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National Manual of Assets and Facilities Management

Volume 5, Chapter 2

Seasonal Planning Procedure

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1.0 PURPOSE

The purpose of this document is to provide guidance to the Entity on the importance of seasonal preparedness though the development of effective asset and facilities management plans. Additionally, this document shall outline the factors that may be considered by the Entity to predict the potential impact of seasonal change on asset performance to ensure that appropriate, timely action plans can be formulated and implemented to remove, minimize, or control any impact that seasonal change may have.

Adopting such an approach provides a higher degree of confidence that assets will continue to perform intended function by ensuring that maintenance practices account for the potential effects of seasonal changes within the operating environment.

This document is also intended to provide insight into the processes required for the development of effective seasonal preparedness plans. The contents of the various plans may differ between Entities and asset types.

2.0 SCOPE

The scope of this document applies to systems, subsystems and components collectively referred to as assets within the context of Building Services and the accountability for which resides with each Entity within the Kingdom of Saudi Arabia (KSA).

Specifically, this document provides guidance to the Entity on the factors related to seasonal change that should be taken into consideration, and their ability to reduce asset performance and residual value.

The guidance is intended to promote a structured approach to seasonal planning and operations. Individual Entities and maintainers shall conduct periodic reviews at an appropriate interval with key stakeholders in order to share information about concerns, risks and the manner in which they shall be controlled.

3.0 DEFINITIONS

Term	Definition
AMS	Asset Management System
CIBSE	Chartered Institution of Building Services Engineers
DOT	US Department of Transportation
FM	Facility Management
HTHW	High Temperature Hot Water
HVAC	Heating and Ventilating and Air Conditioning
IAM	Institute of Asset Management
IET	Institution of Engineering & Technology
ISO	International Organization for Standardization
KPI	Key Performance Indicator
KSA	Kingdom of Saudi Arabia
LTHW	Low Temperature Hot Water
MTWH	Medium Temperature Hot Water
PDCA	Plan-Do-Check-Action
SAR	Saudi Railway Corporation
UV	Ultra Violet

4.0 REFERENCES

- International Organization for Standardization (ISO)
- ISO 55001 Asset Management
- ISO 15686 Buildings and Constructed Assets
- ISO 9000 Quality Management Systems
- Chartered Institution of Building Services Engineers (CIBSE)

- Institution of Engineering & Technology (IET)
- Institute of Asset Management (IAM)
- US Department of Transportation (DOT)

5.0 RESPONSIBILITIES

5.1 Entity

The Entity shall ensure that seasonal plans are developed prescribing the appropriate level and type of maintenance to be carried out. The Entity is also responsible of confirming that the seasonal plans are supported by evidence to ensure that the effects of seasonal change on asset performance is mitigated.

The Entity shall ensure that seasonal plans are communicated to each relevant department. The Entity is also responsible to ensure clear and consistent communication of the requirements and responsibilities to those with whom delivery responsibility rests.

Activities related to the discharge of responsibilities within the scope of this document include, but are not limited to, the following

- Gathering data to understand the nature and extent of seasonal change affecting the environment within which assets relevant to the Entity exist.
- Quantification of the range of seasonal change.
- Conducting asset-specific assessments to identify potential risks to performance caused by seasonal change.
- Development of a risk register detailing prioritized outcomes of risk assessments.
- Introduction and management of review process to ensure that seasonal risks are effectively mitigated or controlled by periodic maintenance.
- Competent persons within applicable timescales shall carry out development of robust maintenance regime to ensure prescribed tasks to the required level of quality.

5.2 Facility Director

The Facility Director is responsible of creating and developing seasonal plans as directed by the Entity Top Management. They should ensure that the plans are communicated to the appropriate managers and teams.

5.3 Facility Managers

Facility Managers shall ensure that all actions within the local seasonal plans are followed at all times. In addition, Facility Managers shall ensure proper adherence to the requirements outlined by statutory legislation and within facility and appointed contractor policies and procedures including the seasonal advice of any manufacturers and suppliers.

Facility Managers should train all staff as appropriate and ensure that all staff fully complies with the requirements of Health and safety.

