

Maintenance requirements for transmission, substation and distribution equipment

Document No. SMI 1000
Amendment No. 0

14/05/2026

Revision History

This standard replaces and supersedes the following specifications:

- SMI 100 – Minimum requirements for maintenance of transmission & zone substation equipment
- SMI 101 – Minimum requirements for maintenance of distribution equipment

This new standard has been written to align maintenance requirement with revised risk-based maintenance strategy.

Minor changes to content have been made to clarify maintenance requirements.

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Document Control

Documentation content coordinator: Asset Integrity & Maintenance Team

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1 Document Scope

This standard applies to the maintenance of transmission, substation and distribution equipment managed by Endeavour Energy.

Specifically, this standard establishes and governs the Maintenance Prioritisation System (MPS), which is the primary mechanism Endeavour Energy's Asset Management & Digital team determines, prioritises, and schedules maintenance activities across the regulated asset portfolio.

This instruction is to be read in conjunction with all relevant Substation and Mains Maintenance Instructions as referenced herein.

2 Purpose

The purpose of this standard is to:

- Establish the Maintenance Prioritisation System (MPS) governance as the approved mechanism for generating, prioritising, and publishing maintenance work packages.
- Define the high-level risk-based maintenance philosophy applied to transmission, zone substation and distribution assets.
- Specify and define various maintenance types, i.e. preventive maintenance including regulated, asset inspection, risk-based maintenance interval for each asset type

This standard is to be read in conjunction with all relevant SMIs and MMIs referenced herein, as well as Endeavour Energy's Network Asset Maintenance Policy (Company Policy 9.9.1).

2.1 Revision History

Amendment No.	Date	Title
0	2026	Not applicable

3 References

External Regulations
ENA National Electricity Network Safety Code (Doc 01-2008)
Electricity Supply Act 1995 (as amended)
Work Health and Safety Act 2011 (NSW)
Work Health and Safety Regulations 2025 (NSW)

External Standards		
Standard No.	Year	Title
AS 60296	2017	Fluids for electrotechnical applications - Unused mineral insulating oils for transformers and switchgear
AS 1851	2012	Routine service of fire protection systems and equipment
AS 2067	2016	Substations and high voltage installations exceeding 1 kV a.c.
AS 2467	2025	Maintenance of electrical switchgear – Code of Practise
AS/NZ 5577	2013	Electricity network safety management systems
AS/NZS 61439.1	2016	Low-voltage switchgear and controlgear assemblies
AS 62271.1	2019	High-voltage switchgear and controlgear
AS/NZS 60050.441	2005	International Electrotechnical Vocabulary

Company Policies and Procedures
Company Policy 4.0 - Environment
Company Policy 9.9.1 - Network Asset Maintenance
Company Policy 9.9.2 – Essential Spares & Mobile Solutions
Company Procedure GPE 0069 - Polychlorinated Biphenyl (PCB) Management
Company Procedure GSU 0006 - Disposal of Surplus Goods and Equipment
Company Procedure GSY 0067 – Personal Protective Equipment
Company Procedure GSY 0050 – Hazardous Chemicals Management
Company Procedure GSY 1065 - Asbestos Management
Endeavour Energy Authorisations Manual
PAE 1054 Reliability Centred Maintenance
PAE 1056 Maintenance Requirements Analysis

Company Standards	
Environmental Management Standards	Environmental Management
ETS 0029	Regenerated Mineral Insulating Oil
PMI 4120	Maintenance of Protection
SMI 102	Substation batteries
SMI 103	Testing of in-service insulation oil
SMI 104	Major substation earthing system test
SMI 106	Zone and transmission substation accommodation
SMI 108	Miscellaneous substation equipment
SMI 109	SCADA equipment
SMI 110	Voltage regulating equipment
SMI 115	Oil separators and bunds
SMI 117	Essential spares
SMI 119	Transmission and zone substation data entry, asset structure and nameplate details
SMI 124	Maintenance data entry and defect prioritisation
SMI 150	Isolating transformers
SMI 151	On load tap changers and tap changer motor boxes
SMI 152	Auxiliary transformers
SMI 153	Voltage transformers and capacitor voltage transformers
SMI 154	Reactors
SMI 155	Power, auto and regulating transformers
SMI 158	Current transformers
SMI 200	HV circuit breakers
SMI 204	Disconnectors, links and air break switches
SMI 205	AFIC load control equipment
SMI 207	HV reclosers, sectionalisers and load break

Company Standards	
	switches
SMI 209	Capacitors
SMI 210	33kV -132kV indoor air and gas insulated switchgear
SMI 250	Low voltage distribution boards
Network Management Plan December 2013 Review	Network Management
Endeavour Energy PCB Management Plan	PCB Management
Electrical Safety Rules	Safety rules
Hazardous Material Database	HAZMAT Register

4 Definitions and Abbreviations

Term	Definition
AIS	Air insulated switchgear
DPS	Defect Prioritisation System
EAM	Enterprise Asset Management system (SAP)
EMS	Environmental Management Standard
FME	Feature Manipulation Engine: Data analytic software that underpins the MPS and DPS.
CB Exercise	Trip and close the circuit breaker electrically
GIS	Gas Insulated Switchgear
HAZMAT	Hazardous material
IMC	Investment Management Committee
MSDS	Material Safety Data Sheets
MMI	Mains Maintenance Instruction
MPS	Maintenance Prioritisation System
MRA	Maintenance Requirements Analysis
Network	Endeavour Energy's electrical network of poles, wires, substations and the like, which transmits electrical power to its customers.
NMIP	Network Maintenance Implementation Plan
Latitude	The allowable variance from the prescribed maintenance period
PD	Partial discharge
PD(TEV)	Partial discharge test detecting the levels of emitted transient earth voltages
PSBI	Pre-Summer Bushfire Inspection
OLI/GLI	Overhead Line Inspection/Ground Line Inspection
RCD	Residual Current Device

Term	Definition
SAP	Endeavour Energy's EAM/Asset Information System
SCADA	Supervisory Control and Data Acquisition
SDI	Substation Design Instruction
Site	Location or an area within the boundaries shown on any indicative general arrangement drawing that may be supplied in the project.
SMI	Substation Maintenance Instruction
System reliability	The ability of a system to perform its required functions under stated conditions for a specified period of time.
Works	All of the work necessary to complete the maintenance activity as described in an SMI or MMI.
WO	Work Order

4.1 Asset Management Definitions and Abbreviations

Term	Definition
Condition based maintenance	Preventive maintenance based on performance and/or parameter monitoring and the subsequent actions. May be carried out according to: (a) continuous monitoring, (b) scheduled inspection, or (c) on request. It includes assessment of physical conditions and analysis, where the condition assessment may be by operator observation, and/or inspection, and/or testing, and/or condition monitoring of system parameters, etc, conducted according to a schedule on request or continuous.
Condition monitoring	The use of advanced technologies in order to determine equipment condition and performance, and potentially predict failure.
Circuit breaker	A mechanical switching device capable of making, carrying and breaking currents under normal circuit conditions, and also making, carrying for a specified time, and breaking currents under specified abnormal circuit conditions, such as those of short circuit. Note: A circuit breaker is usually intended to operate infrequently, although some types are suitable for frequent operation.
Defect	A condition of an asset that represents a degradation from required or acceptable condition, identified through inspection or monitoring, where the asset has not yet reached functional failure
Diagnostic testing	A technique involving the establishment of comparative data for monitoring and checking the condition of equipment.
Disconnecter	A mechanical device, which for reasons of safety provides, in the open position, an isolating distance in accordance with specified requirements. A disconnector is capable of opening and closing a circuit when negligible current is broken or made (up to 0.5A such as capacitance currents). It can carry current under normal conditions and for a specified time under abnormal conditions such as short-circuit.
Examination	An inspection with the addition of partial dismantling, supplemented by measurements and non-destructive tests in order to determine the condition of an item. Note: An examination should be followed by an operational check.
Failure	The termination of an item's ability to perform a required function
Fault	A state in which an asset cannot fully perform a required function due to its degrading condition
Fault & Emergency maintenance (F&E)	Maintenance activities to rectify any emergency, unpredicted or impending failure, incident or event impacting safety, environment, loss of supply to customers, or imposing unacceptable operational constraints on the network.

Fuse	A switching device that opens the circuit by melting one or more of its components when current exceeds a given value for a sufficient time. Includes fuse element, fuse-link, current-limiting fuse and expulsion fuse types.
Fuse switch	A switch in which a fuse link, or fuse carrier with fuse link, forms the moving contact.
Indoor switchgear	Switchgear designed for use entirely indoors where atmospheric conditions are controlled.
Inspection	Maintenance action comprising careful scrutiny of an item without dismantling, using senses to detect anything causing the item to fail to meet acceptable condition. Note: An inspection may be followed by an operational check.
Maintenance	Combination of all technical, administrative and managerial actions during the life cycle of an item intended to retain it in, or restore it to, a state in which it can perform the required function
Operational check	An action carried out to determine whether an item functions correctly.
Outdoor switchgear	Switchgear designed for outdoor use capable of withstanding specified atmospheric conditions.
Overhaul	Maintenance including examination and replacement or rebuilding. Minor overhaul involves lubrication or consumable replacement; major overhaul includes major dismantling or component replacement.
Post fault & emergency (Post F&E) maintenance	Repairs that result directly from a fault and emergency but could not be completed immediately due to resource or network constraints.
Predetermined Maintenance	Preventative maintenance carried out in accordance with established intervals of time or number of units of use but without previous condition investigation. Also referred to as time-based or fixed-interval maintenance.
Predictive Maintenance	Condition-based maintenance carried out following a forecast derived from the analysis and evaluation of significant parameters of the degradation of an item.
Preventive Maintenance	Maintenance carried out at predetermined intervals or according to prescribed criteria, intended to reduce the probability of failure or the degradation of the functioning of an item. Includes predetermined maintenance and condition-based maintenance. Definition is referenced from ISO 13306:2017 Maintenance terminology
Risk-Based Maintenance	Maintenance of network assets optimised to manage the Performance – Cost – Risk function. Higher criticality assets are maintained at tighter intervals, while lower criticality assets allow greater tolerance for failure risk.
Run to Failure Strategy	A deliberate maintenance strategy applied to items of low criticality or low consequence-of-failure, where no preventive maintenance is performed and the item is allowed to fail before restoration. Not synonymous with corrective maintenance — it is a strategy choice, not a maintenance type.
Switch	A switching device capable of making, carrying and breaking currents under normal circuit conditions and carrying currents under specified abnormal conditions.
Switch fuse	A switch in which one or more poles have a fuse in series within a composite unit.
Switch fuse combination	A combination of a three-pole switch with three fuses provided with strikers, where operation of any striker causes all poles of the switch to open automatically.
Switchgear and Controlgear	General term covering switching devices and their combinations with control, measuring, protective and regulating equipment, including assemblies and supporting structures.
Test	A measurement carried out to determine the condition of an item.

