



**Standard Electrical Requirements
for both
Consultant's Specification Requirements
and
Standards to be included by Estates Staff in all Electrical works**

Contents

Standard Electrical Requirements for both Consultant's Specification Requirements and Standards to be included by Estates Staff in all Electrical Works.....	1
General	2
Electrical	2
A. Lighting	3
B. Emergency/Escape/Panic Lighting.....	10
C. Power & Compartmentation	10
D. AV Equipment.....	12
E. Fire Alarm System	12
F. High Voltage Equipment.....	13
G. Data Cabling.....	13
H. Hand Dryers.....	14
I. Door Access	14
J. CCTV...	14
K. SECURITY DETECTION & ALARM.....	15
L. Record Documents.....	15
M. Assisted WC Alarm	15
N.Disabled Refuge Station	15
O. Record Documents	15
P. Preferred Manufacturers	15
R. Key Contacts	16

NOTE:

This document is intended to be in addition and supplementary to the standards as laid down in Building Regulations, Energy Performance of Buildings Directive, HVAC guides, CIBSE guides, British Standards, European Nomenclatures, etc.

To avoid confusion and/or contradictions in specification clauses, consultants/designers must integrate these items into their specification documents and must NOT attach this document as an appendix.

General

1. Obligations under the principles of prevention for design, installation operation, maintenance and replacement of plant and equipment must be included for all items.
2. All plant and machinery must be designed to be fully accessible without the need for specialist access equipment or PPE. Designers will use the hierarchical principles of ERIC (Eliminate, Reduce, Isolate and Control) for installation, operation maintenance and replacement. Full justification for the access protocol must be submitted for to the CDM co-ordinator to ensure that this methodology can be justified prior to adoption.
3. This document is intended to be in addition to the standards as laid down in CIBSE guides, British Standards, European Nomenclatures, etc. To avoid confusion and/or contradictions in specification clauses, consultants must integrate these items into their specification documents and must NOT attach this document as an appendix.
4. All designs must comply with articles given in the European Performance of Buildings Directive 2005.
5. No option to supply equipment and services “equal and approved” or “offered” shall be included
6. All products to be energy efficient, complying with the Government Energy Technology list from www.eca.gov.uk Web-site.
7. All equipment must be considered for full life cycle costs for energy payback periods.
8. Full carbon assessments shall be carried out to ensure carbon emissions do not exceed those specified by building regulations and CIBSE codes.
9. Full compliance with Building regulations parts ADL1, ADL2 (A & B as applicable) and European energy legislation.
10. Each building that has refurbishments over 1000m² gross floor area, major changes in excess of 10% of building floor area and all new buildings must have a full energy performance survey by a competent assessor to incorporate a new building energy performance certificate.
11. All live phase cable sheathing to be brown coloured and neutral phase cable sheathing to be blue coloured, all labelled L1, L2, L3 & N respectively in accordance with harmonised standards for cable identification. Armoured cables will have the new harmonised colours of brown, grey, black, blue for L1, L2, L3 & N respectively colour coded, brown, brown, brown, and blue. Use of grey and black conductor insulated single core cables will not be permitted. All fuse boards will be labelled with warning notices for differing colours between pre and post harmonised installations.
12. All energy usage for water, heat, chilled water, steam, compressed air, electricity and gas in excess of 10kW output must be accounted for with metering in accordance with building regulations and European Directives. Meters to all have digital read-outs, RS485 cable outputs and no-volt pulsed outputs for each and every meter, all connected back to the University Automatic Monitoring and Targeting system.
13. No changes to this specification will be permitted. Any deviations from this document will be replaced with standard and costs remediated at the consultants/designers expense.

(No alterations shall be permitted to this specification will be permitted unless specifically agreed in writing by the University. Any unauthorised deviations from this document will be replaced with materials/equipment in compliance with the specification and costs remediated at the either the consultants/designers expense if instigated by their design without prior approval, or by the contractor if an unauthorised alteration is made by the contractor.

ELECTRICAL

A. Lighting

GENERAL INTERNAL LIGHTING

Internal Lighting

The first consideration shall be for all lighting products specified to be LED and shall be procured from one of the leading branded manufacturers such as Thorn/Zumtobel, Osram or Ridi. Alternatives will require full sampling and approval before contract acceptance

LED's (Light Emitting Diodes) shall have warm white LED source colour. The LED products shall be as specified again for the highest performance and thus energy saving. In particular the LED products shall have L70 and F90 values of >50,000 hours.

All luminaires shall be supplied and installed complete. This includes all bracketry, gaskets and covers (diffusers, louvres & lenses) end caps and lamps.

