

ESTATES SUPPORT SERVICE
Project Briefing Document
Section 3 – Electrical Services design guide and specifications

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1.0 Communications generally

All communications by designers with University personnel must be agreed with the Estates Project Manager. Where references are made in this document regarding contact with Estate personnel, the Estates Project Manager will set up meetings and co-ordinate at each relevant stage of the RIBA Plan of Work.

1.1 Newcastle University Low Voltage Electrical Safety Rules.

The University operates a set of Safety Rules that should be applied to work on all Low Voltage systems at Newcastle University. The University holds a register of authorised personnel who may work on or supervise others to work on the University LV systems.

Specialist contractors, typically those who are registered with regulatory bodies such as the National Inspection Council for Electrical Installation Contracting, NICEIC, may be allowed to carry out work on the University LV systems under their own rules procedures and specific risk assessment procedures. This will be authorised by either the Electrical Duty Holder or authorised personnel.

2.0 Electricity at Work Regulations 1989 (SI 1989/635) as amended.

The University and all companies/persons that are employed by the University to design, construct, operate and maintain electrical installations and equipment have duties imposed on them under the above mentioned act. The University will ensure that all companies/persons have the necessary levels of competence to carry out the required category of works. In turn all companies shall ensure that their employees have the necessary levels of competence to carry out the required category of works. Reference should be made to appropriate guidance, such as may be found in national, international, reputable foreign and harmonised or industry standards and codes of practice or HSE guidance, or they should seek expert advice. Only those who have both the knowledge and the experience to make the right judgements and decisions and the necessary skill and ability to carry them into effect should undertake work subject to these Regulations.

3.0 EMC Directive 2014 and UK's EMC Regulations 2006.

The EMC Directive and UK's EMC Regulations 2006 require that all apparatus and electrical installations as defined shall be designed so as not to be unduly influenced or cause interference to other apparatus or equipment.

Appropriate attention should be given to the design, installation and management to ensure that the regulations and Directive are adhered to.

4.0 Electrical Services Design and Specification guide

4.1 Lighting Design

The university has a variety of spaces and environments within the campus teaching and research buildings, student accommodation and other discrete locations and externally across the public realm, sporting and general circulation spaces. Consequently designers must take into account the differing spaces and design the particular lighting installation to with due regard to the application and brief provided.

The overarching principals that the designer must adhere to are outlined below.

1. Use recognised design principals and guidelines, in particular utilising guidance and parameters within the Society of Light and Lighting (SLL) guides.
2. Achieve compliance to Part L of the building regulations
3. Take a whole life cost approach to installation of energy saving technologies (including digital lighting controls systems, presence detection, daylight controls etc.)
4. Utilise LED luminaires except by written agreement of the Energy Manager
5. Presence detection shall be provided in all communal spaces including open plan offices, corridors, stairwells, toilets, common rooms and all teaching spaces including lecture theatres.
6. Day lit spaces should utilise lux level control, preferably daylight dimming or alternatively by switching off luminaires within the day lit zone(s).
7. Demonstrate value for money within selection of manufacturers and components.
8. Particular attention should be paid to providing value for money through the selection of luminaires that will contribute to the overall campus wide maintenance strategy. Early discussions with the Head of Maintenance prior to detailed design shall be held.
9. Lighting shall be designed to ensure that colour, light and contrast is utilised to enhance the inclusive environment in buildings with particular reference to partially sighted and visually impaired persons.
10. All accommodation schemes shall include a facility for activation of lighting only by presenting door access card.

11. Full commissioning including appropriate training and handover documentation shall be provided.

The proposed lighting design schemes, including calculations and plots, details of manufactures luminaires and drawings, must be submitted to the Head of Maintenance for consultation.

4.1.1 Specific requirements.

4.1.1.1 Lecture Theatres.

Lighting systems must be dimmable and controllable from the designated teaching position within the room, as well as a logical two way switching sequence to allow entrance to and egress from the room. Clear engraving of each particular lighting control must be provided as well as a local mimic diagram. There is currently a standard system for controlling lighting within Lecture which must be maintained in all new installations.

4.1.2 Emergency Lighting.

Static Inverter emergency lighting units shall be used as the energy source in all cases of new emergency lighting installations. LED luminaires are to be used as lighting emitters.

Where there is an extension to an existing system utilising central battery or self-contained systems consultation with the Head of Maintenance must be carried out at an early stage to determine the overall strategy for the building as a whole.

The emergency lighting system shall be utilised to provide reassurance lighting within corridors and other circulation areas as an addition to the existing lighting controls.

