National Manual of Assets and Facilities Management

Volume 5, Chapter 10

Life Safety Systems Operations - Healthcare Procedure

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1.0 PURPOSE

The purpose of this document is to introduce the Entity to the concept, context, and importance of managing operations of the Life Safety Systems (LSS) within the healthcare sector. This also serves as guidance for further development of the Entity's specific operational management process for LSS systems. It also describes the role played by LSS as well as provides approaches that need to be observed while managing and operating those systems, in order to maintain confidence in their ability to perform their intended function when required. It is the responsibility of the Entity and/or Facilities Management Company (FMC) to ensure that all LSS which exist within the Entity's facilities are clearly identified within the asset register, and a clear and robust control is established and put in place with respect to their management and operation, thereby ensuring their availability when required.

Furthermore, the document explains the accountabilities and responsibilities mandatory upon the Entity and/or FMC, ensuring that there is sufficient understanding of the obligations for the management of LSS, as those systems form a part of the Entity's overall assets.

The guidelines contained herein provide a base structure for the Entity and/or FMC from which a singular or set of documents can be developed to define the required scope of process and Standard Operating Procedures (SOPs) for the facility. This will enable the management and senior management to have a clear understanding of the following in relation to LSS:

- Staffing requirements
- Entity, client and the FMC roles and responsibilities
- Operational compliance to standards
- Equipment lifecycles
- Material sustainability
- Energy efficiencies
- Ability to gain analytical information to identify efficiencies throughout the operational management processes

2.0 SCOPE

The scope of this document is to provide guidelines to the healthcare Entity or service providers to improve and enable site specific operation management processes in relation to LSS operational activities such as, but not limited to:

- Ensuring Statutory Compliance (SC) and safety
- Performance monitoring of the LSS
- Controls and monitoring to achieve operational efficiency
- Customized control strategies
- Operational flexibility and ease of change
- Improved operational environment and comfort
- Integration with other engineering systems to improve effectiveness
- Optimize quality service delivery

For the purpose of this document, "a healthcare facility" has been defined as any location where healthcare is provided including, but not limited to:

- Hospitals
- Clinics
- Nursing homes
- Dental care facilities
- Psychiatric institutes/facilities

Specialist healthcare facilities often include departments that will be equipped with or may be served by bespoke plant and equipment such as university hospital (e.g., surgeon teaching facilities), and healthcare research laboratory (e.g., bio-hazard extract, aseptic suite with specialist infection and access control),

palliative care (specialist environmental lighting), dialysis clinics (specialist environmental lighting and reverse osmosis (RO) plant.
Typically, the functionality and asset management requirements associated with LSS are not specific to a sector or geographical application. However, where particular aspects require further explanation in context of a certain function that may be considered sector specific and therefore is provided within the relevant section of this document.

It shall be noted that dependent on the FMC and contracts in place at certain healthcare facilities, following will be the responsibility of occupants including, but not limited to:

- Unit installation
- Asset management
- Equipment operations
- Periodic testing
- Lifecycle replacement

However, delivery to the unit boundary of core utilities including e.g., power, water, Heating, Ventilation, and Air Conditioning (HVAC), fire detection is still with the building operating client and, therefore, with the FMC. It is the responsibility of the client management to ensure that substandard installations are not connected to the core facility utilities and so, the SOP to govern this shall be developed and implemented.

Notwithstanding the recommendations presented in this document, the final responsibilities for the efficient operations management of LSS shall remain with the Entity and/or Operations Engineer (OE).

Life safety embodies concern for the quality of life for everyone in the community; including those in the healthcare facilities, the users, and potential rescuers (shall an incident arise).

3.0 DEFINITIONS

Term	Definition
Life Safety System	Any interior building element designed to protect and evacuate the building population in emergencies, including fires and earthquakes, and utility loss (e.g., power supply outages)
Fire Detection Systems	Include electronic smoke and heat detectors that can automatically activate audible alarms and notify local fire brigades
Fire Suppression Systems	Include building sprinkler, mist and hose systems; hand operated fire extinguishers are often provided
Protective Measures	Smoke is as dangerous as fire, so protective measures include the automated shutdown of ventilating systems and grounding of elevators, and the division of the building into fire and smoke compartments
Evacuation	The egress of occupants is through protected exits (which include exit corridors and stairways in fire and smoke proof enclosures in multistory buildings) leading to the exterior of the building
Abbreviations	
ACOP	Approved Codes of Practice
AGSS	Automated Gas Scavenging System
AHJ	Authority Having Jurisdiction
ASD	Aspirating Smoke Detection
ATS	Automatic Transfer Switch
AVSU	Area Valve Service Unit
BESA	Building Engineering Services Association
BMS	Building Management System
BS	British Standard
C&E	Cause and Effect
CAFM	Computer Aided Facility Management
CB	Capacitor Bank

Term	Definition
CBS	Central Battery System
CDM	Construction Design and Management
CMMS	Computerized Maintenance Management System
CMT	Crises Management Team
COSHH	Control of Substances Hazardous to Health Regulations
DB	Distribution Board
DOC	Department Operations Center
DPA	Data Protection Act
DSEAR	Dangerous Substances and Explosive Atmospheres Regulations
DSP	Distribution Service Provider (Electrical Generation Entity)
EAHU	Extract Air Handling Units
EAP	Employee Assistance Program
EAWR	Electricity at Work Regulations
ECRA	Electricity & Cogeneration Regulatory Authority
ELV	Extra Low Voltage (Classified as below 50V)
EPDS	Emergency Power Distribution System
ERT	Emergency Response Team
ESF	Emergency Support Function
ESG	Emergency Standby Generator(s)
ESQCR	Electrical Safety, Quality and Continuity Regulations
FM	Facilities Manager
FDM	Facilities Departmental Managers
FMC	Facilities Management Company (Facilities Operations)
FOC	Facilities Operating Client (Client/Building Owner)
FOM	Facilities Operations Management (Client/Building Owner Representative)
GAMP	The Good Automated Manufacturing Practice
GASR	Gas Appliance (Safety) Regulations
GSMR	Gas Safety (Management) Regulations
HBN	Health Building Note
HC	Healthcare
HF	Harmonic Filter
HSaWA	Health and Safety at Work Act
HSE	Health and Safety Executive
HSG	Health and Safety Guidance
HSE	Health, Safety, and Environment
HTM	Health Technical Memorandum
HV	HV Voltage (Classified as above 13.8kV with allowable variance of MV 13.1kV – 14.5kV)
HVAC	Heating, Ventilation, and Air Conditioning
IAP	Incident Action Plan
IBC	International Building Code
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IET	Institute of Engineering and Technology
IFC	International Fire Code
IOSH	Institution of Occupational Safety and Health
IPS	Isolated Power Supplies
ISO	International Organization for Standardization
ISPE	International Society for Pharmaceutical Engineering
IVDR	In Vitro Diagnostic Regulations

Term	Definition
KPI	Key Performance Indicator
LAL	Load Acceptance Level
LED	Light Emitting Diode
LEV	Local Exhaust Ventilation
LMR	Lift Motor Room
LOTO	Lock Out Tag Out
LSS	Life Safety System
LTHW	Low Temperature Hot Water
LV	Low Voltage (Classified as being above 50V and below 600V)
LVDB	Low Voltage Distribution Board
MCC	Motor Control Center
MCP	Manual Call Point
MDB	Main Distribution Boards
MEWP	Mobile Equipment Work Platform (Scissor/Boom Lift)
MFCP	Main Fire Control Panel
MS	Method Statement
MSDS	Materials Safety Data Sheet
MSFP	Motorized Smoke and Fire Damper System
MV	Medium Voltage (Classified as being above 600V and below 13.8kV)
MVDB	Medium Voltage Distribution Board
MVS	Medium Voltage Substation
MVSN	Medium Voltage Supply Network
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NIBSC	National Institute for Biological Standards and Control
NMA&FM	National Manual of Assets and Facilities Management
NSF	National Standards Foundation
OE	Operations Engineer
O&M	Operations and Maintenance
OEM	Original Equipment Manufacturer
OSHA	Occupational Safety and Health Administration
PASS	Personal Alert Safety System
PAVA	Public Address Voice Activation
PDS	Product Data Sheet
PMR	Personal Mobile Radio
PSR	Pipeline Safety Regulations
PSSR	Pressure Systems Safety Regulations
PPE	Personal Protective Equipment
PPM	Planned Preventative Maintenance
PTW	Permit to Work
PUWER	Provision and Use of Work Equipment Regulations
QHSE	Quality, Health, Safety and Environment
RA	Risk Assessment
RAMS	Risk Assessment & Method Statement
PUWER	Provision and Use of Work Equipment Regulations
RMU	Ring Main Unit
RPM	Revolutions Per Minute
SASO	Saudi Standards, Metrology and Quality Organization
SBC	Saudi Building Code

Term	Definition
SEC	Saudi Electrical Company
SFG	Service and Facilities Group (A specialist section of BESA)
SG	Safety Group
SLA	Service Level Agreement
SMDB	Sub Main Distribution Board
SOP	Scope of Process/Standard Operating Procedure
SS	Substation
T&C	Test and Commissioning
TR	Transformers
UPS	Uninterruptable Power Supplies
UL	Underwriters Laboratories, Inc.
VESDA	Very Early Smoke Detection Apparatus
VFD	Variable Frequency Drive
VHF	Very High Frequency
WHSR	Workplace Health and Safety Regulations

Table 1: Definitions

4.0 REFERENCES

- British Standards (BS 1838) – Emergency Lighting (Superseded by BS 5266)
- British Standards (BS 5499) – Fire safety signs, notices and graphic symbols (Superseded by BS ISO 3864)
- British Standards (BS 5839) – Fire Detection and Alarm Systems for Buildings
- British Standards (BS 8519) – Fire Detection and Alarm Systems for Buildings
- British Standards (BS 9999, 2017) – Code of Practice for Fire Safety in the Design, Management and Use of Buildings
- British Standards (BS EN 50172/5266) – Emergency escape lighting systems
- British Standards (BS EN 60598-1) – Luminaires
- British Standards (BS EN 50171) – Central Power Supply Systems
- British Standards (BS EN 62034) – Automatic Test Systems for Battery Powered Emergency Escape Lighting
- British Standards (BS EN 7010) – Graphical symbols. Safety colors and safety signs. Registered safety signs (superseded by BS ISO 3864)
- British Standards (BS ISO 3864) – Graphical Symbols. Safety Colors and Safety Signs. Design Principles for Safety Signs and Safety Markings
- Control of Substances Hazardous to Health Regulations (COSHH), 2002
- Control of Major Accident Hazards Regulations (COMAH), L22 2015
- Control of Major Accident Hazards Regulations (COMAH HSG191) – Memorandum of Guidance on the Emergency planning for Major Accidents, 1999
- Construction (Design and Management) Regulations (CDM), 2015
- Data Protection Act 2018
- Dangerous Substances and Explosive Atmospheres Regulations (DSEAR), 2002
- Directive 95/46/EC (General Data Protection Regulation)
- Electricity at Work Regulations (EAWR), HSR 25:1989
- Electricity at Work Regulations (EAWR), HSG85 – Safe Working Practices
- Electricity Safety, Quality and Continuity Regulations (ESQCR), 2002
- EU Regulations on Medical Devices, 2017/745
- EU Regulations on in Vitro Diagnostic Medical Devices, 2017/746
- Gas Appliances (Safety) Regulations (GASR), 1995
- Gas Safety (Management) Regulations (as amended) (GSMR), 1996

- Gas Acts (GA), 1986 & 1995
- Health Technical Memorandum (HBN 00-01) – General design guidance for healthcare buildings
- Health Technical Memorandum (HBN 00-07) – Resilience planning for the healthcare estates
- Health Technical Memorandum (HBN 00-08 Part A) – Strategic framework for the efficient management of healthcare estates and facilities
- Health Technical Memorandum (HBN 00-09) – Infection control in the built environment
- Health Technical Memorandum (HBN 03-01) – Adult acute mental health units
- Health Technical Memorandum (HBN 04-01) – Adult in-patient facilities: planning and design
- Health Technical Memorandum (HBN 11-01 Supplement A) – Resilience and emergency planning in primary and community care
- Health Technical Memorandum (HTM 01-01) – Decontamination of Surgical Instruments
- Health Technical Memorandum (HTM 01-05) – Decontamination in Primary Care Dental Practices
- Health Technical Memorandum (HTM 01-06) – Management and Decontamination of Flexible Endoscopes
- Health Technical Memorandum (HTM 02-01) – NHS Estates Guidance for Medical Gas Pipeline Systems
- Health Technical Memorandum (HTM 03-01) – Heating and Ventilation of Health Sector Buildings
- Health Technical Memorandum (HTM 04-01) – Safe Water in Healthcare Premises
- Health Technical Memorandum (HTM 05-01) – Managing Healthcare Fire Safety
- Health Technical Memorandum (HTM 05-02) – Fire Safety in the Design of Healthcare Premises
- Health Technical Memorandum (HTM 05-03) – Fire Safety Measures for Health Sector Buildings
- Health Technical Memorandum (HTM 06-01) – Electrical Services Supply and Distribution
- Health Technical Memorandum (HTM 06-02) – Electrical Safety Guidance for Low Voltage Systems
- Health Technical Memorandum (HTM 06-03) – Electrical Safety Guidance for High Voltage Systems in Healthcare Premises
- Health Technical Memorandum (HTM 07-01) – Management and Disposal of Healthcare Waste
- Health Technical Memorandum (HTM 07-04) – Water Management and Water Efficiency
- Health Technical Memorandum (HTM 08-02) – Design and Maintenance of Lifts in the Health Sector
- Health Technical Memorandum (HTM 08-03) – Management of Bedhead Services in the Health Sector
- Health Technical Memorandum (HTM 67) – Design of Laboratories for Health Sector Buildings
- Health and Safety at Work Act (HSaWA), 1974
- Health and Safety (Safety Signs and Signals) Regulations (SSR), 1996
- Institute of Engineering and Technology (IET) Wiring Regulations, 8th Edition – BS Standard 7671:2018
- International Organization for Standardization (ISO 18000) – Occupational Health and Safety Assessment Series (OHSAS 18001)
- International Organization for Standardization (ISO 31000) – Risk management
- International Society for Pharmacoepidemiology (ISPE) – GAMP Good Practice Guide: GxP Compliant Laboratory Computerized Systems 2nd Edition
- Lifting Operations and Lifting Equipment Regulations (LOLER), 1998
- Management of Health and Safety at Work Regulations (MHSWR), 1999
- Memorandum of guidance on Safe Management of Industrial Steam and Hot Water Boilers (IND436)
- Memorandum of Guidance on Electrical Test Equipment for Use on Low Voltage Electrical Systems (GS38)
- Memorandum of Guidance on Keeping Electrical Switchgear Safe (HSG230)
- Memorandum of Guidance on Legionnaires' Disease – Technical Guidance (HSG274 Parts 1,2,3)
- Memorandum of Guidance on the Control of Legionella Bacteria in Water Systems (L8 ACOP)