Generally all luminaire diffusers are clear prismatic and of polycarbonate material, UV stabilised only. All diffusers must be UV stabilised to prevent yellowing with age. The diffuser light transmission ratio will be >90%.

Where the consultant or designer believes that LED technology is not appropriate then this shall be discussed and agreed with the University prior to completing their design with alternative lamp such as T5 fluorescent luminaires.

Where fluorescent luminaires are employed these shall be low energy HE high efficiency T5 linear fluorescent lamps luminaires complete, high frequency fully electronic control gear and a minimum light output ratio (LOR) of 80%.

DESIGN STANDARDS

- BS EN 12464-1 2011 Lighting and Lighting of Work Places Part 1: Indoor Work Places
- CIBSE Code for Lighting 2009
- CIBSE Lighting Guide 5 Lighting for Education 2011
- CIBSE Lighting Guide 7 "Offices" for office spaces
- CIBSE Lighting Guide Visual environment in lecture, teaching and conference rooms
- DfES Building Bulletins
- BCIA Best Practice Guidelines for Controls
- LED luminaires with a minimum light output ratio (LOR) of 80% shall only be proposed.
- Luminaires proposed shall be chosen to give a minimum initial circuit luminous efficacy of 65 lumens/circuit watt for the fixed lighting scheme, excluding track mounted luminaires and emergency lighting.
- The uniformity ratio (minimum/average maintained illuminance) of the artificial lighting in teaching rooms/spaces shall be not less than 0.8 over the task area.
- High frequency control gear that avoids flicker and provides an efficient efficacy of the lamp circuit shall be provided. (T5)
- Colour temperature of all lamps shall be 4000k

SCOPE OF WORKS

The designer shall be responsible for taking the lighting design back to first design principles and develop a fully operational coordinated lighting system in line with the tender documents, all relevant British Standards/European Standards and current legislation.

The Consultant/Contractor shall refer to the highlighted luminaire manufacturers proposed.

Different areas of the building will have a wide variety of colour and lighting requirements. The lighting will be designed to blend with the style of interior in addition to providing a low maintenance energy efficient installation. The design will follow the general philosophy and technical recommendations contained in the CIBSE Lighting Guides, whilst retaining scope for design freedom.

The new lighting installation will consist of low energy LED technology. This will consist of a mixture of recessed and surface or suspended indirect/direct luminaires.

All luminaires shall be LED luminaires and shall have a correlated colour temperature corresponding to the fluorescent lamps used in linear or modular fluorescent luminaires.

The lighting installation is to be installed to optimise the internal environment and appearance, whilst minimising energy consumption and maintenance activities. High efficiency, low energy control gear will be provided.

Ensure that no fittings are damaged/spoiled by decoration, finishes, other trades etc. Any damaged luminaires shall be replaced at no cost to the Employer such that the installation is new at the day of handover. Installed luminaires shall not be used for temporary lighting purposes.

All aspects of the lighting installation, including fixing details, luminaire types, exact locations etc. shall be confirmed with the Client/Engineer prior to production of as fitted drawings.

Manufacturer's requirements for fixing, mounting and wiring shall be adhered to in all cases. The Designer shall establish the various types of ceiling systems being used and shall allow for installing the luminaires accordingly, including the correct type of finishing seals/gaskets/flanges are provided. The designer should be fully aware of ceiling types in order to achieve this.

Suspended luminaires on steel wire cords shall involve a clutch mechanism to allow fine adjustment of the suspension length. Suspensions shall ensure that the suspended luminaire rows are evenly balanced. Wire suspensions shall be the single to twin 'Y' type. Such luminaires shall have internal counter weights balancing the luminaire systems weight distribution.

Final connections to luminaires in accessible suspended ceiling areas shall be by means of a plug in ceiling rose connected via a 2 metre length of 0.75mm² (minimum) 3-core heat resistant flexible cable. Plug in ceiling roses shall be located within the suspended ceiling void no more than 1000mm horizontally or vertically from the luminaire aperture.

The luminaires will be carefully selected to suit their environment eg within corridors, main entrances, etc they should be decorative whilst within office areas they will be suitable for VDT use and within other areas shall be suitable for the type of operations being carried out.

Luminaires generally to run parallel to windows and switched in rows.

Where display and specialist lighting is required, lighting designs shall incorporate a balance between surface colours and textures, visual interest, light colour, uniformity and non-uniformity of light patterns.

Where lighting fittings are installed into a suspended type ceiling the fitting is to be supported to the upper structure by either drop rods or wires.