5 Risk-Based Maintenance

5.1 Asset Maintenance Approach

Maintenance of network assets is optimised to balance the Performance – Cost – Risk function in alignment with Endeavour Energy's Enterprise Value Framework (EVF).

FMECA/RCM databases that were previously conducted and developed for Network Assets are used extensively as the foundational data inputs for the MPS. Where risk is employed in determining the maintenance needs of an asset, assets of higher criticality are maintained at intervals that control failure risks to acceptable levels, while lower-criticality assets may tolerate greater failure risk within defined thresholds. Maintenance activities are optimised to ensure ALARP principles are upheld.

Network asset maintenance requirements are determined through quantified, monetised risk assessments. These assessments consider asset condition (as an input to Probability of Failure), applicable failure modes, and the asset's criticality to network and enterprise risk categories. Please refer to Endeavour Energy's Asset Risk Model Framework and EVF for the detailed risk-cost methodology.

The following enterprise portfolio risk categories are considered as the minimum requirement in maintenance planning:

- Reliability (SAIDI, SAIFI, CAIDI)
- Bushfire (network-initiated fire risk)
- Safety (public and employee)
- Sustainability and Environmental
- Financial

Maintenance activities are prioritised based on management of prospective enterprise risk levels, with the intent to maintain, preserve, or reduce portfolio risk across a rolling 3-year planning period.

The approved Asset Management Dashboard comprises of two main elements:

1. MPS (Maintenance Prioritisation System), which is detailed within this standard, i.e. Section 6 refers.
2. DPS (Defect Prioritisation System), which is detailed within SMI 124

The MPS and DPS are Endeavour Energy's scheduling and prioritisation governance frameworks. They operate as a management overlay on top of this maintenance type taxonomy — MPS governs preventive maintenance scheduling and compliance, DPS governs defect prioritisation and corrective maintenance.

5.2 Risk Compliance and Failure Thresholds

Prospective risk is the quantification of the potential impact of future adverse events generally reduced through consideration of probability and likelihood factors.

Prospective risk is the primary compliance control mechanism for Preventive Maintenance and is underpinned by the implementation of FMECA, RCM, PoF, CoF which is associated with the Annualised Risk Cost Factors. Please refer to PAE 1056 for MRA and the Asset Risk Framework Model for PoF, CoF methodology.

6 Maintenance Prioritisation System (MPS)

6.1 MPS Overview

The Maintenance Prioritisation System (MPS) is the approved analytical tool used by the Asset Management & Digital team to determine, rank, and package maintenance activities required to effectively manage network asset risks across the regulated substation asset portfolio. For further information on MRA and RCM, please refer to Doc. No. PAE 1056 and PAE 1054.

The MPS ranks each unique maintenance activity on an asset risk-cost basis and assembles annual maintenance packages containing EAM (SAP) Master Data — specifically, the creation of Work Orders (WOs) — for execution by field delivery teams. Each annual package is designed to address the maximum prospective risk associated with network assets such that portfolio risk levels do not increase over the rolling 3-year planning period.

6.2 Process Flowchart details

6.2.1 Initial Inputs

The flowchart below highlights some of the key inputs including FMECA/RCM, Annualised Risk cost, PoF and CoF models etc.

6.2.2 Risk Cost Calculation Module

FME is used as the Optimiser Module tool to gather all relevant inputs as described above, carry out geospatial extract, transformation and load the inputs as the single source of truth in the MPS approach.

6.2.3 Preventative Maintenance Task List

All preventive maintenance tasks are documented and recorded in the FME, where it is then reviewed by the Asset Integrity & Maintenance team to determine if any of the maintenance tasks are related to the OLI/GLI/PSBI maintenance program that is maintained separately from the MPS.

6.2.4 OLI/GLI/PSBI Maintenance program

If any of the maintenance tasks are related to the OLI/GLI/PSBI maintenance program, it is maintained as a separate program from the MPS and hence bypasses the risk-based prioritisation review.

6.2.5 Risk Based Prioritisation Review

All preventive maintenance activities (except OLI/GLI/PSBI) will go through the risk based prioritisation process, where it prioritises maintenance activities by reviewing each asset type's criticality based on FMECA, RCM, PoF, CoF, annualised risk cost and the estimation of the set date in carrying out maintenance activities etc, i.e. prioritise maintenance activities from most critical to least critical with unconstrained view.

6.2.6 AMC endorsement

Post Risk Based Prioritisation is carried out, it will then be transferred to the Asset Management Committee for review and endorsement to ensure the correct allocated budget is assigned to each asset type with the right resources and labour with constrained view.

6.2.7 Work Planner Optimisation

Following IMC approval, once all maintenance activities are prioritised, it is then transferred into Work Planner Optimisation tool, which is primarily used by EPMO to create the network maintenance implementation plan, create all notifications for maintenance required, i.e. to allocate the maintenance activities over a rolling 3 year period.

6.2.8 Work Order Creation

Once the network maintenance implementation plan is approved by the Asset Management Committee, the associated Work Orders will be generated in SAP.

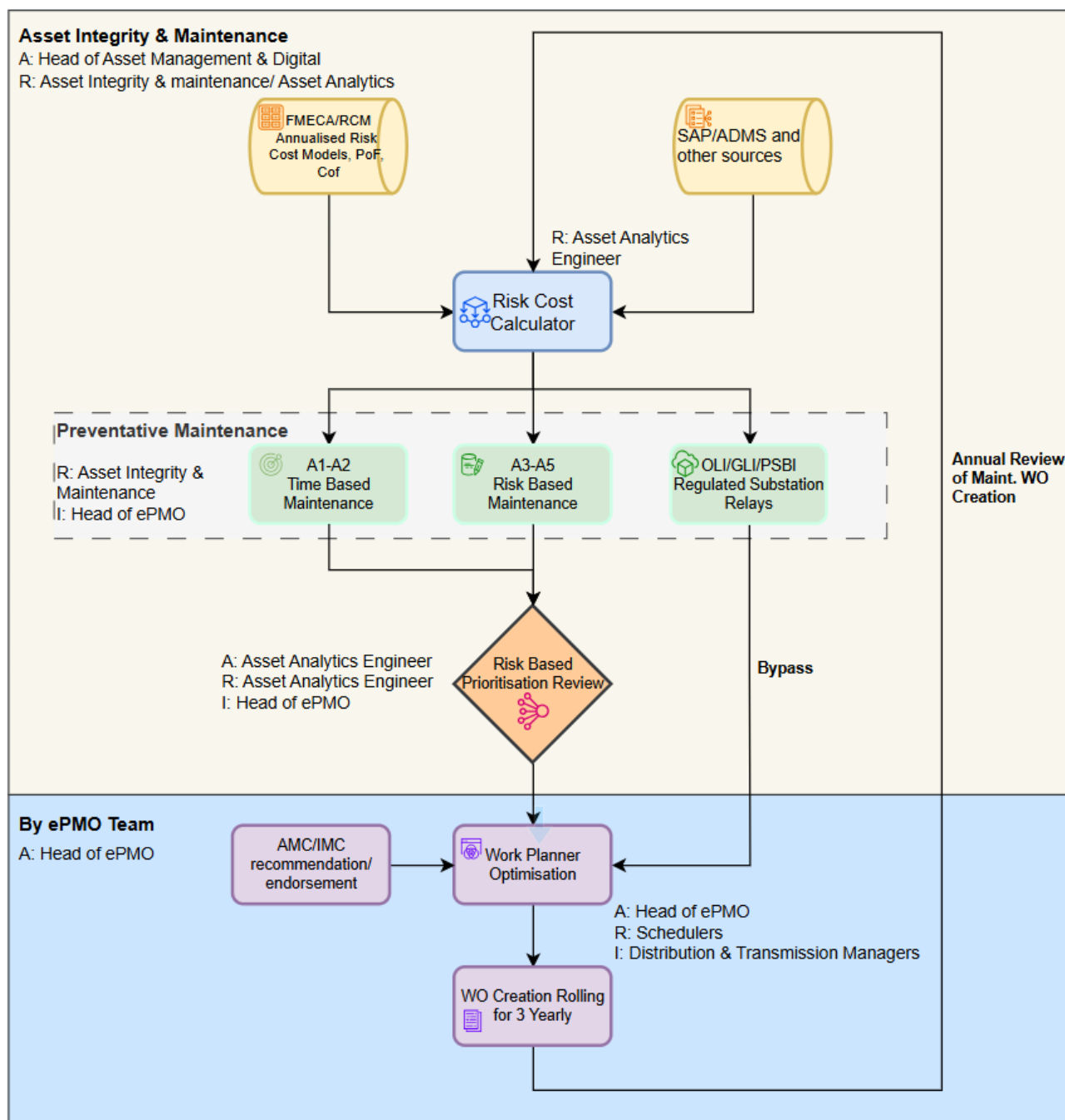


Figure 1 - Prospective Risk Management process flowchart

Note: The Annual Review by the Asset Integrity & Maintenance Team applies to all steps within the process boundary shown above except for the Work Planner Optimisation Tool that is governed by EMPO team.

6.3 Relationship to the Defect Prioritisation System (DPS)

The MPS and DPS are complementary but distinct systems within Endeavour Energy's Asset Management System. Their respective scopes are defined as follows:

Table 1 - Interfaces between MPS and DPS

	MPS (this standard)	DPS (SMI 124)
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Primary Function	Planned, proactive maintenance program generation and prioritisation	Defect recording, classification, and rectification prioritisation
Trigger	Time-based or risk-based interval	Identified defect or abnormality (from inspection, or reactive event)
Output	SAP Work Orders for planned maintenance activities	SAP Notifications and consequent Work Orders for defect rectification
Governing Standard	SMI 1000 (this document)	SMI 124

Both MPS and DPS are captured in the approved Asset Maintenance Dashboard. Schedulers and delivery teams access the consolidated prioritised program from the Dashboard, irrespective of whether the work originated from the MPS or DPS.

6.4 Maintenance Planning

6.4.1 Planning Guidelines

The Asset Management and Network Asset Maintenance Policy 9.9.1 provides assurance that the risk-based approach needs to consider sufficient resourcing and allocated approved budgets in order to enable effective execution of all maintenance activities identified in the rolling 3-year maintenance plan created.