- Memorandum of Guidance for Duty Holders – Legionnaires Disease (INDG458)
- Memorandum of Guidance on the Dangerous Substances (Notification and Marking of Sites) Regulations (HSR29), 1990
- Mental Health Act 2007
- National Fire Protection Association (NFPA 1) – Fire Code
- National Fire Protection Association (NFPA 3) – Standard for Commissioning of Fire Protection and life safety systems
- National Fire Protection Association (NFPA 4) – Standard for Integrated Fire Protection and Life Safety System Testing
- National Fire Protection Association (NFPA 12A) – Standard on Halon 1301 Fire Extinguishing Systems
- National Fire Protection Association (NFPA 25) – Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems
- National Fire Protection Association (NFPA 50) – Standard for Bulk Oxygen Systems at Consumer Sites
- National Fire Protection Association (NFPA 70) – National Electrical Code
- National Fire Protection Association (NFPA 70B) – Recommended Practice for Electrical Equipment Maintenance
- National Fire Protection Association (NFPA 70E) – Standard for Electrical Safety in the Workplace
- National Fire Protection Association (NFPA 72) – National Fire Alarm and Signaling Code
- National Fire Protection Association (NFPA 73) – Standard for Electrical Inspections in the Workplace
- National Fire Protection Association (NFPA 78) – Guide to Electrical Inspections
- National Fire Protection Association (NFPA 79) – Electrical Standard for Industrial Machinery
- National Fire Protection Association (NFPA 99) – Health Care Facilities Code
- National Fire Protection Association (NFPA 101) – Life Safety Code
- National Fire Protection Association (NFPA 101A) – Guide on Alternative Approaches to Life Safety
- National Fire Protection Association (NFPA 110) – Standard for Emergency and Standby Power Systems {Chapter 5 and 8 – Emergency Power System (EPS), Chapter 8 – Emergency Power Supply System (EPSS)}
- National Fire Protection Association (NFPA 111) – Standard on Stored Electrical Energy Emergency and Standby Power Systems
- National Fire Protection Association (NFPA 170) – Standard for Fire Safety and Emergency Symbols
- National Fire Protection Association (NFPA 418) – Standard for Heliports
- National Fire Protection Association (NFPA 496) – Standard for Purged and Pressurized Enclosures for Electrical Equipment
- National Fire Protection Association (NFPA 497) – Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas
- National Fire Protection Association (NFPA 550) – Guide to the Fire Safety Concepts Tree
- National Fire Protection Association (NFPA 791) – Recommended Practice and Procedures for Unlabeled Electrical Equipment Evaluation
- National Fire Protection Association (NFPA 853) – Standard for the Installation of Stationary Fuel Cell Power Systems
- National Fire Protection Association (NFPA 1061) – Standard for Public Safety Telecommunications Personnel Professional Qualifications
- National Fire Protection Association (NFPA 1078) – Standard for Electrical Inspector Professional Qualifications
- National Fire Protection Association (NFPA 1082) – Standard for Facilities Fire and Life Safety Director Professional Qualifications
- National Fire Protection Association (NFPA 1500) – Standard on Fire Department Occupational Safety, Health, and Wellness Program
- National Fire Protection Association (NFPA 1982) – Standard on Personal Alert Safety Systems (PASS)
- National Health Service (NHS) – Premises Assurance Model Guidance, 2016
- National Institute for Biological Standards and Control (NIBSC)

- National Manual of Assets and Facilities Management (NMA & FM) Volume 6 – Maintenance Management
- National Manual of Assets and Facilities Management (NMA & FM) Volume 6, Chapter 9 – Electrical Systems Maintenance Plan for Healthcare
- National Manual of Assets and Facilities Management (NMA & FM) Volume 10 – Health, Safety, and Environment (HSE)
- National Manual of Assets and Facilities Management (NMA & FM) Volume 14 – Emergency Management
- OSHA Personal Protective Equipment
- Pipelines Safety Regulations (PSR), 1996
- Pressure Systems Safety Regulations (PSSR) – Written Schemes of Examination (INDG178), 2000
- Pressure Systems Safety Regulations (PSSR) – Approved Code of Practice and guidance on Regulations (L122), 2000
- Provision and Use of Work Equipment Regulations (PUWER), 1998
- Provision and Use of Work Equipment Regulations (PUWER) – Safe Use of Work Equipment (L22)
- Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR), 2013
- Saudi Aramco Suppliers Safety Management System (SSMS)
- Saudi Building Code (SBC) SBC 801-CR:2018; Saudi Fire Code - Code Requirements
- Service and Facilities Group (SFG20) – Specialist Group within Building Engineering Services Association (BESA) – (SFG20)
- The Health and Social Care Act 2008 – Code of Practice on the Prevention and Control of Infections and Related Guidance
- The Interactive Guide to the New EU Regulations for Medical Devices (MDR) and In Vitro Diagnostic Medical Devices (IVDR)
- Workplace (Health, Safety and Welfare) Regulations (WHSR), 1992
- General Directorate of Civil Defense: https://998.gov.sa/English/safety/Pages/default.aspx

International best practices and standards shall be selectively applied based on the evaluation of individual requirements. Where the standards stipulated conditions conflict, the most stringent shall govern, unless otherwise noted herein. When there is any conflict with the Saudi Building Code (SBC), only the Saudi Building Code will be applied.

5.0 RESPONSIBILITIES

The Ministry is the final Authority Having Jurisdiction (AHJ) unless specifically stated otherwise in other sections of the National Manual of Assets and Facilities Management. If a conflict is discovered between these guidelines and other operations management documents, it shall be brought to the attention of Entity, who will provide a resolution or direction to ensure that all LSS' goals and requirements have been met.

5.1 Organizational Structure

The organizational chart provided in Figure 1 is based on the Health Technical Memorandum (HTM) guidelines. However, some entities may utilize an internal or fully outsourced process flow depending on the adopted SOP of the facility.

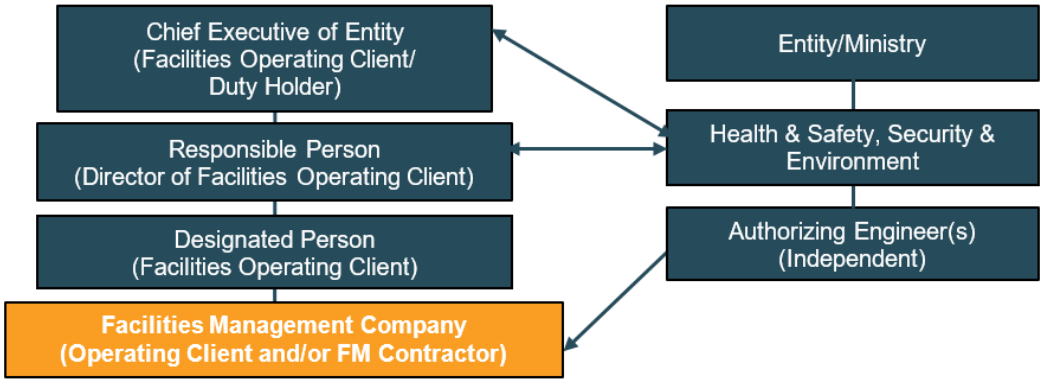

Figure 1: Hierarchy Approval Flowchart

The Entity shall ensure that an organizational plan for each facility exists clearly, setting out where particular responsibilities exist with regards to ensuring continued safe and reliable operations of LSS. This function can either sit within existing function (engineering standards department) or be established as a standalone function.

The responsibilities of the roles mentioned in the above chart are as follows:

Role	Description
Entity	Governmental Entity having jurisdiction over healthcare sector
Entity Representative {Facilities Operating Client (FOC)}	Entity representative having overall management of the facility
Duty Holder	The Entity/Organization is ultimately accountable for ensuring that the legislative requirements and standards are met with respect to the Operations and Maintenance (O&M) requirements of all LSS. This accountability may be met by ensuring the correct processes and other resources are in place to ensure competent discharge of responsibilities
Head of Health, Safety, and Environment (HSE)	The head of the HSE in conjunction with the Responsible Person, shall ensure the management of LSSs can be evidenced through the production and retention of appropriate records providing evidence that O&M requirements are met, and that people operating within those requirements have the necessary competencies
Responsible Person	The Responsible person for operations shall have all information of the systems and full responsibility to act and assign all duties. The responsible person shall be a competent person, having knowledge of each system in the organization/site to carry out operational procedures on time and effectively The Responsible Person should have a clear understanding of their duties and the overall health and safety management structure and policy within the organization. The Responsible Person shall undergo refresher training on the health and safety management structure as part of their duties. It shall be the duty of the HSE team to make sure all responsible teams shall have undergone a health and safety management refresher course, at least once a year
Designated Person	Each facility shall appoint a designated person, responsible for carrying out routine checks of system status when specified The designated person shall be considered a role allocated to a member of existing teams

Role	Description
	The designated person is to be provided with sufficient training to ensure that they are aware of how and when to carry out their duties, to meet specified requirements
Facilities Operations Management (FOM) (Those who employ competent persons/contractors)	FOM shall appoint contractors who are responsible for ensuring LSS are designed and installed in compliance with approved consultant specifications. Contractors are to be licensed and/or accredited by the appropriate authority to carry out work on the LSS for which they are being considered The facilities operations manager in conjunction with the Responsible Person, shall be responsible for ensuring that all works carried out on LSS are done in a safe manner, and to the required standards, whilst minimizing the impact of those works on daily operations of the facility. No system will be accepted back into service, unless the Responsible Person has given the final written approval that the works are completed with the required standards and the areas worked in have been returned to the required levels of operational condition. In hospitals, particular attention is to be paid to site cleanliness The Facilities operations manager shall be responsible for liaising with other departments for the purpose of developing plans for periodic system tests, and planned and unplanned maintenance works

Table 2: Designated Roles and Responsibilities

5.2 Safety Group

As per HTM, a Safety Group (SG) needs to be established for each discipline – Electrical, Medical Gas, and Water. The role of this group is to discuss current issues, solutions, and forthcoming potential problems (e.g., with new projects, dealing with new legislation), to assist in avoiding project clashes, outages, and taking/formulating mitigating actions.

Figure 2 below provides an example of structure that shall be employed as best practice, Electrical SG designations may change dependent on the FMC organization structure.

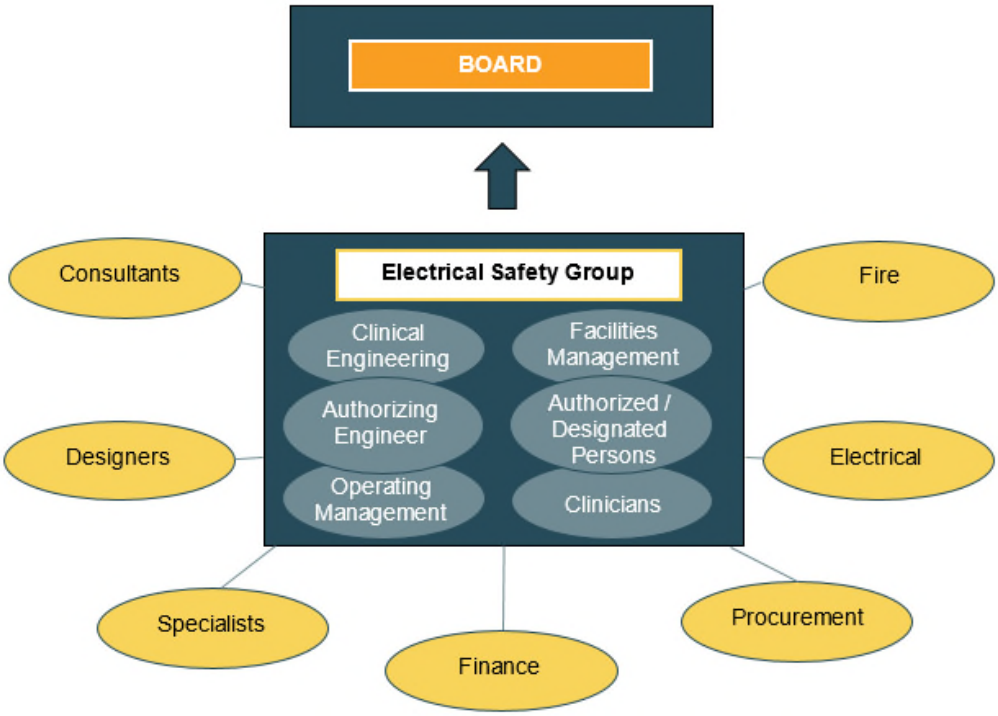

Figure 2: Example of Electrical Safety Group

SGs are put together as part of the best practice process and for the following reasons:

- Formed to ensure that entities follow safety guidelines that are regularly reviewed for reference and operational practice.
- To indicate personnel responsibilities and delegated roles for technical and administrative
- To provide a hierarchy to overall management of the facility
- To instill best practice and assist demonstration of a commitment to robust control measures
- To promote group discussion and shared responsibility for decisions made by the group

6.0 PROCESS

6.1 Overview of Life Safety Systems

The primary purpose of LSS is to provide a supporting functionality during periods when the normal operational status of specified systems is considered to be degraded. In this context, the term ‘degraded’ can be interpreted as ‘no longer capable of performing its intended function’. LSS may, therefore, be usefully described as backup systems that perform their function in the event when others cease to be available.