Lux Levels

Lighting of all internal areas shall comply with illuminance (lux) levels specified in the table below

	Em Maintained Illuminance (Lux)	UGR_L Unified Glare Rating Limit	U_o Minimum Illuminance Uniformity	Ra Minimum Colour Rendering Indices
Reception	300	22	0.6	80
Circulation	100	25	0.4	80
Stairs	150	25	0.4	80
Stores	100	25	0.4	60
Officers/Admin	300	19	0.6	80
Meeting Room	300	19	0.6	80
Resource Centre	300	19	0.6	80
Comms Room	200	19	0.6	80
Café	300	22	0.4	80
Dining	200	22	0.4	80
Kitchen	500	22	0.6	80
Workshop	500	19	0.6	80
Plantroom	200	25	0.4	60
Changing Rooms	100	22	0.4	80
WC's	200	25	0.4	80
Classroom	300	19	0.6	80
Technology	500	19	0.6	80
Lab	500	19	0.6	80
Lecture Theatre/Events Space	500	19	0.6	80
Black, Green & White Boards	500	19	0.7	80

Where general teaching rooms/areas shall be used for adult education, the lighting levels shall be designed to meet 500 lux on the working plane. (If spaces can be used for normal teaching, the upper lighting level shall be provided with dimming control).

Lighting Controls

The control method to the areas indicated above is the preferred control method, although during the design stage of the project the end user activity within these areas should be considered to determine the control method that will be utilised, i.e. machinery and equipment use, etc.

The Contractor shall provide automatic lighting controls as per highlighted in the table below. Extensive use is to be made of automatic lighting controls in order to minimise artificial lighting use and thus reduce energy consumption.

The general lighting controls philosophy to be adopted throughout the new development is manual switching with absence detection, this system of lighting control will eliminate the risk of lighting being left on for long periods of time whilst the room is unoccupied, providing an energy saving to the University.

Area	Lighting Controls					
	Manual Switching	Presence Detection	Absence Detection	Daylight Linking	Dimmable	Scene Setting
Reception	•			•	•	
Circulation		•		•	•	
Stairs		•		•	•	
Stores			•			
Offices/Admin			•	•	•	
Meeting Room				•	•	•
Resource Centre			•	•	•	
Comms Room			•			
Cafe			•	•	•	
Dining			•	•	•	
Kitchen	•			•	•	
Workshop			•	•	•	
Plantroom	•					
Changing Rooms		•				
WC's		•				
Classroom			•	•	•	
Technology			•	•	•	
Lab			•	•	•	
Lecture Theatre/Events Space				•	•	•
Open Plan Hospitality MGMT Space				•	•	•

All automatic lighting controls shall be provided with a manual override switch at a suitable location.

Automatic lighting controls shall be selected so as to avoid nuisance switching.

In particular, care shall be taken to select detectors to provide full coverage throughout all areas concerned. In order to avoid unwanted switching on corridors and similar circulation routes, extensive use shall be made of long range microwave detectors.

All presence detectors within public access areas shall be recessed into the ceiling giving a 360° detection range.

Where a luminaire is greater than 1.5m away from the lighting control device the Contractor shall allow to install the cables within cable containment.

All detectors shall be positioned to ensure their optimum performance is achieved.

Luminaires controlled by automatic lighting controls may be connected by proprietary programmable, plug-in marshalling units. These shall be configured to enable manual off-override provided at the "normal" light switch location.

Where plug-in marshalling units are utilised, cabling shall be neatly installed from the marshalling box to the luminaire, cabling shall not be laid directly on ceiling tiles.

Automatic lighting controls shall not be employed in areas where inadvertent switching off of the lights could result in a dangerous situation.

The controls philosophy will be straightforward, with easy to use and accessible controls for the occupants.

Internal Lighting, Emergency Lighting & External Lighting

Switch plate finishes will be selected to match the utility power accessories.

All switches will comply with DDA standards for visually impaired persons; this will require all switch plates to contrast with the surrounding wall finish. All switches will need to be mounted to 1200mm AFFL or as agreed with the University. Final coordination will need to be carried out with the Project Team to ensure these requirements are fulfilled.

Where multi-gang switches are detailed with more than 1 Phase at the switch, then suitable proprietary phase barriers and "Danger 415 volts" labels shall be fitted to maintain segregation.

Where multi-gang switches are detailed with more than 1 Phase, utilise phase barrier plates and suitable danger sign inscribed "400 volts".

The Contractor shall supply and install all light switches. These shall be 20 Amp rated grid switch type with white moulded rockers. In surface installation areas such as plant rooms and switch rooms, surface metal clad grid switches shall be used.