All efforts are to be put into resource load and risk levelling to ensure even ongoing and balanced expenditure of resources on maintenance and other activities as well as moderation of risk levels. It is acknowledged that the NMIP may deliver maintenance in such a way that balances maintenance risk thresholds and delivery latitudes against other requirements.

The NMIP may enable works to be packaged across various maintenance activity types and risk-based maintenance activities may be completed prior to requiring a risk-assessment.

6.4.2 Addressing Changes in Standard

Any substantial peaks in risk or backlogs in maintenance created from changes in maintenance standards, or other, shall be assessed through risk-based prioritisation methods by the Asset Integrity & Maintenance team, unless otherwise documented in the NMIP. Consideration shall be given to the timeframe over which re-attaining risk-levelled compliance will be required, with the timeframe not being more than the assets 'minimum maintenance interval', so as not to create ongoing resourcing/budget impacts. Asset Risk and Performance Manager shall provide the delivery team with a multi-year maintenance catchup program as a list of assets with corresponding activities and dates until compliance is achieved.

Maintenance budget requirements shall be revised by EPMO by the end of the financial year in which changes were published to enable ongoing maintenance and compliance to maintenance standards.

7 Maintenance Standards Framework

The intent of maintenance activities is to preserve condition of the asset, improve the performance of the asset, or extend the life of the asset, i.e to return the asset to as close as possible to 'as new' condition. It is acknowledged that the condition of an asset will degrade over time irrespective of maintenance conducted.

7.1 Duty of care

Employees undertaking maintenance activities shall display a duty of care to the public, Endeavour Energy employees and others. If a potential safety or environmental issue is identified, it is the employee's responsibility to conduct hazard reviews, implement controls, and report any incidents or near misses.

Where hazards, or other, result in delays to maintenance activities, the Distribution and Transmission Managers are responsible for management of the hazards/issues, and EPMO for any revised prioritisation required.

Distribution and Transmission Managers are responsible for ensure works are completed to a reasonable quality, and the work site is left in a clean, safe state prior to closing the associated WO.

7.2 Safety standards

Maintenance shall be completed in alignment with Endeavour Energy's Authorisation Manuals, WHS instructions, and safe work method statements.

7.3 Standards & instructions

All maintenance activities shall be carried out in accordance with Endeavour Energy's relevant maintenance instructions and Environmental Management Standards.

All Endeavour Energy maintenance standards and workplace instructions should reference original equipment manufacturer manuals, industry guidelines, and Australian Standards where appropriate.

All employees shall have the appropriate workplace instructions and contingency plans in place to cover related safety, environmental and operational issues as outlined in Endeavour Energy's Company Procedures (Safety - Electrical) and Company Procedures (Safety - General), and in accordance with the relevant Environmental Management Standards.

7.4 Deviations from an instruction

In general, the maintenance work activities and respective intervals shall be per this standard and the referenced standards within. The scope of, and related work instructions for, any maintenance activity must be in accordance with the manufacturer's instructions. In some circumstances deviations may exist from the OEM instruction. Written approval for deviations be obtained from the Asset Risk and Performance Manager prior to implementation, and Endeavour Energy standards shall be updated to reflect these deviations.

Any request for deviations must be fully documented and contain substantiating proof of performance (or other benefit) with references to the recommended Australian Standard, industry guide, or other standard, as nominated in the instruction.

7.5 Maintenance work requirements

Maintenance works conducted on Endeavour Energy's substation assets shall meet the following minimum requirements.

7.5.1 General

For general requirements, such as electrical, mechanical and technological; maintenance personnel (e.g. technician/contractor) shall be fully responsible to check that all items of plant and equipment subject to works are compatible with each other and the installation is returned to service in the best possible condition, including but not limited to: including cleaning, finishing, painting, labelling, and data validation in our systems etc.

7.5.2 Environmental

All equipment and maintenance consumables shall be suitable for the environment in which it will need to operate. Maintenance personnel shall ensure that kiosks, cubicles and similar enclosures are adequately ventilated to minimise condensation buildup and, where necessary, anti-condensation heaters shall be cleaned, replaced, or fitted with thermostatic control. Contactors, relays, steelwork, equipment and the like, shall be protected against corrosion by, for example, suitable galvanising, plating, or painting.

Any major works, outside the scope of the maintenance activity, required to meet the above shall be submitted to the Asset Investment & Systems Manager for assessment.

7.5.3 Insulation coordination

Reasonable efforts should be put into maintenance activities to return the assets insulation coordination to design parameters (e.g. through cleaning, refurbishment, or replacing damaged components). Insulation coordination should be maintained between different items of plant, such as transformers, surge arresters, circuit breakers and transmission lines, and also between different components of items within a particular item of equipment.

7.5.4 Spares

Spare parts used in equipment must be from the original equipment manufacturer or under their license, as locally fabricated parts may de-rate the switchgear with respect to fault current withstand capability, lightning impulse withstand voltages, and current ratings. Accordingly, locally fabricated spares may **not** be used unless they have been type-tested or otherwise proven to be fit for purpose, and their use approved by the Asset Risk and Performance Manager.

7.5.5 Interchangeable components

Components of similar types of switchgear may be used provided that modification of designs and settings are not required.

7.5.6 Quality of materials and workmanship

All materials, consumables or components used shall be of new, or suitably refurbished (in accordance with Endeavour Energy Standards), and of a quality and class most suitable for working under the conditions specified without distortion, deterioration or setting up undue stresses on other equipment.

All work shall be neat and carried out to trade standards and in a professional manner.

7.5.7 Maintenance data entry and asset structures

All details for maintenance activities, defects, prioritisation and the like, shall be entered into SAP within one week of the work being completed. This data is to be entered at the lowest possible level of asset (refer to SMI 119 and SMI 124 for maintenance data entry requirements).

Results of the review of hazardous materials shall be provided to the Asset Owner (Transmission Manager) within one week of the work being completed. The Transmission Manager shall arrange the update of HAZMAT Register.

7.5.8 Data validation update

All maintenance activities shall include the validation, identification, creation, and recording of any general and asset data that has previously been captured in, or is missing from, SAP, for the particular item on which the work is being performed. If other data not listed in the instructions is considered necessary, the Manager Asset Risk and Performance should be informed and the data collected. The parent/child hierarchy is shown in the SMI schedules to allow the correct input of data (refer to SMI 119 - Transmission and zone substation data entry, asset structure and details, for details of the SAP hierarchy).

7.6 Materials used in maintenance

7.6.1 General

Maintenance workers have the responsibility to check that they have all the relevant safety data sheets (MSDS) for the materials they use for their work, and that they comply with the instructions for the use and handling of such materials.

All equipment to be disposed of shall be handled in accordance with Company Procedure GSU 0006 and appropriate Environmental Management Standards.

7.6.2 Insulation oil and oil handling equipment

All new, used or refurbished oil used to carry out maintenance work must not contain more than 2ppm of polychlorinated biphenyls (PCBs). This oil is to be of a minimum standard to meet the requirements of AS 1767 and ETS0029 – Regenerated Mineral Insulating Oil.

Care is to be taken to check that equipment used for oil handling is clean and not infected with PCB. Reference shall be made to Endeavour Energy's PCB Management Plan and Company Procedure GPE 0069 - Polychlorinated Biphenyl (PCB) Management.

7.6.3 Asbestos

Electrical equipment, such as transformers and circuit breakers, may contain asbestos or material containing asbestos. In transformers, gaskets may be made out of asbestos material, while arcing chutes in circuit breakers may also contain asbestos.

If any equipment is suspected of containing asbestos, Endeavour Energy's procedure GSY 1065 must be followed to manage the associated risks.

8 Maintenance Activity Interval Details

8.1 Routine maintenance

8.1.1 General

Routine maintenance shall be executed in accordance with the MPS dashboard (Section 6) which considers the maintenance strategy for the various activity types (Section 3).

The maintenance intervals provided herein are minimum requirements for some activity types and are guidelines for the activities that form part of the risk-based maintenance system.

Any additional maintenance requirements identified and requested in writing by the Asset Integrity & Maintenance Manager shall be undertaken within the latitudes provided in this document or in the written instruction.

Where a maintenance requirement is duplicated, either by its time period, or by a corresponding instruction, the duplicated maintenance requirement is not to be carried out.

Maintenance of spare is to be carried out in accordance with our spares policy and strategy.

8.1.2 Inspections

Inspection requirements are to be carried out as far as practical with the item energised, while observing safe working procedures and clearances. Closer inspections are to be carried out on de-energised equipment prior to the commencement of other routine maintenance.

The inspection is to include appropriate cleaning as well as the repair of simple defects and abnormalities that can be easily and safely rectified during the inspection, such as gummy locks, hinges, replacement of light globes and fluorescent tubes.

Where required, the inspection is to include the review of the hazardous materials listed in the HAZMAT Register.

All defects and abnormalities found during inspections are to be lodged in SAP as Notifications with the corresponding fields completed per SMI 0009. It is expected that Operation Managers will review defects and approve WOs to be raised, or alternatively, shall engage with delivery and asset management teams as required.

8.1.3 Maintenance work

Each examination, operational check and overhaul is to be preceded by an inspection. All defects and abnormalities found during this work are to be rectified as part of the maintenance work on the particular item.

8.1.4 Condition monitoring

Carrying out condition monitoring of equipment is intended to reduce unplanned failures and consequential damage to adjacent equipment. All defects and abnormalities found during condition monitoring shall be acted upon and prioritised in accordance with SMI 0009 and SMI 124 - Maintenance data entry and defect prioritisation.

8.1.5 Diagnostic testing using infra-red thermography

Diagnostic testing using infra-red thermography equipment shall be carried out as indicated in the maintenance schedules. Infra-red thermography is a non-contact measurement system that detects radiant energy emitted from a surface. All defects and abnormalities found during diagnostic testing should be acted on and prioritised in accordance with SMI0009 SMI 124 - Maintenance data entry and defect prioritisation.

9 Maintenance Prioritisation System Tables

9.1 Regulated Maintenance

These activities are prescribed by legislation, regulation, or other statutory or licencing obligation. Maintenance for these items must be completed within the timeframes and latitudes provided herein, regardless of asset condition.

Planning is conducted to the maintenance 'baseline interval' while latitude governs flexibility in scheduling arrangements, being considerate of rescheduling needs.

