

Electrical Safety Policy

Originator name:	Principal Electrical Engineer
Section / Dept:	Estates & Facilities Management
Implementation date:	February 2016
Date of next review:	January 2019
Related policies:	
Policy history:	Supersedes previous E&FM document

Version History

Version	Author	Revisions Made	Date
0.7	Clive Batchelor	Draft 0.7 submitted for comments	Dec 2015
0.8	Clive Batchelor	Draft 0.8 revised to policy & guidance	Jan 2016
0.9	Clive Batchelor	Draft 0.9 with input from Faculties	Feb 2016

Approval History

Equality Analysis

Version	Reviewed by	Comments	Date
1	Equality & Diversity Staff Member's Name	Low equality impact - compliant	4 February 2016

Committee Sign Off

Version	Committee Name	Date of Sign Off
1	Health & Safety Committee	12 February 2016
1	Executive Board	18 March 2016

1	Introduction
1.1	Purpose
1.1.1	Electricity is the most useful source of energy throughout the world for lighting, power and data, and is used safely by millions of people on a daily basis. However if not managed correctly, or misused, it presents a serious hazard that can cause injury or death. This document sets out the University policy for electrical safety.
1.2	Scope
1.2.1	The use of electricity is common to Estates & Facilities, Academic Faculties, staff, contractors, students and visitors to the University. Therefore this Electrical Safety policy is applicable in part to everyone using electrical equipment in the University.
1.2.2	This policy includes arrangements for electrical power supplies, distribution, and connection of hard-wired installations including machinery and electrical equipment; selection and procurement of electrical equipment; equipment designed and built in the University; student projects; electrical equipment in flammable and explosive atmospheres; visual inspection and testing of portable appliances; and personal equipment and their use in residences.
1.3	Equality Analysis
1.3.1	<p>The University is strongly committed to equality of opportunity and the promotion of diversity for the benefit of all members of the University community. Safe use of electricity is common to all persons of any nationality, gender, age, race, disability, sexual orientation, religion / belief, pregnancy / maternity / paternity, or marriage / civil partnership.</p> <p>For overseas students bringing personal equipment to use in the University, advice is given how to check that the equipment is suitable and correctly marked for use in the UK.</p> <p>Persons with colour blindness must seek assistance when working with colour coded wiring or components in laboratories.</p>
1.4	Definitions
1.4.1	<p>High Voltage (HV) – Voltages over 1,000 Vac or 1,500 Vdc. The University HV networks are supplied at 11,000 volts ac 3-phase.</p> <p>Low Voltage (LV) – Voltages below 1,000 Vac or 1,500 Vdc. The University LV systems are supplied at 415 volts ac 3-phase, and 230 volts ac single phase.</p> <p>Extra Low Voltage (ELV) – Voltages below 50 Vac or 120 Vdc.</p> <p>Reduced Low Voltage (RLV) – 110 Vac centre tapped to earth (55 Vac to earth).</p> <p>Portable Appliance – any portable, transportable or moveable appliance, machinery, or research equipment plugged in to the electrical distribution system through a socket outlet.</p>
1.4.2	<p>Competence, Training and Briefing</p> <p>Competence is based upon training and is equipping staff, students (and others where the University has a duty-of-care) with relevant skills and knowledge to deal appropriately with a given health and safety situation.</p> <p>Briefing is informing such persons of relevant knowledge in relation to health and safety.</p> <p>Training and briefing will be made available in a range of formats according to the needs of the trainee and different groups of staff, students and others.</p>