All switches in plant room areas shall be complete with surface mounting boxes to suit the area of installation and unless stated otherwise switches shall be mounted at 1200mm above finished floor level.

The Contractor shall supply and install all light switches and lighting control system as stated in this specification Switches shall be 20 amp rated grid switch type.

In surface installation areas such as plant rooms and switch rooms, surface metal clad switches shall be used. Where multi-gang switches are detailed with more than one phase present at the switch then suitable proprietary phase barriers and "DANGER 400v" labels shall be fitted to maintain segregation.

Daylight Linking

The Contractor shall utilise Dali (Digital Addressable Lighting Interface) ballasts where manual or daylight dimming is specified.

The photocells for daylight sensing control will allow the artificial illumination to be dimmed dependant on the amount of daylight available within the space. Manual override switches will also be provided within each area should local control be required.

In open plan areas, lighting systems shall be designed in lighting zones and the control of those zones. The lighting zones shall relate to workplaces (4 work places per zone), where workplace layout is unknown, one workplace shall be allowed to occupy 10m² of area.

Electric lighting is not generally needed when a space is unoccupied or when there is adequate daylight. The lighting control system will therefore enable the lighting to be controlled in zones related to the level of daylight received. For example, luminaires in a well day-lit perimeter area, close to windows, should be controlled separately from luminaires deeper in the room.

Scene Setting

Where conference/meeting rooms are proposed the Contractor shall allow for a scene setting system.

The control of the luminaires shall be by a master controller mounted within the ceiling void in an accessible location. All extra low voltage cabling shall be contained within separate conduits.

The scene setting system shall have the capability to provide various preset lighting options that are easily capable of being re-configured by the end users or estates engineers at a later date.

All fittings shall be equipped with dimmable ballasts.

1. Lighting Controls: Outside lighting - will all be fully controlled via time clocks, external photocell and override switch for maintenance purposes. Internal Lighting (i.e. less than 20m² floor area, plant rooms, store rooms and other small rooms without natural daylight) will use standard high frequency electronic linear fluorescent fittings and ballasts and normal switching techniques. Other rooms will use presence or absence detection usually offices and seminar rooms will have absence detection, corridors, staircases and corridors will have presence detection using B.E.G UK. manufactured products, these are usually to be standalone installations to suit the building. If a dimming system is required in a building especially in a Lecture Theatre then Lutron dimming controls are to be utilised. Where dimming is to be used D.A.L.I. protocol is to be used to include/D.A.L.I. combined presence detection/dimming control with industry standard Digitally Addressable Lighting Interface (D.A.L.I.) ballast fittings which can be incorporated simply and cost effectively into the existing lighting control. User over-ride-off lighting controls must be available in all cases. Where dimming is required or essential in new works or larger refurbishment works for daylight controls, spacing factor switching control, energy control, uniformity control, glare control, etc, the fluorescent fittings shall be of the high frequency electronic dimmable type with industry standard Digitally Addressable Lighting Interface (D.A.L.I.) protocol dimmable ballasts
2. Luminaires will be manufactured by one of the following only:-
 - a. Thorn/Zumbtobel Lighting
 - b. Osram Lighting
 - c. Ridi Lighting

