National Manual of Assets and Facilities Management

Volume 5, Chapter 8

Electrical Systems Operations – Offices Procedure

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THIS NOTICE MUST ACCOMPANY EVERY COPY OF THIS DOCUMENT

IMPORTANT NOTICE

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1.0 PURPOSE

The purpose of this document is to provide guidelines and practices to the Entity to manage operations of the electrical systems in offices Facilities Management (FM) sectors. It is essential to operate and manage electrical systems according to the installation and design methodology to achieve efficient and effective operations.

These guidelines contain a base structure for the entities and/or Facilities Management Companies (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(s). This will enable the management and senior management to have a clear understanding of the following:

- 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 offices Entity or service providers to improve and enable site-specific operation management processes in relation to electrical systems operational activities such as, but not limited to:

- Performance monitoring of the electrical systems
- Controls and monitoring to achieve operational efficiency
- Comfortable and productive indoor working environment
- Customized control strategies
- Operational flexibility and ease of change
- Improved operational environment and comfort
- Support energy utilization and operational cost
- Integration with other engineering systems to improve effectiveness
- Optimize quality service delivery

For the purpose of this document, an “office facility” has been defined as a building, portion of a building or space where businesses operate including, but not limited to:

- High rise buildings
- Low rise buildings
- Commercial blocks
- Business centres/hub

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

3.0 DEFINITIONS

Term	Definition
AHJ	Authority Having Jurisdiction
ATS	Auto Transfer Switch
CB	Capacitor Bank
CMMS	Computer Maintenance Management System
CMT	Crises Management Team

Term	Definition
COSHH	Control of Substances Hazardous to Health Regulations
DB	Distribution Board
DSP	Distribution Service Provider (Electrical Generation Entity)
ECRA	Electricity & Cogeneration Regulatory Authority
ELV	Extra Low Voltage (Classified as below 50V)
EPDS	Emergency Power Distribution System
ESG	Electrical Safety Group
EPGS	Embedded Power Generation Systems
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)
HBN	Health Building Note
HF	Harmonic Filter
HSE	Health and Safety Executive
HTM	Health Technical Memorandum
HV	HV Voltage (Classified as above 13.8kV with allowable variance of MV 13.1kV – 14.5kV)
IBC	International Building Code
IEC	International Electro-technical Commission
IEEE	Institute of Electrical and Electronics Engineers
IET	Institute of Engineering & Technology
IFC	International Fire Code
IPS	Isolated Power Supplies
KPI	Key Performance Indexes
LV	Low Voltage (Classified as being above 50V and below 600V)
MCC	Motor Control Center
MDB	Main Distribution Boards
MS	Method Statement
MSDS	Materials Safety Data Sheet
MV	Medium Voltage (Classified as being above 600V and below 13.8kV)
MVS	Medium Voltage Substation
MVSN	Medium Voltage Supply Network
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NSF	National Standards Foundation
OE	Operations Engineer
OEM	Original Equipment Manufacturer
OSHA	Occupational Safety and Health Administration
PDS	Product Data Sheet
PPE	Personal Protective Equipment
PTW	Permit to Work
RA	Risk Assessment
RAMS	Risk Assessment & Method Statement
RMU	Ring Main Unit
SASO	Saudi Standards, Metrology and Quality Organization
SBC	Saudi Building Code
SEC	Saudi Electrical Company
SMDB	Sub-Main Distribution Board
SOP	Scope of Process/Standard Operating Procedure

Term	Definition
SS	Substation
T&C	Test and Commissioning
TR	Transformers
UPS	Uninterruptable Power Supplies
UL	Underwriters Laboratories, Inc.
VFD	Variable Frequency Drive

Table 1: Definitions

4.0 REFERENCES

- Saudi Building Codes 401 and 801
- SEC-Distribution Connection Code DCC6
- Saudi Arabia Grid Code
- Saudi Building Codes Other
- Saudi Electrical Codes Other
- Saudi Standards, Metrology and Quality Organization (SASO)
- Ministry of Municipal and Rural Affairs (MOMRA)
- Expro Projects White Book – White Book Standards - Installation/Construction
- National Fire Protection Association (NFPA 1) – Fire Code
- 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 70A) – National Electrical Code Requirements for One, and Two-Family Dwellings
- 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 Signalling 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 110) – Standard for Emergency and Standby Power Systems
- National Fire Protection Association (NFPA 111) – Standard on Stored Electrical Energy Emergency and Standby Power Systems
- National Fire Protection Association (NFPA 496) – Standard for Purged and Pressurized Enclosures for Electrical Equipment
- National Fire Protection Association (NFPA 791) – Recommended Practice and Procedures for Unlabelled Electrical Equipment Evaluation
- National Fire Protection Association (NFPA 720) – Standard for the Installation of Carbon Monoxide (CO) Detection and Warning Equipment
- National Fire Protection Association (NFPA 791) – Recommended Practice and Procedures for Unlabelled Electrical Equipment Evaluation
- National Fire Protection Association (NFPA 1078) – Standard for Electrical Inspector Professional Qualifications
- Institute of Engineering Technology (IET) BS 7671:2018
- Institute of Engineering Technology (IET) – Guide to Electrical Installations in Medical Locations:2017
- The Electricity at Work Regulations Act 1989