1.4.7	<p>Accessibility</p> <p>The duty to make reasonable adjustments, as far as possible, to ensure that all staff and students (and others where the University has a duty-of-care) with a disability have equal access to everything they need to do a job or studies as those persons without a disability.</p>
1.5	Legislative Context
1.5.1	<p>The Electricity at Work Regulations came into force on 1st April 1990 under the Health and Safety at Work Act 1974. The Regulations impose duties in respect of all electrical systems, equipment and conductors. The Regulations require all electrical equipment and systems to be designed, installed and maintained to prevent danger “so far as is reasonably practicable”.</p> <p>The Electricity at Work Regulations cover <i>all</i> electrical apparatus whether portable or fixed, and of any voltage or current.</p>
1.6	Health & Safety Implications
1.6.1	<p>This forms part of the range of Health and Safety Policies created to manage the health and safety of all relevant stakeholders.</p>
1.6.2	<p>The effects of electric injuries are well documented in HSE guidance. A brief summary follows.</p> <ul style="list-style-type: none"> • Electric shock resulting from current flowing through the body can cause muscular spasm, heart stoppage, breathing paralysis, and deep burns. • Overheating cables, equipment or appliances can cause burns, fire or explosion. • Arcing can cause very rapid UV skin burns and blindness. • Uncertified electrical equipment in hazardous areas may cause ignition of flammable or explosive atmospheres. • Systems and machinery can operate erratically or run out of control due to electrical faults or electromagnetic interference, causing physical injury. • Exposure to radio-frequency electrical energy can lead to deep-seated heating of body tissue, with resulting scars or organ damage <p>The extent of electrical shock damage to the body depends on a number of physiological factors and environmental conditions however, higher voltages present much greater risk of serious injury or death.</p>
2	Policy
2.1	Principles
2.1.1	<p>The High Voltage networks shall be managed by E&FM electrical engineers in accordance with the HV Management Plan, with all work carried out by HV Approved Contractors. High Voltage systems must only be switched or worked on by Authorised Persons and Competent Persons.</p>
2.1.2	<p>Low voltage fixed wiring installations shall be designed, installed and maintained in accordance with the statutory Regulations, British Standards, the Wiring Regulations, and established practice of the UK electrical industry. Fixed wiring installations must only be worked on by qualified electricians and engineers.</p>
2.1.3	<p>Electrical equipment procured by the University for standard use in academic buildings and residences shall be CE marked, compatible with the UK supply, and comply with the Electrical Equipment (Safety) Regulations 1994. Specialist equipment for use in explosive atmospheres, radiology and medical purposes, and lifts shall be supplied in compliance with their particular Regulations. Bespoke or</p>

	innovative equipment for research which falls outside of international or national standards must nonetheless comply with the fundamental safety requirements of the Regulations.
2.1.4	Electrical equipment made, repaired or modified in the University must comply with the Electrical Equipment (Safety) Regulations 1994 and its design, safety and operation documented and certified safe for use by a competent electrical engineer.
2.1.5	Student projects encompassing electrical power are supervised by Academic Tutors and Laboratory Managers. Projects are normally set at safe extra low voltage levels but any potentially hazardous projects will be subject to risk assessment.
2.1.6	Portable appliances shall be inspected and tested according to HSE and IET guidelines. Fixed electrical equipment in academic buildings, plant rooms and residences shall be maintained in accordance with a planned preventative maintenance routine.
2.1.7	Power tools for use on construction sites shall either be cordless or supplied from a reduced low voltage supply.
2.2	Procedures
2.2.1	<p>High voltage networks</p> <p>The University is supplied at High Voltage and the 11kV distribution network extends to substations in Stag Hill and Manor Park. System details and drawings of the HV distribution systems are held and maintained by E&FM.</p> <p>The HV networks are managed by the University electrical engineers in accordance with the HV Management Plan. Inspection and testing of the 11kV distribution system and sub-stations is carried out by specialist HV contractors appointed by the University. This contract is managed by Estates and Facilities Management.</p> <p>HV substations are identified with warning notices and kept locked by E&FM. Access to substations is controlled by Permit to Access or Permit to Work. Only the Principal Electrical Engineer, Authorised Persons and engineers of the HV Approved Contractor are allowed into the HV substations unless accompanied. High Voltage systems must only be switched or worked on by HV Authorised Persons and Competent Persons.</p>
2.2.2	<p>Fixed distribution systems</p> <p>The low voltage fixed distribution systems at the University are designed, installed and maintained in accordance with BS7671, the IET Wiring Regulations. E&FM are accredited by the National Inspection Council of Electrical Installation Contractors as a conforming body for inspection and testing, with the Principal Electrical Engineer as the principal duty holder and a Qualified Supervisor who carries out inspections and maintains the documentation. The frequency of inspection and testing is carried out to Guidance Note 3 of the Wiring Regulations for educational establishments every 5 years. The schedule of testing and the test records are held by E&FM.</p> <p>LV substations are identified with 415V warning notices, kept locked by E&FM and access controlled by Permit to Work. Fixed wiring installations must only be worked on by qualified electricians and engineers.</p> <p>Hard-wired plant, machinery and equipment is permanently connected to the electrical supply at 415 volts ac 3-phase. All plant and machinery shall be fitted with local isolators as required in the Wiring Regulations.</p>