Facility Managers should ensure formal, written risk assessments are carried out on any procedures posing a significant risk to staff or others and that all staff involved in seasonal specific operations as part of their normal duties has received the appropriate information, instruction and training.

In addition, Facility Managers should monitor the staff to establish compliance with policies, procedures, and safe system of work.

6.0 PROCESS

6.1 Overview

In order to protect assets against the effects of seasonal change, seasonal preparedness plans should be developed to enable each facility management set out the activities that shall be carried out prior to the commencement of the seasonal change to ensure continued performance of the asset to an acceptable level.

The climate in Saudi Arabia represents one of the most challenging environments globally within which assets are expected to operate. In many cases, the failure of particular systems such as those related to air conditioning have the potential to cause serious risks to health, particularly during summer months. This therefore causes systems such as air conditioning to be categorized as safety critical.

Identification and prioritization of such assets and understanding the effects of seasonal change on the performance of the system is essential to support the development of targeted maintenance.

Weather-related ambient change varies throughout KSA, with minimum and maximum temperature and humidity levels changing by region. As a result, each Entity must demonstrate that it has identified assets within the scope of its responsibility and clearly defined the context of the operational environment on region-specific data to allow its seasonal preparedness plans to be developed.

6.2 Seasonal Weather Effects

6.2.1 Temperature

The temperature range that exists in KSA can be described as extreme in that during winter months, some regions can experience temperatures below zero degrees Celsius with snowfall occurring on higher ground, while during summer months, midday temperatures can regularly exceed 50 degrees Celsius. Not only does change in temperature affect the operation of assets; the manner in which assets are operated can also change. For example, during summer months, air conditioning systems are more likely to be in operation for longer periods at lower temperatures than at other times of the year. Considering this increase, non-linear usage must be understood in order to assess its impact on component wear out rates.

Additionally, it is common for manufacturers and suppliers to declare performance and failure rate criteria within a prescribed operating environment with operating temperature range being a common component.

KSA is subjected to extended periods of sunshine throughout the day, particularly during summer. Therefore, consideration should be given to the effects of Ultra Violet light (UV) rays on perishable components. Prolonged exposure to UV rays emitted by the sun lead to deterioration in such components causing premature failure and an increase to the risk of loss of system functionality.

The Facility Maintenance (FM) manager is responsible for obtaining the needed information from manufacturer / supplier. It is to be accepted that prolonged operation or use of assets consistently close to upper or lower limits will affect the operational performance of the asset, and understanding these impacts is essential to effective seasonal planning.

6.2.2 Rainfall

Rainfall does occur in Saudi Arabia, it generally occurs at short intervals of heavy precipitation. The lack of persistent or prolonged rainfall throughout the year can lead to issues caused by heavy intermittent precipitation being inadvertently overlooked. KSA is particularly prone to localized flooding. Thus, the mitigation of the adverse effects of such requires ensuring that;

- Drains, gutters and other systems designed to channel water are inspected,
- Water drainage systems are cleared of obstructions, and maintained to ensure they are capable of performing their intended function when required to do so.

- Careful consideration should be given to the inspection and targeted maintenance of building structures to ensure their ability to prevent unwanted water ingress is robust.

This may present particular challenges when rainfall has not occurred for some time and may only become evident during or shortly following a downpour.

6.2.3 Snow and Hail

Snow and Hail, like rainfall, generally occurs at short intervals of heavy precipitation. The considerations and actions required for mitigation are the same as those for rainfall.

Significant levels of snow affect infrastructure and can easily block access and egress roads as well as pedestrian footpaths, car parks and below surface entry points. Particular attention must be paid to weather forecasts supplied by ministries, which forecast snowfall expected levels.

6.2.4 Dust and Sand Mobility

The presence of sand and dust is common throughout KSA, due to the high percentage of desert landscape and acutely dry atmospheric conditions with high humidity. The occurrence of periodic precipitation is particularly low in comparison with countries with nominally cooler climates resulting in a higher degree of airborne particle suspension over greater durations of time.