3. All luminaires shall be of the high frequency electronic type with PF exceeding 0.95, (No switch-start fittings will be permitted) as standard fitment and shall be complete with DALI (digitally addressable Lighting Interface) ballasts wherever necessary to comply with legislation.
4. All linear fittings shall be complete with warm white 4000K triphosphor T5 tubes in 600mm, 900mm, 1200mm and 1500mm, triphosphor warm white 4000K sizes only. 1800mm or 2400mm fitting lengths or T8 will not be used.
5. 2D Compact fluorescent luminaires are to be avoided. Compact fittings should consider LED technology as first choice
6. T5 tubes should not be considered above 1500mm length due to their increased replacement costs and problems encountered within the University with cold start-up (grey-tube) problems
7. In multiple tube fittings, no triple or quad ballasts are permitted. Luminaires are to be fitted with a combination of separately fused single and twin ballasts only.
8. Satin finish Louvres must not be considered
9. In areas of suspended ceilings, all luminaires must be supported independently from the ceiling by means of 4 No (minimum) supports either vertical drop-rod or vertical wire "gripple" type supports. No more than +/- 5° from vertical on either rod or wire hangers will be permitted. Where congestion of services above fittings is experienced, due allowance for additional stud drop rod and channel support under the congestion must be allowed for.
10. Lift and tilt Louvres will not be acceptable due to luminaires being independently supported.
11. All wiring accessories including multiple pole plug-in ceiling roses to be of the Honeywell MK range or equivalent. Plug in ceiling roses must not be located any further than 600mm above suspended ceiling grids. No more than a 2 gang multiple plug-in outlet will be permitted.
12. All connections to individual luminaires will be in Heat Resistant Oil and Flame Retardant (HOFR) LSF flexible cable of minimum cross sectional area of 1.5mm². Lengths of flexible cables must not exceed 2 metres in any circumstance. Where lengths are less than 2 metres, the flexible cable shall be shortened back to keep a maximum slack loop length of 300mm.
13. Automatic Lighting controls shall be as manufactured by B.E.G. or Ex-Or. The selection of which device will depend of the control function required, i.e. infra red or microwave.
14. Wire wound or other types of controllers will not be used.
15. Client requirements for low voltage dichroic halogen lighting MUST be designed out by use of LED technology. Dimming switches shall be of low loss type Honeywell MK type.
Where end users requirements dictate a need for low voltage dichroic halogen fittings the designer MUST utilise an equivalent LED technology luminaire. Dimming switches shall be of the low loss Honeywell type.
16. External lighting to be correctly IP rated to cover severe weather requirements.
17. Use of sealed luminaires to the correct IP rating must be incorporated in high risk areas such as laboratories, clean rooms, etc. Further specific requirements will be necessary as part of high risk area briefings. Containment level 2 rooms will be to a minimum of IP54X and level 3 rooms to IP65X.

B. Emergency/Escape/Panic Lighting

1. Generally the University prefers standalone emergency self-contained fittings tested via test key switches either local to the area or located within risers/plantrooms adjacent to the lighting distribution board. If a fully automated testing system is required this will be part of the lighting control system for the building. All emergency lighting including exit signs shall utilise LED technology
2. The emergency lighting system shall be in accordance with all relevant standards.
3. Emergency exit signage should be highlighted on all Building Fire Strategy Drawings.
4. All emergency lighting shall provide 3 hour full battery backup.
5. All emergency lighting is to be labelled with a unique reference number to comply with the University asset system.
6. All emergency lighting is to be of the correct IP rating suitable for the application.
7. No self-adhesive labels will be fitted directly to emergency light fitting covers. Instead the fittings will illuminate wall-mounted exit signs to ensure that the maximum amount of light output can be gained from the emergency light.
8. Emergency lighting design must take into account illumination of call points and fire extinguisher stations in accordance with the latest British Standards and European Nomenclatures.
9. All emergency lights are to be wired from distribution fused source as a parallel key-switched feed to each of the local lighting sub-circuit to ensure that they operate on to encompass local sub-circuit failure. A double pole MK secret key switch will be installed between the fuse protection and the feed to the emergency lighting fittings for testing purposes. This secret key-switch shall be incorporated immediately adjacent to the local distribution board.
10. Self contained non-maintained fittings will be installed immediately adjacent to illuminate all distribution boards and distribution panels

C. Power & Compartmentation

1. All accessories and trunking to be of the Honeywell MK range. All socket colours are to take account of Part M of the Building Regulations and have colour contrast e.g. charcoal grey sockets if a white background.
2. Honeywell MK twin earth terminal socket outlets with double pole outboard switches are to be used as standard regardless of high integrity earthing requirements or not.
3. LAN Room socket outlets shall be of the Honeywell MK .
4. All ring main circuits will be wired as high integrity earth installations regardless of circumstance to ensure that section 607 of BS7671 is complied with. Care must be taken to assess the suitability and risk of RCBO protection on ring circuits in controlled areas of the University and the risks documented where not fitted.
5. 13A socket outlets will all be installed on complete high integrity earth ring mains only. No spurs or radial circuits will be permitted. In areas containing PC's no more than 8 work stations are wired on a ring main.
6. All socket outlets and other accessories mounted in multi-compartment trunking shall be mounted on enclosed pattresses. Open-backed mounting plates will not be permitted. The use of manufacturers cross over "bridges" must be used for ALL compartment cable crossings.
7. Circuit cables to be ferruled (not sticky markers) and labelled with phase and circuit numbers within distribution boards.