- The Electricity at Work Regulations – HSR25 (Guidance) – Memorandum of guidance on the Electricity at Work Regulations:1989
- The Electricity Safety, Quality and Continuity Regulations Act:2002
- URN 02/144 (Guidance) - Electricity Safety, Quality and Continuity Regulations Act 2002

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 the Entity, who will provide a resolution or direction to ensure that all electrical systems' goals and requirements have been met.

5.1 Organizational Structure

The organizational chart provided below is based on the National Fire Prevention Association (NFPA) guidelines. However, some entities may utilize an internal or fully-outsourced process flow depending on the adopted standard operating procedure of the facility.

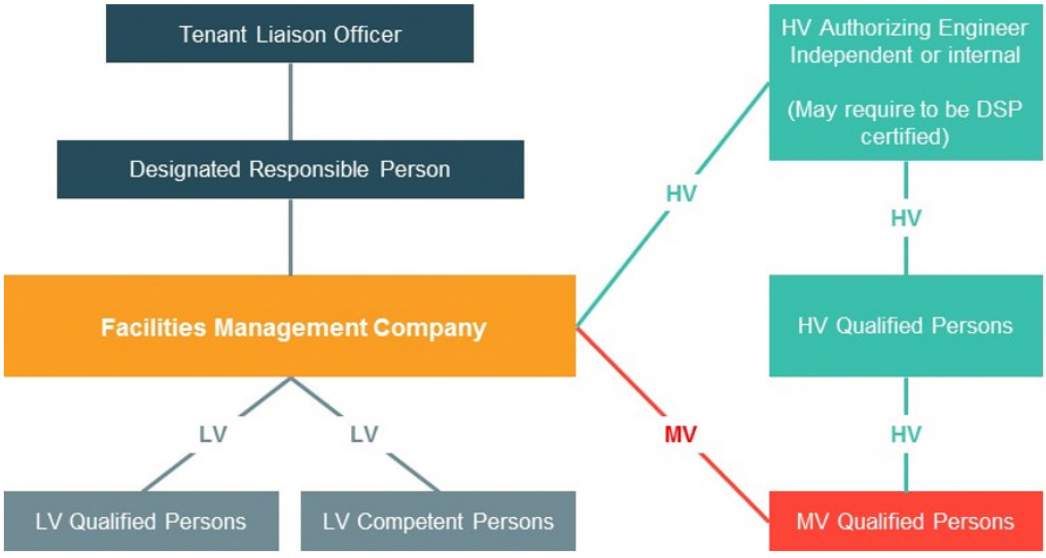


Figure 1 Organizational Chart

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

Role	Description
Competent Person (CP)	An individual with the necessary training, and who has been appointed by an Authorized Person (or by an authorizing body within the Entity), after confirmation of competence, knowledge, skill, and experience. The CP can

Role	Description
	execute the required actions within a Permit To Work (PTW) and/or any other directional document as may be assigned to him.
Authorized Person (AP)	An individual who has been appointed by the Authorizing Engineer (or by an authorizing body within the Entity); who is trained, competent, skilled, experienced, responsible, and has gained the necessary site knowledge, to operate and maintain the system in a controlled and safe manner. The AP is responsible for work or testing carried out on the system.
The Responsible Person (Director of Facilities)	The Responsible Person is employed directly by the Entity and is the "Duty Holder" of the engineering systems and the staff who operate those systems; and is overall responsible and accountable for their design, installation, operations, maintenance and ensuring control of those systems.
The Authorizing Engineer (independent)	The Authorizing Engineer, AE, is appointed by the Responsible Person (normally under the recommendation of the operating client), to take responsibility for the effective management of the safety guidance. The AE should possess the necessary degree of independence from local management to act where necessary and alert the chief executive (in the event the local management does not take action to avoid harm).
LV, MV, and HV Qualified Person	Internal FMC approved and Qualified Persons or FMC's approved external certified specialist service provider with operatives that are disciplined, certified and qualified, competent, skilled, experienced, and have the necessary site knowledge to operate and maintain the system in a controlled and safe manner.

