

Key Risk Area (KRA)

KRA 3.6 Electrical Safety and Isolation

1. Purpose

This document provides guidance on the procedures that must be implemented to protect workers, students, and others from risks associated with working on or in the vicinity of electricity, so far as is reasonably practicable.

2. Scope

This Guideline applies to all health, safety and wellbeing activities of staff, students, visitors (including volunteers and contractors), Council members, and other persons interacting with the University of Newcastle (workers); the operations of staff of University aligned Research Centres and controlled entities; and all activities conducted by or on behalf of the University of Newcastle on and outside of the University's campuses.

3. Guidelines

3.1. Identification and Assessment

IFS will ensure that a risk assessment is conducted by a competent person and recorded in writing for all work involving electrical work, so that risk elimination or control measures can be determined, so far as is reasonably practicable, and in accordance with Guideline [HSG 3.1 Health and Safety Risk Management](#).

Prior to installation of any new electrical equipment a risk assessment will be conducted and any manufacturers, suppliers or contractors involved in the installation will be assessed prior to work commencing for their ability to comply with the safety requirements for the work and the requirements of the Work Health and Safety Regulation 2017 (NSW).

Prior to any task commencing that involves work on electrical plant and equipment, the contractors involved with the work will assess the risks associated with the task and identify the appropriate risk elimination or control measures which will then be incorporated into a Safe Work Method Statement (SWMS) or Job Safety Analysis (JSA). The contractor and all the Workers involved with the task will sign off on the SWMS or JSA.

Risk assessments will consider all energy sources that could potentially impact the contractor's workers undertaking the task and not just the immediate equipment being worked on, for example other equipment operating in the vicinity, overhead or underground electrical lines.

3.2. General Requirements for Electrical Work

IFS or the nominated representative will ensure that contractors conducting electrical work have Safe Work Method Statements (SWMSs), Job Safety Analysis (JSAs) or Standard Operating Procedures (SOPs) specific for the work which have appropriate risk elimination or control measures, and which have been signed off by all workers who will be conducting the work. Refer to Guideline [HSG 6.1 Contractor Health and Safety Management](#) for details on further requirements.

Where it is not reasonably practicable to eliminate the need for electrical work, the need or risk must be minimised so far as is reasonably practicable. Suitable and adequate information, training and instruction in relation to the work will be provided to relevant workers when required by the Work Health and Safety Regulation 2017 (NSW), records of which will be kept for two years. Refer to Guideline [HSG 4.2 Health, Safety and Wellbeing Induction, Training and Competency](#) for competency requirements.

IFS will oversee these general requirements which will apply to managing electrical equipment safely:

- All electrical equipment maintenance and installation will only be undertaken by competent contractors and their workers;
- Each exposed part of electrical equipment is to be treated as if it is energised until it is isolated and it is proven not to be energised i.e. TEST before touch;
- Electrical switchboards and all isolators for de-energising electrical circuits and other energy sources will be labelled;
- All enclosures housing electrical equipment such as substations and switchboards will be fitted with locks and signs to prevent access by unauthorised persons;
- Only authorised competent persons will be permitted to access electrical installations such as substations and switchboards;
- Wherever possible the space around electrical installations and circuits will have sufficient clearance for safe working conditions;
- Sufficient light will be installed in the vicinity of electrical installations and circuits to be able to see clearly all labels and markings;
- IFS will have a plan for the maintenance of electrical equipment and installations which will be compliant with manufacturer's instructions.

3.3. Residual Current Devices (RCDs)

All mains powered portable equipment operating at above extra low voltage will be protected by an RCD. It is preferred that RCDs be part of a fixed installation, e.g. mounted within a switchboard, or integral to a switched socket outlet. Where this is not reasonably practicable with existing installations then portable equipment will be connected to the electrical supply via an approved portable RCD unit.