Studies carried out by the Saudi Railway Corporation (SAR) have shown that sand mobility occurs when wind speeds reach approximately 22 km/h with dust mobility taking place in considerably more stable conditions with almost zero wind speed.

Sand mobility can be described as the airborne transportation of sand and dust particles. Dust and sand in KSA also present challenges to maintaining asset performance due to their ability to infiltrate components because of individual particles being considerably smaller in physical size than those that exist in other countries with similar environments.

Dust and sand particles are known to make a significant contribution to reduced performance in systems containing filters because of their propensity to become clogged. Consideration should also be given to components such as;

- Bearings
- Electric motors
- Pumps
- Other moving mechanical parts

Particular attention should also be given to systems comprising of;

- Vents
- Outlets
- Condensate drains which can also become blocked as a result of excessive sand and dust accumulation.
- Roof drainage systems,
- Sanitary, and air conditioning systems being typical examples of such.

Sand mobility affects infrastructure and can easily block access and egress roads as well as pedestrian footpaths, car parks and below surface entry points. Particular attention must be paid to weather forecasts supplied by ministries, which forecast winds. Contingency arrangements including any call-out requirements for clearing sand build up should factor in the plans.

6.3 Seasonal Preparedness and Maintenance

Typically, summer preparedness planning is distilled into a specific set of tasks that are carried out in advance of seasonal change. The purpose of the activities contained within the seasonal preparedness maintenance plan are to ensure that systems identified as likely to be affected by seasonal change are

maintained to a state of good repair with particular attention given to the aspects presenting the highest degree of risk.

6.3.1 Maintenance Planning

In KSA, seasonal preparedness can be described as the development of Pre-Summer Season Preparation and Pre-Winter Season Preparation Maintenance Plans. An overview of both is provided below.

6.3.1.1 Pre-Summer Season Preparation

Pre-Summer Season Preparation can be described as the development of plans containing targeted and specific maintenance activities that are essential for the continued operation of at-risk facilities when exposed to the environmental effects associated with the summer season.

The content of the plan must be based on a risk based assessment of the facilities and assets associated with the Entity. Once the affected aspects of the asset or system assessed have been identified, a review involving operational, engineering and maintenance stakeholders ought to be conducted in order to agree on an appropriate range of maintenance activities that must be carried out to mitigate the risks identified. Those responsible for the maintenance are then required to carry out the activities identified at an appropriate interval prior to the onset of the summer season.

For example, part of the pre-summer season preparation plan may be the inspection and maintenance of air conditioning systems to ensure they are in a good state of repair prior to the expected increased and prolonged usage anticipated. Typical pre-summer season preparation activities may include, but are not limited to the following, and be carried out during winter months:

- Filter clean or replacement.
- Electrical supply visual check and test.
- Ambient temperature setting check and test.
- Condensing and cooling circuit check and test.
- Functional test and system visual inspection.
- Compressor check and test.

The nature of the tests may differ but will be similar in principle across different designs of air conditioning system.

6.3.1.2 Pre-Winter Season Preparation

Pre-winter season preparation can be described as the development of plans containing targeted and specific maintenance activities that are essential for the continued operation of at-risk facilities when exposed to the environmental effects associated with the winter season.

The content of the plan must be based on a risk based assessment of the facilities and assets associated with the Entity. Once the affected aspects of the asset or system assessed have been identified, a review involving operational, engineering and maintenance stakeholders should be conducted in order to agree on an appropriate range of maintenance activities that must be carried out to mitigate the risks identified. Those responsible for the maintenance are then required to carry out the activities identified at an appropriate interval prior to the onset of the winter season.