Degraded modes of operation can also be extended to include situations where the operational environment changes to one in which an unacceptable level of risk to life, or partial or total loss of the asset is realized (e.g., outbreak of fire). In such situations, the role of particular LSS is to protect life, provide safe egress and minimize the degree of damage suffered by the asset. Assets such as public buildings, therefore, consist of elements that are designed to protect facilities and their occupants during periods of degraded modes of operation and emergencies. They may, therefore, be deemed to be critical to the safe

and continuous operation of a given facility. LSS are documented to have made an invaluable contribution for minimizing casualties during emergencies as well as limiting the loss of life every year. They are also recognized to play a significant role in the preservation of asset value, by limiting or preventing financial loss.

Installation of LSS is a statutory compliance for civil defense approval, the maintenance of which is also a statutory requirement of the Entity. In recognition of the role played by LSS, it is now a standard practice internationally for various types of systems to be mandated as part of building design in many public sectors, and it is not uncommon for relevant legislations to be mandated retrospectively, resulting in LSS being retrofitted to existing facilities, to which they had not been fitted at the time of initial construction.

It shall also be noted that in some sectors, particularly those accessible to or used by the public, it may prove extremely challenging, if not impossible, to obtain mandated insurances against loss or injury caused to others where LSS are either not provided, or is not functional. It is therefore essential that the Entity and/or FMC work to understand the nature of LSS within their asset ensure that the hierarchies of control exist to ensure that they are maintained, inspected, and tested base and to acceptable levels. Such that the ability of the LSS to perform its intended function, if required to do so, can be demonstrated and independently verified.

Note: A poorly maintained LSS can present an unacceptable risk to the loss of life. It is the responsibility of the Entity and/or FMC, that LSS are always maintained to a good state of repair and shall be demonstrated and documented.

The following systems shall be considered within the Entity for operations management of the facility, details of which can be found within the document. The Entity and/or FMC shall be aware of the systems that are established for risk aversion; the list of Entity risks (which shall be recorded), must be reviewed annually.

- **Utilities:**
  - Water – Mains water supply for all areas and RO used in renal
  - Gas/Fuel Oil (Fuel) – Used for heating, electrical generation
  - Medical Gas – This macroscopic term covers the use of Oxygen, Nitrous Oxide, Entonox, Surgical Air, Medical Air, and Vacuum, used in operating theatres, intensive care and general wards, surgical assessment and any other areas that may necessitate their use. Some of these gases are stored as liquids, in vacuum insulated tanks to reduce storage size
  - Steam – Used for heating of theatres and wards, and used for sterilization and other facilities on site
  - Electricity – Main electricity incoming supply, needed to support the hospitals from the local electricity network
- **Maintained Power Supplies:** Emergency Diesel Generators, Uninterruptable Power Supplies and Isolated Power Supplies used in the following areas; and any other areas that may necessitate their use, e.g., Operating theatres and their lights, Intensive Care, Neonatal Intensive Care, Midwifery, Cardiology, Neurology, Endoscopy, X-Ray, Microbiology, and Nurse Call used in all patient areas
- **HVAC:** HVAC used in life critical areas, i.e. operating theatres, Intensive care, Neonatal Intensive Care, Midwifery, Cardiology, Neurology, Endoscopy, X-Ray, surgical assessment rooms
- **Imaging:** These may not be classed as LSS, however in some cases, i.e. an emergency department insist that these are operational for emergency patients, to assist with faster diagnosis. CT scanners and MRI scanners used in emergency departments will also have Uninterruptable Power Supply (UPS) backup
- **Fire Detection Systems:** Manual call points, heat detectors, smoke detectors and Very Early Smoke Detection Apparatus (VESDA), to alert staff, patients, and visitors in the case of a fire
- **Fire Suppression:** Sprinklers, mist systems, local extinguishers, halon gas or reduced oxygen atmosphere, are used to suppress and extinguish the fire (where possible)
- **Protective Measures:** Fire doors, fire shutters, fire curtains, fire proofing, are used to compartmentalize the fire and assist in reducing the rate of spread to other areas/floors of the building
- **Evacuation:** Emergency stairs, evacuation/fire lifts are used to enable staff, patients, and visitors to leave the building by a fire compartmented route to safety

- **Security and IT systems:** These systems are used to enable escape in the event of a fire, and alert security to any breaches in locked fire doors (which are released by activation of the fire alarm)

6.2 Equipment Used in Life Safety Systems

The structure of LSS are made up of numerous components; that include, but not limited to, the systems mentioned in **Section 6.0**.

The following are items/systems that shall be installed within a healthcare facility. Each Entity and/or FMC shall identify and implement a testing plan that meets with regulatory/statutory compliance, not limited to:

- Mains water supply
- Mains gas supply {e.g., Liquid Petroleum Gas (LPG), LNG (Liquid Natural Gas)}
- Steam/LTHW (low temperature hot water) boilers
- Medical Gas (further information contained in mechanical systems)
- Emergency power generation system
- Main incoming MV electrical supply (emergency generator supply is listed below)
- Emergency lighting and central battery system(s)
- HVAC systems
- Fire detection
- Suppression system
- Evacuation/Firefighting elevators
- Public address systems

Refer to the following for further reference:

- NMA & FM Volume 5, Chapter 7 – Mechanical Systems Operations
- NMA & FM Volume 5, Chapter 8 – Electrical Systems Operations
- NMA & FM Volume 10 – Health Safety and Environment (HSE)

6.2.1 Sub Systems Within Life Safety Systems

- Storage tanks
- Treatment (water)
- Treatment and distribution (Fuel)
- Electrical distribution systems
- Emergency shut off valves
- Boilers
- Oxygen (liquid oxygen storage – VIE)
- Medical air system – compressors
- Medical air system – backup bottles
- Surgical air
- Nitrous oxide (bottles)
- Entonox (bottles)
- Auto changeover regulator manifolds (all bottles)
- AVSU (Area Valve Service Unit)
- Vacuum
- AGSS (Automated Gas Scavenging Systems)
- All Pipework
- Medical Gas Alarms
- Dual electrical supplies + changeover
- MV Distribution Boards (MVDB)
- MV Ring(s)
- Ring Main Units (RMU)
- MV/LV transformers
- LV Distribution Boards (LVDBs
- Automatic Transfer Switches (ATS)

- Static inverter UPS (and battery system)
- Rotary UPS (hybrid - generator driven flywheel/motor with slipper clutch)
- Emergency lighting and Central Battery system(s), covering all areas
- Emergency standby generators
- Fuel processing {e.g., water separators, particulate filters and Polishers (centrifuges)}
- Prime movers
- Alternators
- Hard wired nurse call systems
- Wireless nurse call systems
- HVAC supplies
- Local exhaust ventilation systems
- Stair pressurization systems
- Car park jet fans
- BMS/ELV systems
- Fire Alarms
- Smoke detectors
- VESDA
- Heat detectors
- Fire sprinklers
- Fire mist
- Fire hoses
- Portable fire extinguishers
- Smoke extraction fans
- Fire dampers
- Fire doors (all areas)
- Door hold opens/Door closers
- Fire curtains
- Fire shutters
- Fire escapes
- Fire lifts
- Auto dialers
- Life intercoms
- Central servers
- Patch panels
- ID cards
- Isolated Power Supplies (IPS)
- Door hold magnets
- CCTV
- Public address system
- Voice over IP System (VOIP)
- Portable two-way radios (VHF/HF – depending on licensing)

6.3 Utilities

6.3.1 Domestic Water

The need to have a dedicated water supply and if possible, a backup water supply; whether it be another healthcare supply, or a dedicated bore hole shall be considered (including necessary water treatment). Storage tanks shall provide at least 24 hours supply at a minimum and be able to be serviced independently without the need to shutdown supplies to the hospital avoiding pipework “dead legs”. Water treatment plans shall be installed to avoid waterborne pathogens (see HTM 04 for further information on these systems).

Note: In order to prevent patient fatalities, silver ion or silver stabilized treatments shall not be used on supplies to renal facilities.

Distribution pipework shall be maintained by the avoidance of ‘dead legs’ and the use of lead-free solder when changes are made to copper pipework, and temperatures shall be maintained as per HTM 04, HSG274.

Refer to NMA & FM Volume 5, Chapter 7 – Mechanical Systems Operations, for further information.

6.3.2 Gas (Fuel)

A storage of at least two weeks shall be kept on site, to facilitate patient evacuation in case of loss of supply, or lack of delivery, see HBM 00-07.

Refer to NMA & FM Volume 5, Chapter 7 – Mechanical Systems Operational Procedures.

6.3.3 Steam

Steam systems shall be maintained to facilitate maintenance without interruption and ensure environmental conditions for patients are not affected. Decontamination systems, especially sterile services, and autoclave functions for contaminated waste, must also be maintained.

Sterile surgical instruments can be brought to site for operations but is very costly (See HTM 01). Transport of highly contaminated waste is not an option.

Refer to NMA & FM Volume 5, Chapter 7 – Mechanical Systems Operational Procedures.

6.3.4 Medical Gas

Dual redundancy shall be implemented for each type of medical gas system, and HTM-02 / NFPA 99 shall be used as a reference, also see mechanical systems operational procedures.

Refer to following for further insights:

- NMA & FM Volume 5, Chapter 7 – Mechanical Systems Procedures
- NMA & FM Volume 10, Chapter 3 – Health Safety and Environment (HSE)

6.3.5 Maintaining Power Supplies

6.3.5.1 Main Incoming MV Electrical Supply

This shall be dual redundant, i.e. if the mains fail, either the supply shall auto changeover to the redundant supply (supply not in use), or a competent and qualified person shall be available, competent to changeover the mains from the failed supply to the working redundant supply.

In the event a loss of supply is detected, the electrical system shall trigger the Emergency Standby Generators (ESG) to start and take the site load, see HTM 06, NFPA 70 & 101, or provide power to emergency systems to aid with protection and evacuation.

Refer to NMA & FM Volume 5 Chapter 8 – Electrical Systems Operations, for further information.

In some buildings and facilities, the loss of mains power serves to be no more than a relative inconvenience to its occupants, or those who rely on its utility. However, the tolerance of complete or partial power loss can range from low to intolerable in other facilities, where temporary loss of mains power represents a serious risk. It is common for an alternative means of power to be incorporated within the design of the facility, so that in the event of a complete or partial power loss, the standby facility can step in to sustain critical electrical loads for a prescribed period of time.

6.3.5.2 Emergency Standby Generators (ESG)

ESG are commonly used as a means of providing standby power in the event that the mains power supplies are lost. ESG comprise of the following main components:

- Diesel powered internal combustion engine
- Alternator
- Manual or automatic changeover unit
- Electrical interface with the facility's main electrical infrastructure

ESG are independent of the primary source of power and are intended to be brought online in the event of a main power failure. Due to sizing and practicality constraints, it is not usual for the ESG to have sufficient capability to sustain the entire load of the facility. Therefore, the electrical distribution design may be such that critical systems are powered from specific circuits, which via a changeover contactor may be supplied by the ESG. By identifying the actual requirements for standby power, the ESG can be sized and designed accordingly.

It is therefore essential that strict controls are put in place around the modification of power supplies, intended for an upgrade or modification. This is to ensure that additional electrical loads are not intentionally or inadvertently connected to the backed power supply, which may increase the risk of the ESG being unable to provide sufficient power to support their originally intended load.

It is important to point out that ESG invariably lay dormant for extended periods of time, and therefore see very little use, particularly in districts that enjoy stable mains distribution systems, with a highly reliable electrical supply. Entities shall have a procedure in place to check operation of generators on load, as off load running is detrimental to equipment life. The backup faculties shall be tested periodically by the maintenance team to ensure that they are available for use in emergency and must form part of the periodic testing as shown in **Attachment 5**.

Note: Operation of generators and associated life safety electrical systems are only to be operated by qualified and trained personnel. As incorrect operation can lead to significant danger with consequent loss of service that will be detrimental to patients, medical and non-medical staff, and visitors' safety.

Refer to NMA & FM Volume 5 Chapter 8 – Electrical Systems Operations, for further information.

6.3.5.3 MV Distribution

Normally supplied and consists of MV rings and RMUs. MV backup systems are a specialist area and are covered in detail in NMA & FM Volume 6, Chapter 8 – Electrical Systems Operations.