Designers should ensure they consult the maintenance provider currently nominated to carry out planned maintenance on University emergency lighting systems. The Head of Maintenance can provide details of the current provider.

4.1.3. Starwells

Specific care should be undertaken in positioning of luminaires within stairwells to ensure that maintenance can be easily undertaken without access arrangements.

4.2 Electrical Distribution.

4.2.1 General Electrical Information

1. All outlets will be labelled with their circuit identification number. All cables will be labelled with their circuit identification using PVC
2. Ring cable markers at every point of connection.
3. All means of isolation will have an engraved label fixed by screws.
4. Redundant circuits are to be stripped back to the origin along with the relevant containment .
5. New distribution boards should be numbered. Contact Estates Project Manager to advise on suitable references (avoiding, for example, default numbers such as P1 and L1).
6. Where equipment requires a specialist service visit, the first year maintenance contract shall be included in the installation costs. The end user will also be informed that they may be responsible for the ongoing service charges.
7. All tripping devices will be of the manual re-set type, auto re-set will not be considered.
8. All distribution boards must be metered. Guidance is provide within the Metering specification, section 9, of this document.

The University owns and operates its electrical HV ad LV distribution system on the main campus from the point of connection to the supply authority 33KV distribution network. All applications for connection, modifications and change in demand must be made to the Head of Maintenance which will be considered in consultation with the Energy Manager giving due regard to the load profile and load flow to the network. There are however a number of buildings which are connected to Utility Company distribution networks and enquiries for connection, modification and cahnegs in dmeinad must be made in conjunction with the relevant supply authority and the Head of Maintenance/Energy Manager.

Electrical distribution shall be designed and installed in accordance with all appropriate statutory regulations and applicable codes of practice. The design and installation methods shall be appropriate taking into account the location, accessibility, maintainability, characteristics and environmental conditions. Due to the varying uses and complexity within the University the following list shall be considered the minimum wiring standards applicable. In all cases the exact installation shall be agreed with the Head of Maintenance.

1. *Industrial Installations i.e. Mechanical Workshops, Plant rooms or areas with a high risk of mechanical damage.* All final circuit wiring will be of single cables contained within galvanised steel conduit.
2. *Domestic Installations i.e. Study bedrooms, flats etc.* Protected twin and earth may be used, the protection may either be by positioning, contained within the building fabric, or by the use of plastic trunking utilising propriety fittings.

3. *Laboratories (excluding containment level 3 rooms)*. All final circuit wiring will be of single cables contained within trunking or conduit utilising propriety fittings.
4. *Other rooms with ceiling voids or suspended ceilings*. Twin and earth cable may be installed provided it is contained within open basket and is neatly clipped and dressed in according to the relevant sections of the IEE Regulations. The connections to ceiling roses, "Klick" (or similar and approved) boxes or any other fittings, where the twin and earth cable is required to be installed outside of the basket must be of the shortest length possible to minimise the risk of mechanical damage.
5. *Rooms with raised access floors*. Twin and earth cable may be installed provided it is contained within open basket and is neatly clipped and dressed in according to the relevant sections of the IEE Regulations. The connections to ceiling roses, "Klick" (or similar and approved) boxes or any other fittings, where the twin and earth cable is required to be installed outside of the basket must be of the shortest length possible to minimise the risk of mechanical damage.
6. Medical School Installations are generally single cables drawn into galvanised steel conduit.

4.2.2 Cable Sizing.

With the exception of the Medical School all cables shall be sized in accordance with the appropriate regulations, standards, and codes of practice. In the case of the medical school the following shall apply;

Ring main circuits, minimum cable size to be 4mm²

Lighting circuits, minimum cable size to be 2.5mm²

4.2.3 Electrical Testing

Prior to a Distribution Board or Sub-circuit being re-energised the following tests and inspections will be carried out as per BS7671 Requirements for Electrical Installations. Copies of test certificates must be provided to the Head of Maintenance prior to areas being put back into use.

4.2.3.1 Before the supply is connected

1. Visual inspection of the installation
2. Continuity of protective conductors, main and supplementary bonding.
3. Continuity of ring final circuit conductors, including protective conductors.

4. Insulation resistance.
5. Polarity (by continuity methods).
6. Earth electrode resistance (where applicable).
7. Statement of earth loop impedance at source of connection and prospective short-circuit current .

4.2.3.2 With the supply connected

1. Re-check of polarity.
2. Earth fault loop impedance.
3. Functional testing.
4. Prospective fault current measurement, if applicable.