Table 2: Designated Roles and Responsibilities

5.2 Electrical Safety Group

As per HTM, an Electrical Safety Group (ESG) needs to be established. The role of this group is to discuss current issues, solutions, and forthcoming potential problems (i.e., with new projects or dealing with new legislation), to assist in avoiding project clashes, outages, and taking/formulating mitigating actions. Although not a specific requirement for office facilities, it is recognized as best practice to have a safety group assigned. The diagram below provides an example of structure that should be employed as best practice, ESG designations may change dependent on the FMC organization structure:

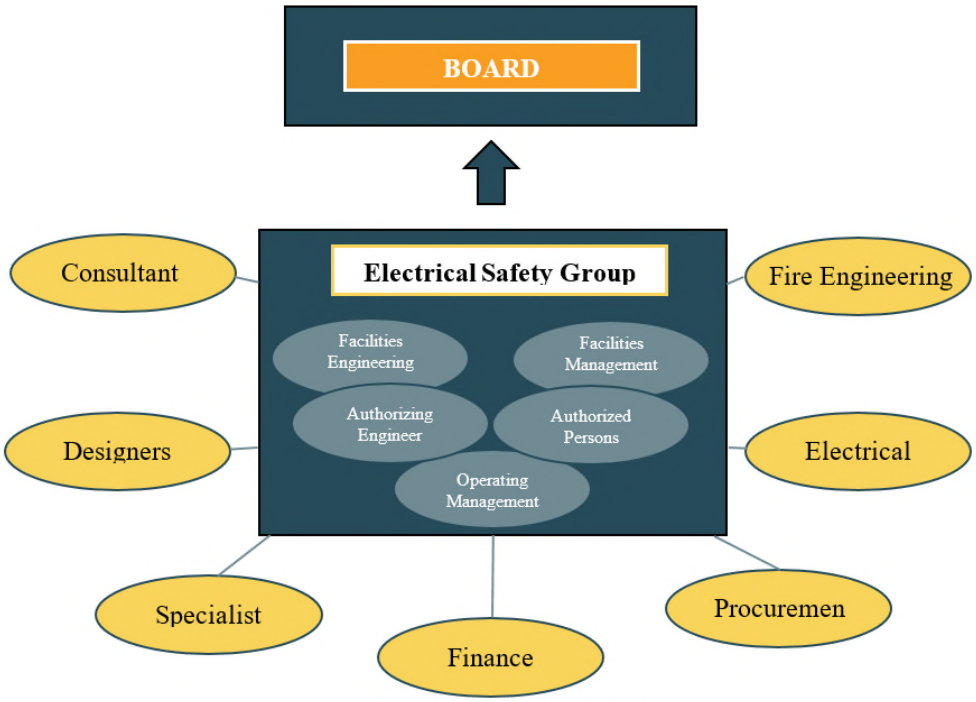


Figure 2 Electrical Safety Group

6.0 PROCESS

6.1 Systems Overview

The following systems should be considered within the Entity for operations management of the facility:

6.1.1 High Voltage (HV)

Classed as above 13.8 kV (allowable variance of MV 13.1kV – 14.5kV) and will not normally be within the FMC scope. However, it is considered good practice to have an established communication protocol in place and form part of the facilities emergency action plan. If the HV equipment does become or is the responsibility of the FMC, they shall engage a registered and certified HV company for all aspects of maintenance and/or required switching. Good practice would also dictate that the FMC company consider directly employing a qualified HV engineer to oversee all actions on behalf of the FMC.

6.1.2 Medium Voltage (MV)

Classified as being above 600V and below 13.8kV and will normally be delivered to a facility via a 33kV to 13.8kV transformer. These medium voltage transformers (allowable variance of between 13.1kV to 14.5kV) are often incorporated into the FMC scope. It should be noted that depending on the adopted regulations and/or standards, the maintenance tasks and any switching tasks on the MV systems may be required to be carried out only by a registered and certified MV company and/or approved persons.

6.1.3 Low Voltage (LV)

Classed as above 50V to 600V and will normally be delivered at the facility via a 13.8kV to 400V transformer. These transformers (allowable variance of between 360V to 410V) are often incorporated into the FMC scope. It should be noted that depending on the adopted regulations and/or standards, the maintenance tasks and any switching tasks on the LV systems may require a registered and/or certified,

approved, or competent persons, and the FMC should consider formal certified training of staff for these tasks.

6.1.4 Extra Low Voltage (ELV)

Classed as below 50V and will normally be delivered via an internal equipment transformer connected to a single-phase LV system input, such as nurse-call, fire detection, Building Management System (BMS), or within dedicated control systems with standby and/or constant 50V AC or DC outputs.