<p>2.2.3</p>	<p>Portable appliances</p> <p>Portable appliances must be formally inspected and tested at intervals and must display a test label indicating the test date. New appliances should be visually inspected and labelled before being put into service.</p> <p>The frequency of testing of portable appliances varies according to risk assessment depending upon the class of equipment and the environment in which it is used; in accordance with Table 1 of the Code of Practice for In-service Inspection & Testing of Electrical Equipment, HSE guidance HSG107 Maintaining Portable Electrical Equipment, and INDG236 Maintaining Portable Electric Equipment in Low-risk Environments.</p> <p>Portable appliance testing must be carried out by specialist approved contractors, staff or co-opted students who have attended recognised PAT training. PAT testers require a level of competency set out in the University of Surrey document Electrical Safety Guidance and Best Practice.</p> <p>Any portable appliance that fails either a visual inspection or a formal test must be disconnected, withdrawn from service, marked as 'Unsafe – Not to be used', and either made safe by a competent electrician or disabled and disposed of according to University waste disposal requirements.</p> <p>E&FM carry out portable appliance testing for central departments and residences. Faculties arrange for portable appliance testing of their own equipment.</p>
<p>2.2.4</p>	<p>Personal equipment on campus and in residences</p> <p>The University recognises that students bring their own laptop computers, tablets, and mobile phones chargers onto the campus. There is no objection to sensible use of personal equipment providing it conforms to EU standards and is compatible with the UK 230V, 50Hz electrical supply.</p> <p>The requirements for portable electrical appliances brought into residences by residents are set in the Residents Guide incorporating the Conditions of Residence. Students personal equipment is not considered to be within the workplace and not PAT tested by the University.</p>
<p>2.2.5</p>	<p>Procurement of equipment</p> <p>Standard electrical equipment procured or leased new shall be CE marked for use within the EU, compatible with the UK supply voltage and frequency, and comply with the Electrical Equipment (Safety) Regulations 1994.</p> <p>Specialist equipment for use in explosive atmospheres, radiology and medical purposes, and lifts shall be supplied in compliance with their particular Regulations.</p> <p>Bespoke or innovative research equipment, for which international or national standards do not yet exist, must nonetheless comply with the fundamental safety requirements of the Regulations. The University in conjunction with suppliers of the equipment must satisfy themselves as to the compliance of the electrical equipment with the Regulations. Second hand equipment does not necessarily have to be CE marked.</p>
<p>2.2.6</p>	<p>Design, build, repair and modification</p> <p>Electrical equipment, apparatus or devices made in the University must comply with the Electrical Equipment (Safety) Regulations 1994, but does not require CE marking for use within the University. The design, safety and operation of the equipment must be documented, reviewed and certified safe for use by a competent electrical engineer. Equipment under 50 Vac or 75 Vdc is exempt.</p> <p>Repairs carried out in the University must restore the equipment to its original safety standard, with particular attention to insulation, electrical protection (fuses etc) and earthing. Where possible repairs should be carried out in dedicated workshops by</p>

	<p>competent persons.</p> <p>Modifications to equipment need to be assessed by a competent engineer to determine whether the modifications have introduced risks or hazards which were not present in the original design, and act accordingly.</p>
2.2.7	<p>Student projects</p> <p>Student projects using or generating electrical power are supervised by Academic Tutors and Laboratory Managers. Any projects above safe extra low voltage levels or with particular hazards such as exposed parts, stored energy, radiated electromagnetic fields, or emitting laser energy shall be subject to a risk assessment by a competent electrical engineer and/or radiation specialist.</p>
2.2.8	<p>Electrical equipment in Hazardous Areas</p> <p>Hazardous areas (where an explosive atmosphere may occur due to flammable gases or volatile liquid vapours) are classified according to BS EN 60079. Electrical equipment for installation or use in hazardous areas must conform to the necessary standards Ex i (intrinsically safe), Ex d (flameproof), or Ex n (low temperature non-sparking) according to the area classification Zone 0, Zone 1 or Zone 2. Hazardous area installations must be approved by a competent electrical engineer.</p>
2.2.9	<p>Construction site tools</p> <p>The preferred system for use on construction and refurbishment sites around the University is to use cordless battery powered tools, or those that operate from a reduced low voltage supply with automatic disconnection comprising a 110 Vac centre-tapped to earth (CTE) supply transformer so that the maximum voltage to earth does not exceed 55V.</p>
2.2.10	<p>Maintenance</p> <p>Electrical equipment in academic buildings is maintained by the Faculties. HV and LV distribution equipment, plant and machinery in plant rooms is maintained by E&FM.</p> <p>Lighting, power and domestic equipment such as ovens, hobs and irons in the University residential blocks are maintained by E&FM. The frequency of maintenance and inspection & testing routines are defined in a planned preventative maintenance system.</p> <p>Damaged or defective equipment must be repaired or replaced. Old or obsolete equipment will be subject to planned replacement based on age and condition, as determined by a competent electrical engineer.</p>
2.2.11	<p>Disposal</p> <p>Equipment must be disposed of in accordance with the EU Waste Electrical and Electronic Equipment (WEEE) Directive and where applicable the Hazardous Waste Directive. Refer to the University H&S document A – Z guidance for Hazardous Waste Management for guidance on disposal of electrical goods.</p>
3	Governance Requirements
3.1	Responsibility
3.1.1	<p>Estates and Facilities</p> <p>Estates and Facilities Management (E&FM) are responsible for power supplies, distribution, and connection of hard-wired installations including machinery and electrical equipment throughout the University. E&FM specify new electrical installation projects, and operation and maintenance of existing installations and equipment.</p>

