

## 5 MAINTENANCE PROCEDURES

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5.1	INTRODUCTION .....	2
5.2	SPECIALIST MAINTENANCE .....	2
5.3	MAINTENANCE MATRIX .....	3
5.4	MAINS ELECTRICITY & DISTRIBUTION .....	4
5.5	SUB-METERING .....	4
5.6	SUB-MAINS (DISTRIBUTION) .....	4
5.7	NEW DISTRIBUTION BOARDS .....	5
5.8	POWER INSTALLATION.....	5
5.9	LIGHTING INSTALLATION .....	5
5.10	EXTERNAL LIGHTING.....	6
5.11	EMERGENCY LIGHTING.....	6
5.12	FIRE DETECTION & ALARM SYSTEM.....	7
5.13	LIGHTNING PROTECTION SYSTEM .....	8
5.14	SPARE PARTS & CONSUMABLES .....	8
5.15	SPARES TABLE.....	9

## 5.1 Introduction

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A regular and organised programme of maintenance work, planned to cover all details of the installation within given maintenance periods, will ensure continued satisfactory operation with a minimum liability to interruptions to supply caused by equipment faults.

These maintenance instructions comprise general recommendations relating to the installation carried out under this contract. Reference should also be made to any manufacturers literature provided in Section 9.

Careful attention must always be given to securing the safety of personnel and equipment while maintenance or repair work is in progress and prior to carrying out any maintenance works operatives must be trained and competent, both in the equipment and systems being maintained as well as in the complexity level of work being carried out. Operatives should also be fully conversant with the relevant Health and Safety Legislation.

Before any work is commenced on any item of electrical equipment, the supply and ancillary circuits must be made "dead" (isolated) and locked off. In general all maintenance staff should remember the following golden rules:

- Identify the source(s) of supply.
- Isolate the source of supply.
- Secure the isolation.
- Test that the equipment/system is DEAD, then begin work.
- Reference should be made to the Health and Safety Executive's Health and Safety series booklet HS(G) 85 on Electricity at Work available from Government bookshops.
- Reference should be made to Electricity at Work Guide 1989.
- Reference should be made to the appropriate section of the B.S.7671 Regulations for Electrical Installations prepared by the Institution of Electrical Engineers.

Where maintenance work is in progress a DANGER notice must always be attached to any "live" apparatus to call attention to the danger of approach. A CAUTION notice should also be attached to plant or its associated control equipment warning of possible damage to equipment, which may be caused by interference.

## 5.2 Specialist Maintenance

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The maintenance of specialist systems and equipment should only be carried out by the Manufacturer/Supplier or Approved Agent because of the requirements for particular knowledge and the use of special equipment and methods.

The following systems are considered to require specialist maintenance due to the nature of the systems and the specialist equipment required to carry out testing and maintenance. It is generally a requirement of building insurance policies, local authority and fire authorities that approved and recognised Contractors provide the required certification.

Mains Electrical Distribution

Solar Photovoltaic System

Fire Detection & Alarm System

## 5.3 Maintenance Matrix

The table below provides a summary of the recommended intervals between maintenance inspections/actions as itemised in further detail within the actual maintenance sheets included in sub-section Maintenance Sheets.

These routines would form the basis of any planned maintenance system that may be incorporated by the building occupier. In the event of any disparity between the recommendations and those indicated by the manufacture (now or at a later date) the manufacturer's information should be followed.

However actual user experience will develop the long-term maintenance requirements for any particular installation.

The following notation has been used:

D = Daily                      3M = Three Monthly  
 W = Weekly                    6M = Six Monthly  
 M = Monthly                  Y = Annually

Description	D	W	M	3M	6M	Y
Main Switchgear	✓					✓
Submain Distribution				✓		✓
Distribution Boards		✓	✓	✓		✓
Power Installation				✓		✓
Lighting Installation			✓			✓
Emergency Lighting		✓	✓			✓
External Lighting		✓				✓
Fire Alarm	✓	✓				✓
Lightning Protection						✓

## 5.4 Mains Electricity & Distribution

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We suggest the following regime is implemented and that, in the interests of safety, maintenance work is carried out 'ONLY' when standing upon a rubber safety mat that should be permanently located in front of the main switch panel in the Electrical Switch Room.