8. All armoured cables up to 35mm² 2 core or 16mm² 4 core, will be fully clipped with single hole cleats, nuts and bolts/screws and rawplugs. Armoured cables of these sizes will be permitted to be clipped on tray/basket with LSF PVC coated metal banding on horizontal runs and where no cable is suspended from trays/baskets. Where armoured cables are lying directly onto tray or basketwork, stainless steel banding will be permitted in lieu of cleats. Cables over 35mm² 2 core or 16mm² 4 core will be fully clipped with twin hole cleats, nuts and bolts/screws and rawplugs. Cable cleats will be used throughout for all other instances. All- round LSF plastic coated metal banding will be permitted on the smaller cables under 6mm² providing that a written statement is given to cover the capacity of the banding to withstand the mechanical movement caused by cable fault stress levels. Tie-wraps of other types will NOT be permitted.
9. Where Cat5e cables are mounted on tray or basket, Cat6 "Velcro" hook-and-loop type cable fixings will be used throughout. All data cables will have Cat6 standard containment installed.
10. Distribution Boards to be provided with a dual earthing bar for duplicate earthing connections in accordance with BS7671 Regulation 607.
11. Distribution Boards to be fully M9 rated, with additional future capacity of 25% (spare capacity to be demonstrated at handover) built into all designs. DB's to have facility for lockable covers but should be always be housed within restricted plant room or service riser spaces only and not within public/student areas. Distribution board rooms must be designated as Estates plant room areas and must not be used for any other designation. If existing Distribution boards are housed in public areas, then lockable covers must be fitted.
12. DB's to be metalclad only, M9 rated MCB's/RCBO's and shall be manufactured by Schneider Electric all complete with integral isolators.
13. All distribution boards and control panels shall either have miniature circuit breakers to BS EN 60898 (MCBs) or residual current circuit breakers with overload protection to BS EN 61009 (RCBOs) RCBOs shall be of Class AC trip sensitivity i.e. not sensitive to DC components. All distribution boards are to have engraved traffolyte labels securely fixed with distribution board reference/description e.g. DB1, incoming cable details e.g. 4c, 35mm² XLPE SWA LSF from Main LV Panel Board MCCB 3. Also any danger notices where called for and Periodic Inspection labels are to be fitted.
14. All distribution boards to be complete with framed circuit chart and schematic drawing. (not within polythene envelope on back of cover)
15. All distribution panels that need to have meters to comply with Part L2 of the building regulations are to have Schneider Electric type PM750MG meters supplied as part of the split metered configuration Distribution Boards. The meters shall have pulsed output for future connection to the Universities Metering System, the meters should also have a Modbus connection to allow for future connection to an energy monitoring target system (BEMS)
16. All rooms containing Primary LV Distribution Panels shall have rubber matting supplied to the complete floor area for health and safety purposes to limit the risk of electric shock.
17. Galvanised metal conduit will be used in plant rooms and areas of high mechanical impact. All metal conduits will incorporate hospital/distance saddles only. Spacer-bar saddles will not be permitted. Draw-in/inspection bends on any type of conduit will not be permitted.
18. Generally all cabling shall be contained in metal galvanised trunking and conduit. This system should allow for 30% spare capacity for future use and be installed to allow for future re-wiring causing minimal disruption to the building fabric. BMS cabling should be run within a second dedicated compartment of the LV cable trunking. Within plant rooms dedicated BMS metal trunking and conduit shall be utilised. Trunking shall generally be of

the 2- compartment type to meet with relevant British Standards on separation and segregation of cables and to comply with the various system providers' requirements.

19. Dado trunking that is surface mounted or of the bench type is to be manufactured by Honeywell MK 3D Range or Marco, profile TBC by the University.
20. Where conduits pass through fire rated walls, floors or ceilings, fire and smoke proofing must be installed as per the manufacturers' recommendations.
21. All data and voice outlets shall be mounted onto MK Logic plus Euro Data Front plates complete with blanking modules as necessary. Front plates and blanking modules to be supplied as part of the electrical services contract. These are to comply with Part M of the Building Regulation and have a colour contrast e.g. if on white walls to be Charcoal grey front plate.

D. AV Equipment

Containment, relevant power and data installations are to be provided as part of this electrical services document. This installation is on a Project by Project basis as many different installations can be required.

The AV equipment and specification is the responsibility of the Universities Information Technology Department.