9.1.1 Transmission Assets

9.1.1.1 Fire Control Equipment

Item	Activity	Baseline Interval (months)	Latitude (Days (D)/ Month (M))	Reference
Fire Extinguisher	Half-yearly inspection	6	1M	AS 1851 Table 1.11 (A)
	Yearly inspection	12	2M	
	Pressure Test	60	3M	
Emergency Exit Lights	Inspection and Test	6	1M	
Fire Alarm Detector	VESDA Fire System Inspection	3	10D	
	Pipe Network Check	6	1M	
	Filter Inspection Pipe Integrity	12	2M	
	Sample Point Cleaning and Pipe Network Flush	24	2M	
Fire Indicator Panel	Inspection	1	5D	
	Minor Overhaul	6	1M	
	Major Overhaul	12	2M	
	5-yearly Overhaul	60	3M	
Fire Blanket	Dry Blanket Inspection	6	1M	
	Wet Blanket Replacement	48	3M	
Fire Doors	Inspection and Test	6	1M	
Fire Sliding Doors	Inspection and Test	3	10D	
Fire Sprinkler System	Inspection	1	5D	
	Inspection and Functional Test	6	1M	
	Inspection and Test	12	2M	
	Major Overhaul	60	3M	
	10 Year Overhaul	120	6M	

Item	Activity	Baseline Interval (months)	Latitude (Days (D)/ Month (M))	Reference
	25 Year Overhaul	300	6M	
	30 Year Overhaul	360	6M	
Fire Water Storage Tank	Inspection	1	5D	
	Inspection and Test	6	1M	
	Minor Overhaul	12	2M	
	Major Overhaul	120	6M	
Gaseous Fire Extinguisher	Inspection	1	5D	
	Functional Test	6	1M	
	Minor Service	12	2M	
	Major Service	120	6M	
Gen Sprinkler and Hydrant Pumpsets	Monthly Inspection	1	5D	
	6 Monthly Inspection	6	1	
	Yearly Inspection	12	2M	
	5 year Inspection	60	3M	
Fire Hydrant	6 Monthly Inspection	6	1M	
	Yearly Inspection	12	2M	
Fire Hydrant Boost Valve	6 Monthly Inspection	6	1M	
	Yearly Inspection	12	2M	
Fire Shutter and Vent	Inspection	12	2M	
Fire Dampers	Wall-HVAC Inspect and Test	60	3M	
	At Height Inspect and Test	60	3M	
	HV Room Inspect and Test	60	2M	

9.1.1.2 Residual Current Devices

Item	Activity	Baseline Interval (Months)	Latitude (Weeks)	Reference
RCD	Push Button Test	6 [^]	2 [*]	AS/NZS 3760-In-service inspection and testing of electrical equipment (Indicative testing and inspection intervals for electrical equipment-Table 2.4)

Item	Activity	Baseline Interval (Months)	Latitude (Weeks)	Reference
	Operating Time Test	12 [^]	2 [*]	AS/NZS 3760-In-service inspection and testing of electrical equipment (Indicative testing and inspection intervals for electrical equipment-Table 2.4)

[^]Operating Time Test supersede a Push Button Test

^{*}Where tests are delayed beyond the latitude, it must be completed prior undertaking work on sites

9.1.1.3 Substations identified in HAZMAT Register

Item	Routine maintenance	Baseline Interval (years)	Ref
Substation	Hazardous materials assessment	5	GSY1065 and AZMAT Register
Substation	Review of items containing hazardous materials	1	GSY1065 and AZMAT Register

9.1.2 Distribution Assets

Fire Control Equipment for all buildings in the distribution network

Item	Activity	Baseline Interval (months)	Latitude (Days(D)/ Month(M))	Reference
Fire control and emergency equipment	Check (extinguishers, blankets)	0.5	1M	AS1851 Table 1.11 (A)
	Check (fire dampers)	1	5D	
	Check (smoke/thermal sensors, fire protection panels, emergency exit lighting and signs)	Check in conjunction with building fire system maintenance		

9.2 Programmed Inspections and Maintenance

Multi-asset grouped activities, or critical asset activities, that are investigative in nature with requirements assessed to ALARP principles underpinned by FMECA and RCM methods. Maintenance for these items must be completed within the timeframes and latitudes provided herein.

Planning is conducted to the maintenance 'baseline interval' while latitude governs flexibility in scheduling arrangements, being considerate of rescheduling needs.

9.2.1 Transmission Assets

9.2.1.1 Exercising of Circuit Breakers

Circuit Breaker exercise shall be carried out on a one-yearly frequency unless the circuit breaker has been operated prior within the last year.

9.2.1.2 Major Substation Inspection Program

The major substation inspection program has a **baseline interval of 6-months, with a 1-month latitude**, and includes the following inspection activities:

Item	References
Circuit Breakers	SMI 200
High pressure GIS	SMI 210
AIS, hybrid, low pressure GIS	SMI 210
Substation reclosers 11kV-33kV	SMI 207 and PMI4120
Power Transformers	SMI 155
Oil/Water Separator	SMI 115
Reactors oil	SMI 154
Voltage Transformer	SMI 153
Capacitor voltage transformer	SMI 153
Current Transformer	SMI 158
Auxiliary Transformers	SMI 152
Auto Transformers	SMI 155
Isolating Transformers	SMI 150
Transformer regulating	SMI 150 & SMI 151
Tap Changer	SMI 151
SCADA Systems	SMI 109
Static frequency unit (AFIC)	SMI 205
Coupling equipment (AFIC)	SMI 205
Motor generator (AFIC)	SMI 205
Bushings/wall bushings	SMI 108
Insulators	
Surge arrestors	
Cable boxes	
Control panels	
Busbars/conductors/connections	
Panel lamps	
Lightning masts	
Voltage chart recorder	
Auxiliary board	SMI 250
Compressors	SMI 200

Item	References
All other capacitors (except ABB Abbaccus and Ampcontrol)	SMI 209
Switch and switch fuse units epoxy encapsulated (All brands)	SMI 204
Switch and switch fuse combination sheet steel enclosed	
Switch and switch fuse combinations oil	
Air break switches	
Links	
Isolators	
Switch earthing	
Fault throwers	*

**Maintenance references same as similar switchgear.*

9.2.1.3 Preventative Maintenance – Battery and Chargers

Item	Function	Voltage	Routine maintenance		Baseline Interval (years)	Ref.
Lead acid	Station	120V	Minor overhaul		0.25	SMI 102
			Quick discharge test		1	
			High current discharge test	Pre 5 years	-	
				Post 5 years	2.5	
			Capacity cycle test		5	
	Communications	12V 50V	Minor overhaul		0.25	
			Quick discharge test		1	
			Capacity cycle test		5	
Nickel Cadmium	Station	120V	Minor overhaul		0.25	
			Quick discharge test		1	
			High current discharge test	Pre 5 years	-	
				Post 5 years	2.5	
			Capacity cycle test		5	
	Communications	12V 50V	Minor overhaul		0.25	
			Quick discharge test		1	
			Capacity cycle test		5	
Lead acid sealed/valve regulated	Substation	120V	Minor overhaul	Pre 10 years	0.5	
			Quick discharge test	Pre 10 years	1	
				Post 10 years	0.5	
			Capacity cycle test	Pre 10 years	5	
				Post 10 years	1	
	Communications	12V 50V	Inspection		1	
			Quick discharge test#		0.25	
			Capacity cycle test	Pre 5 years	-	
				Post 5 years	2	
Lead acid sealed/valve regulated	Miscellaneous, for example, radio/ reclosers	12V 24V	Minor overhaul		0.5	
			Replace		3	

Only for sites capable of performing a remote quick discharge test

9.2.1.4 Transformer Oil Testing

Item	Age	Interval (years)	Latitude	Ref
Power Transformer	After warranty	2	-	SMI 103
Power Transformer	0-warranty expiry	From date of commissioning, every four (4) months for one (1) year and then annually before warranty period expires*	-	

9.2.1.5 Bushing Condition Test

Item	Activity	Interval (years)	Latitude	Ref
345GCN CB Bushing	Bushing test	3	0.25	SMI 200

9.2.2 Distribution Assets

9.2.2.1 HV Recloser, Sectionaliser and Load Break Switches

Item	Activity	Baseline Interval (years)	Latitude	Ref
Recloser	Battery replacement	4	-	SMI 102
	Protection and control calibration	4		PMI4120
Load break switch	Battery replacement	4	-	SMI 102
Sectionaliser	Battery replacement	4	-	SMI 102
	Protection and control calibration	4		PMI4120

9.2.2.2 Ground and Indoor Substations

Item	Activity	Baseline Interval (years)	Latitude	Ref
Batteries	Major overhaul (dry types)	Replace every 3 years	-	SMI 110
SCADA	Major overhaul (fault indicator reset)	Replace every 15 years	-	SMI 109

9.2.2.3 OLI/GLI Inspection and Treatment - Poles

Item	Activity	Baseline Interval (years)	Latitude	Ref
Full length* preservative treated (FPT) poles (including private).	Ground line inspection	5.5	0.5	MMI0001
	Overhead line inspection	5.5	0.5	MMI0001
Sureline and Ingal steel mains poles^	Ground line inspection	5.5	0.5	MMI0001
	Overhead line inspection	5.5	0.5	MMI0001
Concrete and composite poles (33kv and above)	As specified in MMMI002	-	-	MMI0012
Poles	Ground line inspection	5.5	0.5	MMI 0001
	Overhead line inspection	5.5	0.5	

*OLI only for the first three inspection, but full OLI/GLI by the Fourth (4th) and subsequent inspections. For example, a pole installed in October 2005, only OLI is conducted for inspections in 2009, 2014 and 2018. The inspection scheduled for 2023 will be full OLI/GLI and every inspection after.

^OLI for first inspection only and full OLI/GLI in the second and subsequent inspections. Does not include street light columns. The inspection of street light columns is covered by MMI 0003 - Routine external structural inspection of streetlight columns and LV pillars and MMI 0022 - Routine electrical inspection of streetlight columns and LV pillars and associated electrical terminations.

9.2.2.4 OLI/GLI Inspection and Treatment – Fire prone areas

Item	Activity	Baseline Interval (years)	Latitude	Ref
Pre-Summer Bushfire Inspection	Inspection	Annual, within defined periods detailed in MMI0034	-	MMI0034

9.2.2.5 Water way Crossing

Item	Activity	Baseline Interval (years)	Latitude	Ref
Warning signs	Ground line inspection	1	-	MMI 0012
Inspection of line and measurement of clearance	Overhead line inspection	4.5	0.5	MMI 0001

9.3 Risk-based Asset Inspections

The Risk-based asset inspections involve planned visual, thermographic, or functional checks to assess the state of equipment. The baseline maintenance inspections are used to determine the estimated time interval of the generally quick, low-cost, low risk activities being carried out for each asset type.

Maintenance is planned based on asset risk, which informs both time to maintenance and maintenance latitudes. Baseline intervals are provided for guidance only and are used in the MPS in the risk-assessment.

Maintenance latitudes provide guidance for the creation of the NMIP.