6.3.5.4 LV Distribution

Normally supplied and consists of MV/LV transformers. The LV backup systems are a specialist area and are dependent upon the design of the facility and its overall function. Certain common systems are explained further within this document, but further details may also be found in NMA & FM Volume 5 Chapter 8 – Electrical Systems Operations.

6.3.5.5 Uninterruptible Power Supply (UPS) Systems

The primary function of the UPS is to ensure continuity of power supply in the event when main power is lost. They may also serve to improve the quality of the power source by keeping it within specified limits. UPS systems are predominantly battery based and self-contained units that are specified to provide an alternative means of supply for relatively short periods of time.

UPS systems are normally specified in conjunction with ESG in order to provide continued or maintained power during the startup sequence of the ESG. They operate on a 'make before break' principle with the changeover between the normal power supply and UPS, and from UPS to ESG load acceptance being almost imperceptible. It is, therefore, followed such that the load carrying capacity of the UPS will be matched to that of the ESG at the design stage, in order to ensure that there is sufficient power available to match demand throughout the whole process.

It is to be noted that both UPS systems and ESG when paired with an application shall be considered as a system; therefore, any changes or modifications intended shall be developed in consideration of the system as a whole in order to ensure that the system can continue to function post modification.

UPS systems are also employed in other standalone applications, where ESG are not provided. In such circumstances, the UPS systems performance will be rated such that it can support a specified maximum instantaneous or nominal continuous load for a specified duration before reverting to mains supply (whether the supply has returned or not). In some situations, it may be necessary for the UPS system to incorporate a load shed function, which provides a means of prioritizing the absolute criticality of loads supplied and shutting them down as power decreases. In this way, power supplies to essential systems are maintained for the longest possible duration. In applications where this function exists, the load shedding schedule must be clearly documented and understood by operators in order to allow accurate functional testing to be carried out, thereby confirming performance requirements.

UPS systems are typically employed to provide alternative means of supporting systems, such as lighting, or computer-based Building Management Systems (BMS) in the event of a total power loss. When originally procured and installed, the UPS system will have been specified to be able to support a defined load for a specific amount of time (autonomy), and it will be these performance criteria that will form the basis of a testing plan.

UPS systems are generally specialized systems when installed in life critical facilities and generally maintained by a third party or specialist contractor. The following shall be considered for UPS systems installations as part of a maintenance contract:

- Periodic system test simulates mains power fault and initiate changeover function
- Routine battery standup testing involving voltage and current measurement over time to establish battery performance
- Periodic battery replacement
- Any additions to UPS supplied equipment are to be approved by senior management and checked to ensure that they do not breach the rated output or affect overall system autonomy
- Installation of a standalone 'Battery Monitoring System' to provide early warning to the Entity, of problems associated with UPS
- Only trained and operated staff shall be engaged in switching operations of UPS systems, as they contain batteries which if operated incorrectly can prove to be hazardous

6.3.5.6 Isolated Power Supplies (IPS)

IPS are imperative (and a statutory requirement of operating theatres) for use where patients are treated internally, to avoid the possibility of electrocution. By using IPS, any potential stray currents are avoided between different instruments connected to a patient, and ensures a patient isn't physically grounded to the mains supply.

The earth is then used to detect any leakage to earth from either the live or neutral, without harm to the patient.

IPS are classed as a specialist system and are therefore maintained by a third Party/OEM specialist.

BS7671:2018, IET Guidance Note 7: Special locations and IET Guide to Electrical Installations in Medical Locations shall be used for reference.

For further reference, see NMA & FM Volume 6, Chapter 9: Electrical Systems Maintenance and Operations.

6.3.5.7 Nurse Call/Crash Call

These systems are installed in patient areas, or where patients are treated. These can either be hard wired systems or wireless, the preference normally being the former due to extraneous signals and "ghost" calls occurring with the wireless systems; which can be disruptive to staff and patients. The nurse call/Crash Call activation handsets, must be "fail safe", i.e. If the handset cable is unplugged or the batteries fail, the alarm must be activated.

Refer to Volume 6, Chapter 9: Electrical Systems Maintenance and Operations of the NMA&FM.

6.4 HVAC Systems

In some buildings and facilities, the loss of HVAC serves to be no more than a relative inconvenience to its occupants, or those who rely on its utility. However, the tolerance of complete or partial loss of HVAC can range from low to intolerable in other facilities, where temporary loss of HVAC represents a serious risk. It is common for an alternative means of power to be incorporated within the design of the facility, so that in the event of a complete or partial power loss, the standby facility can step in to sustain critical electrical loads of HVAC, for a prescribed period of time.

Certain systems related to life safety are described within this document. Further information related to HVAC series may be found in NMA & FM Volume 5, Chapter 4 – HVAC Systems Operations.

6.5 Fire Systems

6.5.1 Evacuation / Firefighting Lifts

Firefighting lifts are a system, including a vertical series of lift lobbies and associated lift lobby doors, a lift shaft(s), and a machine room(s), that provides protection from fire effects for lift passengers, people waiting to use lifts, and lift equipment so that lifts can be used safely for evacuation.

These lifts are linked to the FAS and will revert to 'Fire Mode' in the event of an activation. Additionally, they may be operated by the attending civil defense to access areas close to the fire, or incident, via a key switch adjacent to point of entry. They may also be used for the evacuation of mobility impaired persons. These lifts should be clearly identified, and support systems checked as part of LSS checks, i.e. Lift Motor Room (LMR) fire dampers and shaft pressurization systems.

6.5.2 Fire Safety (Detection and Suppression Systems)

Fire detection and fire suppression systems are critical to life safety, in those the former is designed to detect and alert the occupants of a building in case of fire, and the latter to contain or extinguish fire. The

critical nature of both dictate a thorough understanding of the duties and responsibilities incumbent on the Entity for ensuring that fire detection and suppression systems are maintained to a good state of repair.

It is often the case that more modern fire detection and suppression systems are designed as one with a single overarching control philosophy. Within this section, the fundamental characteristics and requirements of each will be explained separately and concluded with an overview of the manner in which they can be designed with interdependencies. It is a common practice for an organization to meet its LSS responsibilities with respect to fire detection and suppression by selecting a number of integrated systems which when combined, provide defense in depth against both the risk of fire, and the impact of fire, shall the risk be realized.

6.5.3 Fire Detection Systems

Most systems are addressable, so a defined sequence of actions can take place in the event of activation. This is commonly referred to as the Cause & Effect (C&E) matrix which is checked and verified at installation and commissioning. Entities shall consider any impact to the overall C&E, should any modifications or compartment layouts be undertaken after final handover.

Fire detection systems are designed to raise an alarm upon the identification of precursors to fire, or in the event that the system is manually activated in the event that a fire is identified or suspected to be present. The fire detection system can be further refined into the detection aspect of the system or trigger, and the alarm aspect, both of which are described below.

6.5.3.1 Detection Function

The detection function is performed by providing inputs into the Main Fire Control Panels (MFCP). Fire detection systems are composed of detection, alarm, and on more modern installations, the auxiliary output functions that shall be described below. It is also to be noted that typically, MFCP contain their own internal backup power supply, allowing internal batteries to power the system for a short time until power is restored. Collectively, they are referred to as fire alarm systems.

The fire detection function is provided by one of the following device types:

- **Smoke Detector:** These devices are located in rooms, corridors, roof spaces, under floor voids, and other areas. Their function is to detect the presence of smoke in a building within its area of coverage and alerting the MFCP when smoke density reaches a predetermined limit
- **Heat Detector:** These devices provide a similar function to a smoke detector, alerting the MFCP when an element within the device reaches a predetermined temperature. Heat detectors are normally installed in dusty environments or those which could impact normal optical type detectors, but that which does not result from uncontrolled fire, such as kitchens. They can be beneficial since they avoid false alarms being raised as a result of dust accumulating within the device over time
- **Manual Call Points (MCP):** MCP, sometimes referred to as break glasses, are located throughout buildings and are designed to be manually operated by persons within their vicinity, when a fire is suspected to exist. They are predominantly located on the side of doorways and along the means of escape in prominent positions so that their use is intuitive, as occupants evacuate the building. These shall be clearly labelled with photo-luminescent signs to be seen in low light conditions

6.5.3.2 Very Early Smoke Detection Apparatus (VESDA) System and Beam Detectors

These types of detection are generally fitted to areas that may be inaccessible for routine maintenance activities often requiring high level access. VESDA is a system that utilizes a sampling pump to extract air from a remote position and pass it over a smoke detection device. This device is connected to the addressable system and can indicate to the house system, the presence of smoke to activate the C&E associated. Typical installations for these devices are normally unoccupied areas, void spaces, and lift shafts.

Beam detection devices are types of detector that operate on the principle of a fixed beam transmitter (Tx) and Receiver (Rx). These devices work on the principle of an uninterrupted signal in normal conditions

which generates no output from the device. If the presence of smoke is detected, then the beam will be broken and will output a signal to the house system for activation. The location of these devices is generally high level atrium facilities within a building.

Maintenance of the above systems shall be undertaken by trained personnel as small errors in the set up may cause numerous nuisance alarms. Additionally, specialist access equipment is normally required to obtain entry.

6.5.3.3 Alarm Function

MFCP consist of an alarm function. Their purpose is to provide an audible alarm that can be heard at a specified decibel level throughout the building. It is essential that the alarm system is audible throughout the building to ensure that all occupants are given suitable warning for the need to evacuate. It shall be noted however, that in certain applications the alarm system may not be audible, to avoid panic, and activations are transmitted to dedicated positions and users to execute evacuations. This may be based upon a 'phased evacuation' protocol, where those areas closest to the point of activation are notified immediately. This may be due to the capacity of escape routes being limited or external facilities being restricted to collect evacuating personnel.

In some facilities, it may be necessary to provide an audio-visual alarm so that persons with impaired hearing are also alerted to the need to evacuate the building.

Fire detection systems are to provide an early warning system for emergency events to inform staff, patients, and visitors within the healthcare facility, the immediate area, or both, to evacuate safely. The fire detection systems may also be linked with a Public Address Voice Activation (PAVA) system to warn and notify occupants with preprogrammed recorded messages. Additionally, they may also be connected to a remote facility to automatically warn about an activation which may need to be followed up from a call to the attending services from the site, to confirm whether attendance shall be cancelled due to an unwanted alarm. It may not always be necessary to evacuate immediately and PAVA systems are a useful tool to keep occupants informed and allay fear and panic.

6.5.3.4 Auxiliary Output Function

Depending on system specification at design and installation, MFCP are often specified to contain several auxiliary outputs that enable other functions to be performed, particularly in the event of a fire. In large facilities, the fire detection system is the core of all the LSS and shall interface with many of the facilities' electrical and mechanical systems.

6.5.3.5 Fire Detection System Maintenance and Testing

Due to the safety critical nature of fire detection systems, the requirement for them to be maintained to exacting standards and tested at regular intervals is set within legislative and regulatory provisions as well as tenancy agreements, buildings insurance, and public liability policies.

Internal backup power supplies for the MFCP shall also be tested to ensure they are capable of providing power to the MFCP, keeping it operational for the prescribed period of time. These shall also be renewed periodically, as specified by the OEM.

In public and healthcare buildings, a test of the fire alarm system may be required on a weekly basis. Typically, MCP test is performed by activation of a different MCP, on one day of each week, in the early morning before the facility opens for business. The test is initiated using a test key, typically inserted into the side of the MCP housing rather than by breaking the glass in front of the unit. At least one test shall be conducted in-hour, so occupants are familiar with its operation. A warning shall be given in advance that this is a test, which shall be cancelled on completion.

Only authorized persons, from accredited competent organizations (shall have prior registration with the civil defense) may perform maintenance on, or modifications to the fire alarm system. Failure to control this may result in the system failing to operate when required to do so. The Entity is required to ensure that

appropriate provision is made to make due enquiry into the credentials of any organization it selects to work on its LSS.

The four primary purposes for routine maintenance and testing can be described as the need to:

- Identify any faults present, and take action to rectify them
- Ensure that there have been no major failures of the system, either as a whole, or in part
- Ensure that occupants of the building are aware of the fire alarm signal(s), and decide what action is to be taken
- Carry out a 100% test of all system devices, and shall be carried out over the period of a year

It is mandatory for the Entity to ensure that a regime of system testing is in place, which can be subdivided into weekly and monthly routines. Details of all tests shall be recorded in a system logbook, detailing what has been tested, when, and by whom.

Management shall additionally check and ensure that the output from the fire alarm system to connected equipment functions as designed for the following are recorded ideally within a local fire logbook:

- Control of elevators and locking them out for first responder use only, and automatically returning them to the ground floor with doors remaining open
- Shut down of HVAC units to prevent the spread of smoke
- Unlocking security doors to permit exit from the facility and access for first responders
- Controlling mechanical evacuation systems to vent smoke
- Notifying the occupants about the location of the fire and what exits they shall use for evacuation
- Shutting off natural gas lines to prevent explosions
- Shutting off sound systems so that emergency notifications can be communicated
- System status to indicate devices, outputs or nodes that mat be disabled

6.5.4 Fire Suppression Systems

Fire suppression systems are intended to either extinguish a fire or stop it from propagating. The three primary methods of fire suppression system rely on the use of water, inert gases, or various chemical agents. They can be either automatic or manual, depending on whether they require outside intervention to activate. Some suppression systems can be hazardous to anyone in the general vicinity at the time that they are activated, as they present a risk of asphyxiation, being designed to starve a fire of oxygen.