E. Fire Alarm System

1. The University fire alarm systems will be extended where existing, retaining existing wiring systems and not mixing different types of wiring.
2. New fire alarm systems will adhere to the following protocol:-
 - a. An analogue addressable detection system is to be installed. The system is to be provided by Siemens Building Technologies and linked to the University Control Room via the Gateway in The Main Academic Building.
3. All fire alarm systems will be designed to the latest British Standards/European Nomenclatures to classification BS 5839 L1 coverage. The system is to be designed by the specialist supplier.
4. All graphics are to be updated whether it is a new building or an alteration to an existing system. A system cause & effect matrix shall be produced for any new proposed system to satisfy University requirements in conjunction with Building Control and the local Fire Service.
5. On all new installations fire alarm wiring will be with fire resistant soft skinned cabling with red LSOH sheath. The cable shall be certified to BS 8434 part 2 and EN 50200 PH120. Wiring should be installed on dedicated cable trays and securely fixed.
6. All new fire alarm panels to be fitted with surge arresting devices. Any existing panels that are to be utilised will also have a surge arresting device installed

(All new fire alarm shall be fitted with surge arresting devices. Where existing fire panels are to be utilised which do not already incorporate surge arresting devices, the project works shall include for the upgrade of the panel to add surge arresting devices)
7. All wiring above ceilings will be fully clipped onto soffits, walls or slab. Wiring on tray or basked will be permitted if cabling is clipped with proprietary metallic clips. Tie wraps will not be permitted.
8. All drops to Manual call points, sounders, beacons, etc. are to be enclosed in metal galvanised conduit whether buried in walls or surface mounted.
9. All new and replacement fire alarm panels must be connected to the Siemens MM8000 life management system.

10. All new systems and if zones are added or altered in an existing building a new framed zone chart is shall fitted adjacent to each fire panel.
11. Void detection is to avoided if at all possible, any voids are to be kept below 800mm. If required the University must approve this and any necessary access hatches etc required.

F. High Voltage Equipment

This is generally dealt with as a separate issue and specification but the following guidance sets minimum standards required:-

All High Voltage works must be submitted to the University Senior Authorised Person for comment and approval in writing must be given prior to any tendering for the works commencing.

All transformers to be super low loss amorphous core types only to industry standard connection configuration.

Typical 1000kVA no-load losses not to exceed 500watts, full-load losses not to exceed 7,700 watts, as per IEC:76.

Transformers to be ONAN Dyn11 11,000/433v (+5% to -7.5% at 2.5% staged tap points) types only.

Transformer oil tank air-vent pipe (3/4" BSP) to be complete with dehydrant breather.HV take-off box Facing "E" BS 2562 with one take-off per phase LV take-off box Facing "F" BS2652 with two take-off's per phase/neutral

All HV cable to be multicore XLPE types. Single polymeric type or any other type if single core cables will not be permitted.

Sub-station details and operating procedures are dealt with in a separate document.

To match University equipment already installed around campus, fused ring main units will be of the Schneider Ringmaster 2 RN2c 11KV Ring Main units only,

complete with TLF protection and ring switch(s) phasing facilities (Phister) complete with Union YVL 482 brass shackle switchgear padlocks on all circuit switch covers, circuit earthing covers, transformer switch cover, transformer earth cover, tap changing cover test spill covers and main door cover. (10 No in total) plus 2 No spares.

Full protection and grading studies will be undertaken for any extensions or modifications to the high voltage system. All new system will also have a full protection and grading study completed to the satisfaction of the University Senior Authorised Person.

The Universities Specialist Contractor is EME Power Systems for all High Voltage Works. (contact Rob Horn 01529 410999)

G. Data Cabling

1. The data and voice cabling, including testing and terminations shall be carried out by the University's Cat5e Authorised data cabling installer. The containment will be to Cat6 rating and will be installed by the electrical contractor to ensure a continuous containment throughout the installation. The data installer shall supply the correct number of MK "Eurocom" logic plus faceplates for the data outlets to be mounted into.
2. The maximum cable length of the category5e cable run must not exceed 90 metres, including flying lead lengths and coil length in LAN room. The electrical contractor and design consultants shall liaise with the data cabling contractor to ensure that all containment is as to their requirements and that cable runs will be less than 90 metres before starting work.

3. All cable management tray, basket, trunking, conduit, etc. shall be installed to Cat6 rating including slow radius bends, sets and changes of direction as necessary
4. Data and voice outlets shall be terminated with the outlet supplied by the University's Cat5e Authorised data cabling installer. All outlets must be fitted onto MK Logic Plus "Eurocom" faceplates to match the profile of all other accessories.
5. The electrical contractor shall supply and install all back-boxes, trunking and pattresses as required for each installation.

H. Hand dryers

All hand dryers shall be manufactured by Warner Howard Airforce range high speed low energy, these will either be white or brushed stainless steel finish.

I. Door Access System

The University's door access control system is part of the Schneider Continium BMS system.

The Continium system consists of Master control units called CX controllers and IOU modules.

The CX controller is connected to the BMS PC via an Ethernet connection and this unit is to have back up battery incorporated that will power the modules/CX for 6 hours.