Portable RCDs will be registered, tested and tagged as with other portable equipment, see [KRA 3.7 Electrical Testing and Tagging](#) for further details. The recommended minimum test frequency for portable and permanently installed RCDs is listed in the table below.

Type of Test	Portable	Fixed
Push button test, and visual inspection	Daily, or before each use, whichever is the longer	Twelve Monthly
Calibration check		Twelve Monthly

3.4. Live Electrical Work

From time to time a competent person may need to be called upon to undertake activities which include working on or near live exposed low voltage electrical equipment. Live work includes:

- Working within 500mm of live exposed electrical conductors;
- Fault finding or testing on live electrical equipment e.g. the process of fault finding on energised equipment, but not working on the live equipment;
- Working on live electrical equipment e.g. replacement of a main circuit board on an energised 415-volt distribution board.

Working on live electrical equipment is a known high risk activity, exposing the person to possible severe burns and / or shock and such work should only be undertaken in the limited circumstances contemplated by regulation 157 of the Work Health and Safety Regulation 2017 (NSW), after other options have been considered. It must also be undertaken only in accordance with a SWMS that has been developed by the contractor in consultation with IFS or the nominated representative which contains (at a minimum) the information contemplated by regulation 161(3) of the Work Health and Safety Regulation 2017 (NSW).

Specific procedures will include (without limitation):

- Having a competent person conduct a risk assessment to identify (amongst other things) whether there is a reasonable alternative way of doing the work;
- Working under a Permit to Work issued by IFS or the nominated representative;

- Where relevant, working with a stand-by person who has the competence and qualifications contemplated by the Work Health and Safety Regulation 2017 (NSW) (including CPR);
- Provision and/or proper use of appropriate tools, equipment and personal protective equipment e.g. insulated tools, cotton clothing; non-conductive footwear, face shields, insulated gloves, non-conductive safety mats.

3.5. Electrical Arc Protection

While working near live electrical equipment for testing and fault finding, a fault current of up to 20 times the rated current of the supply transformer can flow for short times during fault conditions.

Arcs that are produced under these conditions have the energy to cause an explosion and/or melt metallic switchboard cabinets. Arcs may cause severe burns to the skin and/or burns to the face and eyes. Inhaled hot gasses and molten particles can cause serious internal burns to the throat and lungs. Injury can also occur through the impact from flying debris and dislodged components. Over current circuit protection (e.g. RCDs) may not operate in such circumstances.

The safest way to address maintenance and repair situations with electrical equipment is to work only when equipment is de-energised using energy isolation procedures, if this is reasonably practicable. When energy isolation has occurred, no electrical energy is present, no arc flash hazard exists, and no arc flash precautions are necessary.

When working on or near de-energised electrical equipment is not reasonably practicable arc flash protection will be provided. Arc flash protection equipment includes the following:

- For low voltage work, insulated tools will be used;
- Personal protective equipment (PPE) compliant with Australian Standards which may include:
 - Safety hat with face shield;
 - Anti-flash safety glasses/face shield;
 - Insulating gloves;
 - Safety boots;
 - Insulated sheeting;
 - Fire resistant clothing e.g. pants, shirts, overalls.

3.6. Excavations and Ground Penetrations

Excavations and digging can include trenches and ground penetration such as drilling and digging drainage channels. Therefore, it is essential that before work commences, up to date services diagrams will be consulted to identify the existence and location of underground

essential including electrical services. See [KRA 3.4 Excavation and Demolition](#) for the procedures to be followed when excavations and ground penetration is to occur.