Part of the pre-winter season preparation plan may require the inspection and maintenance of heating systems to ensure they are in a good state of repair prior to the expected increased and prolonged usage anticipated. Typical pre-winter season preparation activities may include the following, and be carried out during summer months:

- Drainage and roof guttering clearance, repair and replacement
- Heating system leak tests
- Thermostat and temperature control systems check and test
- Boiler combustion process check and test
- Functional test and system visual inspection
- Compressor check and test

6.3.2 Seasonal System Checks

A sample list of possible system checks is provided within the Attachments of this document. It should be noted that this is a sample and it is the responsibility of the Entity to ensure that seasonal plans are developed prescribing the appropriate level and type of maintenance to be carried out supported by evidence

6.4 Planning High Level Flow Process

Figure 1, shown below, illustrates the Plan-Do-Check-Action (PDCA) continuous improvement cycle which underpins the maintenance development, planning, implementation and review processes. In essence, the benefit of the process lies in gathering asset performance data post-season and feeding it back into a periodic evaluation process in order to provide a greater understanding of the effectiveness of current plans and maintenance activities. The output of the evaluation of the information streams allows for the adjustment or removal of existing activities or introduction of new activities to improve risk mitigation based on actual asset performance data. The management and reporting of all maintenance activities, planned or unplanned, shall be delivered using the Asset Management System (AMS).

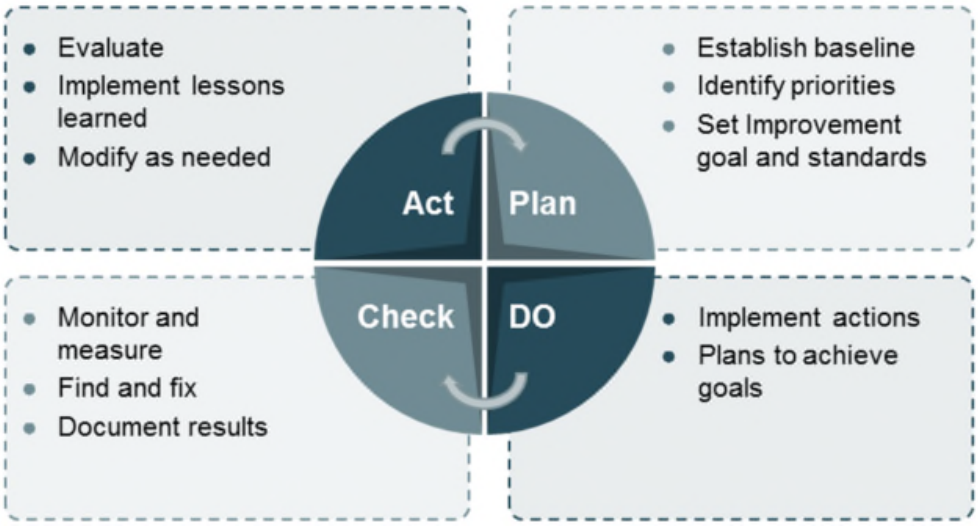

Figure 1: The Continuous Improvement Cycle

Figure 2, shown below, demonstrates a typical high-level process flow for planning maintenance activities, including both planned and reactive maintenance. Typically, the management of all maintenance activities, is most effectively carried out though the AMS applied by the Entity.