Each door is to have a door magnet, door status contact, proximity card reader, ACIA module, exist request dome button and break glass unit.

Each door is secured 24/7 and access only granted to personnel with the relevant access added to their card.

The system is to monitor

- Valid access
- Invalid attempt
- Forced entry
- Exit request
- Door ajar

During a fire alarm activation the doors are to unlock and then re lock once the fire alarm has been reset.

The magnetic locks, exit request, break glass, door contacts, and reader are wired in 8 core alarm cable, the network cabling from the CX controllers is wired in Beldon 8721 4 core screened cable.

J. CCTV Systems

Where a CCTV system is to be installed it shall provide coverage to the building perimeter, building access points and high risk areas. The system shall provide facilities in the Control Room in the Main Academic Building for viewing live and recorded images, the recorders are to be housed in the Control Room unless other specified by the University. In buildings that are located too far away from the Main Building local recording may be provided but with viewing facility in the Main Control Room.

The cabling back to the Main Building shall be provided by fibre optic cabling to the monitoring locations with the DVR mounted in the existing rack in the Control Room.

The CCTV system shall be designed supplied and installed in accordance with the NACOSS codes of practice 20 and all relevant legislation, all necessary signage is to be included to meet these standards.

Relevant camera's and DVR's are to be manufactured by Samsung or Pelco. A 240v fused spur is to be installed at each camera position.

K. Security Detection And Alarm

An Intruder Alarm system shall be designed and installed to comply with PD6662:2004, EN50131 and DD243:2004. The system shall be designed to transmit dual path alarm activations to a central monitoring station supplemented by external and internal audible warning devices.

A NSI Gold approved Intruder Detection and Alarm System specialist shall be engaged to develop the scheme, supply, install and commission a complete system.

The system is to be from the Honeywell Galaxy range of system.

L. Assisted Hearing Systems

Assisted hearing systems are now a requirement in the UK, to comply with the Disability Discrimination Act, which has become embodied in the Building Regulations Part M.

Assisted hearing facilities shall be provided to reception desks, canteen counters, lecture theatres, workshops and seminar rooms as stipulated by the University

A combination of IR and induction loop technology shall be utilised and these systems shall be selected and installed so as minimise potential cross-over of signals between adjacent areas.

Portable equipment shall not be utilised within the assisted hearing solution.

M. Assisted WC Alarm

An emergency assisted WC alarm will be installed at each ambulant WC comprising of pull-cord, re-assurance lamp/reset, external alarm audio/visual indicator and a remote alarm repeater panel positioned at the main reception desk.

The remote alarm repeater panel shall be a multi-zone unit clearly indicating the assisted WC from which the alarm call was activated.

N. Disabled Refuge Station

To compliment with the university's current procedures, an Emergency Voice Communication System shall be installed to comply with BS 5839-9:2011. The requirements for the EVAC system shall be detailed within the building fire strategy document/report, the fire strategy report shall determine where each EVAC outstation/refuge is to be located. Recent installations at the University have been carried out using Baldwin Boxall Omicare System and the installation has been carried out by Elite Audio. These have been linked back to the Main Security office in the Main Academic Building where they is a dedicated panel.

O. Record Documents

Provide any system record documents and full documentation as required to include

Fire systems, Installation certificates, Lightning Protection Systems, Operation & Maintenance manuals in paper and electronic format including a copy of all as fitted record drawings in CAD format.

P. Preferred Manufacturers

Listed below are manufacturers for plant items and equipment to be specified for the project.

Item	Manufacturer
Electrical Plan	
Switchgear LV	AF Switchgear Or Scheider
Distribution Boards	Schneider Electric
LV Mains Cables	BICC, Pirelli or AEI

Fire Rated Cables	Draka or Pirelli
Internal Luminaries	Thorn/Zumtobel Lighting, Osram, Ridi
External Luminaries	Thorn Lighting, Osram
Electrical Accessories	MK Electric
Automatic Lighting Controls	B.E.G./Exor
Access Control System	Schneider Continium
Fire Alarm	Siemens Building Technologies
High Voltage Works	EME Power Systems
Hand Driers	Warner Howard (Airforce range)

R. Key Contacts

Access control – Martin Rodgers Triad Controls 07834 717081

Siemens Building Technologies – Ken Skitt 07808 822012

Thorn Lighting – Paul Bussoopun 07768 011834

Osram Lighting – Mark Gawtry 07971 255416

Ridi Lighting – Mitchell Hurst 07973 173415

B.E.G – Adam Ingham 07795 143314

EME Power Systems – Rob Horn 07796 864268