4.3 Data and Telecommunications Network

The University data and telecommunications network is managed by the NUT. All new installations, modifications and additions including provision and system architecture must only be undertaken following consultation at all stages of the design process with the Telephony & Cabling Manager.

Containment for the installation must be suitably sized, exclusive and co-ordinated with the overall electrical installation.

Accessories such as data outlet plates must match the installed or proposed electrical scheme of accessories.

It is important that the requirements of NUT are fully understood throughout the design and installation process and an outline technical specification detailing specific University requirements is contained within appendix A of this document. This specification must be further developed in consultation with NUT to ensure that a full specification of works is provided.

4.3.1 Wireless Access Connectivity.

As part of the Universities requirement for the Digital Campus, wireless access points should be installed within all new internal and external

developments. The installation shall provide a seamless connection throughout the development and to adjacent spaces. Determination of requirements shall be undertaken by site and predictions surveys in consultation with the ISS Telephony and Cabling manager who will provide details of client usage. All costs associated with the installation of wireless access including that of active network equipment should be undertaken as part of the project.

4.4 Audio Frequency Induction Loops (AFILS)

Induction loops within teaching spaces are maintained by the NUIT Audio visual services, all other systems are maintained by the project sponsor.

In all cases any new installations, modifications and additions must only be undertaken in consultation with the ESS accessibility adviser and the AV technical team from NUIT. See Appendix B for further details.

4.5 Fire Alarm Systems

4.5.1 General

All modifications, additions and alterations to fire alarm systems must be carried out in consultation with the Head of Maintenance. A full risk assessment of the overall system strategy must be undertaken at the initial design stage. This may involve the University fire Officer, building control and other stakeholders.

Fire alarm systems shall not be designed to classification L1 unless specifically requested by the Head of Maintenance.

4.5.2 Fire Alarm Panel Keys

The following is a mandatory list University staff /departments that should be supplied with control keys/access codes for new and upgraded fire alarm panels. The keys/access codes should be presented to the University project manager and have acceptance signatures recorded. The numbers of keys to be handed over will be confirmed by the Project Manager. As a minimum the following should be provided with keys;

- Head of Maintenance
- School Safety Officer,
- The University Security Services Division

4.5.3 Labelling of Control Panels

Each fire alarm control panel must have a unique reference number and University call out procedure attached to or adjacent to the panel by means of an engraved notice.

4.5.4 Fire Alarm Monitoring.

Unless otherwise stated the fire alarm system will be monitored internally within the University by the University security service. Exact connection details will be determined in discussion with the Head of Maintenance.

4.6 Access Control

Access control should be by means of the University Smart card system details for installation purposes can be obtained from the Security or Smart Card manager. The use of digital locks should be avoided.

Users should be advised that there will be a monitoring charge applicable to all smart card installations.

4.6.1 Magnetic Door Lock Installation

Where possible when replacing door sets we should aim for a minimum clearance height of 2.00m to the underside of the door head.

When installing magnetic locking devices to the top of door sets measuring 2.00m or less we will not compromise the door height by installing the magnetic device on the underside of the head of the door, instead the magnetic lock will be installed on the face of the head as below.

4.7 CCTV

The University operates several CCTV systems and installations, additions and modifications must only be undertaken following consultation with the University Security Manager.

Users should be advised that there will be a monitoring charge applicable for all CCTV installations.

Containment for the installation must be suitably sized, exclusive and co-ordinated with the overall electrical installation.

4.8 Intruder Alarm Systems

The University monitors the intruder alarm installations within the University and any installations, additions and modifications must only be undertaken following consultation with the University Security Manager.

Users should be advised that there will be a monitoring charge applicable for all intruder alarm installations.

Containment for the installation must be suitably sized, exclusive and co-ordinated with the overall electrical installation.

4.9 Lightning Protection systems

Lightening protection systems shall be signalled inspected and maintained in accordance with BS EN 62305, Protection against lightening parts 1, 2,3 & 4. Any new installation or modification shall be undertaken following a comprehensive risk assessment, and installed giving due regard to the levels and types of protection.

The University currently uses a specialist contractor to maintain and test all lightening protection systems, details of the current provider, at any given time, are available from the Head of Maintenance.

4.10 Warrantees

Where applicable details of all warrantees associated with new plant, appliances etc. should be included within the Operations and Maintenance Manuals for the project.

For all systems which require planned preventative maintenance by specialist service engineers the first year maintenance contract should be incorporated into the project costs, there after the school or service who “own” the system will be responsible.

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