9.3.1 Transmission Assets

9.3.1.1 Emergency Spares

Item	Activity	Baseline Interval (years)	Ref
All free-standing emergency spares	Inspection	1	SMI 117

9.3.2 Distribution Assets

9.3.2.1 Water way Crossing

Item	Activity	Baseline Interval (years)	Latitude	Ref
Warning signs	Ground line inspection	1	-	MMI 0012
Inspection of line and measurement of clearance	Overhead line inspection	4.5	0.5	MMI 0001

9.3.2.2 Thermovision of distribution feeders

Item	Activity	Baseline Interval (years)	Latitude	Ref
Distribution and transmission lines [^]	Thermovision inspection	3	-	MMI 0032

[^] A minimum of seven (7) switches out from the zone or transmission substation shall be scanned, including each main branch (if there is more than one). If a significant number of defects are found in the first seven (7) switches, the operator shall scan further along the feeder.

9.3.2.3 Air break switches, underslung links and isolators*

Item	Activity	Baseline Interval (years)	Latitude	Ref
Air break switches	Inspection	4.5	0.5	MMI 0001
Links and isolators	Inspection	4.5	0.5	

* To be carried out in conjunction with the OLI inspection program as per MMI0001 – 'Pole and line inspection and treatment procedures'.

9.3.2.4 Pole substations

Item	Activity		Baseline Interval (years)	Latitude	Ref
Special subs. 33kV/415V	Inspection		1	-	SMI 107
Earth grid	Inspection		10	0.5	EDI0005
Transformer*	Inspection		4.5	0.5	SMI 107/MMI0001
MDI	Predicted load in next three years is more than 95% maximum summer cyclic rating	MDI reading	1	-	SMI 116
	Predicted load in next three years is not more than 95% maximum summer cyclic rating		3	-	

*To be carried out in conjunction with OLI inspection program.

9.3.2.5 Ground and Indoor Substations

Item	Activity		Baseline Interval (years)	Latitude	Ref
Special subs. 33kV/415V	Inspection		1	-	SMI 106
Accommodation	Inspection		3	1	SMI 160
Earth grid	Inspection		3	1	EDI0005
Transformer	Inspection		3	1	SMI 159
MDI	Predicted load in next three years is more than 95% maximum summer cyclic rating	MDI reading	1	-	SMI 116
	Predicted load in next three years is not more than 95% maximum summer cyclic rating		3	-	
HV switchgear	Inspection		3	-	SMI 212
LV switchgear	Inspection		3	1	SMI 160

9.3.2.6 Padmount and Kiosk Substations

Item	Activity		Baseline Interval (years)	Latitude	Ref
Earth grid	Inspection		3	1	EDI0005
Transformer	Inspection		3	1	SMI 159
MDI	Predicted load in next three years is more than 95% maximum summer cyclic rating	MDI reading	1	-	SMI 116
	Predicted load in next three years is not more than 95% maximum summer cyclic rating		3	-	
HV switchgear	Inspection		3	-	SMI 212
LV switchgear	Inspection		3	1	SMI 160

9.3.2.7 Switching Station

Item	Activity	Baseline Interval (years)	Latitude	Ref
Earth grid for switching station with HOLEC MD4	Inspection	1	-	EDI0005
Earth grid for switching station with other switchgear	Inspection	3	1	
HV switchgear	Inspection	3	-	SMI 212

9.3.2.8 Ground mounted voltage regulator

Item	Activity	Baseline Interval (years)	Latitude	Ref
Accommodation	Inspection	1	-	SMI 106
Earth grid	Inspection	3	1	EDI0005
HV switchgear	Inspection	4.5	0.5	SMI 107

9.3.2.9 Pole mounted voltage regulator

Item	Activity	Baseline Interval (years)	Latitude	Ref
HV switchgear	Inspection	4.5	0.5	EDI0005
Transformer and tap changer	Inspection	1	-	SMI 107

9.3.2.10 HV recloser, sectionaliser and load break switches

Item	Activity	Baseline Interval (years)	Latitude	Ref
Recloser	Inspection	4.5	0.5	SMI 207/MMI0001
Load break switch	Inspection	4.5	0.5	SMI 207/MMI0001
Sectionaliser	Inspection	4.5	0.5	SMI 207/MMI0001

9.3.2.11 Streetlight columns and lv pillars

Item	Activity	Baseline Interval (years)	Latitude	Ref
Columns and pillars	Above and below ground external inspection	4.5	0.5	MMI0003
	Thermal external inspection*	4.5	0.5	MMI002
	Internal visual inspection of LV terminations	As required [#]	0.5	

[#] Internal visual inspection performed during follow up thermal scans, the installation of MEN bonds and column insulation kits, and, any other circumstance where column cover or pillar lid is removed.

* To be completed during winter months (June – August)

9.3.2.12 Portable Earths

Item	Activity	Baseline Interval (years)	Latitude	Ref
Portable earthing	Inspection	0.5	-	SMI 104

9.3.2.13 Surge diverter/lightning arrester

Item	Activity	Baseline Interval (years)	Latitude	Ref
Surge diverter/lightning arrester	Inspection	4.5	0.5	MMI0001

9.4 Risk-based Preventative Maintenance

Proactive activities to prevent functional failure from known failure modes (e.g. lubrication, component replacement). These activities maintain operability, reduce the probability of failure, and may improve asset performance or extend asset service life.

Maintenance is planned based on asset risk, which informs both time to maintenance and maintenance latitudes. Baseline intervals are provided for guidance only and are used in the MPS in the risk-assessment.

It is expected that some minor and major overhauls shall fall under this category.

Maintenance latitudes provide guidance for the creation of the NMIP.

9.4.1 Transmission Assets

9.4.1.1 Circuit Breaker Minor Overhauls

Refer to SMI 200 and SMI 140 for instructions associated with the below activities.

9.4.1.2 Bulk Oil – 11kV and 22kV

Brand / Type	Activity	Baseline Interval (years)	Latitude	Ref
All brands	Minor Overhaul	5.5	0.5	SMI 200

9.4.1.3 Bulk Oil – 33kV

Brand / Type	Activity	Baseline Interval (years)	Latitude	Ref
Westinghouse 345GCN*	Minor Overhaul	6	0.5	SMI 200
AEI LGIC44	Minor Overhaul	6	0.5	
Reyrolle L800	Minor Overhaul	Not applicable		
All Other Brands	Minor Overhaul	4.5	-	

* Westinghouse oil circuit breakers:

a) Breakers that perform capacitor-switching operations are to be maintained six monthly or at 300 capacitor switching operations, whichever occurs first.

b) The dielectric dissipation factor of circuit breaker bushings to be tested as set out in Annexure 2 in SMI 200.

9.4.1.4 Min Oil – 11kV and 22kV

Brand / Type	Activity	Baseline Interval (years)	Latitude	Ref
All brands	Minor Overhaul	5.5	-	SMI 200

9.4.1.5 Min Oil – 33kV

Brand / Type	Activity	Baseline Interval (years)	Latitude	Ref
Magrini Galileo – MG Indoor & MGE Outdoor	Minor Overhaul	6	0.5	SMI 200
All Other Brands	Minor Overhaul	4.5	-	

9.4.1.6 Min Oil – 66kV

Brand / Type	Activity	Baseline Interval (years)	latitude	Ref
ASEA HLC	Minor Overhaul	Not applicable	-	SMI 200
Sprecher & Schuh HPF	Minor Overhaul	6	-	
All Other Brands	Minor Overhaul	4.5	-	

9.4.1.7 Min Oil – 132kV

Brand / Type	Activity	Baseline Interval (years)	Latitude	Ref
ASEA HLR	Minor Overhaul	6	0.5	SMI 200
All Other Brands	Minor Overhaul	4.5	-	

9.4.1.8 SF6 – 11kV and 22kV

Brand / Type	Activity	Baseline Interval (years)	Latitude	Ref
All brands	Minor Overhaul	12	0.5	SMI 200

9.4.1.9 SF6 – 33kV

Brand / Type	Activity	Baseline Interval (years)	Latitude	Ref
Magrini Galileo / Merlin Gerin 36GI-E25	Minor Overhaul	12	0.5	SMI 200
ABB EDF	Minor Overhaul	12	0.5	
ABB PASS M00	Minor Overhaul	12	0.5	
All Other Brands	Minor Overhaul	4.5	-	

9.4.1.10 SF6 – 66kV

Brand / Type	Activity	Baseline Interval (years)	Latitude	Ref
ABB EDF	Minor Overhaul	12	0.5	SMI 200
ABB PASS M00	Minor Overhaul	12	0.5	
Areva / Alstom DT1	Minor Overhaul	12	0.5	
GEC / Sprecher & Schuh HGF	Minor Overhaul	12	0.5	
Siemens 3AP1DT	Minor Overhaul	12	0.5	
All Other Brands	Minor Overhaul	4.5	-	

9.4.1.11 SF6 – 132kV

Brand / Type	Activity	Baseline Interval (years)	Latitude	Ref
ABB PASS M00	Minor Overhaul	12	0.5	SMI 200
Areva DT1	Minor Overhaul	12	0.5	
GEC / Sprecher & Schuh HGF	Minor Overhaul	12	0.5	
Siemens 3AP1DT / 3AP1FG	Minor Overhaul	12	0.5	
Hyosung HCSP-144B	Minor Overhaul	12	0.5	
All Other Brands	Minor Overhaul	4.5	-	

9.4.1.12 Vacuum – 11kV and 22kV

Brand / Type	Activity	Baseline Interval (years)	Latitude	Ref
All brands	Minor Overhaul	12	0.5	SMI 200

9.4.1.13 Vacuum – 33kV

Brand / Type	Activity	Baseline Interval (years)	Latitude	Ref
All brands	Minor Overhaul	12	0.5	SMI 200

9.4.1.14 Switchboards – AIS, hybrid and low pressure GIS – 33kV

Brand	Item	Activity	Baseline Interval (years)	Latitude	Ref
Merlin Gerin	Overall installation	Clean and vacuum	1	0.25	SMI 210 and manual
	Circuit breaker	Minor overhaul	12	0.5	
Alstom Areva	WSA circuit breaker	Minor overhaul	12	0.5	
Tamco GV3	Circuit breaker				
	Disconnect/earth switch				

9.4.1.15 Switchboards – AIS, hybrid and low pressure GIS – 66kV

Brand	Item	Activity	Baseline Interval (years)	Latitude	Ref
ABB ELG/ENK	Circuit breaker	Minor overhaul	12	0.5	SMI 210 and manual
	Disconnecting switch	Minor overhaul	12	-	