	<p>The Director and Deputy Directors of E&FM are accountable for ensuring that their staff and contractors understand what they can do, and must not do, in relation to electrical distribution and electrical equipment and that staff who carry out electrical work are competent to do so.</p> <p>The Principal Electrical Engineer is the University's designated competent person for electrical supply and distribution systems and for equipment connected to these systems.</p> <p>The Principal Electrical Engineer sets the required level of competency for those working in electrical systems and inspection & testing. In addition the University has appointed named persons as competent engineers for operational control of these systems.</p>
<p>3.1.2</p>	<p>Faculties</p> <p>The Faculties are responsible for provision of electrical equipment and PAT inspection and testing within their faculty premises and laboratories. Faculties and Directorates are responsible for provision of electrical equipment and PAT testing in their premises. Responsibilities for these are outlined in the local arrangements.</p> <p>The Faculties also have competent electrical engineers among their academic and technical staff who supervise student projects; design, build, repair and modify equipment; and carry out PAT testing.</p>
<p>3.1.3</p>	<p>HV Management</p> <p>The Principal Electrical Engineer is responsible for authorising works to the University's HV and LV electrical infrastructure, equipment and systems, and appointing staff Authorised Persons. The Authorising Engineer is the primary contact with the District Network Operator (UK Power Networks).</p> <p>Authorised Persons are qualified electrical engineers with the necessary technical knowledge, training and experience to switch HV and LV systems and work safely on them. The University AP's are responsible for the practical implementation, management and operation of switching HV and main LV supplies in the University Estates and Buildings.</p>
<p>3.1.4</p>	<p>HV Approved Contractor</p> <p>Operation, maintenance and switching of the University HV networks is contracted to a specialist HV Approved Contractor. Any activity involving High Voltage networks requires strict safety rules for switching, isolation and working.</p> <p>The Approved Contractor shall work to their own safety rules and procedures at all times.</p> <p>The University Principal Electrical Engineer and HV Approved Persons may authorise works to proceed, but control of safety during High Voltage works is solely held by the Approved Contractor and rests with their AP's and Senior AP's.</p>
<p>3.1.5</p>	<p>Staff, Students and Visitors</p> <p>In normal working conditions, mains socket outlets may be used safely by staff, students and visitors in the same manner as in their homes. However all users in the workplace and residences have a duty to be vigilant and report any wear or damage to plugs, sockets, switches, flexible power cords and equipment which may expose people to danger.</p> <p>Staff and students using items of personal equipment on the campus are responsible for ensuring that they comply with European and British Standards and they are in a safe condition to use.</p>