The most common form of fire suppression system relies on water and the basic system design can either be wet or dry. A wet sprinkler system contains water at pressure in its pipework at all times and is activated automatically by the system sensing smoke or an excessively high temperature. These systems are designed to contain a fire at its source in order that personnel may evacuate. They are NOT designed to extinguish a fire. Dry sprinklers are manual systems that can only be activated after a water source is connected to an external standpipe usually by the attending civil defense.
Other fire suppression systems are designed to fill an area with inert gas, which starves the fire of oxygen. These systems are intended to protect areas containing sensitive electrical equipment, or combustible items of value such as documents. These systems are normally left in an auto state when in use, and only isolated during maintenance or repair. Staff shall be familiar when entering areas where these systems are in place and take necessary precautions for their safety.

6.5.5 Fire Doors

Fire doors create partitions in a building, to prevent the spread of fire from one section to another. In particular, they are utilized to protect the means of escape for building occupants in the event of a fire. The means of escape can be described as the route through which occupants are navigated to quickly and safely exit the building, facility or premises. Protecting the means of escape is normally achieved by adopting fire rated doors and other construction materials that are normally rated to resist the effects of direct exposure to naked flames, for a certain period of time. It is that time period, which is used to specify the fire performance of an item or material specified. For example, a two (2) hour rated fire door is designed

when installed correctly, to maintain its structural integrity whilst being exposed to fire for a period of two (2) hours without failure or degradation.

Generally, it is required that fire doors remain closed at all times. However, it is permissible for interior fire doors to be held open with magnetic latches linked to the MFCP. When the MFCP goes into evacuation mode, power to the magnetic latches must be automatically removed, they may also operate upon detection of the fire alarm sounder. Thereby releasing the doors and allowing them to close using an installed closing device.

The Entity shall ensure that doors are checked periodically, at monthly intervals, and recorded upon the asset system as persihable componets, in particular, intumescent seals on the frame or leaf that expand to seal the aperture in the event of a fire and prevent the spread of smoke, including the operation of magnetic door hold backs that release upon activation of the fire system (be it a fire or periodic test). Modifications to doors (or their frames) shall require the doors and frames to be recertified as a unit.

6.6 Protecting the Means of Escape

All healthcare buildings, and premises shall have a defined means of escape in the event of an emergency. Their function is to direct occupants to exterior of the building, along the shortest route. The means of escape shall be clearly identified in fire safety plans and evacuation procedures. Due to their nature, higher specifications in design and careful selection of construction material are required to provide an increased level of protection to users in the event of an emergency. An explanation of how to achieve the increased safety protection level is provided in sub sections below.

Entity staff shall conduct regular rounds to these areas in order to ensure that they are not used as storage areas and emergency egress is not impeded.

6.6.1 Emergency Lighting

A critical aspect of the means of escape is the provision of emergency lighting and emergency exit signage. Healthcare buildings shall have a suitable means of providing emergency lighting. The purpose of emergency lighting is to provide a minimum level of illumination in critical areas, such as in corridors leading to emergency exits, whereas the purpose of emergency exit signage is to illuminate the doorways throughout the building and direct occupants to the building exit. Standards state that the level of luminance from emergency lighting shall be no less than 10% of that under normal conditions.

Central Battery System (CBS) based emergency lighting and signage are one of the best ways to help people safely leave a building in the instance of an accident or a catastrophic event happening. Having proper illumination, instructions and directions for people to see clearly and be able to find the nearest exit is essential in these types of situations. There are various types of emergency light fittings that fall into two main categories. Type X – self-contained, and Type Y – external source (e.g. CBS). A detailed description of each is provided below:

- **Self-Contained, Non-maintained Luminaire**: These are luminaires with their own internal battery supply. The luminaire is not illuminated during normal operation. Upon loss of the main power supply, the luminaire is illuminated for a certain period of time under power from its own batteries. The luminaire is distinguished from normal luminaires, by a small red Light Emitting Diode (LED), visible from the ground level, which remains lit when batteries are charging
- **Self-Contained, Maintained Luminaire**: These are luminaires fed from an external battery supply. The luminaire provides lighting during normal operation. Upon loss of the main power supply, the luminaire can remain lit for a certain period of time under power from its own batteries. The luminaire is distinguished from normal luminaires by a small red (or green) LED visible from the ground level, which remains lit when batteries are charging
- **Extraneous Supply, Maintained Luminaire**: These are luminaires fed from an external battery supply. The luminaire provides lighting during normal operation. Upon loss of the main power supply, the luminaire can remain lit for a certain period of time under power from its own batteries. The luminaire is distinguished from normal luminaires by a small red LED visible from the ground level, which remains lit when batteries are charging. Typically fed from a CBS that provides power during loss of mains power supply

- **Extraneous Supply, Non-Maintained Luminaire**: These are luminaires with their own internal battery supply. The luminaire is not illuminated during normal operation. Upon loss of the main power supply, the luminaire is illuminated for a certain period of time under power from its own batteries. The luminaire is distinguished from normal luminaires by a small red LED visible from the ground level that remains lit when batteries are charging. Typically fed from a CBS that provides power during loss of mains power supply
- **Illuminated Emergency Exit Signage**: This is an emergency exit signage which illuminates under power provided either internally or externally. Signage is typically green with white translucent legends which are illuminated when the sign is lit. Small red LEDs are fitted to identify when batteries are charging
- **Way-Out Signage**: Typically, these are adhesive-backed or screwed into position at appropriate locations. They have a green background with fluorescent legends and script. Upon loss of lighting, the message on the sign is illuminated by fluorescence

Emergency lighting and signage designed to illuminate will be installed with the provision to manually switch it on under its emergency power supply. This facility is provided through installation of a key switch positioned close to the luminaire, or luminaires in that area with emergency lighting capability. The key switch is to be labelled clearly indicating its function. The key switch is to be operated periodically to test that the emergency control side of the luminaire remains capable of performing its intended function.

Maintenance activities for emergency lighting must be undertaken periodically and the following shall be undertaken:

- **Monthly:** Ten (10) minutes operation using the system test procedure
- **Annually:** Full three (3) hours duration test

The results of the above shall be recorded in an 'Emergency Lighting Logbook' for help onsite and maintained by the Entity technical team. Failure shall be recorded and rectified promptly.

6.6.2 Extract Air Handling Units (EAHU)

EAHU systems can play an active role in limiting smoke migration within buildings. EAHUs are intended to prevent smoke from overcoming people before they have escaped the building, by maintaining clean air throughout the escape routes.

The main process, by which this is attained, is pressurization. To achieve pressurization, clean air is supplied above atmospheric pressure via the HVAC to those areas not containing fire and smoke to set up positive pressure areas, thereby helping to reduce the spread of smoke.

These fans shall be checked on a monthly basis by entity maintenance staff to ensure that they operate correctly. They are normally linked to a fire damper on the floor, or bell mouth within the ceiling void. In certain installations, they may also be linked to the BMS system to indicate their current position, allowing for a user control to check their operations.

6.6.3 Lift Safety Fans

Normally, life safety fans are intended for creating a positive pressure differential in lift shafts, at landings and in airlock corridors to prevent the contamination by smoke in case of fire, by pressurizing the shaft and allowing air to escape in lobby areas, thereby preventing it from entering the protected area. The effectiveness of lift safety fans is maintained by ensuring the integrity of walls, doors, and window surrounds are maintained.

These fans shall be checked on a monthly basis by Entity maintenance staff to ensure that they operate correctly and are recorded. Deficiencies shall be investigated and rectified promptly.

6.6.4 Motorized Smoke and Fire Damper Systems (MSFD)

Smoke dampers are devices installed in ventilation ducts, intended to restrict airflow and therefore smoke transferal in the event of a fire. Smoke dampers tend to be controlled by the MFCP, staying in the open position during normal operation, and closing when activated by the MFCP in evacuation mode.

These shall be checked at least annually as part of the maintenance schedule.

6.6.5 Smoke Curtains and Barriers

Smoke curtains and barriers are used to subdivide building spaces to restrict the movement of smoke. They are usually arranged in a continuous manner, from an outside wall to an inside wall, from one floor to another floor, or from one smoke barrier to another smoke barrier, or by use of a combination thereof.

Smoke barriers, usually, are continuous through all concealed spaces, such as those found above a ceiling, including interstitial spaces. There are four main styles of smoke curtains: elevator, vertical, draft, and perimeter. Each style of curtain shall be compatible with other fire safety systems and installed to deploy automatically when a fire or smoke sensor is triggered.

Smoke barriers may be deployed automatically on command from the MFCP when in evacuation mode. They may also be installed in underground car parks as steel shutters to compartmentalize these areas in the event of an activation. Therefore, strict control of parking areas shall be in place to ensure their operation is not impeded.

Examples of automatic smoke curtains are provided below in Figure 3.

Figure 3: Automatic Fire Barriers

6.6.6 Emergency Exits

An exit route is a continuous and unobstructed path of exit, travel from any point within a healthcare facility to a place of safety. An exit route consists of three parts:

- **Exit Access:** Portion of an exit route that leads to exit
- **Exit**: Portion of an exit route that is generally separated from other areas, to provide a protected way of travel to the exit discharge
- **Exit Discharge:** Part of the exit route that leads directly outside or to a street, walkway, refuge area, public way, or open space with access to the outside

Essentially, emergency exits are separated by fire resistant materials, and are permitted to have only those openings that are necessary to allow access to the exit from occupied areas of the healthcare facility, or to the exit the building. Openings shall be protected by a self-closing and approved fire door that remains closed or automatically closes in an emergency.

Some may also be fitted with alarms to security systems, and have magnetic locks fitted for maintaining facility security. Where fitted with magnetic locks these shall be tested to release in the event of a fire activation and recorded in the fire logbook.

Note: Under no circumstances shall chains or cables with padlocks be used to secure fire exits.

6.6.7 Evacuation/Firefighting Lifts

Firefighting lifts are a system that includes a vertical series of lift lobbies and associated lift lobby doors, a lift shaft(s), and a machine room(s), which provides protection from fire effects for lift passengers, people waiting to use lifts, and lift equipment so that lifts can be used safely for evacuation or access to upper levels by the attending services, civil defense.

These lifts are linked to the fire alarm system and will revert to “Fire Mode” in the event of an activation. Additionally, they may be operated by the attending civil defense to access areas close to the fire, or via a key switch adjacent to the point of entry. They may also be used for the evacuation of mobility impaired persons.

These lifts shall be clearly identified, and support systems checked as part of LSS checks, i.e. Lift Motor Room (LMR) fire dampers, and shaft pressurization systems.

6.6.8 Maintenance Considerations

It is essential when carrying out maintenance or modifications to systems, in or passing through the means of escape that strict observance is paid to the compartmentalization of the area. Where other services such

as ventilation or electrical systems pass through compartmented areas, it is essential that they are fire stopped in order to ensure the integrity of the compartmented area.

Any structural modifications to these areas shall be clearly documented, and where necessary, following works, the fire stopping is installed or reinstated to maintain the fire integrity ratings. Examples of fire stopping methods are shown below. On no account shall non-certified materials be used to seal up penetrations that are not rated to the level of structure to which they pass.

Figure 4: Fire Stopping Through Walls and Floors

6.7 Building Management System (BMS) Integration

All life safety systems associated with the internal environment shall, wherever possible, be monitored and controlled by an installed BMS, and where necessary assigned 'Critical Alarms'. Effective systems shall be in place for both off-site and on-site response to alarms.

The maintenance of some life safety systems require integration with other electrical systems via BMS including, but not limited to, the fire alarm system and related smoke control dampers. On no account shall LSS rely solely upon the BMS system, unless the integrity and cabling of devices meet with the requirements of NFPA approvals. In particular network connectivity FP200 type cabling systems are used.

For further details, refer to the following:

- NMA & FM Volume 5, Chapter 5 – BMS Operations
- NMA & FM Volume 5, Chapter 6 – Instrumentation Systems Operations

6.8 Quality, Health, Safety and Environment Management (QHSE) Policy

Critical life safety equipment within a healthcare facility have a large impact on the facility's overall performance. Hence, it is crucial to identify what equipment is critical in ensuring the safety, comfort, and amenity of a facility. The Entity may wish to plan for major plant failure by procuring critical assets and having a process in place to minimize downtime and inconvenience to end users.

The loss of service of these units would seriously degrade the ability of the premises to deliver business operations. In order to ensure reliable service provisions, it is essential to inspect, verify, and maintain these LSS at appropriate intervals. In any event, it will be necessary to liaise with the user department when switching the electrical or life safety systems off to carry out routine inspection and maintenance. As this may preclude certain operations within part or whole of the facility during this period.

6.8.1 Risk Assessment

A hazard, simply put, is something that can result in harm. There are several hazards that can cause harm to the healthcare facility and its occupants, and unless a consistent and comprehensive approach is utilized to identify hazards, then it will not be in place. The HSE operators shall recognize that the ability to identify hazards, assess risks, and determine risk controls, is the basis of the entire HSE management system. In the context of LSS, the intended or unintended deactivation of part, or all LSS, places the Entity in a state

of risk, in which the protection afforded by the LSS is no longer available for a certain period of time. Where the deactivation is intentional, such as during the performance of certain direct or indirect maintenance activity, the risk of periodic lack of system coverage must be understood, documented, and managed. This process is known as a risk assessment.

Potential hazards may be physical or health-related, and a comprehensive risk assessment shall identify hazards in both categories. Examples of physical hazards include moving objects, fluctuating temperatures, high intensity lighting, rolling or pinching objects, electrical connections, and sharp edges. Examples of health hazards include overexposure to harmful dusts, chemicals, or radiation. Equally, the inability to detect hazards, such as isolation of a fire alarm system is to be considered as a hazard in itself.