9.4.1.16 Switchboards – High pressure GIS – 33kV

Brand	Item	Activity	Baseline Interval (years)	Latitude	Ref
All brands	Circuit breaker	Minor overhaul	12	0.5	SMI 210 and manual
	Disconnecter/Earth switch				

9.4.1.17 HV Switchgear

Item	Voltage kV	Brand	Type	Activity	Baseline Interval (years)	Latitude	Ref
Switch and switch fuse unit epoxy encapsulated	11	Holec MD4	Indoor	PD(TEV) test and thermovision	1	0.25	SMI 212
				Major overhaul	6	0.5	
	11	ABB RGB 12	Indoor	PD(TEV) test and thermovision	1	0.25	
				Major overhaul	6	0.5	
Switch and switch fuse combination sheet steel enclosed	11	Holec SVS	Indoor	PD(TEV) test and thermovision	1	0.25	
				Major overhaul	6	0.5	
	11	ABB Safelink	Indoor	PD(TEV) test and thermovision	1	0.25	
				Major overhaul	12	1	
	11	Melin Gerin SM6	Indoor	PD(TEV) test and thermovision	1	0.25	
				Major overhaul	12	1	
	11	Areva/Schneider Fluokit M24	Indoor	PD(TEV) test and thermovision	1	0.25	
				Major overhaul	12	1	
	11	Other (SF6 or vacuum interruption)	Indoor	PD(TEV) test and thermovision	1	0.25	
				Major overhaul	12	1	

Item	Voltage kV	Brand	Type	Activity	Baseline Interval (years)	Latitude	Ref
Switch and switch fuse combination oil	11	-	Indoor/ outdoor	PD(TEV) test and thermovision	1	0.25	
				Major overhaul	6	1	
Fault throwers	132	-	Outdoor	Minor	4.5		*
				Major overhaul	9		
Links	11 to 33	-	Indoor/ outdoor	Major overhaul	12^	0.5	SMI 204
Air break switches	11 to 132	-	Indoor/ outdoor	Major overhaul	12^	0.5	
Isolators#	11 to 132	-	Indoor/ outdoor	Major overhaul	12^	0.5	
Switch earthing#	11/22	-	Indoor	Major overhaul	9	0.5	*
	33 to 132	-	Indoor	Major overhaul	12^	0.5	SMI 204
	11 to 132	-	Indoor	Major overhaul	12^	0.5	

*Maintenance references same as similar switchgear

^Recommended period for major overhaul, however the period can be reduced or extended as required to coincide with work on other equipment.

Excludes isolators and earthing switches associated with 36-145kV air and gas insulated switchgear.

9.4.1.18 Preventative Maintenance – Substation Transformers (All types) & Reactors

Preventative maintenance in the form of a **Major Overhaul** shall be conducted...

Item	Voltage	Type	Activity	Interval (years)	Latitude	Ref
Auxiliary Transformer	11kV	Non-padmout	Major overhaul	6	0.5	SMI 152
Auto Transformer	11kV – 33kV	-	Major overhaul	6	-	SMI 155
Regulating Transformer	11kV	Outdoor	Major overhaul	6	-	SMI 155/SMI 151
Voltage Transformer	11kV – 22kV	Indoor	Major overhaul	9	0.5	SMI 153
	33kV – 132kV	Indoor (oil only)	Major overhaul	12	0.5	
	11kV – 132kV	Outdoor	Major overhaul	12	0.5	

Item	Voltage	Type	Activity	Interval (years)	Latitude	Ref
Capacitor Voltage Transformer	11kV – 132kV	-	Major overhaul	6	0.5	SMI 153
Current Transformer	11kV – 132kV	-	Major overhaul	6	0.5	SMI 158
Oil Reactor	33kV	Outdoor	Major overhaul	6	-	SMI 154
Air Reactor	33kV	Outdoor	Major overhaul	6	-	SMI 154
Power Transformer	33kV – 132kV	-	Major overhaul	7	1	SMI 155

9.4.1.19 Preventative Maintenance – Miscellaneous Substation Equipment

Item	Voltage	Type	Activity	Baseline Interval (years)	Ref
Bushings/Wall Bushings	11kV – 132kV	-	Minor Overhaul	5*	SMI 108
Insulators	11kV – 132kV	-	Minor Overhaul	5*	
Surge Arrestors	11kV – 132kV	-	Minor Overhaul	^Please refer to notes below	
Control Panels	-	-	Minor Overhaul	5	
Lightning Masts	-	Outdoor	Minor Overhaul	5	
Capacitors	11kV	ABB ABBACUS	Minor Overhaul	1	SMI 209
			Major Overhaul	9*	
	11kV	AmpControl 11kV	Minor Overhaul	1	
			Major Overhaul	9*	
	11kV – 132kV	All Other Brands	Major Overhaul	9*	
Compressor	-	-	Minor Overhaul	9*	SMI 200
In-ground oil/water separator	-	-	Minor overhaul	1 year	SMI 115
	-	-	Major overhaul	3 year	
Coalescing plate oil/water separator	-	-	Major overhaul	1	

* Recommended period for minor/major overhaul, however period can be extended as required to coincide with work on other equipment.

^ Maintenance shall align with major equipment in the bay and shall only be carried out if extended isolation for surge arrestor maintenance does not result in extended outage of network.

9.4.1.20 Preventative Maintenance – SCADA and Voltage Regulating Equipment

Item	Activity	Baseline Interval (years)	Ref.
Voltage Regulating Equipment	Minor Overhaul	4*	SMI 110
SCADA	Minor Overhaul	4	SMI 109

* Where V/R is incorporated in the SCADA software, the minor overhaul is to be done as part of the SCADA routine maintenance.

9.4.1.21 Preventative Maintenance – Earthing system and equipment earthing system

Item	Routine maintenance	Baseline Interval (years)	Ref.
Earth Grid	Test	12	SMI 104
Portable Earthing Equipment	Test	3	
Indoor CB Earthing Trucks	Test and maintenance	3	SMI 200

9.4.1.22 Preventative Maintenance - AFIC

Item	Activity	Baseline Interval (years)	Ref.
Contactors	Minor overhaul	2	SMI 205
Controller	Minor overhaul	2	
Supervision unit	Minor overhaul	2	
	Minor overhaul	2	
Coupling equipment	Test	2	
	Major overhaul	4.5	
Motor generator	Major overhaul	4.5	

9.4.1.23 Preventative Maintenance - Accommodation

Item	Routine maintenance	Baseline Interval (Years)	Ref.
Building/Yard	Minor overhaul	1	SMI 106
Lawns and gardens (October to March)	Minor overhaul	Annexure 2	
Lawns and gardens (April to September)	Minor overhaul	Annexure 2	
Back flow prevention device	Minor Overhaul	1 year	
Lighting tower winding mechanism	Minor Overhaul	1 year	
Building Interior Hygiene	Minor Overhaul	12 weeks	

9.4.2 Distribution Assets

9.4.2.1 Air break switches, underslung links and isolators

Item		Activity	Baseline Interval (years)	Latitude	Ref
Air break switches (Essantee HS641, Taplin D571, AK Power A24)	Within 5km of the coast	Major overhaul	4	-	SMI 204
	Not within 5km of the coast	Major overhaul	8	-	

9.4.2.2 Ground and Indoor Substation

Item		Activity	Baseline Interval (years)	Latitude	Ref
Lawns/gardens		Minor overhaul (Dec-Feb and Sept-Nov)	4 weeks#	-	MMI 0012
		Minor overhaul (March - May and Aug)	6 weeks#		
		Minor overhaul (June, July)	8 weeks#		
HV Switchgear	Epoxy resin-cast and oil types	Partial discharge test	1	-	SMI 212
		Major overhaul	10	-	
		Operational check (all CBs)	5	-	
	SF6 insulated switchgear	Partial discharge test	1	-	
		Operational check (all CBs)	5		
LV Switchgear		Partial discharge test	3	1	SMI 160
Batteries		Minor overhaul (lead acid and nickel-cadmium)	0.25	-	SMI 102
		Minor overhaul (sealed lead acid)	0.5		
		Quick discharge test (sealed lead acid, lead acid and nickel-cadmium)	1		
		Capacity test (sealed lead acid, lead acid and nickel-cadmium)	5		
SCADA		Minor overhaul	10	-	SMI 109

9.4.2.3 Padmount and kiosk Substations

Item		Activity	Baseline Interval (years)	Latitude	Ref
HV Switchgear	Epoxy resin-cast and oil types)	Partial discharge test	3	-	SMI 212
		Major overhaul	10	-	
		Operational check (all CBs)	5	-	
	SF6 insulated switchgear	Partial discharge test	3	-	
		Operational check (all CBs)	5		
LV Switchgear		Partial discharge test	3	1	SMI 160

9.4.2.4 Switching Stations

Item		Activity	Baseline Interval (years)	Latitude	Ref
HV Switchgear	Epoxy resin-cast and oil types)	Partial discharge test	1	-	SMI 212
		Major overhaul	5	-	
		Operational check (all CBs)	5	-	
	SF6 insulated switchgear	Partial discharge test	3	-	
		Operational check (all CBs)	5		
Batteries		Maintain as applicable in SMI 102 for selected sites	3	1	SMI 102

9.4.2.5 Voltage Regulators – Pole Mounted

Item	Activity	Baseline Interval (years)	Latitude	Ref
Voltage control regulating equipment	Minor overhaul	2	-	SMI 110
SCADA	Minor overhaul	10	-	SMI 109

9.4.2.6 Earth Grid

Item	Category	Activity	Baseline Interval (years)	Latitude	Ref
Earth grid	Pole substation		10	-	EDI 0005

Item	Category	Activity	Baseline Interval (years)	Latitude	Ref
	Ground and Indoor substation	Earth resistance test (common or separate)			
	Padmount and kiosk substation				
	Switching station				
	Ground mounted voltage regulator				
	Recloser				
	Load break switch				
	Sectionalizer				
	Pole substation	Earth resistance test (SWER)	6	-	

9.5 Trigger Based Maintenance

Planned but reactive maintenance initiated upon meeting target thresholds. Thresholds can be condition based or condition implied use-based. Thresholds can be representative of condition degradation, performance degradation, or operation metrics.

Latitudes provided govern the flexibility in scheduling arrangements, being considerate of rescheduling needs.

9.5.1 Transmission Assets

9.5.1.1 Circuit Breaker Major Overhauls

Condition based maintenance in the form of a **Major Overhaul** shall be conducted as per below time and performance-based conditions.