3.2	Implementation / Communication Plan
3.2.1	<p>The policy will be made available on the University Policy Website and Health and Safety pages. Electrical Safety needs to be communicated and adopted by Facilities Managers, E&FM staff electricians and engineers, and their electrical contractors.</p> <p>Residential Managers and Faculties should promote electrical safety among staff and students and encourage them to report any faults which may cause danger.</p> <p>Electrical faults should be communicated by telephone in emergency or via the E&FM portal. Injuries should be reported to Security for first aid or emergency services.</p>
3.3	Exceptions to this Policy
3.3.1	<p>Electrical supply assets in the University belonging to the District Network Operator (UK Power Networks) remain their own property, under their control, and this policy does not apply.</p>
3.4	Supporting documentation
3.4.1	<p>Electricity at Work Regulations</p> <p>The Electricity at Work Regulations 1989 came into force on 1st April 1990 and are issued under the Health and Safety at Work Act 1974. The Regulations impose duties on persons (duty holders) in respect of systems, electrical equipment and conductors, which includes fixed installations and other equipment such as portable appliances. The Regulations make no specific stipulations, but require all systems to be constructed, operated and maintained to prevent danger so far as is reasonably practicable.</p>
3.4.2	<p>Wiring Regulations</p> <p>BS 7671:2008 Incorporating Amendment 3:2015, 'The Wiring Regulations', published by the IET and currently at 17th Edition. There is a long-established precedent that compliance with the Wiring Regulations may be used to claim compliance with the statutory requirements in law. These regulations set out requirements for design, testing and inspection of new LV installations, alterations and extensions, and periodic inspection and testing in maintenance.</p>
3.4.3	<p>Electrical Installation Condition Report</p> <p>The Code of Practice for In-service Inspection and Testing of Electrical Equipment published by the IET, currently 4th Edition (2012) applies to the fixed wiring installation in buildings. Recommended frequency of inspection and testing of portable electrical appliances is set out in Table 1. The inspection and testing activity for each building or facility is encapsulated in an Electrical Installation Condition Report.</p>
3.4.4	<p>Portable Appliance Testing</p> <p>HSG 107 Portable Appliance Testing provide guidance for managers, electricians and users for maintaining and inspection and test of portable, movable or transportable electrical equipment to prevent danger. Examples include power tools, office and IT equipment, cleaners equipment, domestic appliances and similar equipment used in laboratory, teaching, faculty and construction environments. The IET Code of Practice for In-service Inspection & Testing of Electrical Equipment provides further practice guidance.</p>
3.4.5	<p>HSE Guidance</p> <p>HSR 25 Guidance on the Electricity at Work Regulations – 2015. HSR 25 sets out the Regulations and gives technical and legal guidance on them to highlight the</p>

	nature of the precautions in general terms and help dutyholders achieve high standards of electrical safety in compliance with the duties imposed.
3.4.6	<p>Electrical Equipment Safety</p> <p>The Electrical Equipment (Safety) Regulations 1994 applies to manufacture of electrical equipment designed or adapted for use in the workplace between 50 and 1,000 volts ac, or 75 and 1,500 volts dc. This would apply for example to apparatus made in-house for laboratory use in research, testing or teaching. Separate regulations apply for equipment for use in an explosive atmospheres and equipment for radiology and medical purposes.</p>
3.4.7	<p>Hazardous Areas</p> <p>Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 1996 apply to all equipment intended for use in explosive atmospheres, and certification ensures that the equipment or protective system is fit for its intended purpose.</p>
3.4.8	<p>Electromagnetic Fields</p> <p>The EU Electromagnetic Fields Directive (2013) sets out minimum requirements for exposure of workers to risks from electromagnetic fields. HSE is working to develop UK Guidance for 1st July 2016.</p>
4	Designated Post Holders
4.1.1	<p>The following persons are the appointed Electrical Engineers for E&FM:</p> <p>Principal Electrical Engineer: Clive Batchelor (HV Authorising Engineer)</p> <p>Electrical Engineer: Michael Harris (HV Authorised Person)</p> <p>Engineering Maintenance Asst. Electrical: Kevin Kerr (HV Authorised Person)</p>
4.1.2	<p>The following persons are the appointed NICEIC Duty Holders for the University:</p> <p>NICEIC Principal Duty Holder: Clive Batchelor</p> <p>NICEIC Qualified Supervisor: Kevin Kerr</p>
4.1.3	<p>The Approved Contractor currently appointed to carry out operation and maintenance of the high voltage distribution system and sub-stations is:</p> <p style="text-align: center;">UK Power Networks Services</p> <p>The Approved Contractor provides HV Authorised Persons, Senior Authorised Persons and Competent Persons and operates to their own procedures for working on HV networks.</p>

Equality Analysis Template

for all University Policies

Organisational Sign Off by Equality and Diversity Team:	NAME OF POLICY: <u>ELECTRICAL SAFETY POLICY</u>
	<input checked="" type="checkbox"/> Low Equality Impact (Minor input to Policy to reflect equality considerations)*
	<input type="checkbox"/> Medium to High Equality Impact (Equality Analysis template completed)
	<input checked="" type="checkbox"/> Sign off received
	Signed off by: <u>Jo McCarthy-Holland</u>
Position: <u>Equality Adviser</u>	
Date: <u>4/02/16</u>	

Note: This Template must be used in conjunction with the associated Equality Analysis Guidance Notes, which can be accessed from the [Equality and Diversity Website](#)