Risk assessments must be consultative in nature and the results of risk assessments shall be communicated to all affected personnel. The objectives of the risk assessment process must be reviewed to ensure that the risk reduction targets established within the safety system are being met. Details of conducting and preparing Risk Assessments and Method Statements (RAMS) are contained within NMA & FM Volume 10 – HSE.

The healthcare facility shall be periodically reassessed for any changes in conditions, equipment, or operating procedures that could affect occupational hazards. This periodic reassessment shall also include a review of injury and illness records to spot any trends or areas of concern and taking appropriate corrective action. The suitability of existing Personal Protective Equipment (PPE), including an evaluation of its condition and age, shall be included in the reassessment.

Refer to the following for further guidance:

- Saudi Aramco Suppliers Safety Management System
- OSHA Personal Protective Equipment (PPE)

6.8.2 Critical Systems Protection

It is essential to protect fire and security systems from any unauthorized access and password systems shall be in place and changed periodically. Passwords shall also be changed when key personnel have moved on or redeployed to other sites/facility. Only the Authorized Person shall download the required information, in terms of data download, under access entries, history logs, time stamps, video records, and attendance history. Security and LSS shall be programmed to have different user level access for data protection, and an effective system operation. Any unauthorized entries will potentially harm system operations and the data can be compromised. The software/firmware and applications shall be updated on regular intervals, according to OEM guidelines for an effective Security and LSS Operations.

6.8.3 Cause & Effect (C&E) Matrix Checks

A C&E matrix shall be available to the operations team and the matrix must be understood. Any changes to be found within the existing C&E program to comply with building operational standard and briefing shall be provided to the site operations team. Systems integrated with fire alarm and programed with any other special control system shall be reflected within the C&E matrix. A mandatory testing regime shall be developed, and integration checks are to be performed at intervals with reference to NFPA standards.

Any deviations found shall be documented and communicated to all parties. A revised program shall be developed, reviewed, tested, and approved by system specialists, witnessed by the operations team. All deviations, or non-conformances, shall be reflected in all documents and amended at the next formal review.

6.8.4 Risk Assessment and Method Statement (RAMS)

Periodic and reactive maintenance shall only be undertaken by competent personnel that are familiar with the system and where applicable, approved for the site or system. This shall be held within a method statement held at site to describe the activities to be performed and measures to be taken to ensure users and operators are safe. Regular maintenance activities shall be undertaken in a safe manner by the person

undertaking the activity, such that other persons (e.g., staff, patients, visitors) are unaffected by their actions. Barriers or sentries shall be in place and these shall be detailed upon a site specific RAMS. Details of how to compile a method statement are contained within NMA & FM Volume 10 – HSE.

6.8.5 PPE and Tools List

Hazards exist in every healthcare facility in many different forms e.g., sharp edges, falling objects, flying sparks, chemicals, noise, other potentially dangerous situations. Therefore, facility owners/managers shall protect the staff, patients, and visitors from facility hazards that can put them at risk. All tools that are used for the testing and maintenance of LSS shall conform to their use and where necessary, be dated for test or calibration.

Personnel shall utilize PPE where requirements exist. The PPE must be in good repair and worn correctly. Details of PPE are contained within NMA & FM Volume 10 – HSE.

Refer to OSHA – Personal Protective Equipment, for further information.

6.8.6 Line Diagram/System Architecture

Line diagrams, or system schematics shall be kept up to date, and any changes made to the systems have to be 'marked up' for review on drawings prior to agreement with the Entity and/or FMC. After agreement and modifications to the systems, new line diagrams/schematics shall be issued, and the O&M, and any framed schematics affected in the plant rooms/healthcare facility be updated accordingly.

6.8.7 Lock Out, Tag-Out (LOTO) Procedure

LOTO procedures are essential for all staff to prevent them from unexpected energizing or startup of machinery and equipment, or the release of hazardous energy during service or maintenance activities, and the isolation of devices, in order to prevent inadvertent activation and accidental evacuation.

This procedure applies to all staff, including affected contractors who assign, authorize, or perform work on equipment that has an energy source, or provides a function of a safety critical nature, that could be activated or released during service or maintenance activities.

The LOTO procedure serves as an essential element in identifying and managing energized sources affecting people. Ignoring this procedure could result in serious injuries or significant harm.

Refer to NMA & FM Volume 10 – HSE, for further information.

6.9 Documentation

Compliant operations management documentation is necessary for effectively managing daily operations of the facility engineering services. The documentation shall consider the following:

6.9.1 Define Facility Equipment and Requirements

The Entity and/or FMC shall be aware that the document encompasses single or portfolio of a healthcare facility of varied sizes and/or types that may or may not include the same equipment. Therefore, diligence around the documents developed structure shall be required to enable ease of inclusion and/or exclusion at contract site level.

Outline the overarching LSS that may be found in any healthcare facility environment and include other sub systems and equipment examples for development. Some facilities will include all the above. However, inclusion into the facilities bespoke document shall be only for those found within the Entity's facilities.

The Entity through facility management and safety professionals are ultimately responsible for ensuring that LSS are maintained, tested and modified by authorized, accredited organizations. Subsequent to completion of the construction phase, LSS are certified as compliant with applicable regulations, thereby

from a life safety perspective, fit for occupancy. This certification shall be retained by ensuring the requisite testing, inspection, and maintenance of all systems, within the limits of the building, are carried out in line with OEM requirements, by authorized, competent personnel. It is the responsibility of the body entering into the contract with the maintainer, on behalf of the Entity to ensure the maintainer is authorized to work on the LSS that is set out within the contract.

6.9.2 Define Roles and Responsibilities

Outline the management and staffing roles and responsibilities of the FMC and possible entities. It shall be understood that adopting or being requested by the client to adopt specific managing standards, i.e., NFPA over Saudi Arabia Standards, SASO will affect how the roles and responsibilities are structured within the operations management process. When formulating this guide document, the NFPA standards are predominantly used to demonstrate how the structure may be compiled. For the facilities bespoke document, all standards shall be considered, and the most effective and/or stringent elements adopted and detailed within RAMS and compliance documentation.

6.9.3 Define Procedures

Outline the minimum procedures e.g., startup, shutdown, monitoring, and emergency response/actions. It is the responsibility of FMC to ensure that the descriptions and charts are used as a baseline and not as a comprehensive final element of the operations management document. The managing entities role is to ensure that a comprehensive document is produced and/or developed in line with the baseline guides and that it is disseminated as a working document being reviewed on a regular basis thereafter to ensure all information and process content are updated and relevant. Refer to **Section 6.9.5**, Operating Instructions (O&M Manual) further details.

6.9.4 Security and Data Protection

The Entity is to consider its policy upon the storage of data relating to LSS performance, maintenance and certification. Such data shall be controlled and accessed only by authorized personnel appointed by the Entity. Further information in the formation of the policy may be obtained within the guidance of the Data Protection Act (DPA), 2018

6.9.5 Operating Instructions (O&M Manual)

LSS are different from each other in terms of O&M. Therefore, best practices approaches recommend operators to have a systems' O&M manual on hand when starting up, operating, or shutting down such systems. This will ensure that designed modes of operation are adhered to and avoids the use of 'short cuts' that may impede normal operation. Official O&M manuals which are produced by the systems' OEM shall provide all required instructions and guides, for proper and safe startup, operation, and shutdown. They also guide operators on how to perform adequate maintenance planning and implementation for all maintenance categories. The submission is a composite document that provides warranties, and manufacturer and distributor information for each control device. It shall also detail final programming, schedules, and/or calibration settings. Manuals shall be available to maintenance personnel and used frequently as refresher training for system knowledge. They shall be reviewed by following any system or material changes and updating accordingly at the earliest opportunity.

6.9.6 Security Control Systems

Security control systems are complex systems and it is vital that these shall start and shutdown, following system specific startup/shutdown procedures. In general, the OEM manual must be adhered to when developing the startup or shutdown checklist. A step to step methodology shall be in place for each system and hence a checklist must be followed, subject to the operation of the system mentioned in OEM guidelines for below systems:

- Access control system
- CCTV

- Bollards/Barriers
- External lighting
- Helipad lighting system

Further information on these systems can be found within NMA & FM Volume 5 Chapter 9 – Security Systems Operations.

6.10 Procedures

6.10.1 Startup Procedures

A startup procedure is a reference document to be used when preparing a process to operate a system from an offline position. The actions within the procedure are intended to ensure that a methodological approach is taken when bringing LSS or piece of equipment back online. Startup procedures for life safety systems include the following. The Fire Alarm System being an example of one of the many systems that need to be included:

6.10.1.1 Fire Alarm Systems

- Ensure that a fire alarm system's start-up and bringing online process has been formulated in conjunction with the Distribution Service Provider (DSP), Facilities Operating Client (FOC), and/or specialist company designated by the FMC to carry out all maintenance and switching on functions of fire alarm systems in the facilities
- Check with the fire alarm system specialist company to understand the required process
- A review of all Test & Commissioning (T&C) results shall be carried out by specialist and/or certified company, or as per the requirements of the facilities adopted operating standards for fire alarm systems, which shall also include the facility clients appointed Fire Officer to take final acceptance for fire systems
- Ensure that the T&C results are within the manufacturer's O&M requirements
- The specialist company and/or approved facilities Fire Officer shall ensure that the Facilities Departmental Managers (FDM) have been informed of the startup procedure via fire permit and/or any other approved process adopted by the facility. This shall include but not limited to outage timelines, department operations disruption, and possible cause and effect to the department, should timelines extend beyond the forecast
- All involved FDM shall have visibility of actions within the startup action plan
- The specialist company and/or approved facilities Fire Officer shall ensure that all upstream and/or downstream equipment are correctly configured as per the startup action plan requirements
- Ensure all actions as required under the facilities "Fire systems equipment startup and taking online" SOPs have been followed
- Ensure that areas containing fire systems control equipment remain locked at all times, and that no unauthorized access is permitted

6.10.2 Shutdown Procedures

A shutdown procedure is a reference document for a planned activity to take a system or a piece of equipment offline. The shutdown procedure shall be clear, prescriptive and well understood. The specific steps often mirror those taken within a startup procedure but include additional considerations for the effect on utilities, and other active facility services connected to the process. Shutdown procedures for LSS shall include the following. The Fire Alarm System being an example of one of the many systems that need to be included:

6.10.2.1 Fire Alarm Systems

- Ensure that the fire alarm system equipment's shutdown and taking offline process has been formulated in conjunction with the DSP, FOC, and/or specialist company designated by the FMC to carry out all maintenance and switching off functions of electrical systems in the facilities

- Check with the specialist company to understand the required process
- Ensure that the equipment/system shutdown procedure is in line with the manufacturer's O&M requirements
- The specialist company and/or approved facilities engineer shall ensure that the FDM have been informed of the shutdown procedure via fire permit and/or any other approved process adopted by the facility. This shall include, but not limited to outage timelines, department operations disruption, and possible cause and effect to the department, should timelines extend beyond the forecast
- All involved FDM shall have visibility of actions within the shutdown action plan
- The specialist company and/or approved facilities Fire Engineer shall ensure that all upstream and/or downstream equipment are correctly configured as per the shutdown action plan requirements
- The fire system shall NOT be left shutdown/isolated overnight; unless a suitable insurance rated temporary measure has been installed for the duration of the outage period
- Ensure all actions as required under the facilities "Fire Alarm System equipment shutdown and taking offline" SOPs have been followed

6.10.3 Systems De-Energization Checks List

A system specific checklist shall be developed and approved prior to de-energization by the operations team. Once the de-energization has occurred, the responsible person shall carry a checklist, and ensure that the expected operational impact has been limited according to the plan. Any deviation from the plan shall be picked immediately and communicated to the operations team to make them aware of possible changes and impact on the original operational plan.

6.10.4 Post De-Energization Test Results

It is essential to verify dead results in order to practice a safe system of operation. Any deviation from the plan shall be picked immediately and communicated to the operations team in order to make them aware of possible changes and impact on the original operational plan.

6.11 Daily Reports/Monitoring

Facilities management/service providers shall consider the following items that need to be monitored:

- Key Performance Indicators (KPI) - which are agreed upon between the FMC and the Entity
- The fire alarm systems shall be analyzed for high fault/alarm trigger areas and identify potential causes to prevent repeated false alarms/potential fires. A custom-made report shall be set to determine the alarm activation periodicity and locations
- The security systems shall be analyzed for high fault/alarm trigger areas and identify potential causes to prevent repeated false alarms/potential fires. A custom-made report shall be set to determine the alarm activation periodicity and locations
- The emergency electricity usage is monitored and recorded in relation to outages, site volume, floor area, staffing numbers, tenant occupancy, and footfall to designated areas. Seasonal variations in the electricity usage shall also be monitored to assist in highlighting anomalies in usage across the site, and to benchmark electricity utilization against other similar entities
- Work orders under the Computer (or Paper) Maintenance Management System (CMMS) shall be actioned in accordance with the agreed contract requirements
- Assets in the CMMS shall be audited and kept up to date as per the agreed contract requirements to prevent the accumulation of unregistered assets not visible on the CMMS system, and hence at risk from lack of maintenance
- A staff training matrix shall be used and updated regularly. Staff training shall be relevant and include any new applicable statutory and mandatory legislation. A percentage of operational staff shall be trained on first aid as per site requirements
- Regular checks are carried out to ensure that operational and maintenance remedial actions are in place to prevent minor faults from developing into operational issues (e.g., Emergency lights checks resulting actions). Once these issues have been addressed, the associated work orders must be closed within specified Service Legal Agreement (SLA)

- Biannual stock checks are carried out to ensure stored parts match the items held in the CMMS system

Refer to NMA & FM Volume 15 – Performance Management for further information on KPI procedures and **Attachment 3** for a full generic System Monitoring/Daily Rounds Checklist.