### Weekly

- Make a general inspection for cleanliness to ensure the plant room and electrical cupboards are not being used for storage and that the equipment is clean and free from obstruction.
- Check for signs of over heating
- Check for any electrical discharge noises including loose components.
- Remove all external dirt from the distribution equipment using proper materials. Do not use cleaning solvents or any fluids on Live equipment.
- Examine and check all earth connections.
- Log electrical consumption (auto by BMS)
- Check that all indicator lamps if present are functioning correctly for the switches in operation and replace faulty lamps.

### Annually

- Clean all insulating surfaces
- Clean and inspect arc shields / arc shrouds and renew if there is any sign of damage
- Inspect fixed and moving contacts, examining for any signs of burning, arcing or overheating
- Renew switch contacts as necessary
- Check switches for correct operation
- Carry out insulation, earth continuity and earth loop impedance tests.

## 5.5 Sub-Metering

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No maintenance required. If meters are not displaying a reading then a competent electrician should be called to ensure the CT leads are connected properly.

## 5.6 Sub-mains (distribution)

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Test need not be carried out all at one time. It is quite acceptable to split the installation into smaller sections and carry out tests at more frequent intervals, provided that all parts of the installation are addressed within the time scale recommended by BS7671.

### Every 3 Months

Check security of cable trays, trunking etc.  
Temperature check for overheating.  
Check security of connections whilst circuits are dead.

### Annually

Carry out insulation, earth continuity and earth loop impedance tests on the whole installation.

## 5.7 New Distribution Boards

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Ensure all light fittings, emergency lights and portable equipment is disconnected from the distribution circuits prior to undertaking any insulation or continuity tests, and ensure fixed equipment is isolated prior to any such tests.

### **Weekly**

Make a general inspection for cleanliness

Check for signs of over heating

Make a general inspection for external damage and loose mountings.

### **Monthly**

Check for broken circuit breakers and replace as necessary.

### **Every 3 Months**

Check operation of incoming isolator, MCB's, RCBOs, fuse links and contactors.

Check that the circuit chart is still fixed inside the board and is up to date.

### **Annually**

Carry out insulation, earth continuity and earth loop impedance tests.

## 5.8 Power Installation

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All users should visually inspect the condition of power outlets and flexible power cables before use. This includes checking that socket outlets, plug tops, rotary isolators and/or connection units are not broken or show signs of overheating. Otherwise we recommend the following planned maintenance:

### **Every 3 months**

Check condition of flexible cables to all fixed equipment and repair as necessary.

Check operation of rotary isolators and interlocked sockets to ensure correct operation

### **Annually**

Carry out insulation, continuity and earth loop impedance tests on the whole installation.

## 5.9 Lighting Installation

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Light fittings normally need to be re-lamped and cleaned on a regular basis but as every installed luminaire has an LED light source, the only thing to do is check for failed units and clean the luminaires when dirt appears to affect their output.

Cleaning of reflectors, lenses or diffusers with a clean, soft, lint-free cloth and anti-static cleaning fluid. Under no circumstances should an abrasive cleaning substance be used.

### **Every Month**

Check all luminaires and switches for signs of damage or disrepair. Replace and/or repair as necessary

### **Every Year**

Clean all lighting diffusers

Perform full inspection and duration test of the emergency lighting system. On completion and restoration of supply check all indicators to confirm proper functioning of chargers and luminaires. Record results and rectify any faults.

## 5.10 External Lighting

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All LED luminaires – no maintenance considered necessary other than cleaning and regular inspection for damage.

## 5.11 Emergency Lighting

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Emergency versions of normal service luminaires should be maintained as above and included in the testing regime below.

The stand-alone emergency luminaires and exit signs installed should require minimal maintenance as they also have an LED light source HOWEVER the following minimum inspections and tests should be carried out at the intervals recommended. These minimum inspections should already be part of the College's weekly maintenance regime.