3.7. Energy Isolation

Energy sources will be isolated whenever workers are required to perform electrical work on electrical equipment, unless work on energised electrical equipment is specifically permitted by the Work Health and Safety Regulation 2017 (NSW) and this procedure. The following requirements apply and will be overseen by IFS or the nominated representative:

- Isolation will always be undertaken at the energy source and will not rely on control circuitry such as stop switches, interlocks, emergency stops or lanyards;
- Positive isolation will be used i.e. the energy source has been isolated, tested and the isolation is proved to have worked;
- Wherever reasonably practicable, isolation will be secured by the use of a personal locking device which requires a key for removal;
- The equipment will also be tagged at the control panel to indicate it is isolated;
- Prior to work commencing the equipment will be tested by a competent person to verify it has been isolated;
- If a personal locking device cannot be used, a personal danger tag will be used instead by each Worker involved with the job. The danger tag indicates that the person identified on the tag is involved in the work related to the item of equipment and is at risk of personal harm if the equipment is re-energised while the danger tag is in place;
- A personal danger tag will only be removed from the isolation point by the person identified on the tag who placed it on the isolator;
- De-isolation and re-energising of equipment will only occur when all personal locks or danger tags have been removed;
- If for any reason the person identified on a personal danger tag is not available to remove it when the work is completed, it will only be removed by an authorised person at the site after following these actions:
 - Inspecting the area;
 - Making personal contact with the tag owner, in person or by phone; or
 - Seeking reliable information from a third party that the person has left the area.

3.8. Out of Service Tags

An out of service tag is used to indicate an item of equipment is defective or unsafe where there are reasonable grounds for believing this, and that the equipment will not be used until cleared for safe operation by an authorised competent person. The following requirements apply to out of service tags:

- An out of service tag will be placed on all defective or unsafe equipment as soon as the defect or safety issue has been recognised;
- The item of equipment will be disconnected or isolated from its energy supply and will not be used or reconnected while the out of service tag is in place. The tag will remain in place at all times while the equipment is defective, unsafe or being worked on;
- The tag will indicate the date and time that it has been applied and the name of the person who placed the tag;
- An out of service tag will only be removed by a competent person once the defect or safety issue has been corrected.

3.9. Electrical Shock

Whenever electrical work is to be conducted procedures will be in place so that immediate action can be taken if a worker sustains an electric shock during the course of their work.

The following actions will be taken:

- A sufficient number of first aiders will be available whose training includes CPR and pole rescue;
- All workers who have sustained an electric shock will be taken for immediate medical assessment and monitoring to ensure there have been no cardiac or other complications;
- Electrical events will be reported by the contractor to IFS or the nominated representative who will enter the incident into the University's online Incident Management System (IMS). The University will ensure that the contractor reports the incident to the relevant health and safety regulator;
- An investigation will be conducted following all electrical incidents.

3.10. Flexible Electrical Extension Cords

The following risk controls for safe use of flexible extension cords will be implemented:

- Protected from accidental damage, e.g. pedestrians, vehicles, doorways, other pinch points such as being run through walls, ceilings or floors;
- Never used as a substitute for fixed wiring of a structure;
- Only used in continuous lengths without splicing or joining;
- Be visually inspected prior to use and be maintained in good working order;
- A portable RCD must be fitted to a portable extension cord or power tool where there is not a fixed RCD fitted at the relevant power outlet.

3.11. Completion of the Work

On completion of the electrical work, the following actions will be taken:

- The contractor will inspect the area and check for debris and waste;
- The contractor will document the completion time in the Permit, and return it to IFS or the nominated representative;
- IFS or the nominated representative will inspect the work area after the job has been completed to check the area has been left free of debris prior to signing off the Permit to Work and filing it;
- Permit records will be maintained in accordance with document control procedures Guideline [HSG 7.1 Health and Safety Records and Document Control](#).