Many of these systems require specialist knowledge and the FMC should consider manufacturer/supplier training for system responsible staff.

6.1.5 Embedded Power Generation Systems (EPGS)

For operational governance of any embedded generation system, be it “emergency backup” system, “demand supplement” systems or a “standalone distribution network” system the “distribution connection code” section DCC6 shall apply and reference to the “Saudi Arabia Grid Code” SAGC should always be taken into account.
The Entity or Entity representative shall make the DCC aware of any requirements for embedded generation during the electrical design stage and at any time the distribution network is added to in the future. Renewable Systems such as “Solar Energy”, Hydro Energy, etc. fall into this category as do all emergency and or generated backup systems.
All systems need prior DCC approval before the design can be signed off or distribution network added to. Operation standard and good practice says that all precaution should be taken to ensure Un-Authorised back feed into the grid does not occur and therefore all systems should have automatic or as a minimum Manual “Separation System” in place.
Further references can be taken from NM-A&FM “life safety systems operations” volume 5 chapter 10 document No EOM-ZO0-PR-000048

6.2 Electrical Systems Components

6.2.1 Sub-Systems within Electrical Systems

The electrical systems have sub-systems including, but not limited to:

- Emergency Power Generation System
- Fire Detection and Suppression System
- Lighting Systems (e.g., scene-setting)
- Central Battery System
- Public Address Systems

6.2.2 Equipment Used in Electrical Systems

The electrical equipment that are used within these systems including, but not limited to:

- Medium Voltage Supply Network (MVSN) Distribution Panel
- Emergency Power Distribution System (EPDS) Panel
- Generator Set
- Auto Transfer Switch (ATS)
- Transformers (TR)
- Main Distribution Boards (MDB)
- Capacitor Bank (CB)
- Harmonic Filter (HF)
- Sub-Main Distribution Board (SMDB)
- Distribution Board (DB)
- Uninterruptable Power Supplies (UPS)

- Variable Frequency Drive (VFD)

6.3 Building Management System (BMS) Integration

All electrical systems associated with the internal environment should, wherever possible, be monitored and controlled by a BMS. Effective systems should be in place for both off-site and on-site response to alarms.

The maintenance of some electrical systems require integration with other electrical systems via BMS including, but not limited to, the fire alarm system and related smoke control dampers.

6.4 Risk Management

Critical pieces of electrical equipment within an office facility have a great impact on 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 electrical systems at appropriate intervals. In any event, it will be necessary to liaise with the user department when switching an electrical system off to carry out routine inspection and maintenance.

6.5 Documentation

Compliant operations management documentation is necessary for effectively managing the day-to-day operations of the engineering services of an office facility. The documentation should consider the following:

6.5.1 Define Facility Equipment and Requirements

The Entity and FMC should be aware that the document encompasses single or portfolio of office facilities 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 systems HV, MV, LV and ELV that may be found in an office 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 should be only for those found within the Entity's facilities.

6.5.2 Define Roles and Responsibilities

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

6.5.3 Define Procedures

Outline the minimum procedures: start-up, 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.

6.6 Procedures

6.6.1 Start-up Procedures

A start-up 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 an engineering system or piece of equipment back online. Start-up procedures for electrical systems include the following:

6.6.1.1 HV/MV Systems

- Ensure that a HV/MV equipment 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 electrical systems in the facilities
- Communication and collaboration may be required with the DSP if loads are to be shed from one DSP incoming supply to another
- Check with the HV/MV specialist company to understand the required process
- A review of all 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 HV/MV systems. Which may also include the facility clients appointed HV engineer to take final acceptance for HV systems
- Ensure that the T&C results are within the manufacturer's Operations and Maintenance (O&M) requirements
- The specialist company and/or Approved Facilities Engineer shall ensure that the Facilities Departmental Managers (FDM) have been informed of the start-up procedure via electrical 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 should have visibility of actions within the start-up action plan
- The specialist company and/or Approved Facilities Engineer shall ensure that all upstream and/or downstream equipment are correctly configured as per the start-up action plan requirements
- Ensure all actions as required under the facilities "HV/MV equipment start-up and taking offline" SOPs have been followed
- Ensure that areas containing HV/MV equipment remain locked at all times and that NO UNAUTHORIZED access is permitted

6.6.1.2 LV/ELV Systems

- Ensure that a LV/ELV equipment start-up and bringing online process has been formulated in conjunction with FOC and FMC to carry out all maintenance and switching on functions of electrical systems in the facilities
- A review of all T&C results shall be carried out by the FMC approved, appointed or competent person, the control point designation being as per the requirements of the facilities' adopted operating standards
- This may also include the FOC Appointed Engineer to take final acceptance
- The Approved, Appointed or Competent Person (control point designation as may be agreed with direct supervision and/or management) should also review the T&C results so that they are within the manufacturer's O&M requirements.
- The Approved, Appointed or Competent Person (control point designation as may be agreed with direct supervision and/or management) shall ensure that the FDM have been informed of the start-up procedure via electrical 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 should have visibility of actions within the start-up action plan