6.11.1 Walk Around Inspections

When conducting a walk around inspection, encourage operators to refer to each equipment's O&M Manual for diagrams and information. However, experienced operators of equipment are often familiar with the equipment and are able to identify issues out of normal operation using their senses to identify any faults or impairments about the status of an item of equipment.

6.11.2 Fault Reporting

If an operator has a request for a repair, there shall be a formal fault report form or fault reporting hotline. Fault reports are of different categories according to their criticality and priority. These are as follows:

- Minor/Low Priority Fault Reports which are usually checked in specific working hours. Faults reported after this time or over the weekend will not be reviewed until the next working day
- Critical/High Priority Fault Reports, for example, a power failure, which are urgent or likely to endanger life, or cause structural damage to property shall be reported immediately by telephone and clarified that it is critical, so that it can be resolved quickly

6.11.3 Maintenance

Maintenance activities on the system shall only be undertaken by staff that are trained and approved for the operation of the system, as incorrect or poorly exercised maintenance could have a detrimental effect upon the efficient operation of all systems, restricting access, causing delays, or possibly inflicting damage that may be expensive or onerous to repair. Maintenance, ideally, shall be undertaken during off-peak periods to reduce disruption. Consideration shall be given to alternative arrangements during the maintenance. For instance, additional manned security to inspect user credentials, record personnel on site, or allow access to sensitive areas. Consider how routine checks can mitigate risk when LSS are isolated.

6.11.4 Scheduled Maintenance

Scheduled maintenance of the system should be coordinated with Facility Management (FM) and site security staff. Wherever necessary, escorting staff should be provided to supervise and witness the maintenance activity. Specialist contractors may be required for the maintenance and this shall be arranged as a planned activity, scheduled through the Site Maintenance Management Platform, Computer-Aided Facility Management (CAFM)/Computerized Maintenance Management System (CMMS).

Any temporary passwords or access cards necessary for planned or corrective maintenance related activities are to be returned, de-activated and/or destroyed upon completion.

Details of maintenance activities are detailed within NMA & FM Volume 6 – Maintenance Management.

6.11.5 System Testing

System testing shall be undertaken by qualified personnel who have approved access from the Entity Security Officer. Testing shall be undertaken periodically, as per the requirements within NMA & FM Volume 6.

- All testing must meet with the specifications of the system, and any deviations are to be recorded and notified to the security officer.

- Any temporary passwords or access cards necessary for testing or commissioning are to be returned and, de-activated and/or destroyed upon completion.
- A dedicated fire logbook is recommended and implemented to record periodic tests and identify shortcomings that need rectification without delay.

6.12 Emergency Response/Actions

Emergency procedures are intended to highlight the key issues that may arise at departmental level in the event of a disaster, be it internal or external. Good practice in emergency management shall include development of an Emergency Management Plan (EMP) and actions that outlines responsibilities, identification of high risk areas, and appropriate responses.

Within the “healthcare facility operating procedures,” there will be many elements of the overall FOC EMP that the FMC plan will need to feed into and take direction from. The response actions required will then depend on these plans and integrations.

Following is an example of the possible FMC emergency plan integration elements, reporting entities, and designated person organization that are required to build a basic plan.

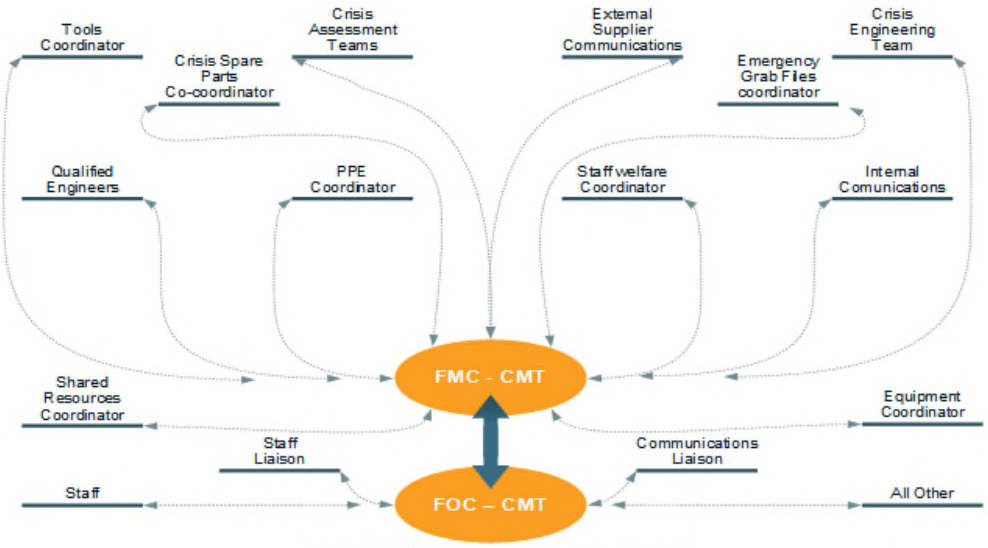

Figure 3 Emergency Plan Integration

For the FMC (Operations), this will be focused around management for the continuation of service at the facility as outlined below:

Life Safety Systems
SGBS
UPS
Gas
Fuel
Fire Systems
Other

Table 4 Critical Services

Planning development shall consider how different emergency scenarios and situations will impact the operation of facilities and in which areas the emergency has originated. It is a good practice to prioritize these emergency origins and impact areas into specific categories and document the influence on site operations that may occur due to these emergencies. Emergency origins may be categorized as:

1. **External Disaster** (e.g., earthquake, flooding, weather, multi discipline disruptions)
2. **External Specific** (e.g., major outage, localized area outage, specific transformer outage, local cabling)
3. **Internal Disaster** (e.g., major fire, major flooding, critical site wide systems failure)
4. **Internal Specific** (e.g., external to internal cabling, internal MV transformer failure, main distribution failure, localized area failure, specific sub system failure)

From the high-level headings, the impact to other systems and/or facilities can be identified and therefore, the action plans formulated.

Below is an example of how the emergency action planning development may flow for one scenario. Plans applicable to other scenarios shall also be put into emergency grab packs giving the FMC emergency response staff clear initial direction to an emergency while the FMC – Crisis Management Team (CMT) and FOC – CMT are convened and become fully operational.

External Disaster (e.g., earthquake, flooding, weather, multi discipline disruptions)

Scenario 1: Major Flooding and Bad Weather

1. Scenario parameters

- External electrical supply has been lost
- External supply chain is not responding
- Emergency power restoration crews to prioritize other facilities e.g., hospitals

2. Initial Actions

- Relevant grab packs to be provided and/or taken by the emergency response engineering staff
- Implement the FMC emergency action plan/plans
- Establish/Convene at the FMC crisis management command center/designated area
- Establish communication with the FOC – CMT
- Establish the communication process with external governmental departments through FOC – CMT process

3. Assessments

- Assess the impacted electrical systems
- Formulate action requirements from the emergency grab packs
- Prioritize in conjunction with FOC – CMT direction and/or consultation
- Calculate load shedding requirements to conserve resources (e.g., stored diesel) in line with FOC – CMT direction and/or consultation

4. Implementation

- Deploy to FMC – CMT designated command area
- Initiate initial action process
- Establish communications processes
- Initiate initial assessment process
- Select relevant emergency grab packs
- Report initial assessment findings to FOC – CMT
- Take informed direction from FOC – CMT
- Initiate emergency grab pack(s) process
- Initiate staff deployment
- Report, update, take direction from FMC – CMT ↔ FOC – CMT
- Continue intensive situation assessments until emergency is stabilized
- Initiate forward operation requirements
- Assess staffing requirements

- Assess staffing welfare requirements
- Operate on emergency operations requirements until emergency stand down is agreed
- Initiate emergency stand-down processes in conjunction with FOC – CMT

The following procedures and checklists have been prepared for FM personnel to meet the needs of their own organizations during failure of a system.

They are not intended to be appropriate or definitive for all facilities, but they provide an idea of the general format that may be used and the different levels of technical content that may be applied to contrasting sites.

Further procedures will be required within an Entity and a regular review is important to ensure that the directives of staff and equipment remain current.
Refer to **Attachment 4** for full Emergency Response/Actions.

6.12.1 Emergency Services Plan

The emergency action plan shall be, in writing, and shall cover those designated actions that facility managers/owners and staff must take in order to ensure staff, patients, and visitors' safety from fire and other emergencies.

6.12.1.1 Elements

The following elements, at a minimum, shall be included in the plan:

- Emergency escape procedures and emergency escape route assignments
- Procedures to be followed by staff who remain to operate critical operations before they evacuate
- Procedures to account for all staff, after emergency evacuation has been completed
- Rescue and medical duties for those staff who are to perform them
- The preferred means of reporting fires and other emergencies
- Names or regular job titles of persons or departments who can be contacted for further information or explanation of duties under the plan

6.12.1.2 Alarm System

- The employer shall establish an employee alarm system which complies with the best practice standards
- If the employee alarm system is used for alerting fire brigade members or for other purposes, a distinctive signal for each purpose shall be used

6.12.1.3 Evacuation

- The employer shall establish in the emergency action plan, the types of evacuation to be used in emergency circumstances

6.12.1.4 Evacuation Practice Drills

- It is essential that occupants of a building are conversant and familiar with instructions and directions that are to be followed in the event of an Emergency linked to the purpose of LSS such as a fire. In order to ensure this knowledge and understanding is in place, a program of evacuation drills shall be developed to practice the response of occupants to the activation of relevant LLS.

6.12.1.5 Training

- Before implementing the emergency action plan, the employer shall designate and train enough persons to assist in the safe and orderly emergency evacuation of patients, staff, and visitors.

The employer shall review the plan with each employee, covered by the plan at the following times:

- Initially when the plan is developed
- Whenever the employee's responsibilities or designated actions under the plan change
- Whenever the plan is changed
- Annual review

Refer to following for further guidance:

- NMA & FM Volume 14 – Emergency Management
- OSHA EAP Standard

6.12.1.6 Evacuation Plans/Emergency Preparedness/Incident Command (Inside/Outside Company)

Within Entity emergency evacuation/preparedness and incident command procedures, the following factors shall be considered:

- **Emergency Management:** It is defined as an ongoing process to prevent, prepare, and respond to emergency situations in order to maintain continuity and effectively recover from a situation that threatens life, property, operations information, or the environment
- **Business Continuity:** It is described as a process to ensure that organizational steps are taken to identify the impacts of potential losses and to maintain continuity, and implement recovery strategy plans
- **Crisis Management:** It is defined as the ability of an Entity to manage incidents effectively, which are likely to impact significantly on public, security, strategic, reputational, or financial factors
- Consideration shall be given to the routine performance of evacuation drills

Refer to NMA & FM Volume 14 – Emergency Management, for further guidance.

An incident response team or Emergency Response Team (ERT) is a group of personnel from the staff who prepare for, and respond to any emergency incident, such as a natural disaster, or an interruption to business operations. Incident response teams are common in public service organizations, as well as in private organizations. As a best practice, it is recommended that the Entity consider utilizing ERTs to assist during an emergency. Consideration shall be given for continuation of training and regular tabletop exercises annually for the personnel involved.

6.12.2 Investigation

Following any incident or accident, an appropriate level of investigation must be undertaken by the required qualified individual, department, or governing body.

The term “incident” is defined as an occurrence, condition, or situation arising in the course of work that has resulted in, or could have resulted in injuries, illnesses, damage to health, or fatalities.

The term "accident" is also commonly used and can be defined as an unplanned event that interrupts the completion of an activity, and that may (or may not) include injury to a person or property damage. Whereas The term incident can refer to an unexpected event that has not caused injury or damage at that specific time but involved a potential for it. "Near miss" and "dangerous occurrence" these are terms for an event that could have caused harm but did not.

It shall be noted that the term incident is used in some situations to cover both an accident and incident. It is argued that the word accident implies that the event was related to fate or chance. When the root cause is determined, it is usually found that many events were predictable, and could have been prevented if the right actions were taken making the event not one of fate or chance (thus, the word incident is used). For simplicity, we will now use the term incident to mean all the above events.

This information is intended to be a general guide for employers, supervisors, health and safety committee members, or members of an incident investigation team. When incidents are investigated, the emphasis

shall be on finding the root cause of the incident, so it may be documented, and future incidents can be avoided. The purpose is to find facts that can lead to corrective actions, not to find faults.

Reasons to investigate a healthcare facility incident include:

- To establish the cause of incidents and to prevent similar incidents in the future
- To fulfill any legal requirements
- To determine the cost of an incident
- To determine compliance with applicable regulations such as occupational health and safety or criminal

The same principles apply to an inquiry of a minor incident and to the more formal investigation of a serious event. Most importantly, these steps can be used to investigate any situation.

Refer to IOSH – Accident investigation, for further guidance.

6.12.3 Critiquing Session

After any incident, it is recommended that a tabletop discussion be held with emergency services around “Lessons Learned”. This is an effective way to improve emergency response planning and procedures. By conducting a post incident critique with staff and responders, an evaluation can be held into the effectiveness of the emergency response to identify areas that need improvement.

6.12.4 Employee Assistance

An Employee Assistance Program (EAP) is a support program that assists the facility users with traumatic events, personal problems or work-related issues that may impact their job performance, health, mental and emotional well-being. EAPs generally offer free and confidential assessments, short term counseling, referrals, and follow-up services for employees and their family members. EAP counselors also work in a consultative role with managers and supervisors, to address employee, and organizational challenges and needs. Many corporations, academic institutions and/or government agencies are active in helping organizations to prevent and cope with facility violence, trauma, and other emergency response situations. There is a variety of support programs offered for employees. Even though EAPs are mainly aimed at work related problems, there are a variety of programs that can assist with problems outside of the healthcare facility. EAPs have grown over the years and are more desirable economically and socially.