4. Definitions

In the context of the Health and Safety Management System Framework:

Competent Person	A person who has, through training, qualification or experience, acquired the knowledge and skills to carry out a specified task.
Electrical Equipment	Any equipment that is energised by electricity.
Employer	Means the University of Newcastle (the University).
Energy Isolation	The separation of equipment or circuits from energy sources.
Executive Committee	Consisting of the Vice-Chancellor, the Deputy Vice-Chancellors, the Pro Vice-Chancellors, the Chief Operating Officer, Chief People and Culture Officer and the Chief Financial Officer, the University Secretary and the President of Academic Senate.
Extra Low Voltage	Voltage that does not exceed 50V alternating current (AC).
Leader / Supervisor	Any member of the University who is responsible for supervising staff and/or undergraduate or postgraduate students and/or for leading research projects.
Low Voltage	Voltage that exceeds extra low voltage, but not exceeding 1000V AC.
Portable Equipment	Equipment which is moved in operation, or an appliance which can be easily moved from one place to another while connected to an electrical supply.
Residual Current Device (RCDs)	An electrical wiring device that disconnects an electrical circuit whenever it detects that the electrical current is not balanced between the energised conductor and the return conductor.
Worker	Includes an employee, conjoint, student on work experience, contractor, sub-contractor, and volunteer. A person is a worker if the person carries out work in any capacity for the University or another person conducting a business or undertaking, including work as: <ul style="list-style-type: none"> (a) an employee, or (b) a contractor or subcontractor, or (c) an employee of a contractor or subcontractor, or

	<p>(d) an employee of a labour hire company who has been assigned to work in the person's business or undertaking, or</p> <p>(e) an outworker, or</p> <p>(f) an apprentice or trainee, or</p> <p>(g) a student gaining work experience, or</p> <p>(h) a volunteer, or</p> <p>(i) a person of a prescribed class.</p>
--	--

5. Responsibilities

A comprehensive list of health, safety and wellbeing responsibilities is provided in [HSG 1.2 Roles and Responsibilities Guideline](#).

Specific responsibilities under this Guideline include:

Infrastructure and Facility Services (IFS)

- Ensure that all new plant and equipment will be purchased / supplied with facilities to accommodate a positive locking device. Where reasonably practicable, (e.g. during upgrade works or following a risk assessment), existing installations will be upgraded to accommodate a positive locking device;
- Ensure electrical work is conducted in accordance with this procedure and the requirements of the Work Health and Safety Regulation 2017 (NSW);
- Ensure that contractors who are required to undertake electrical work have the appropriate procedures, equipment and competent persons to undertake the work;
- Ensure that when portable tools are to be used by contractors that RCDs are available to protect the electrical circuit, so far as is reasonably practicable;
- Ensure that portable electrical equipment used by contractors has been tested and tagged (see [KRA 3.7 Electrical Testing and Tagging](#));
- Ensure that where contractors are required to work on energised equipment energy isolation procedures are followed;
- Provide information in relation to affected locations where electrical work is to be conducted to ensure the necessary actions are taken to protect workers, students and other persons, so far as is reasonably practicable.

Leaders and Supervisors

- Ensure that risk elimination and control measures are followed when they are implemented to protect workers, students and any other persons when electrical work is to be conducted, so far as is reasonably practicable.

Health, Safety and Wellbeing Team

- Provide professional input regarding electrical work when required; and
- Support IFS in risk assessment and review of electrical work.

6. References & Related Documents

The following documentation is referenced in, or applicable to this Guideline:

[HSG 1.2 Roles and Responsibilities](#)

[HSG 3.1 Health and Safety Risk Management](#)

[HSG 4.2 Health, Safety and Wellbeing Induction, Training and Competency](#)

[HSG 6.1 Contractor Health and Safety Management](#)

[KRA 3.4 Excavation and Demolition](#)

[KRA 3.7 Electrical Testing and Tagging](#)

[IFS Permit to Work Procedure](#)

[SafeWork NSW Managing Electrical Risks in the Workplace Code of Practice](#)

7. Amendment History

Version	Date of Issue	Approval	Section(s) Modified	Details of Amendment
1	September 2015	Director, People and Workforce Strategy	-	Original version
2	October 2023	CPCO	All	1. All sections reviewed for legal compliance 2. Updated content in all sections 3. Added new/renamed Related Documents 4. Added Amendment History 5. Amended document control header and footer

8. Appendices

Nil