9.5.1.2 Bulk Oil – 11kV and 22kV

Brand / Type	Baseline Interval (years)	Fault Cycles	Op Cycles	Ref
Westinghouse B18	11	5	-	SMI 200
English Electric / GEC OLX	11	7	-	
Reyrolle LMT / LMI	11	7	-	
Hawker Siddeley	11	4	-	
All Other Brands	11	6	-	

9.5.1.3 Bulk Oil – 33kV

Brand / Type	Baseline Interval (years)	Fault Cycles	Op Cycles	Ref
Westinghouse 345GCN	12	6	500	SMI 200
AEI LGIC44	12	6	500	
Reyrolle L800	9	6	500	
All Other Brands	9	6	500	

9.5.1.4 Min Oil – 11kV and 22kV

Brand / Type	Baseline Interval (years)	Fault Cycles	Op Cycles	Ref
EIB	9	4	-	SMI 200
All Other Brands	9	7	-	

9.5.1.5 Min Oil – 33kV

Brand / Type	Baseline Interval (years)	Fault Cycles	Op Cycles	Ref
Magrini Galileo MG Indoor & MGE Outdoor	12	7	500	SMI 200
All Other Brands	9	7	500	

9.5.1.6 Min Oil – 66kV

Brand / Type	Baseline Interval (years)	Fault Cycles	Op Cycles	Ref
ASEA HLC	4	7	500	SMI 200
Sprecher & Schuh HPF	12	7	500	
All Other Brands	9	7	500	

9.5.1.7 Min Oil – 132kV

Brand / Type	Baseline Interval (years)	Fault Cycles	Op Cycles	Ref
ASEA HLR	12	7	500	SMI 200
ASEA HLD145/1200A	9	7	500	

Brand / Type	Baseline Interval (years)	Fault Cycles	Op Cycles	Ref
HPL13L6352B HPL13L6352C				
All Other Brands	9	7	800	

9.5.1.8 SF6 – 11kV and 22kV

Condition Based Maintenance is not applicable.

9.5.1.9 SF6 – 33kV

Brand / Type	Baseline Interval (years)	Fault Cycles	Op Cycles	Ref
Magrini Galileo / Merlin Gerin 36GI-E25	-	Annexure 1	2,000	SMI 200
ABB EDF	-	Annexure 1	10,000	
ABB PASS M00	-	Annexure 1	3,000	
All Other Brands	9	100	5,000	

9.5.1.10 SF6 – 66kV

Brand / Type	Baseline Interval (years)	Fault Cycles	Op Cycles	Ref
ABB EDF	-	Annexure 1	10,000	SMI 200
ABB PASS M00	-	Annexure 1	3,000	
Areva / Alstom DT1	-	Annexure 1	2,000	
GEC / Sprecher & Schuh HGF	-	Annexure 1	2,500	
Siemens 3AP1DT	-	Annexure 1	6,000	
All Other Brands	9	100	5,000	

9.5.1.11 SF6 – 132kV

Brand / Type	Baseline Interval	Fault Cycles	Op Cycles	Ref
ASEA / Brown Boveri (HPL series, ELF, etc.)	9	100	5,000	SMI 200
ABB PASS M00	-	Annexure 1	3,000	
Areva DT1	9	Annexure 1	2,000	
GEC / Sprecher & Schuh HGF	9	Annexure 1	2,500	
Siemens 3AP1DT / 3AP1FG	9	Annexure 1	6,000	
Hyosung HCSP-144B	-	Annexure 1	2,000	
All Other Brands	9	25	2,500	

9.5.1.12 Vacuum – 11kV and 22kV

Brand / Type	Baseline Interval	Fault Cycles	Op Cycles	Ref
GEC SBV	-	Annexure 1	-	SMI 200
All Other Brands	-	Annexure 1	-	

9.5.1.13 Vacuum – 33kV

Brand / Type	Baseline Interval	Fault Cycles	Op Cycles	Ref
Alstom / Areva / GEC OX36	-	-	5,000	SMI 200
Hawker Siddeley Horizon	-	Annexure 1	10,000	
All Other Brands	-	-	10,000	

9.5.1.14 Switchboards – AIS, hybrid, and low pressure GIS – 36kV

Brand / Type	Item	Activity	Baseline interval (years)	Fault cycles	Op Cycles	Ref
Merlin Gerin	Circuit breaker	Major overhaul		Annexure 1	10000	SMI 210 and manual
Alstom/Areva WS	Circuit breaker	Minor Overhaul	12	-	10,000	
		Major overhaul	-	Annexure 1		
	Disconnecter/earth switch	Minor overhaul	-	-	1000	
		Major overhaul	-	-	2000	
Tamco GV30	Circuit breaker	Minor overhaul	12	-	2000	
		Major* overhaul	-	Annexure 1	10000	
	Disconnecter	Major overhaul	-	-	2000	

*Major overhaul shall be also be undertaken whenever wide gap reduces to 1mm

9.5.1.15 Switchboards – AIS, hybrid, and low pressure GIS – 72kV

Brand / Type	Item	Activity	Fault cycles	Op Cycles	Ref
ABB ELG/ENK	Circuit breaker	Major overhaul	Annexure 1	1500	SMI 210 and manual
	Disconnecting switch		-	2500	

9.5.1.16 Switchboards – High pressure GIS

Brand / Type	Item	Activity	Baseline interval (years)	Fault cycles	Op Cycles	Ref
ABB	Circuit breaker	Major overhaul	-	Annexure 1	5000	SMI 210 and manual
	Disconnecting switch		-		5000	
	Earth switch with short circuit making capacity		-	2	2000	
Areva	Circuit breaker	Major overhaul	-	Annexure 1	2500	
	Disconnecting switch		-		2000	
	Earth switch with short circuit making capacity		-	1	2000	
Hyosung	Circuit breaker	Major overhaul	-	Annexure 1	2000	
	Disconnecting switch		-		2000	
	Earth switch with short circuit making capacity		-	2	2000	
Hyundai	Circuit breaker	Major overhaul	-	Annexure 1	2000	
	Disconnecting switch		-		2000	
	Earth switch with short circuit making capacity		-	2	2000	

9.5.1.17 Tap changers

Brand	Type	Activity	Baseline interval (years)	Op cycles	Ref
Reinhausen	B, BC and C	Major overhaul	7	25000	SMI 151
		Replace energy accumulator spring (in conjunction with major overhaul)		50000	
	BC and C	Not required		-	
	D	Major overhaul	7	50000	
	F	Major overhaul	7	35000	
	M	Major overhaul	7	80000	
	V	Major overhaul	7	70000	
ACEC	-	Major overhaul	7	20000	
Associated Tap Changers Ltd	All	Major overhaul	7	60000*	
Ferranti	-	Major overhaul	7	20000	
English Electric	-	Major overhaul	7	30000	
ABB	All types	Major overhaul	7	100000	
Fuller	F317 and F315	Major overhaul	7	50000	
All other brands	-	Major overhaul	7	60000*	

Number of operations can be extended or reduced to coincide with manufacturer's recommendations for a specific type.

9.5.1.18 Accommodation

Item	Activity	Baseline Interval (years)	Latitude	Ref
Coalescing plate oil/water separator	Minor overhaul	As required or maximum of six (6) month interval	-	SMI 115
Gross pollutant traps / stormwater drains / on-site detention systems	Minor overhaul	As required	-	SMI 106

9.5.2 Distribution Assets

9.5.2.1 Pole Substations

Item	Activity	Baseline Interval (years)	Latitude	Ref
Transformer	Workshop refurbishment	As required	-	SMI 159

9.5.2.2 Ground and Indoor Substations

Item	Activity	Baseline Interval (years)	Latitude	Ref
Transformer	Workshop refurbishment/rebuild	As required	-	SMI 159
Batteries	Major overhaul (dry types)	Replace every 3 years	-	SMI 110
SCADA	Major overhaul (fault indicator)	Replace every 15 years	-	SMI 109

9.5.2.3 Padmount and Kiosk Substation

Item	Activity	Baseline Interval (years)	Latitude	Ref
Transformer	Workshop refurbishment	As required	-	SMI 159

9.5.2.4 Voltage Regulator (VR)

Item	Activity	Baseline Interval (years)	Latitude	Ref
Ground Mounted VR				
Transformer and tap changer	Work refurbishment	As required	-	SMI 159
Pole Mounted VR				
Transformer and tap changer	Major overhaul VR-32 type)	Condition based [^]	-	SMI 155
	Major Overhaul (GEC type	Replace ^{**}		

^{**} Replace in accordance with refurbishment program.

[^] Voltage regulator major overhaul must be scheduled in accordance with the table below: For CL-6 and CL-7 controllers with Quik Drive, the in-built feature 'duty cycle monitor' (DCM) provides the reading of % of contact life. Major overhaul is to be scheduled when the readings are $\geq 75\%$ of contact life. This will allow sufficient time to plan and perform major overhaul before contact reaches end of useful life.

For CL-5 controllers and CL-6 and CL-7 controllers without Quik Drive, the maintenance is to be scheduled based on number of operations and current rating, refer to the table on page 3 for details

Controller type	CL-5 ^{^^}		CL-6 & CL-7 ^{^^}		CL-6 & CL-7
Drive type	Any		Drive other than Quik Drive type		Quik Drive type
Load current as % of rating	>50%	$\leq 50\%$	>50%	$\leq 50\%$	Any
Maintenance interval	When operations count is $\geq 100,000$ ops	When operations count is $\geq 200,000$ ops	When operations count is $\geq 100,000$ ops	When operations count is $\geq 200,000$ ops	When DCM reading is $\geq 75\%$

9.6 Reactive (After Failure) Maintenance

Reactive maintenance shall be undertaken following a functional or conditional failure that results in the asset being unable to perform its intended function or meet defined performance requirements.

Reactive maintenance is unplanned in nature and is triggered in response to asset failure events (e.g., slow CB operation, stuck operating mechanism, stiff isolator etc.)

Where practicable, immediate corrective actions shall be implemented to restore the asset to service in a safe and controlled manner. This may include temporary or interim maintenance measures.

Following restoration of service, the major overhaul shall be planned within 24 hours and added to the asset management dashboard. Works shall be scheduled and completed within 3 months of the failure.

Completion of the major overhaul shall reset the baseline maintenance interval for the corresponding overhaul level.

All information about the failure shall be recorded via a notification, including the failure mode, scope of work, overhaul classification, reset of maintenance intervals, and the immediate corrective actions.

10 Authorities and Responsibilities

General Manager Future Grid & Asset Management has the authority and responsibility for approving this instruction.

Head of Asset Management & Digital has the authority and responsibility for:

- Reviewing this standard and making recommendations to the General Manager Future Grid & Asset Management for approval.
- Approving changes to risk-models and MPS.