6.12.5 Debriefing

As soon as practical, a site debriefing shall be undertaken for patients, staff, and visitors who have been directly involved within a traumatic or an emergency. Part of a debriefing is to allow personnel to have the time to process the event and work through any negative emotions. A debriefing is not an individual counseling session, but it can enable them to talk about the personal impact of a traumatic event they participated in.

6.12.6 Post-Incident: Briefing/Discussion

After any significant incident or situation, an organizational de-briefing shall be held. It shall also be included as an integral part of any organization’s processes and be embedded into organizational learning and development. The process enables improvements within the way the organization operates and continuous improvement of its procedures, systems and processes. It shall promote an open and honest discussion but not compromise any ongoing investigation. Essentially, it is a process by which lessons can be identified, discussed, analyzed, and incorporated into organizational thinking and learning, thereby creating good practice for the future. In essence, the debriefing process looks for answers to the following three questions:

- How well prepared were we?
- How well did we perform?
- What can we achieve better in the future?

This will enable the organization to be better placed, in dealing effectively with any significant situations or security incidents and will also enable the emergency services to better understand emergency management and effective procedures.

6.13 Grab Packs for Attending Civil Defense

Consideration shall be given to the provision of a grab bag containing information such as an available list of emergency contacts, buildings' floor plans, egress details, fire hydrant locations, first aid kit, and any essential items required, which could assist civil defense within an emergency. Appoint someone to grab this, if there is an emergency, and provide to the attending emergency service/civil defense. These plans should be reviewed periodically to ensure that any change of layout, system modifications or upgrades, or additions are incorporated into the plans. Additionally, the plans shall be used for periodic testing and training of staff to ensure that they are suitable and relevant. Any comment or deficiencies shall be reviewed, and where necessary, amended at the next formal review.

6.14 Testing and Inspection Management

It is the responsibility of the Entity to ensure that LSS are inspected, tested and maintained at the required intervals by accredited organizations and competent and qualified personnel.

Testing and inspection are to be conducted in line with the guidance provided within NMA & FM Chapter 14 – Emergency Exercise and Drills, at periodicities stipulated by the licensing authority and risks associated with shutting down LSSs for maintenance. Further guidance is provided within British Standards on the philosophy to be employed when developing a testing regime. A sample recording method for tests and inspections is provided within attachments.

7.0 ATTACHMENTS

Attachment 1: EOM-ZO0-TP-000141 – Startup Checklist
Attachment 2: EOM-ZO0-TP-000142 – Shutdown Checklist
Attachment 3: EOM-ZO0-TP-000143 – System Monitoring/Daily Rounds Checklist
Attachment 4: EOM-ZO0-TP-000144 – Emergency Response Action Checklist
Attachment 5: EOM-ZO0-TP-000205 – Life Safety System Equipment Checks

Attachment 1 – EOM-ZO0-TP-000141 – Startup Checklist

Healthcare Name:		Reference No.		REV-001
Vol.5 Operations Management Chapter 10				
No.	**Start-Up Procedure**	**CHECKED SATISFACTORY**		
		N/A	YES	NO
	Life Safety Systems (LSS): Healthcare			
	Health and Safety			
1	Required Personal Protective Equipment (PPE) available	☐	☐	☐
2	Risk Assessments Method Statement (RAMS) available	☐	☐	☐
3	Location of first aid instructions and supplies available	☐	☐	☐
4	Emergency eyewash and showers available	☐	☐	☐
5	Emergency evacuation plan reviewed	☐	☐	☐
6	Emergency contact details of the authorized person and the contractors	☐	☐	☐
7	Life Safety Systems (fire extinguishers, sprinklers, gas suppressors and fire-alarm)	☐	☐	☐
8	Ventilation	☐	☐	☐
	Pre-approvals			
9	System owner/Manager/Engineering team's approvals available	☐	☐	☐
10	End-user/Department Head's approval available	☐	☐	☐
11	Quality, Health, Safety, Environment Management (QHSE) approval available	☐	☐	☐
12	Specialist contractor's schedule of work	☐	☐	☐
13	Approved Permit To Work (PTW)	☐	☐	☐
	System Readiness			
14	System health checks	☐	☐	☐
15	System is free of faults	☐	☐	☐
16	Required tools checks	☐	☐	☐
17	Tags - Lock Out Tag Out (LOTO) checks	☐	☐	☐
18	Confirm with schematic and Business Management system (BMS)	☐	☐	☐
19	Areas are cleared and egress checks	☐	☐	☐
	Pre-Start Checks			
20	System fault free/alarm free check	☐	☐	☐
21	Original Equipment Manufacturers' (OEM) start-up procedure available	☐	☐	☐
22	Automatic controller checks	☐	☐	☐
23	Parameters set point checks	☐	☐	☐
24	Previous services reports checks (3rd party specialist)	☐	☐	☐
25	Primary supplies systems/plants checks	☐	☐	☐
26	Mechanical and electrical schematic diagrams	☐	☐	☐
	Start Checks			
27	System operating parameters checks	☐	☐	☐
28	System alarms/warnings checks	☐	☐	☐
29	System/programming Building Management System (BMS) operation running checks	☐	☐	☐
30	System running and on-line (cause and effects checks)	☐	☐	☐
	Notifications			
31	Department heads (Facility Management)	☐	☐	☐
32	Reporting	☐	☐	☐

Attachment 2 – EOM-ZO0-TP-000142 – Shutdown Checklist

Healthcare Name:		Reference No.		REV-001
Vol. 5 Operations Management Chapter 10				
No.	**Isolation and Shutdown Checklist**	**CHECKED SATISFACTORY**		
		N/A	YES	NO
	Life Safety Systems (LSS): Healthcare			
	Health and Safety			
1	Required Personal Protective Equipment (PPE) available	☐	☐	☐
2	Risk Assessments Method Statement (RAMS) available	☐	☐	☐
3	Chemical Material Safety Data Sheets (MSDS) and Product Data sheets (PDS) checks available	☐	☐	☐
4	Location of first-aid instructions and supplies available	☐	☐	☐
5	Emergency eyewash and showers available	☐	☐	☐
6	Emergency evacuation plan reviewed	☐	☐	☐
7	Emergency contact details of the responsible person and the contractors	☐	☐	☐
8	Life Safety Systems (fire extinguishers, sprinklers, gas suppression and fire alarm)	☐	☐	☐
9	Ventilation	☐	☐	☐
	Pre-approvals			
10	System Owner/Manager/Engineering team's approvals available	☐	☐	☐
11	End-user/Department heads' approvals available	☐	☐	☐
12	Quality, Health, Safety and Environment Management (QHSE) approvals available	☐	☐	☐
13	Specialist contractor's schedule of work	☐	☐	☐
14	Approved Permit To Work (PTW)	☐	☐	☐
	Stand by System Condition			
15	System's operating condition checks	☐	☐	☐
16	System is leakage free	☐	☐	☐
17	System fault/alarm free checks	☐	☐	☐
18	Water flow checks	☐	☐	☐
19	Systems' parameters checks	☐	☐	☐
	Pre-Shutdown Checks			
20	System is alarm free checks	☐	☐	☐
21	Automatic control panel parameters checks	☐	☐	☐
	Routine Stop			
22	Lock Out Tag Out (LOTO) removed checks	☐	☐	☐
23	Stop fan from Business Management System (BMS)	☐	☐	☐
24	Stop water supply	☐	☐	☐
25	Stop electrical power supply	☐	☐	☐
26	Close valves checks	☐	☐	☐
	Notifications			
27	Departments' heads (Facility Management)	☐	☐	☐
28	Computer Aided Facility Management (CAFM) system	☐	☐	☐

Attachment 3 – EOM-ZO0-TP-000143 – System Monitoring/Daily Rounds Checklist

Healthcare Name:		Reference No.		REV-001
Vol. 5 Operations Management Chapter 10				
No.	**Systems Monitoring / Daily Checks**	**CHECKED SATISFACTORILY**		
		N/A	YES	NO
	Life Safety Systems (LSS): Healthcare			
	This monitoring checklist is intended to highlight key issues that may arise day to day at local level. The procedures and any supporting information should be reviewed and amended as necessary to ensure that the document remains up-to-date and definitive for the healthcare facility.			
1	System inspection and checking: main control panels for fire alarm and sprinkler systems 'ON' running?	☐	☐	☐
2	System assessment checks: Is the control panel and its associated equipment secured from unauthorized access?	☐	☐	☐
3	Are there any fault codes or indications showing on the control panel?	☐	☐	☐
4	Identifying maintenance risks on equipment and raising work orders	☐	☐	☐
5	Investigating fault/alarms for LSS systems checks	☐	☐	☐
6	Keeping daily logs and records of all the maintenance functions	☐	☐	☐
7	Fire doors	☐	☐	☐
8	Complying with service standards, work instructions, and users' requirements	☐	☐	☐

No.	Reviewer's Comments	Resolution
Originator's Name/Signature and Date:		Checker's Name/Signature and Date:

Attachment 4 – EOM-ZO0-TP-000144 – Emergency Response Actions Checklist

Healthcare Name:	Reference No.	REV-000
Vol. 5 Operations Management Chapter 10		

No.	Emergency Response Actions	CHECKED SATISFACTORY		
		N/A	YES	NO
	Life Safety Systems (LSS): Healthcare			
	Introduction			
	This emergency procedure is intended to highlight the key issues that may arise at departmental level in the event of LSS failure. It is appreciated that this may be a result of a full site systems' failure, but it may also be the result of a local failure for which notification from the Entity may be necessary. The main aim is to provide a structured approach to safety of staff, patients, visitors and the general public for minimizing the risks associated with LSS systems' failure			
Priority 1	Life safety (Evacuation Plan) is evacuation necessary?	☐	☐	☐
Priority 2	Stabilization of incident	☐	☐	☐
Priority 3	Minimize potential damage	☐	☐	☐
Priority 4	Containment of incident	☐	☐	☐
Priority 5	Damage Assessment	☐	☐	☐
Priority 6	Clean-up after the incident (Post-Incidents Plans)	☐	☐	☐
Priority 7	Designated Person to monitor weather sources for updated emergency instructions and broadcast warnings if any, issued by the weather services	☐	☐	☐
Priority 8	Building lockdown Plan/Plant lockdown plan	☐	☐	☐
1	The Designated Person shall conduct an initial and ongoing situational assessment of the incident	☐	☐	☐
2	The Designated Person shall establish an effective communications plan	☐	☐	☐
3	The Designated Person shall deploy available resources and request additional resources based on the needs of the incident	☐	☐	☐
4	The Designated Person shall develop an incident organization for the management of the incident	☐	☐	☐
5	The Designated Person shall review, evaluate, and revise the strategy and tactics based on the needs of the incident	☐	☐	☐
6	The Designated Person shall provide for continuity, transfer, or termination of commands	☐	☐	☐
7	The procedures shall provide for a routine process of escalation as additional resources are required/utilized	☐	☐	☐
8	The Designated Person shall determine what levels and elements of the incident management system are to be implemented in each case, and shall develop the command structure for each incident by assigning supervisory responsibilities according to standard operating procedures (SOPs)	☐	☐	☐
9	The Incident Management Plan (IAP) shall define standardized supervisory assignments	☐	☐	☐
10	The Person designated for incidence shall be responsible for controlling communications on the tactics, commands, and designated emergency traffic channels for the incident	☐	☐	☐
11	The Person designated for incident shall be responsible for overall responders' accountability for the incident	☐	☐	☐
12	The Person designated for incidence shall be responsible for developing and/or approving an IAP	☐	☐	☐

Attachment 5 – EOM-ZO0-TP-000205 – Life Safety System Equipment Checks

System	Description of test	Frequency				Remarks
		Daily	Weekly	Monthly	Annual	
Fire Detections	Sounder Test		X			
Fire doors Hold Backs	Check release upon activation		X			
Fire Escape routes/final exit	Check clear of obstruction	X				
Stair Pressurization system	Check fans run on Activation			X		
Elevators	Check proceed to Escape level and doors open		X			
Security Barriers	Check that all open upon activation		X			
Escalators and Moving walkways	Check that they come to stop		X			
Emergency Generator	Operate generator OFF LOAD for maximum of 15 minutes			X		
Emergency Generator	Carry out ON LOAD test of Generator with building or Emergency load				X	
Emergency Lighting	Operate lights for short period to ensure they remain illuminated			X		
Emergency lighting	Operate Lighting for full 3 Hour duration test				X	
Sprinkler Pumps	Undertake 'Bell Test' of sprinklers and record cut in pressure		X			
Dry Riser	Check all landing valves and caps are in place			X		
Dry Riser	Check using system pressure and drain down on completion				X	
Fire Dampers	Check operation of fire dampers (visually or confirmation on BMS			X		
Plant and Equipment	Check associated plant shutters down in the event of a fire activation (AHU/TEF/ Kitchen fans)			X		
Fire suppression system	Check panel outputs to 'House Alarm'			X		
Fire Suppression Bottle storage	Check system pressure within limits			X		
Fire Extinguishers check	Check if correct location pins are in place and pressure is correct			X		
Fire Extinguishers check	Carry out Annual Maintenance				X	
PAVA System Check	Operate TEST message where fitted		X			
PAVA Carry out dBA test of speakers	Undertake test using calibrated meter of speakers to meet designed output				X	