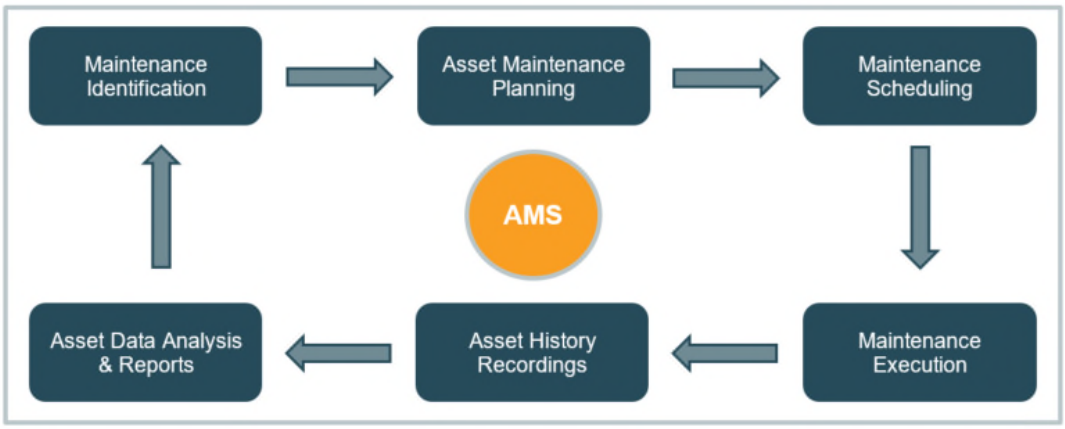

Figure 2: Typical Maintenance Planning Process

- Maintenance Identification: Identification of affected assets and their associated maintenance requirements.
- Asset Maintenance Planning: The process of ensuring sufficient materials, resources and equipment are available in good time for the maintenance activities to be conducted and for permits, tools, and skills to be defined
- Maintenance Scheduling: The development of necessary access arrangements and allocation of resources to facilitate the execution of maintenance related activities.
- Maintenance Execution: Undertaking the assigned maintenance task.
- Asset Data Collection, Analysis & Reports: The basis of information that enables intelligent decisions to be made in relation to the manner in which the asset is maintained.

The Entity's planning team shall assess and analyze historical data about the assets, the potential impact to services, customers, and users due to weather conditions in KSA. Using these and other attributes, such as technical seasonal consideration, the maintenance shall be planned in accordance with business needs and impacts that seasonal changes may potentially have on assets, customer, and users.

6.5 Contingency Planning

Contingency Planning encompasses the processes and systems to ensure an organization can continue to either operate its assets to deliver the required level of service in the event of an adverse impact, or maintain the safety and integrity of the assets (whether or not they operate).

Notwithstanding the above, the Entity should give due consideration to assets in remote locations where the ability to respond to failures is limited. In such cases, contingency plans should be developed which may include the provision of back up or standby systems that can provide the level of required functionality during seasonal periods where risks presented by asset failure are high. This is particularly relevant to power generation and the provision of water and other welfare facilities.

6.6 Risk Management

The Entity shall produce a risk register, which forms the foundation of its seasonal preparedness plans. The risk register shall demonstrate that the Entity has identified and evaluated the risks associated with seasonal change to the operation of its assets, supporting the justification for the content of its maintenance plans.

Detailed guidance on risk management is contained within Volume 12.

7.0 ATTACHMENTS

1. Attachment 1 - EOM-ZO0-TP-000068 - Seasonal Checklist

Attachment 1 – EOM-ZO0-TP-000068 - Seasonal Checklist

A Sample of Summer Checks

1	Enclosure system
	Cleaning of exterior windows, skylights, railing glass, canopies, and other similar surfaces
	Power-washing of pavers on decks and pavers
	Check alignment of exterior doors
	Scheduling of exterior painting projects
	Check operation of sunshades
2	Electrical systems
	Check operations of photocells and timers for exterior lights on summer daylight hours
	Check and service the operation of cooling equipment in electrical vault
3	Mechanical systems
	Lift machine room temperature control
	Purging of closed loop mechanical systems
	Replacing of filters in air handling units
	Servicing of air conditioning equipment
	Shutdown of any seasonal heating equipment
	Adjustment of thermostats to summer set points
	Check operations of exhaust fans and supply fans
	Cleaning of dryer exhaust vents
4	Site work system
	Start-up of irrigation sprinkler system
	Check operation of mowers, pressure washers, ladders and other summer maintenance equipment
	Pressure-washing of walkways and retaining walls
	Cleaning and repair of outdoor furniture
	Implementation of weed control measures
	Roads, platforms and footways, cleaning and gritting
	Storage of temporary winter runners and mats
	Check stability of retaining walls
	Check levelling on roadways and walkways

A Sample of Winter Checks

1	Mechanical systems - heating & ventilation and chillers
	Service central heating equipment
	Check requirements of heat pumps, air handlers and other heating systems for freeze protection and pre-winter season preparation procedures
	Replace/clean filters on equipment, as required
	Check boilers
	Inspect flue pipes and seams for proper support, any holes and cracks
	Clean chimneys and flues as required
	Vacuum vents and terminal/packaged heating devices, as may be required
	Clear any obstacles from heating vents so air can flow freely
	Test operation of HVAC controls and instrumentation such as thermostats and humidistats
	Check for any carbon monoxide leaks