Manager, Asset Integrity & Maintenance has the responsibility for:

- Clarifying all the technical aspects of this Standard with stakeholders.
- Ensuring that the content of this instruction is kept up to date.
- Governing changes and modifications to the risk-models and MPS and making recommendation to the Head of Asset Management and Digital.
- Interpreting test results, condition and risk models associated with the activities documented in this instruction.

Manager, Asset Analytics has the responsibility for:

- Lead the development and application of asset analytics to support data-driven asset lifecycle decisions across maintenance, investment and regulatory outcomes
- Define and embed consistent asset risk, health and performance modelling approaches, enabling improved prioritisation and optimisation of cost, risk and performance
- Provide critical insights that strengthen decision-making, transparency and confidence across asset strategy, maintenance and investment planning

Head of Systems Operations has the authority and responsibility for:

- Ensuring appropriate data capture from ADMS to feed into CBM triggers
- Ensuring accuracy of the data captured from ADMS
- Arranging execution of maintenance activities assign to their work centres.

Head of Field Operations has the authority and responsibility for:

- Ensuring appropriate data capture from field operations to feed into CBM triggers
- Ensuring accuracy of the data captured from field operation
- Arranging development of work instructions for works execution

Distribution and Transmission Managers have the responsibility for:

- Confirming that the Endeavour Energy employees performing the work have appropriate qualifications.
- Ensuring that works meet the requirements of this, and the references, standards and instructions.
- Ensuring works in executed in accordance with local and statutory requirements.
- Maintaining a high level of public safety during all works.

- Confirming that employees and contractors work in accordance with the Endeavour Energy Authorisation Manual.
- Provide analysis of test results to identify potential problems and take appropriate action.

All Endeavour Energy employees and/or contractors are responsible for:

- Working in accordance with local and statutory requirements.
- Recording maintenance and test data in Endeavour Energy's electronic databases.
- Maintaining a high level of public safety.
- Working in accordance with Endeavour Energy's Electrical Safety Rules.

Annexure 1 – Fault Cycles for Vacuum/SF6 CBs

The fault cycle is dependent on individual characteristics of the circuit breaker type and the fault current that is interrupted. The fault cycle for each of these circuit breakers has been (conservatively) determined by using the maximum fault level at the substation where the type of circuit breaker is located. The table below provides the formula that can be used to calculate the fault cycle for each of these circuit breaker types.

Item	Brand	Type	Fault Cycle (FC) [I_f = max fault current at substation]	Reference
11kV SF6	ABB	GK1M	$FC = 8561/(I_f)^{2.1}$	SMI200
	ABB	HB_12	$FC = 3179/(I_f)^{2.2}$	SMI200
	ABB	HB_25	$FC = 2226/(I_f)^{1.7}$	SMI200
	Schneider/Merlin Gerin	SM6	$FC = 15625/(I_f)^2$	SMI200
	Yorkshire	YSF6	$FC = 2897/(I_f)^{1.7}$	SMI200
11kV Vacuum	ABB/Calor Emag	VD4	$FC = 49281/(I_f)^{2.3}$	SMI200
	GEC	SBV	$FC = 13852/(I_f)^{1.6}$	SMI200
	Reyrolle	LMVP	$FC = 14425/(I_f)^{1.6}$	SMI200
	Schneider	HWX2	$FC = 42804/(I_f)^{2.1}$	SMI200
	Siemens	3AF	$FC = 60422/(I_f)^{3.1}$	SMI200
	Siemens	3AH	$FC = 18436/(I_f)^{2.7}$	SMI200
	Tamco	VW2	$FC = 15414/(I_f)^{1.9}$	SMI200
36kV Vacuum	Hawker Siddeley	Horizon	$FC = 100681/(I_f)^2$	SMI200
	Areva	WSA	$FC = 31831/(I_f)^{1.7}$	SMI210
	Tamco	GV3	$FC = 52879/(I_f)^{1.8}$	SMI210
	Sumitomo / Meidensha	NVBOA	$FC = 47709/(I_f)^{2.3}$	SMI200
36kV SF6	Merlin Gerin	36GI-E25	$FC = 4500/(I_f)^{1.7}$	SMI200
	Merlin Gerin	FG4/F400	$FC = 84938/(I_f)^{2.5}$	SMI210
	ABB	EDF	$FC = 14731/(I_f)^{2.2}$	SMI200
	ABB	PASS M00	$FC = 4760/(I_f)^{2.0}$	SMI200
72.5kV	ABB	EDF	$FC = 14731/(I_f)^{2.2}$	SMI200

SF6	ABB	ELK	$FC = 31006/(I_r)^{2.0}$	SMI210
	ABB	PASS M00	$FC = 4760/(I_r)^{2.0}$	SMI200
	ABB	ENK	$FC = 17499/(I_r)^{2.1}$	SMI210
	Areva / Alstom	DT1	$FC = 18526/(I_r)^2$	SMI200
	Hyosung	HLSP	$FC = 11521/(I_r)^{1.9}$	SMI210
	Hyundai	145-SP-1	$FC = 4581/(I_r)^{1.7}$	SMI210
	GEC / Sprecher & Schuh	HGF	$FC = 19739/(I_r)^2$	SMI200
	Siemens	3AP1DT	$FC = 117300/(I_r)^{2.5}$	SMI200
132kV SF6	GEC / Sprecher & Schuh	HGF	$FC = 19200/(I_r)^2$	SMI200
	Siemens	3AP1DT/FG	$FC = 107258/(I_r)^{2.5}$	SMI200
	Areva	F35	$FC = 16000/(I_r)^{1.7}$	SMI210
	Areva	DT1	$FC = 18526/(I_r)^2$	SMI200
	Hyosung	HCSP-144A	$FC = 11521/(I_r)^{1.9}$	SMI210
		HCSP-144B	$FC = 11521/(I_r)^{1.9}$	SMI200
	Hyundai	145-SP-1	$FC = 4581/(I_r)^{1.7}$	SMI210
	ABB	ELK	$FC = 31006/(I_r)^{2.0}$	SMI210
	ABB	PASS M00	$FC = 4760/(I_r)^{2.0}$	SMI200

Note: The fault cycle for a circuit breaker may be reviewed if the fault level for a substation significantly changes (for example, due to changes in network configuration). The Network Maintenance Manager may be consulted to obtain the fault cycle for new circuit breakers installed.

The fault cycle assigned to an after-fault maintenance MST shall be rounded to values as shown in the table below. This is to provide easier interpretation when running reports.

Calculated Fault cycle (FC)	Value for MST
1 to 200	Round down to closest 5
200 to 500	Round down to closest 10
500 to 1000	Round down to closest 50
> 1000	1000

As detailed in SMI 200, when the number of fault operations for (any pole/phase of) a circuit breaker has been reached, certain checks must be made prior to carrying out major maintenance. These checks (which may include reviewing the validity of recorded faults and taking dynamic resistance measurements) are necessary to determine if the circuit breaker actually requires major intrusive maintenance.

Annexure 2 – RACI

RACI	Head of Asset Management & Digital	Asset Risk & Performance Manager	Lead Engineer - Maintenance	Asset Analysis Engineer	Head of EP&O	Project Director - PS&B & Maintenance	Program Manager Maintenance & PS&B	Head of Field Ops	Distribution Transmission Manager	Schedule	Operational Improvement Manager	Operational Improvement Team	Field Tech	System Ops Team	Head of System Ops	Network Core & Manager	Senior System Operator	Reliability & Performance Manager	Grid Engineering Manager - Engineer	Head of Engineering Design	Engineering Design Engineer	Data Analytics & Insights	Safety	Technical Training
Portfolio Level																								
Review of Maintenance Standard in line with RCM approach, GAM0001	D	A	R			C	C							C	C									
Review maintenance work practices & provide safety/efficiency improvements	D										A	R	C									C	C	
Develop maintenance work practice training material & deliver training											A	R	C										R	
Review effectiveness of maintenance work practices	D	A	R			C	C		C		C			C	C									
Define & Maintain prioritisation approach	D	A	R			C	C							C	C									
Creation of Maintenance Tasks	D	A		R		I	I																	
Run digital works planner to arrive at a deliverable plan					D	A	R		C						C									
Determine & provide deliverable plan and ensure delivery of plan	D				A	R																		
Approve/Endorsement of deliverable plan	D				A	R																		
Deliver change management & training to Schedulers/TSOS	D				A	R		I	I	I					I									
Deliver preventative maintenance plan					D				A	R					A	R								
Carry out preventative maintenance according to standards and procedures									A															

Annexure 3 - High Level Maintenance Activity Categories

To ensure the risk-based maintenance strategy is balanced across regulatory obligations, enables proactive risk management, and supports efficient resource utilisation, Endeavour Energy applies the following maintenance activity categories:

Maintenance Type	Maintenance Activity Description	Planning Basis & Compliance
A1 Regulated Maintenance	Activities prescribed by legislation, regulation, or statutory obligation (e.g. WHS Regulations, fire system testing). Must be completed at the specified mandatory interval regardless of asset condition or assessed risk	Mandatory minimum interval set by the relevant regulator. Scheduling latitude may apply within the interval window. Non-compliance constitutes a regulatory and legal liability. MPS Governed — highest compliance priority.
A2 Programmed Inspections	Grouped activities that are investigative in nature with requirements assessed to ALARP principles, underpinned by FMECA and RCM methods. Intervals are mandatory minimum values, but scheduling latitude is provided.	Mandatory minimum interval. Scheduling latitude provided. Non-compliance carries high risk across multiple asset classes and risk pillars. Note: Programmed inspections are not part of MPS
A3 Risk-Based Inspections	Planned visual, thermographic, or functional checks to assess the state of equipment. Generally quick, low-cost activities. Inspection intervals are variable and guided by risk assessment with extended latitudes.	Variable intervals guided by risk. Extended scheduling latitudes apply. Prospective risk-based compliance measures. MPS Governed.
A4 Risk-Based Preventive Maintenance	Proactive activities to prevent functional failure from known failure modes. Reduces probability of failure and may improve asset performance or extend service life. Intervals are variable and risk-derived.	Variable intervals guided by risk. Extended scheduling latitudes apply. Prospective risk-based compliance measures. MPS Governed.
A5 Threshold / Trigger-Based Maintenance	Planned but reactive maintenance initiated upon meeting target thresholds. Thresholds can be condition based or condition implied use based. Thresholds can be representative of condition degradation, performance degradation, or operation metrics. Reduces probability of failure and may improve asset performance or extend asset service life.	Reactively planned upon threshold breach, with mandatory completion latitudes. Threshold criteria documented in relevant maintenance strategy. Non-compliance carries high risk associated with accelerated degradation. MPS Governed.