- Approved Facilities Engineer shall ensure that all upstream and/or downstream equipment are correctly configured as per the start-up action plan requirements
- Ensure all actions as required under the facilities "LV/ELV equipment start-up and taking offline" SOPs have been followed
- Ensure that areas containing LV equipment remain locked at all times and that NO UNAUTHORIZED access is permitted

6.6.1.3 Embedded Power Generation Systems

- Ensure that a EPGS equipment start-up and bringing online process has been formulated in conjunction with FOC and FMC to carry out all maintenance and switching on functions of electrical systems in the facilities
- A review of all T&C results shall be carried out by the FMC approved, appointed or competent person or specialist supplier, the control point designation being as per the requirements of the facilities' adopted operating standards
- This may also include the FOC Appointed Engineer to take final acceptance of some systems
- The Approved, Appointed or Competent Person (control point designation as may be agreed with direct supervision and/or management) should also review the T&C results so that they are within the manufacturer's O&M requirements.
- The Approved, Appointed or Competent Person (control point designation as may be agreed with direct supervision and/or management) shall ensure that the FDM have been informed of the start-up procedure via electrical 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 should have visibility of actions within the start-up action plan
- Approved Facilities Engineer shall ensure that all upstream and/or downstream equipment are correctly configured as per the start-up action plan requirements
- Ensure all actions as required under the facilities EPGS equipment start-up and taking offline" SOPs have been followed

6.6.2 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 should be clear, prescriptive and well understood. The specific steps often mirror those taken within a start-up procedure but include additional considerations for the effect on utilities and other active facility services connected to the process. Shutdown procedures for electrical systems shall include the following:

6.6.2.1 HV/MV Systems

- Ensure that a HV/MV equipment 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
- Communication and collaboration may be required with the DSP if loads are to be shed from one DSP incoming supply to another
- 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 electrical 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 should have visibility of actions within the shutdown action plan

- The specialist company and/or Approved Facilities Engineer shall ensure that all upstream and/or downstream equipment are correctly configured as per the shutdown action plan requirements
- Ensure all actions as required under the facilities "HV/MV equipment shutdown and taking offline" SOPs have been followed

6.6.2.2 LV/ELV Systems

- Ensure that a LV/ELV equipment shutdown and taking offline process has been formulated in conjunction with the FOC and FMC to carry out all maintenance and switching off functions of electrical systems in the facilities
- The specialist company and/or approved facilities engineer shall ensure that the FDM have been informed of the shutdown procedure via electrical 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 should have visibility of actions within the shutdown action plan
- The Approved, Appointed or Competent Person (control point designation as may be agreed with direct supervision and/or management) shall ensure that all upstream and/or downstream equipment are correctly configured and all low voltage bus coupling actions are within and as per the shutdown action plan requirements
- Ensure all actions as required under the facilities "LV/ELV equipment shutdown and taking offline" SOPs have been followed

6.6.6.3 Embedded Power Generation Systems

- Ensure that a EPGS equipment shutdown and taking offline process has been formulated in conjunction with the FOC and FMC to carry out all maintenance and switching off functions of electrical systems in the facilities
- The specialist company and/or approved facilities engineer shall ensure that the FDM have been informed of the shutdown procedure via electrical 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 should have visibility of actions within the shutdown action plan
- The Approved, Appointed or Competent Person (control point designation as may be agreed with direct supervision and/or management) shall ensure that all upstream and/or downstream equipment are correctly configured and all low voltage bus coupling actions are within and as per the shutdown action plan requirements
- Ensure all actions as required under the facilities "EPGS equipment shutdown and taking offline" SOPs have been followed

6.6.3 Daily Reports/Monitoring

Facilities Management/Service Providers should consider the following items that need to be monitored:

- Key Performance Indexes (KPI) - which are agreed upon between the FMC and the Entity e.g. Work Order completion times are within an agreed threshold time; and recorded as a percentage for the KPI; and can graded according to % category, i.e.

