or equivalent manufacturer's part number or an OEM approved alternative.
SWMS	Safe Work Method Statement
JSEA	Job Safety and Environment Analysis
Complex isolation	A complex isolation involves: • more than 2 isolation points, or • more than 2 energy sources.

Inadvertent Contact with Electricity Critical Controls

The minimum requirements for preventing an inadvertent contact with electricity during electrical and associated work are:

E1	Only trained and competent persons may perform electrical work IAW State Electrical Licensing Standards.
E2	Where isolation is not reasonably practicable, barriers or physical markers must be used to maintain the clearance distances between mobile plant and overhead electrical services.
E3	Electrical isolation and lock out procedures must be in place and completed prior to work commencing on live electrical circuits. Any deviation to this process must be documented and risk assessed.
E4	RCD protection and testing in place for portable electrical equipment not battery operated
E5	Underground and concealed electrical services must be located prior to any excavation or penetration.
E6	Switchboards must be compliant and secured
E7	Maintenance, testing, tagging and visual inspection of electrical equipment and plant conducted and in date.
E8	Implement design, configuration and management of change processes for electrical circuits, plant and equipment.

E1 Training and Competency

Only trained and competent persons may perform electrical work.

MINIMUM REQUIREMENTS

- Each site shall have a system for Verification of applicable qualifications / licenses current for state or territory.
- Each site shall have a system for verifying the qualifications of contracted electrical workers.
- Each site shall have a risk-based system for assessing the initial and ongoing competency of electrical workers.
- Workers who assess the competency of others must be qualified and experienced electrical workers who are authorised in this role by the site's senior leadership.

ADDITIONAL REQUIREMENTS

The following additional requirements should be considered in the risk assessment:

- The qualifications of electrical contractors provided ongoing or routine services should be verified upon site induction and recorded in the contractor management system. The qualifications of electrical workers providing ad hoc services may be randomly checked, for example, at visitor sign-in or during site safety walks.

NOTES AND REFERENCES

- PPE is in place and fit for purpose and employees are trained in the use of PPE.

For further information, refer to;

- 83392531 HSE Verification of Competency Instruction
- 83392508 Thales Electrical Safety Instruction

E2 Overhead Electrical Services

Where isolation is not reasonably practicable, barriers or physical markers must be used to maintain the clearance distances between mobile plant and overhead electrical services.

MINIMUM REQUIREMENTS

- SWMS have been developed and reference electrical risks and controls when applicable. These must include contingencies for Mobile Plant if applicable.
- The separation distance must allow for the maximum reach of the mobile plant, such as cranes jibs, EWP boom extensions, excavator reach etc.
- Power lines where possible are isolated/disconnected and earthed Static controls in place (where not possible project Risk Assessment contains controls for Live Working)
- Safe Approach Distance is known for works around overhead and underground power lines, and communicated in the Safe Systems of Work (SSOW) (e.g. SWMS)

ADDITIONAL REQUIREMENTS

- Where reasonably practicable, arrangements must be made with the owner of the overhead service to isolate the service.

NOTES AND REFERENCES

For further information, refer to:

- 83392126 Electrical Safety Management System Manual
- 83392508 Thales Electrical Safety Instruction

E3 Isolation

Electrical isolation and lock out procedures must be in place and completed prior to work commencing on live electrical circuits. Any deviation to this process must be documented and risk assessed.

MINIMUM REQUIREMENTS

- No work is carried out on live energised equipment greater than >110vDC or 50vAC without an Isolation Permit and Isolations in place. This is to be supported by a documented isolation plan, procedure or SWMS.
- Prior to starting work, each person working on an isolated circuit must:
  - check they are following the correct isolation plan or procedure
  - verify the isolation has been effective, and
  - attach their personal lock(s) to the isolator, hasp, lock box, or group lockout board.
- Circuits must not be re-energised until all personal locks and/or isolation tags have been removed.
- A test for dead is undertaken prior to any work on the isolated circuit(s), routinely as the job progresses, and after any circuit has been left unattended.

ADDITIONAL REQUIREMENTS

The following additional requirements should be considered in the risk assessment:

- A safety observer trained in Low Voltage Rescue must be present when an electrical worker is working on or near live circuits.

NOTES AND REFERENCES

- Persons observing work only do not need to apply a personal lock.

For further information, refer to:

- 83392508 Thales Electrical Safety Instruction

E4 Residual Current Devices

Residual Current Device (RCD) protection and testing is in place for all portable electrical equipment that is not battery operated

MINIMUM REQUIREMENTS

- All static and portable powered equipment is protected by an RCD
- Portable RCDs are suitable for the environment and any units used outdoors are IP56 rated Working on or near live circuits is subject to documented approval.
- RCD equipment is tested at initial installation and throughout the life of the installation and test results are recorded and available on site

ADDITIONAL REQUIREMENTS

NOTES AND REFERENCES

- This control does not apply to naval vessels and other platforms with 110V supplies.

For further information, refer to:

- 83392508 Thales Electrical Safety Instruction

E5 Underground Electrical Services

Underground and concealed electrical services must be located prior to any excavation or penetration.

MINIMUM REQUIREMENTS

- Where a risk exists the location of electrical services is to be confirmed and marked for any excavation
- Mechanical digging methods must not be used within 300mm of a known service.
- A check for the presence of concealed electrical services must be undertaken for any penetration of the lining of walls, floors or ceilings.

ADDITIONAL REQUIREMENTS

NOTES AND REFERENCES

- Services may be located by scanning, potholing, consulting plans, Dial-Before-You-Dig etc.
- Non-mechanical digging methods include hand-digging or hydrovac extraction.
- Penetration includes drilling, cutting or driving fixings.

For further information, refer to:

- 83392508 Thales Electrical Safety Instruction

E6 Switchboards

Switchboards must be compliant and secure

MINIMUM REQUIREMENTS

- Switchboard / distribution board panels are secured
- Warning decals, single line diagrams and signage is applied to switchboards
- Switchboards are numbered and labelled according to site plans / drawings established relevant standards

ADDITIONAL REQUIREMENTS

NOTES AND REFERENCES

IP rated enclosures require routine inspections to confirm water ingress has not been compromised.

For further information, refer to:

- 83392508 Thales Electrical Safety Instruction

E7 Inspection and Maintenance

Maintenance, testing, tagging and inspection of electrical equipment and plant conducted and current.

MINIMUM REQUIREMENTS

- Plant and equipment must be inspected and maintained as required by the OEM and relevant Australian and International Standards to ensure integrity and proper containment of live electrical components.
- Portable electrical equipment must be visually inspected prior to use including sighting of Test and Tag

ADDITIONAL REQUIREMENTS

NOTES AND REFERENCES

For further information, refer to:

- 83392508 Thales Electrical Safety Instruction

E8 Design and Configuration Management

Implement design, configuration and management of change processes for electrical circuits, plant and equipment.

MINIMUM REQUIREMENTS

- The Thales Australia process for safety in design must be applied to any new electrical installation or modification.
- Where “like-for-like” replacement of electrical parts, plant or equipment cannot be achieved, the Thales Australia Management of Change process must be applied.

ADDITIONAL REQUIREMENTS

The following additional requirements should be considered in risk assessments:

- The management of change and risk assessment processes should include the input of end-users where appropriate.
- Management of change must be applied when checking and replacing electrical test equipment to ensure it is fit for purpose.

NOTES AND REFERENCES

- Modification to electrical circuits must only be done with the approval of the design authority and include updating of relevant manuals and circuit diagrams.

For further information, refer to:

- 83392508 Thales Electrical Safety Instruction

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