All emergency luminaires are fitted with emergency battery packs that will eventually deteriorate. When the luminaire no longer meets the 3 hour duration requirement, replace the batteries.

Because of the possibility of a real failure of the normal lighting supply occurring shortly after testing or during the subsequent recharge period, all full duration tests should be carried out before a time of low risk to allow for battery recharge.

### **Weekly**

A quick visual check to confirm that the Green LED within emergency luminaires is illuminated indicating that the emergency pack is operating correctly.

### **Monthly**

Check operation of emergency lighting by operating the test switch provided, or in the absence of a test switch, by failing the local lighting circuit to which the emergency light is connected.

The period of simulated failure should be sufficient to check all emergency luminaires are functioning correctly.

The test must be recorded and if failures are detected, these must be remedied asap.

### **Annually**

Carry out a simulated failure for the full duration of the luminaires (e.g. 3 hours). The luminaires must still be working at the end of the test.

The test must be recorded and if failures are detected, these must be remedied asap.

## 5.12 Fire Detection & Alarm System

User Manual provided in Section 9C.

The fire alarm system requires checking on a regular basis in order to ensure that it is maintained in a perpetual state of readiness.

Routine testing of the fire alarm system in accordance with BS5839: 2013 will identify any malfunction of the control panel and any malfunction should be reported to the fire alarm maintenance company immediately.

The Fire Alarm Panel should be visually checked daily to ensure that there are no faults present and that the power supply is healthy. (Note: If there is any alarm or fault conditions showing this test will not be possible).

The control panel contains sealed lead acid batteries to provide standby power in the event of a mains failure. These batteries have a life expectancy of around 4 years. The batteries should therefore be tested annually and replaced as required.

The Fire Alarm Panel should not require any specific maintenance but should it become dirty it may be wiped over with a barely damp cloth.

Fire detection devices are automatically calibrated on a daily basis and any devices that fail the detector malfunction requirements will be notified as a maintenance fault. The contamination status is also useful in determining detection devices that are approaching their working range limits.

Frequency	Item	Maintenance Details
<b>Daily</b>	1	Inspect the panel to ensure the system is operating normally.
	2	Test the control panel lamps by operating the lamp test controls on the fire control panel.
<b>Weekly</b>	1	Test the alarm system by operating one of the detection devices. A different point should be selected for each test so that over a period of time the whole installation receives a test.
	2	Check that the sounders can be heard over all parts of the protected area and that the correct zone light is illuminated.
	3	Inspect automatic detectors (heat or smoke) for damage, accumulations of dirt, paint and other conditions likely to cause a malfunction.
	4	Attend to any failures or deficiencies in the system.
	5	Record inspection in Log Book
<b>Annually</b>	1	Carry out a simulated failure for the full duration of the luminaires (e.g 3 hours). The luminaires must still be working at the end of the test.
	2	The test must be recorded and if failures are detected, these must be remedied asap
	3	Fire Alarm Provider maintenance visit and testing

## 5.13 Lightning Protection System

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The system requires no periodic maintenance however we suggest an occasional walk around the building to visually check that the low-level bonds have not been removed, stolen or damaged. The system should be tested yearly and preferably at a shorter interval each year to vary the season of testing, by a lightning protection specialist such as Orion Lightning Protection.

## 5.14 Spare Parts & Consumables

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Generally there are no crucial spares or consumables that must be kept as most items are readily available from the relevant manufacturer for next day delivery or can be picked up from a local merchant.

In addition, to hold spares properly, pre-supposes the availability of a designated stores area and knowledgeable person to maintain the spares in a useable condition.

We suggest that any in-house maintenance team develops a spares policy through experience of running the building and records details of any spare parts deemed necessary in the spares table provided on the following pages.

### **Recommended**

- Emergency Lighting Test Keys (also called 'fish keys') – we suggest a few are kept with the emergency lighting testing record book.
- A selection of Lawson Fuses (household fuses) – to replace blown fuses in plug tops and fused connection units.