Work Order Completion Times KPI Result %	Grading
95%<100%	Excellent
80%<94%	Good
70%<79%	Room for improvement
50%<69%	Poor
0%<49%	Unacceptable

Table 3: KPI Performance Grading

- The electricity supply should be analyzed for high consumption areas and identify potential electricity saving opportunities. A custom-made report should be set to determine the electricity consumption
- The electricity supply from the distribution service supplier and any outages and their reasons recorded; sometimes the DSP will need to be contacted directly for an explanation.
- The electricity usage is monitored and recorded in relation to site volume, floor area, staffing numbers, tenant occupancy, and footfall to designated areas. Seasonal variations in the electricity usage should 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) should be actioned in accordance with the agreed contract requirements
- Assets in the CMMS should 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 should be used and updated regularly. Staff training should be relevant and include any new applicable statutory and mandatory legislation. A percentage of operational staff should 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., HV annual transformer oil checks and the resulting actions). Once these issues have been addressed, the associated work orders must be closed within specified Service Legal Agreement (SLA)
- Bi-annual stock checks are carried out to ensure stored parts match the items held in the CMMS system

Refer to **Volume 15 Performance Management** for further information on KPI procedures and **Attachment 4** for a full generic Electrical Systems Monitoring/Daily Rounds Checklist.

6.6.4 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 should include development of an Emergency Management Plan (EMP) and actions that outlines responsibilities, identification of high risk areas, and appropriate responses.

Within the “office 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.

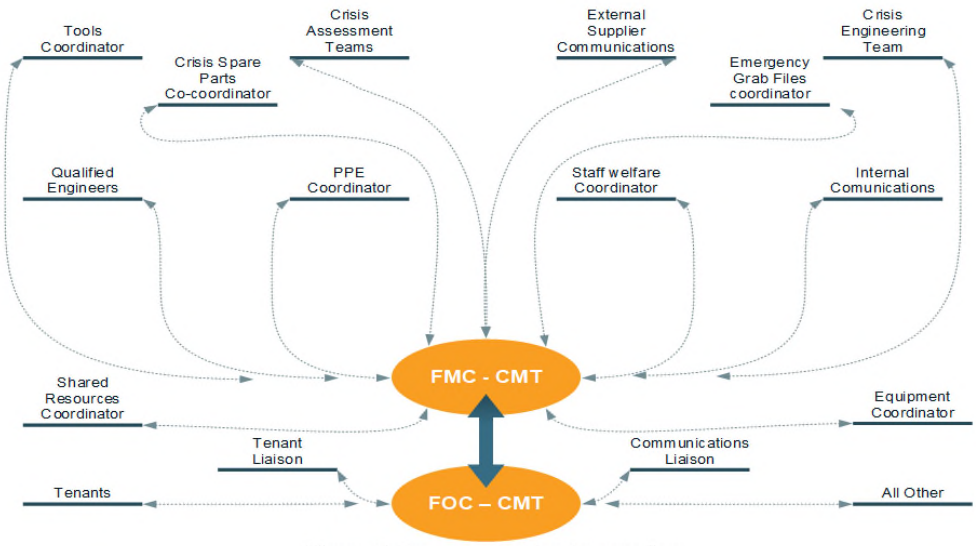


Figure 3 Emergency Plan Integration

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

To Facility	From Facility
Power	Grey water
Water	Sewage
Gas	Waste
Fuel	Other
Spares Supplies	
Other	

Table 4 Critical Services

Planning development should 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:

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

<u>Scenario 1: Major Flooding and Bad Weather</u>

1. Scenario parameters

- External electrical supply has been lost
- External supply chain is not responding
- Emergency power restoration crews to prioritize other facilities such as 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 centre/designated area
- Establish communication with the FOC – Crisis Management Team (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.

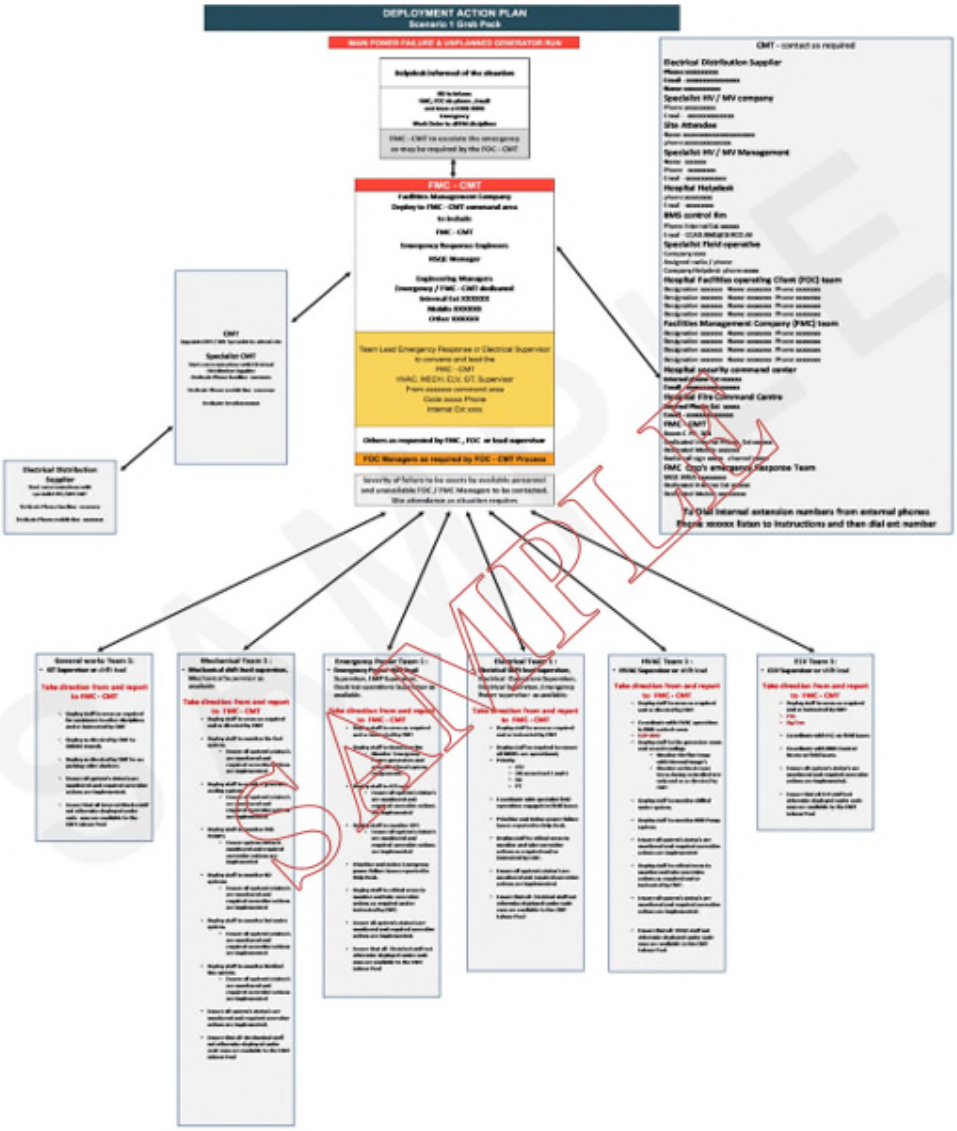
Refer to **Attachment 1,2 and 5** for full Emergency Response/Actions

7.0 ATTACHMENTS

Attachment 1: EOM-ZO0-TP-000054 Deployment Action Plan
Attachment 2: EOM-ZO0-TP-000055 Emergency Response Action – Deployment Checklist

Attachment 3: EOM-ZO0-TP-000056 Emergency Response Action – Critical Contacts Template
Attachment 4: EOM-ZO0-TP-000133 System Monitoring Procedure Checklist
Attachment 5: EOM-ZO0-TP-000134 Emergency Response/Actions – Checklist

Attachment 1: EOM-ZO0-TP-000054 Deployment Action Plan Template



Attachment 2: EOM-ZO0-TP-000055 Emergency Response Action – Deployment Checklist

Mechanical Team: Mechanical shift lead supervisor, Mechanical supervisor as available

Take direction from and report to Facilities Management Company – Crisis Management Team

Deploy staff to areas as required and or directed by CMT		Deployed Y/N
Deploy staff to monitor the fuel system	Ensure status of all the systems are monitored and required corrective actions are implemented	
Deploy staff to monitor fire pumps	Ensure status of all the systems are monitored and required corrective actions are implemented	
Deploy staff to monitor generator cooling system	Ensure status of all the systems are monitored and required corrective actions are implemented	
Deploy staff to monitor hot water	Ensure status of all the systems are monitored and required corrective actions are implemented	
Ensure that all mechanical staff not otherwise deployed under code xxx are available to the central labor pool		

Emergency Power Team: Emergency Power shift lead supervisor, MEP Supervisor, Electrical operations supervisor as available.

Take direction from and report to Facilities Management Company – Crisis Management Team

Deploy staff to areas as required and or directed by CMT		Deployed Y/N
Deploy staff to generator room	Ensure status of all the systems are monitored and required corrective actions are implemented	
Deploy staff to automatic transfer switch (ATS) room	Ensure status of all the systems are monitored and required corrective actions are implemented	
Deploy staff to monitor all uninterruptible power source (UPS) units	Ensure status of all the systems are monitored and required corrective actions are implemented	
Prioritise and action emergency power failure issues reported to help desk	Ensure status of all the systems are monitored and required corrective actions are implemented	
Deploy staff to critical areas	Monitor and take corrective actions as required and or instructed by CMT	
Ensure that all electrical staff not otherwise deployed under code xxx are available to the labor pool		

Attachment 3: EOM-ZO0-TP-000056 Emergency Response Action – Critical Contacts Template

Company/Department	Contact Details
Distribution Service Provider	Phone: Email: Name:
Specialist High Voltage Medium Voltage (HV/MV) company	Phone: Email: Name:
Site Attendee	Phone: Email: Name:
Specialist HV/MV Management	Phone: Email: Name:
Helpdesk	Phone: Email: Name:
BMS Control Room	Phone Internal Ext.: Email:
Specialist Field Operative	Company: Assigned radio / phone: Company Helpdesk-phone:
Facilities Operating Client (FOC) Team	Designation: Name: Phone:
Facilities Management Company (FMC) Team	Designation: Name: Phone:
Security Command Center	Internal phone Ext.: Email:
Fire Command Center	Internal Phone Ext.: Email:
Facilities Management Company - CMT	Room: Dedicated internal Phone Ext: Dedicated Mobile: Radio call example sign: AR1 channel: 09
Facilities Management Company Operations Emergency Response Team	Base Area: Dedicated Internal Ext.: Dedicated Mobile:

Attachment 4: EOM-ZO0-TP-000133 System Monitoring Procedure Checklist

Hospital Name:		Reference No.		REV-00A

No.	Systems Monitoring / Daily Rounds Checklist	CHECKED SATISFACTORY		
		N/A	YES	NO
	Electrical Systems – Office Facilities			
	This monitoring checklist is intended to highlight the key issues that may arise day-to-day at local level. The procedure and any supporting information should be reviewed and amended as necessary to ensure the document remains up-to-date and definitive for the facility			
1	System inspection and checking: Are the systems running?	☐	☐	☐
2	System assessment: Is the unit and its associated plant secure from unauthorized access?	☐	☐	☐
3	Remote monitoring of electrical systems via BMS	☐	☐	☐
4	Identifying maintenance risks on equipment and rising work orders	☐	☐	☐
5	Investigating faults/alarms for electrical systems	☐	☐	☐
6	Cleaning and adjusting of system	☐	☐	☐
7	Performing emergency repairs promptly and efficiently	☐	☐	☐
8	Providing technical direction to ensure system maintains online	☐	☐	☐
9	Keeping daily logs and records of all maintenance functions	☐	☐	☐
10	Ensuring compliance with appliance standards and with occupational health and safety	☐	☐	☐
11	Complying with service standards, work instructions and user requirements	☐	☐	☐

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

Attachment 5: EOM-ZO0-TP-000134 Emergency Response/Actions – Checklist

Hospital Name:		Reference No.		REV-00A

No.	Emergency Response/Actions Checklist	CHECKED SATISFACTORY		
		N/A	YES	NO
	Electrical Systems – Office Facilities			
	Emergency Response Action Plan (ERAP)			
	This Emergency Action Plan (EAP) is a guide intended for areas of a facility with complex services, for example, a major boiler house or specialist plant room. The actions to be taken by designated and authorized persons may be expressed in a checklist. The steps below are simple indication of some issues that may arise although a more detailed list may be appropriate for each specific area. The designated staff functions of office facility personal need to be made clear in order that the correct measures are taken to minimize the impact of any crisis.			
1	Define ownership of the problem	☐	☐	☐
2	Will tenants/public/staff safety/care be affected?	☐	☐	☐
3	Will evacuation be required?	☐	☐	☐
4	Risk of fire outbreak or reduced re-fighting ability	☐	☐	☐
5	Consider impact on electricity supply	☐	☐	☐
6	Consider impact on gas supply	☐	☐	☐
7	Consider impact on water supply	☐	☐	☐
8	Consider impact on drainage	☐	☐	☐
9	Consider impact on other services	☐	☐	☐
10	Increased risk of legionella	☐	☐	☐
11	Consider impact on site security	☐	☐	☐
12	Study impact on re-alarms	☐	☐	☐
13	Will medical gases be affected?	☐	☐	☐
14	Is there an impact on clinical waste?	☐	☐	☐
15	Agree responsibility boundaries	☐	☐	☐
16	Control of Infection Team involvement	☐	☐	☐
17	Do public relations need to be addressed?	☐	☐	☐
18	Consider Service Level Agreements (SLAs) with suppliers	☐	☐	☐
19	Involve commercial services	☐	☐	☐
20	Record entities' personnel contact details	☐	☐	☐
21	Locate supply of specialist equipment	☐	☐	☐

No.	Reviewer's Comments	Resolution

Originator's Name/Signature and Date:	Checker's Name/Signature and Date: