



# WEM Procedure: GPS Compliance Tests and Generator Monitoring Plans

**Prepared by:** AEMO

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**Document ref:**

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**Version:** 2.0

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**Effective date:** 21 July 2023

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**Status:** FINAL

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**Date:** 18 July 2023

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## Version Release History

Version	Effective Date	Summary of Changes
1.0	01 February 2021	New WEM Procedure
2.0	21 July 2023	Updates relating to: <ul style="list-style-type: none"> <li>-Revision of terminology in accordance with Tranche 6 WEM Rules revisions</li> <li>- Clarifications of GMP for Existing Transmission Connected Generating Systems;</li> <li>- Clarification on testing requirements to demonstrate performance with a Registered Generator Performance Standard, including before an Interim Approval to Generate Notification and an Approval to Generate Notification is issued and after the Relevant Generator Modification;</li> <li>- Modifications of Appendix B to clarify its application before an Interim Approval to Generate Notification and an Approval to Generate Notification is issued and after a Relevant Generator Modification;</li> <li>- Modifications to Appendix C to clarify its application for Generator Monitoring Plans;</li> <li>- Modifications to Appendix D to maintain alignment with WEM Rules Appendix 12 and to define verification of compliance on the Technical Requirement level and linking it to specific examples of compliance verification provided in the Generator Monitoring Plan Template</li> </ul>

### IMPORTANT NOTICE

#### Explanatory Notes Disclaimer

Explanatory notes included in this document as shaded in-line text are provided for explanatory purposes only to assist with comprehension and readability. The information contained in these explanatory notes does not constitute legal or business advice and should not be relied on as a substitute for obtaining detailed advice about the *Electricity Industry Act 2004 (WA)*, the WEM Rules, or any other applicable laws, procedures or policies. AEMO has made reasonable efforts to ensure the quality of the information, but cannot guarantee its accuracy or completeness.

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#### WEM Procedure Inconsistencies Disclaimer

This WEM Procedure has been developed in accordance with the requirements under clauses 1.41.6, 3A.6.2 and 3A.9.1 and prevails to the extent of any inconsistency with other WEM Procedures.

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# 1. Introduction

## 1.1. Purpose and scope

- 1.1.1. This WEM Procedure: GPS Compliance Tests and Generator Monitoring Plans (Procedure) is made in accordance with AEMO's functions under clause 2.1A.2(h) of the Wholesale Electricity Market Rules (WEM Rules).
- 1.1.2. The *Electricity Industry Act 2004* (WA), the WEM Regulations and the WEM Rules prevail over this Procedure to the extent of any inconsistency.
- 1.1.3. In this Procedure, where obligations are conferred on a Rule Participant, that Rule Participant must comply with the relevant obligations in accordance with clause 2.9.7A, 2.9.7D or 2.9.8 of the WEM Rules, as applicable.
- 1.1.4. The purpose of this Procedure is to document:
- (a) the information required by AEMO to, and the method by which AEMO will, consider a proposed Generator Monitoring Plan submitted under clause 1.41.2 **[clause 1.41.6(a)]**; and
  - (b) the information required by AEMO to, and method by which AEMO will, consider and determine requests for an extension made under clause 1.41.3 **[clause 1.41.6(b)]**;
  - (c) the following requirements relating to the content of a Generator Monitoring Plan ("Generator Monitoring Plan Requirements"):
    - (i) how a Market Participant responsible for a Transmission Connected Generating System must monitor performance against the applicable Registered Generator Performance Standards including any testing and verification requirements **[clause 3A.6.2(a)(i)]**;
    - (ii) the record keeping obligations relating to monitoring compliance with Registered Generator Performance Standards **[clause 3A.6.2(a)(ii)]**; and
    - (iii) the information and data provision obligations a Market Participant responsible for a Transmission Connected Generating System must comply with when requested by AEMO, the Network Operator or the Economic Regulation Authority, including the form by which that information and data must be provided **[clause 3A.6.2(a)(iii)]**;
  - (d) the process a Market Participant responsible for a Transmission Connected Generating System must follow to submit a proposed Generator Monitoring Plan to AEMO **[clause 3A.6.2(aA)]**;
  - (e) the assessment and approval process to be followed by AEMO for a proposed Generator Monitoring Plan submitted by a Market Participant responsible for a Transmission Connected Generating System **[clause 3A.6.2(b)]**;
  - (f) the process by which a Market Participant responsible for a Transmission Connected Generating System must report any alleged non-compliance or suspected non-compliance with the applicable Registered Generator Performance Standards and the applicable Generator Monitoring Plan approved by AEMO **[clause 3A.6.2(c)]**;

- (g) the process by which a Market Participant responsible for a Transmission Connected Generating System must report that it has not met or complied with, or may not be able to meet or comply with an approved Rectification Plan in accordance with clause 3A.11.9 **[clause 3A.6.2(d)]**;
- (h) the process by which a Market Participant responsible for a Transmission Connected Generating System must submit proposed updates and amendments to a Generator Monitoring Plan approved by AEMO and the assessment process to be followed by AEMO for such updates and amendments **[clause 3A.6.2(e)]**; and
- (i) the testing requirements and how compliance with:
  - (i) Registered Generator Performance Standards will be verified, including tests required before an Interim Approval to Generate Notification and an Approval to Generate Notification is issued **[clause 3A.9.1(a)]**; and
  - (ii) a Generator Monitoring Plan is measured and verified **[clause 3A.9.1(b)]**.

1.1.5. Appendix A of this Procedure outlines the head of power clauses that this Procedure is made under, as well as other obligations in the WEM Rules covered by this Procedure.

## 1.2. Definitions

1.2.1. Terms defined in the *Electricity Industry Act 2004 (WA)*, the WEM Regulations and the WEM Rules (including terms defined in Appendix 12 of the WEM Rules where applicable) have the same meanings in this Procedure unless the context requires otherwise.

1.2.2. The following definitions apply in this Procedure unless the context requires otherwise.

**Table 1 Definitions**

Term	Definition
Disturbance Data	Data obtained as a result of analysis of performance during and following a Power System Disturbance under paragraph 3.6.3(b).
Existing Monitoring Plan	Has the meaning given in WEM Rules clause 1.41
Generator Monitoring Plan	A Generator Monitoring Plan Template that has been completed by a Market Participant and approved by AEMO.
Generator Performance Standards Test Procedure (GPS Test Procedure)	A GPS Test Procedure Template that has been completed by a Market Participant and approved by AEMO.
Hold Point	A verification point during Commissioning Testing of a Generating System with a pre-defined Active Power output level. Compliance must be demonstrated and verified at each pre-defined Active Power output level.
Market Participant Interface (MPI)	A web-based application that allows Market Participants to trade in the Wholesale Electricity Market, as well as access market related data.
Monitoring Data	Data obtained as a result of continuous in-service monitoring under paragraph 3.6.3(a).
Power System Disturbance	Power system deviating from normal operating conditions, as a result of one or more Contingency Events, to the extent that could threaten the stability or change the operation of the Transmission Connected Generating System.
Test Data	Data obtained as a result of periodic online and/or offline testing under paragraph 3.6.3(a).

## 1.3. Interpretation

- 1.3.1. The following principles of interpretation apply in this Procedure unless the context requires otherwise.
- (a) Clauses 1.3 to 1.5 of the WEM Rules apply in this Procedure.
  - (b) References to time are references to Australian Western Standard Time.
  - (c) Terms that are capitalised, but not defined in this Procedure, have the meaning given in the WEM Rules.
  - (d) A reference to the WEM Rules or WEM Procedures includes any associated forms required or contemplated by the WEM Rules or WEM Procedures.
  - (e) Words expressed in the singular include the plural and vice versa.
  - (f) A reference to a paragraph refers to a paragraph of this Procedure.
  - (g) A reference to an appendix refers to an appendix of this Procedure.
  - (h) A reference to a clause refers to a clause or section of the WEM Rules.
  - (i) References to WEM Rules in this Procedure in bold and square brackets **[Clause XXX]** are included for convenience only, and do not form part of this Procedure.
  - (j) Text located in boxes and headed as E[X] in this Procedure is included by way of explanation only and does not form part of this Procedure. The Procedure prevails to the extent of any inconsistency with the explanatory notes contained within it.
  - (k) The body of this Procedure prevails to the extent of any inconsistency with the figures, diagrams, appendices, schedules, annexures or attachments contained within this document.

## 1.4. Related documents

- 1.4.1. The documents in Table 2 are associated with this Procedure.

**Table 2 Related documents**

Reference	Title	Location
Template	Generator Monitoring Plan Template	<a href="#">WEM Website</a>
Template	Generator Performance Standards Test Procedure Template (GPS Test Procedure template)	<a href="#">WEM Website</a>
Technical Rules	Technical Rules	<a href="#">ERA Website</a>
WEM Procedure	WEM Procedure: Communications and Control Systems	<a href="#">WEM Website</a>
WEM Procedure	WEM Procedure: Generation System Model Submission and Maintenance	<a href="#">Western Power Website</a>
WEM Procedure	WEM Procedure: Generator Performance Standards for Existing Transmission Connected Generating System	<a href="#">Western Power Website</a>
WEM Rules	Wholesale Electricity Market Rules	<a href="#">Energy Policy WA Website</a>

## 1.5. Information Confidentiality

- 1.5.1. Where information that is required to be shared between a Market Participant and AEMO or a relevant Network Operator under this WEM Procedure is not otherwise assigned a confidentiality status under the WEM Rules, it is assigned the information confidentiality status of Rule Participant Network Restricted in accordance with clause 10.2.1.
- 1.5.2. Market Participant information that is required to be shared between AEMO and a relevant Network Operator under this WEM Procedure that is not otherwise assigned a confidentiality status under the WEM Rules, is assigned the information confidentiality status of Rule Participant Network Restricted in accordance with clause 10.2.1.

## 1.6. Communications and provision of information

- 1.6.1. All communication and provision of information by a Market Participant or Network Operator to AEMO under this Procedure must be conducted via email and sent to [WEM.GPS@aemo.com.au](mailto:WEM.GPS@aemo.com.au), unless otherwise specified in this Procedure.
- 1.6.2. All communication and provision of information by AEMO to a Market Participant or Network Operator under this Procedure will be conducted via email, unless otherwise specified in this Procedure.

# 2. GPS Test Procedure Requirements

## 2.1. Overview

- 2.1.1. A Market Participant must perform tests to demonstrate and verify compliance with the relevant Registered Generator Performance Standards on a Transmission Connected Generating System:
  - (a) where significant maintenance has been carried out, including, but not limited to, testing necessary to confirm compliance with a Registered Generator Performance Standard following a Potential Relevant Generator Modification that is not declared to be Relevant Generator Modification;
  - (b) following a Relevant Generator Modification;
  - (c) in order to receive an Interim Approval to Generate Notification or an Approval to Generate Notification;
  - (d) where testing is necessary following the identification of a non-compliance or a suspected non-compliance with a Registered Generator Performance Standard; and
  - (e) as part of an approved Rectification Plan.
- 2.1.2. Paragraphs 2.3 and 2.4 specify testing requirements, and associated verification and reporting requirements for demonstrating compliance with a Registered Generator Performance Standard in accordance with paragraph 2.1.1.

## 2.2. GPS Test Procedure Template

- 2.2.1. AEMO will publish and maintain a GPS Test Procedure Template on the WEM Website.



- 2.2.2. A Market Participant must prepare and submit a proposed Generator Performance Standards Test Procedure (GPS Test Procedure) using the GPS Test Procedure Template.

## 2.3. Testing requirements

- 2.3.1. The testing required under paragraph 2.1.1 must be conducted via testing procedures and methods approved by AEMO and must be included in an approved GPS Test Procedure.
- 2.3.2. The Market Participant must complete the GPS Test Procedure specified in paragraph 2.3.1 in accordance with:
- (a) the GPS Test Procedure Template developed and published by AEMO in accordance with paragraph 2.2;
  - (b) the tests outlined in Appendix B; and
  - (c) the principles described in paragraph 2.3.6.
- 2.3.3. Market Participants must allow for the tests in a GPS Test Procedure to be witnessed by AEMO and/or by the Network Operator, where required by AEMO or the Network Operator, as soon as practicable after receiving AEMO's approval of the GPS Test Procedure.
- 2.3.4. All testing described in paragraph 2.1.1 and documented under paragraph 2.3.1, must be included in and conducted via an approved Commissioning Test Plan (in accordance with clause 3.21A). To avoid doubt, an approved GPS Test Procedure does not replace the obligation to also obtain an approved Commissioning Test Plan.
- 2.3.5. For each of the tests outlined in Appendix B, AEMO may agree for alternative tests to be undertaken, where AEMO forms the view that, due to the conditions at the time of testing, undertaking the test in accordance with Appendix B will result in unacceptable risks to Power System Security and Power System Reliability.
- 2.3.6. In developing a GPS Test Procedure, a Market Participant must consider and incorporate:
- (a) all relevant parts of an applicable Registered Generator Performance Standard that are required be verified in the GPS Test Procedure;
  - (b) detailed steps of how an online and offline test will be performed under paragraph 3.6.3(a) (as relevant);
  - (c) a verification mechanism in accordance with the specific requirements in paragraph 2.4;
  - (d) clear objectives and expectations of the outcomes of any test;
  - (e) the quantities to be measured during a test, including the duration for which the quantities are measured, before, during and after a test, with clear links to the required outcomes of the test;
  - (f) where relevant, performance demonstration of backup control or protection systems and switching to/from backup control or protection systems;
  - (g) information about the locations within the relevant Transmission Connected Generating System where the test measurements will be made, including those measurements necessary to assist with post-test analysis;
  - (h) information about the appropriateness of the form of the Test Data to enable a compliance status to be established conclusively;

- (i) information about the appropriateness and degree of accuracy of the units of measurement of the testing, including those used in the recording devices and analysis of Test Data, such that they describe a measured quantity accurately and support a compliance status being established conclusively;
- (j) any other reasonable information that supports a conclusive assessment of the compliance status of the Transmission Connected Generating System with an applicable Registered Generator Performance Standard, where a quantity cannot be directly measured in the test environment;
- (k) information about the variation in technical performance of the Transmission Connected Generating System under power system operating conditions and ambient conditions, resulting in the requirement to repeat the tests multiple times under different conditions to conclusively establish the compliance status of an applicable Registered Generator Performance Standard;
- (l) information about the technical performance of the Transmission Connected Generating System in the most onerous power system operating conditions and ambient conditions that are applicable to the Transmission Connected Generating System;
- (m) all relevant test information that must be recorded to assist with post-test analysis, including the time and date, relevant power system conditions during the period, operating arrangement and configuration within the Transmission Connected Generating System, and ambient conditions at the start of, end of, and during a test;
- (n) information about the suitability of the test regime for validating modelled technical performance, where any parts of the modelled technical performance have been identified as requiring validation;
- (o) appropriateness of recording devices so that application of the recording devices does not lead to inaccurate or inconclusive results. Information and evidence in relation to each of the recording devices must be provided, including:
  - (i) the type of equipment, the make and model;
  - (ii) valid calibration or relevant test certificates;
  - (iii) the accuracy and resolution of the measurements;
  - (iv) measurement location for the recording device;
  - (v) whether the recording device is installed for continuous monitoring and/or triggering (event-based and/or manual triggering); and
  - (vi) confirmation that the measurement device meets the relevant requirements for high-resolution time synchronised data described in the WEM Procedure: Communications and Control Systems; and
- (p) confirmation that the relevant Registered Generator Performance Standards for each Generating Unit and protection and control system within the Generating System will be verified, or information to support justification to and approval by AEMO for any lack of verification;
- (q) information about any potential risks associated with the GPS Test Procedure, which may include, but is not limited to, those related to:
  - (i) Power System Security and Power System Reliability;

- (ii) health and safety of personnel on-site;
    - (iii) health and safety of the public; and
    - (iv) damage to equipment; and
  - (r) information about any mitigation actions taken for each of the potential risks identified in paragraph 2.3.6(q).
- 2.3.7. Any information provided under paragraph 2.3.6 must be sufficiently detailed as to allow AEMO to assess the suitability of a proposed GPS Test Procedure.
- 2.3.8. AEMO may request further information to be provided by email or an alternative method specified by AEMO, where it reasonably considers the details provided are insufficient.
- 2.3.9. A Market Participant must provide information requested by AEMO under paragraph 2.3.8 by the time and date specified in AEMO's request, unless otherwise agreed.
- 2.3.10. Where a proposed test is referenced from another document (such as Australian Standards or other international standards), the relevant parts of the external document must be quoted in the GPS Test Procedure and details must be specified in relation to the exact characteristics of the Transmission Connected Generating System.
- 2.3.11. Market Participants may propose any suitable testing methods and any number of tests, as necessary to verify compliance against any part of the applicable Registered Generator Performance Standards. However, these tests must incorporate all relevant principles and requirements described in paragraph 2.3, and the mandatory tests described in Appendix B.

## 2.4. Verification of GPS Compliance Test Data

- 2.4.1. Market Participants must formulate and document mechanisms to verify their compliance with Registered Generator Performance Standards within a GPS Test Procedure.
- 2.4.2. Market Participants must ensure that the tests in a GPS Test Procedure are developed and executed in order to demonstrate that the performance of a Transmission Connected Generating System is equal to or better than the performance requirements in its associated Registered Generator Performance Standard.
- 2.4.3. After the execution of tests described in a GPS Test Procedure, a Market Participant must submit its Test Data to AEMO, as well as any relevant performance analysis specified in the GPS Test Procedure.
- 2.4.4. AEMO may require Test Data to be provided at different stages of the execution of tests required in accordance with Hold Points described in the GPS Test Procedure in order to review performance of the Transmission Connected Generating System and provide approval to proceed to further stages.
- 2.4.5. The Market Participant must provide data specified in paragraph 2.4.3 and 2.4.4 to AEMO within the timeframe specified in the GPS Test Procedure, or as otherwise agreed by AEMO.
- 2.4.6. AEMO will review data provided under paragraph 2.4.5 and as soon as practicable provide written approval to the Market Participant to proceed to the further stages of the GPS Test Procedure.

- 2.4.7. A Market Participant must provide the information specified in paragraph 2.4.3 and 2.4.4 to AEMO within a reasonable timeframe as specified in the GPS Test Procedure.
- 2.4.8. AEMO may provide test result information received from a Market Participant under paragraph 2.4.7, or other test result information that it holds, to a Network Operator.
- 2.4.9. Within three months of the completion of testing performed under a GPS Test Procedure, or as otherwise agreed by AEMO, a Market Participant must finalise all relevant data associated with the verification of their Registered Generator Performance Standards and the supporting documentation, and must submit to AEMO:
  - (a) data collected during execution of the GPS Test Procedure presented in accordance with the requirements in paragraph 2.3 and the reporting requirements agreed as part of the approved GPS Test Procedure;
  - (b) the Registered Generator Performance Standard compliance report, based on the data collected during the commissioning tests, which demonstrates the compliance of the Transmission Connected Generating System with its Registered Generator Performance Standards, created in accordance with the reporting requirements agreed as part of the approved GPS Test Procedure.
- 2.4.10. A Market Participant should prepare and submit all relevant data associated with the generation system model and the generating system model validation report in accordance with Western Power's WEM Procedure: Generation System Model Submission and Maintenance.

## 3. Generator Monitoring Plan Requirements

### 3.1. Overview

- 3.1.1. This paragraph 3 specifies the Generator Monitoring Plan Requirements as required by clause 3A.6.2.

### 3.2. Generator Monitoring Plan

- 3.2.1. A Market Participant that is responsible for a Transmission Connected Generating System must develop a Generator Monitoring Plan in accordance with the Generator Monitoring Plan Requirements described in this paragraph 3, and submit the proposed Generator Monitoring Plan to AEMO in accordance with paragraph 4.2.
- 3.2.2. The Generator Monitoring Plan must meet the Generator Monitoring Plan Requirements and be in the format specified by AEMO in paragraph 3.3.

### 3.3. Generator Monitoring Plan Template

- 3.3.1. AEMO will publish and maintain the Generator Monitoring Plan Template on the WEM Website.
- 3.3.2. A Market Participant required to develop a Generator Monitoring Plan, in accordance with paragraph 3.2.1, must prepare and submit its proposed Generator Monitoring Plan using the Generator Monitoring Plan Template, except where it makes variations as permitted under clause 3A.6.4(b).

### 3.4. General Principles

- 3.4.1. A Market Participant must consider and incorporate the following compliance principles when developing a Generator Monitoring Plan:
- (a) the testing and monitoring regime (including the relevant recording devices to be used), verification mechanism and frequency with which evidence of compliance will be obtained (as described in paragraph 3.9), must be such that compliance with an applicable Registered Generator Performance Standard can be conclusively established at intervals approved by AEMO;
  - (b) where compliance with a Registered Generator Performance Standard cannot be demonstrated through generator performance testing and monitoring, alternative methods that can be used to demonstrate compliance must be included;
  - (c) the inclusion of risks and mitigation strategies associated with the testing and monitoring regime described in paragraph 3.4.1(a);
  - (d) a description of the efficiency and practicality of implementing the Generator Monitoring Plan, which includes, but is not limited to, implementation costs and availability of skills and labour, while maintaining the ability to conclusively establish the relevant compliance status of an applicable Registered Generator Performance Standard; and
  - (e) a process for regular reviews and updates incorporating learnings from past implementation of the Generator Monitoring Plan, and continuous changes and improvement relevant to all parts of the Generator Monitoring Plan (e.g., testing and monitoring regime and verification mechanisms).

### 3.5. Information and Data requirements

- 3.5.1. A proposed Generator Monitoring Plan, submitted by a Market Participant to AEMO for approval in accordance with paragraph 4.2, must contain as a minimum, for each Technical Requirement described in Appendix 12 of the WEM Rules:
- (a) the applicable Registered Generator Performance Standard for that Technical Requirement;
  - (b) a compliance testing and monitoring methodology, in accordance with the requirements described in paragraph 3.6;
  - (c) a mechanism to verify compliance, in accordance with the specific requirements described in paragraph 3.8;
  - (d) a description of the frequency with which evidence of compliance will be obtained, in accordance with the specific requirements described in paragraph 3.9;
  - (e) details of any non-compliance or suspected non-compliance that has occurred, any rectification action taken, the status of compliance at the time of submission of the proposed Generator Monitoring Plan, and, if applicable, the Test Data following a request by AEMO to undertake a test in accordance with clause 3A.9.4 (refer to paragraph 7.1.11);
  - (f) a process for future audits or reviews of the Generator Monitoring Plan, including the proposed process and frequency of the review;

- (g) any relevant information requested by AEMO and, where applicable, details of any notification provided by AEMO in accordance with clause 3A.9.2, 3A.10.3 or 3A.10.4;
  - (h) the commencement date of an approved Generator Monitoring Plan; and
  - (i) a proposed timeframe for when the Market Participant will initially provide evidence to AEMO that it is fully compliant with its Generator Monitoring Plan (as described in paragraph 3.7).
- 3.5.2. A proposed Generator Monitoring Plan, submitted by a Market Participant to AEMO for approval in accordance with paragraph 4.2, may include additional information at the discretion of the Market Participant.

### 3.6. Testing and monitoring requirements

- 3.6.1. A Market Participant must create a testing and monitoring regime for a Transmission Connected Generating System to demonstrate and verify compliance with the relevant Registered Generator Performance Standard for that Transmission Connected Generating System.
- 3.6.2. The testing and monitoring regime referred to in paragraph 3.6.1 must be captured in the Generator Monitoring Plan that is prepared in accordance with the testing and monitoring methods outlined in Appendix B and Appendix C, and in accordance with the Generator Monitoring Plan Template described in paragraph 3.3.
- 3.6.3. The testing and monitoring regime specified in paragraph 3.6.1 may include, but is not limited to:
- (a) continuous in-service monitoring in accordance with Appendix C;
  - (b) analysis of performance during and following a Power System Disturbance in accordance with Appendix C; and
  - (c) where in-service monitoring and analysis of performance following a Power System Disturbance is unable to verify compliance, periodic online or offline testing (as relevant) in accordance with Appendix B.
- 3.6.4. For each of the tests outlined in Appendix B, AEMO may agree for a test to be undertaken with alternative requirements or thresholds, where AEMO forms the view that, due to the conditions at the time of testing, undertaking the test in accordance with Appendix B will result in unacceptable risks to Power System Security and Power System Reliability.
- 3.6.5. In developing a Generator Monitoring Plan, a Market Participant must consider and incorporate:
- (a) all relevant parts of an applicable Registered Generator Performance Standard that are required be verified in the Generator Monitoring Plan;
  - (b) where relevant, information about how continuous monitoring will be performed, including location, quantities to measure, the recording device used and analysis of the measurement results;
  - (c) detailed steps of how an online and offline test will be performed under paragraph 3.6.3(a) (as relevant);

- (d) where relevant, ensuring that required tests, as well as ongoing monitoring activities required to demonstrate compliance with Registered Generator Performance Standards, are included;
- (e) a verification mechanism in accordance with the specific requirements in paragraph 3.8;
- (f) clear objectives and expectations of the outcomes of any test or monitoring;
- (g) the quantities to be measured for a test, including the duration for which the quantities are measured, before, during and after a test, with clear links to the required outcomes of the test;
- (h) where relevant, performance demonstration of backup control or protection systems and switching to/from backup control or protection systems;
- (i) information about the locations within the relevant Transmission Connected Generating System where the test or monitoring measurements are made, including those measurements necessary to assist with post-test or post-monitoring analysis;
- (j) information about the appropriateness of the form of the Test Data and Monitoring Data to enable a compliance status to be established conclusively;
- (k) information about the appropriateness and degree of accuracy of the units of measurement of the testing or monitoring, including those used in the recording devices and analysis of Test Data, such that they describe a measured quantity accurately and support a compliance status being established conclusively;
- (l) any other reasonable information that supports a conclusive assessment of the compliance status of the Transmission Connected Generating System in relation to an applicable Registered Generator Performance Standard, where a quantity cannot be directly measured in the test environment;
- (m) information about the variation in technical performance of the Transmission Connected Generating System under power system operating conditions and ambient conditions, resulting in the requirement to repeat the tests multiple times under different conditions or via continuous monitoring to conclusively establish the compliance status of an applicable Registered Generator Performance Standard;
- (n) all relevant test information that must be recorded to assist with post-test or post-monitoring analysis, including the time and date, relevant power system conditions during the period, operating arrangements and configuration within the Transmission Connected Generating System, and ambient conditions at the start of, end of, and during a test (or monitoring);
- (o) information about the suitability of the test and monitoring regime for validating modelled technical performance, where any parts of the modelled technical performance have been identified as requiring validation;
- (p) appropriateness of recording devices so that application of the recording devices does not lead to inaccurate or inconclusive results. Information about each of the recording devices must be provided, including:
  - (i) the type of equipment, the make and model;
  - (ii) evidence of valid calibration or relevant test certificates;
  - (iii) the accuracy and resolution of the measurements;



- (iv) measurement location for the recording device;
  - (v) whether the recording device is installed for continuous monitoring and/or triggering (event-based and/or manual triggering); and
  - (vi) confirmation that the measurement device meets the relevant requirements described in the WEM Procedure: Communications and Control Systems; and
- (q) confirmation that the relevant Registered Generator Performance Standards for each Generating Unit and protection and control system within the Generating System will be verified, or information to support justification to and approval by AEMO for any lack of verification;
- (r) information about any potential risks associated with the Generator Monitoring Test Plan, which include, but are not limited to, those related to:
- (i) Power System Security and Power System Reliability;
  - (ii) health and safety of personnel on-site;
  - (iii) health and safety of the public; and
  - (iv) damage to equipment; and
- (s) information about any mitigation actions taken for each of the potential risks identified in paragraph 3.6.5(r).
- 3.6.6. Any information provided under paragraph 3.6.5 must be specific and detailed and AEMO may require additional details to be provided where it reasonably considers the details provided are insufficient.
- 3.6.7. Where a proposed test refers to content or requirements from another document (such as Australian Standards or other international standards), the relevant parts of the external document must be quoted, and details must be specified in relation to the exact characteristics of the Transmission Connected Generating System.
- 3.6.8. Market Participants may propose any suitable testing and monitoring methods, and any numbers of tests and monitoring regimes, as necessary to verify compliance against any part of the applicable Registered Generator Performance Standards. However, these tests must incorporate all relevant principles and requirements described in paragraphs 3.4 and 3.5.
- 3.6.9. Any testing conducted in accordance with an approved Generator Monitoring Plan must be included in and conducted via an approved Commissioning Test Plan (in accordance with clause 3.21A).

### **3.7. Evidence of compliance with the Generator Monitoring Plan**

- 3.7.1. Notwithstanding the self-reporting regime specified in clause 3A.10, a Market Participant must provide evidence to AEMO, in accordance with its approved Generator Monitoring Plan, demonstrating that the requirements in paragraph 3.5.1 have been met.
- 3.7.2. Market Participants must identify any lack of compliance with the approved Generator Monitoring Plan to AEMO no later than the date and time specified in the approved Generator Monitoring Plan under paragraph 3.5.1(i).



- 3.7.3. Evidence of compliance provided under paragraph 3.7.1 must include information and data (as applicable) to demonstrate that the required tests and monitoring specified in the Generator Monitoring Plan have been successfully conducted and recorded.
- 3.7.4. Evidence of compliance provided under paragraph 3.7.1 must clearly specify the applicable compliance reporting period, as well as the period during which the testing and monitoring occurred.
- 3.7.5. In reviewing the evidence of compliance provided under paragraph 3.7.1, AEMO may determine that the evidence is inconclusive or insufficient.
- 3.7.6. Where AEMO determines that evidence is inconclusive or insufficient, it may require the Market Participant to provide additional clarifying information or data.
- 3.7.7. Unless otherwise agreed with AEMO, the Market Participant must provide additional information or data requested under paragraph 3.7.6 to AEMO within the timeframe stipulated in the notification under paragraph 3.7.6.

#### **E[A] Examples of inconclusive evidence of compliance**

Examples of evidence of compliance provided under paragraph 3.6.5 that will not conclusively establish that compliance has occurred are:

- (a) statements such as 'The active power ramp rate was observed to have operated satisfactorily' made without providing relevant active power measurements and results to substantiate the statement; and
- (b) Test Data failing to record and demonstrate that the post-step response has settled to a new level and Settling Time has been calculated based on such Test Data; and
- (c) charts that have not been appropriately annotated and fail to provide clarity.

### **3.8. Compliance verification mechanism**

- 3.8.1. A Market Participant must implement and maintain verification mechanisms in accordance with their approved Generator Monitoring Plan to verify their compliance with Registered Generator Performance Standards, including obtaining the evidence of compliance at the frequency described within the approved Generator Monitoring Plan.
- 3.8.2. A Market Participant must verify a Technical Requirement by incorporating the following into the verification mechanism implemented under paragraph 3.8.1:
  - (a) where a requirement for performance is quantified in a Technical Requirement (such as speed of response and accuracy level), the verification mechanism must be such that the performance can be quantified;
  - (b) where a Technical Requirement requires provision of certain information, and requires that updates to that information are provided where there are changes, the verification mechanism must include confirmation that updated information has been provided and that this information is valid at the time the evidence of compliance is submitted to AEMO;
  - (c) where a Technical Requirement specifies how a test is to be performed, including the location at which the technical performance must be established, the verification mechanism must appraise whether the tests have been conducted in the required

manner and include measurements that demonstrate the test has been conducted at the required location;

- (d) where a Technical Requirement is in relation to installation or availability of a control system or equipment, the verification mechanism must include confirmation that the relevant system or equipment has been installed and all required functionality is available and will continue to be available;
- (e) where a Technical Requirement is in relation to the connection status of a Transmission Connected Generating System (such as a requirement to remain in Continuous Uninterrupted Operation (CUO)), the verification mechanism must include, as applicable:
  - (i) if the Transmission Connected Generating System or equipment within the Transmission Connected Generating System was disconnected, evidence to support the notion that the disconnection was intentional and in accordance with an approved Protection Scheme;
  - (ii) evidence that a Transmission Connected Generating System will remain connected during a disturbance; and
  - (iii) confirmation of the presence of relevant in-service protection settings; and
- (f) consideration of compliance verification mechanisms listed in Appendix D; and
- (g) in all cases, confirmation that the verification mechanism supports a compliance status being established conclusively.

3.8.3. Where a Technical Requirement includes an obligation that AEMO reasonably considers cannot be verified by means of testing, monitoring or analysis of performance following a power system disturbance, Market Participants are not required to include a verification mechanism for the requirement.

3.8.4. Where a Technical Requirement is in response to a requirement in a WEM Procedure, the Technical Rules, Australian Standards or other documented requirements relating to the relevant Generating System, the verification mechanism must accord with how the requirement is described in the relevant document.

### 3.9. Frequency of obtaining evidence of compliance for a Generator Monitoring Plan

3.9.1. A Generator Monitoring Plan must include the frequency of obtaining evidence of compliance for each of the tests and monitoring arrangements in the verification mechanism developed under paragraph 3.8.

3.9.2. The frequency of obtaining evidence of compliance specified in the Generator Monitoring Plan, as described in paragraph 3.9.1, must correspond with the frequency of periodic testing outlined in Appendix B, or the timeframes for alternative monitoring outlined in Appendix C.

3.9.3. In setting the frequency of obtaining evidence of compliance required by the verification mechanism developed under paragraph 3.8, a Market Participant must consider and address the following factors:

- (a) the technology adopted by the Transmission Connected Generating System in relation to a Technical Requirement;

- (b) past learnings/experience with the specific Transmission Connected Generating System, or the relevant parts of the Transmission Connected Generating System;
- (c) industry experience with the particular generation technology;
- (d) manufacturer's advice, for example, with respect to the particular model of equipment within a Transmission Connected Generating System or control system version; and
- (e) an assessment of the frequency with which evidence of compliance must be obtained to provide reasonable assurance of compliance.

3.9.4. A Generator Monitoring Plan must also propose how the frequency of obtaining evidence of compliance should be reviewed and updated, including the philosophy and basis on which the frequency of obtaining evidence of compliance will be reviewed.

### 3.10. Retention of records

3.10.1. A Market Participant must retain information and data related to Registered Generator Performance Standards and Generator Monitoring Plans for all applicable Transmission Connected Generating Systems, including but not limited to:

- (a) all information and data stated in the Registered Generator Performance Standards;
- (b) all inputs used in developing the Generator Monitoring Plans, including the information and data described in paragraph 3.5;
- (c) all information and data described in the Generator Monitoring Plans, including the evidence of compliance described in paragraph 3.7, such as:
  - (i) records of tests conducted and the results of those tests, which include but are not limited to:
    - (A) date and time of the test;
    - (B) a description of the test;
    - (C) results of the test; and
    - (D) any other information in relation to compliance resulting from the test; and
  - (ii) Monitoring Data, either from continuous recording or as a result of a disturbance or a test; and
  - (iii) records of relevant general or technical inspections conducted by a Market Participant; and
- (d) all written correspondence with AEMO, the Network Operator and the Economic Regulation Authority in relation to Registered Generator Performance Standards and Generator Monitoring Plans, including, but not limited to, emails, meeting minutes and all exchanges and documents via the Market Participant Interface.

3.10.2. Market Participants must retain all information and data referred to in paragraph 3.10.1 for the period outlined in clause 10.1.2 of the WEM Rules, including where there is a transfer of ownership or registration under paragraph 5.1.17.

3.10.3. Where requested by AEMO, the Network Operator or the Economic Regulation Authority, a Market Participant must provide any data and information referred to in paragraph 3.10.1 to the requesting person within 5 Business Days.

- 3.10.4. Information requested under paragraph 3.10.3 must be provided in the form and via the method specified by AEMO, the Network Operator or the Economic Regulation Authority, at the time of request.
- 3.10.5. Where data referred to in paragraph 3.10.1 is stored in respect of continuous recording or as a result of a disturbance or a test, that data must be stored in a format that is non-proprietary and must be able to be accessed by AEMO, the Network Operator or the Economic Regulation Authority via typical Microsoft Office applications (e.g. CSV or Excel format).

## 4. Submission process

### 4.1. GPS Test Procedure Submission

- 4.1.1. Prior to submitting a Commissioning Test Plan for a Transmission Connected Generating System that will outline the activities to be undertaken to demonstrate compliance with Registered Generator Performance Standards, Market Participants must prepare a proposed GPS Test Procedure in accordance with the requirements in paragraph 1.5.1 and submit this GPS Test Procedure to AEMO in accordance with this paragraph 4.1.
- 4.1.2. A proposed GPS Test Procedure must be submitted no later than 65 Business Days before the first day of testing and must allow for time required by AEMO and the Network Operator to assess the submission in accordance with paragraph 5.1.
- 4.1.3. A Market Participant must include the GPS Test Procedure referred to in paragraph 4.1.1 in their Commissioning Test Plan, which must be submitted in accordance with the WEM Procedure: Commissioning Tests.
- 4.1.4. Where AEMO has rejected a GPS Test Procedure under paragraph 5.1.10 and has requested a Market Participant to submit a new or revised GPS Test Procedure, a Market Participant must ensure that any applicable revisions are also made to the accompanying Commissioning Test Plan.
- 4.1.5. A Market Participant must notify AEMO as soon as practicable after it forms the view that any parts of the approved GPS Test Procedure are no longer valid or cannot be implemented.
- 4.1.6. A Market Participant must no later than 20 Business Days after notifying AEMO that an approved GPS Test Procedure is invalid under 4.1.5:
  - (a) provide details as to which parts of the approved GPS Test Procedure have been deemed invalid or unable to be implemented;
  - (b) submit an updated proposed GPS Test Procedure in accordance with paragraph 4.1.8; and
  - (c) make any applicable revisions to the associated Commissioning Test Plan.
- 4.1.7. Where a previously submitted proposed GPS Test Procedure or an approved GPS Test Procedure has been amended and is re-submitted to AEMO by a Market Participant under paragraph 4.1.6, the Market Participant must include:
  - (a) reasons for the updates and amendments; and

- (b) references within the document where the approved GPS Test Procedure has been updated.
- 4.1.8. A Market Participant must make all required notifications and submissions related to the GPS Test Procedure via the process described in the GPS Test Procedure Template, unless otherwise approved by AEMO in writing.

## 4.2. Generator Monitoring Plan Submissions

- 4.2.1. A Market Participant must submit a proposed Generator Monitoring Plan for a new Transmission Connected Generating System, that has not yet received an Interim Approval to Generate Notification, to AEMO within six months of a new Registered Generator Performance Standard taking effect.
- 4.2.2. Where a Facility with Registered Generator Performance Standards is required to submit a new or amended proposed Generator Monitoring Plan for a Transmission Connected Generating System that will be conducting Commissioning Tests via an approved GPS Test Procedure, the Market Participant responsible for the Transmission Connected Generating System must submit their proposed Generator Monitoring Plan to AEMO:
- (a) no later than 65 Business Days before the first day of proposed testing; or
  - (b) by another date approved by AEMO in writing.

### **E[B] Timing of Generator Monitoring Plan submissions**

In accordance with clauses 3A.8.11 and 3A.6.1(b), Facilities must have an approved Generator Monitoring Plan before an Approval to Generate Notification can be issued. As such, it is a Market Participant's responsibility to prepare and submit the Generator Monitoring Plan with sufficient time to allow for AEMO's assessment and approval as well as to account for potential re-submission, if necessary. Market Participants should always consider the timing requirements described in paragraph 4.2 and 5.2.

- 4.2.3. A Market Participant must submit an amended proposed Generator Monitoring Plan to AEMO, containing updates and amendments to an approved Generator Monitoring Plan:
- (a) within six months of a new Registered Generator Performance Standard taking effect, where the new Registered Generator Performance Standard supersedes an existing Registered Generator Performance Standard, including in accordance with clause 3A.14.1(b) where there has been a Relevant Generator Modification;
  - (b) within six months of amendments to the Generator Monitoring Plan Requirements, taking effect under paragraph 3, as required by clause 3A.6.9 ; and
  - (c) within 20 Business Days of identifying that any parts of an approved Generator Monitoring Plan have been found to be infeasible and have subsequently not been implemented.
- 4.2.4. A Market Participant must notify AEMO as soon as practically possible after it forms the view that any parts of the approved Generator Monitoring Plan are no longer valid due to reasons other than those specified in paragraph 4.2.3 and this notification must:
- (a) provide details as to which parts of the approved Generator Monitoring Plan it believes are invalid; and

- (b) submit an updated proposed Generator Monitoring Plan in accordance with this paragraph 4.2 no later than 20 Business Days after notifying AEMO that the information is invalid.
- 4.2.5. Where a previously submitted proposed Generator Monitoring Plan or an approved Generator Monitoring Plan has been amended and re-submitted to AEMO by a Market Participant, the Market Participant must include:
  - (a) reasons for the updates and amendments; and
  - (b) references within the document where the approved Generator Monitoring Plan has been updated.
- 4.2.6. A Market Participant with an approved Generator Monitoring Plan may submit an amended proposed Generator Monitoring Plan at any time for any reason subject to the submission requirements in this paragraph 4.2.
- 4.2.7. Market Participants must make all required notifications and submissions related to the Generator Monitoring Plans, including those described in this paragraph 4.2 and paragraph 5.2 via the process described in the Generator Monitoring Plan Template, unless otherwise approved by AEMO.

## 5. Assessment and approval process

### 5.1. GPS Test Procedure Assessment and Approval

- 5.1.1. Where a Market Participant submits a proposed GPS Test Procedure, AEMO will perform an assessment to inform its decision to approve or reject the proposal.
- 5.1.2. The scope of AEMO's assessment of a proposed GPS Test Procedure, as outlined in this paragraph 5.1, is limited to the content of the proposed GPS Test Procedure and associated supporting documents and is conducted for the purpose of confirming suitability for testing compliance of a Transmission Connected Generating System with its Registered Generator Performance Standards.
- 5.1.3. AEMO's approval of a proposed GPS Test Procedure does not constitute approval of any other necessary processes, approvals, and arrangements, including the associated Commissioning Test Plan.
- 5.1.4. Where a GPS Test Procedure has been submitted without Registered Generator Performance Standards, it may be assessed by AEMO, but it will not be approved by AEMO until there are Registered Generator Performance Standards for the relevant Transmission Connected Generating System.
- 5.1.5. Where a Market Participant has submitted a proposed GPS Test Procedure to AEMO under paragraph 5.1.1, AEMO will provide the proposed GPS Test Procedure to the Network Operator for review within five Business Days of receipt.
- 5.1.6. Where the Network Operator receives a request for review of a proposed GPS Test Procedure in accordance with paragraph 5.1.5, the Network Operator must respond within 15 Business Days, or another timeframe approved by AEMO, and provide a recommendation to AEMO in relation to whether a proposed GPS Test Procedure should be approved or rejected by AEMO.

- 5.1.7. Where the Network Operator recommends that AEMO reject a proposed GPS Test Procedure in accordance with paragraph 5.1.6, the Network Operator must
- (a) provide written reasons to AEMO for the recommendation; and
  - (b) if applicable, provide recommendations for amendments to the proposed GPS Test Procedure that the Network Operator considers meets the criteria described in paragraph 5.1.8.
- 5.1.8. In assessing whether to approve or reject a proposed GPS Test Procedure for a Transmission Connected Generating System, AEMO will consider whether:
- (a) the tests in the proposed GPS Test Procedure can demonstrate compliance with the Registered Generator Performance Standards;
  - (b) the GPS Test Procedure has been prepared and submitted in accordance with paragraphs 2.3 and 4.1;
  - (c) all test-related risks are reasonably identified, and reasonable mitigation methods are proposed;
  - (d) the measuring and recording equipment and its locations follow relevant requirements described in GPS Test Procedure Template;
  - (e) all roles, responsibilities and communication protocol between AEMO and other parties involved in the tests to demonstrate compliance with Registered Generator Performance Standards are established and covers all common commissioning activities;
  - (f) all relevant commissioning prerequisites are listed and addressed by the Market Participant;
  - (g) a Test Data verification mechanism to demonstrate compliance with Registered Generator Performance Standards is established and approved by AEMO and the Network Operator;
  - (h) methods of reporting testing results and reporting compliance with Registered Generator Performance Standards is established and approved by AEMO and the Network Operator;
  - (i) test data file format and file naming conventions are in accordance with the GPS Test Procedure Template;
  - (j) Hold Point levels for Commissioning Tests to demonstrate compliance with Registered Generator Performance Standards are established in accordance with AEMO guidance from the GPS Test Procedure Template and approved by AEMO and the Network Operator; and
  - (k) the testing regime demonstrates consideration of the relevant principles and requirements described in paragraph 1.5.1.
- 5.1.9. In making an assessment under paragraph 5.1.8, AEMO will also consider information from the Network Operator's review of the GPS Test Procedure and its response received in accordance with paragraph 5.1.6.
- 5.1.10. AEMO will use its best endeavours to notify a Market Participant of the outcome of the assessment described in paragraph 5.1.8 within 30 Business Days of submission.



- 5.1.11. Where AEMO has rejected a proposed GPS Test Procedure in accordance with paragraph 5.1.8, AEMO must provide to the Market Participant:
- (a) written reasons for the rejection; and
  - (b) if applicable, recommendations for amendments to the proposed GPS Test Procedure that the Network Operator considers meets the criteria described in paragraph 5.1.8.
- 5.1.12. Where AEMO has rejected a proposed GPS Test Procedure under paragraph 5.1.11, a Market Participant may amend and resubmit the proposed GPS Test Procedure to AEMO.
- 5.1.13. Where a Market Participant has submitted an amended proposed GPS Test Procedure under paragraph 5.1.12, the Market Participant must ensure that the amended GPS Test Procedure is submitted within 65 Business Days of the first day of proposed testing, or within a reasonable timeframe as agreed with AEMO.
- 5.1.14. Where an amended proposed GPS Test Procedure has been submitted following a rejection notification by AEMO under paragraph 5.1.11, AEMO will assess the new proposed testing regime in accordance with the requirements and timeframe specified in this paragraph 5.1.
- 5.1.15. A GPS Test Procedure submitted by a Market Participant is not an approved GPS Test Procedure until it has been assessed and approved by AEMO in accordance with this paragraph 5.1 and AEMO has issued a notice to the Market Participant that the GPS Test Procedure has been approved.
- 5.1.16. There must only be one approved GPS Test Procedure in effect at any time. The applicable approved GPS Test Procedure remains effective until such time that:
- (a) it is superseded by another approved GPS Test Procedure;
  - (b) the period of testing described in the approved GPS Test Procedure has expired; or
  - (c) the relevant Market Participant has notified AEMO that the tests in an approved GPS Test Procedure have been cancelled.
- 5.1.17. Where there is a transfer of ownership or registration of a Transmission Connected Generating System, any approved GPS Test Procedure for that Transmission Connected Generating System continues to be in effect until such time as any of the circumstances outlined in paragraph 5.1.17 occur.

## 5.2. Generator Monitoring Plan Assessment and Approval

- 5.2.1. Where a Market Participant submits a proposed Generator Monitoring Plan to AEMO under clause 1.41 or 3A.6.4 of the WEM Rules, AEMO will perform an assessment to inform AEMO's decision to either approve or reject a proposed Generator Monitoring Plan.
- 5.2.2. AEMO will notify a Market Participant of the outcome of the assessment described in paragraph 5.2.1 within 30 Business Days of submission, unless otherwise advised.
- 5.2.3. The scope of AEMO's assessment of a proposed Generator Monitoring Plan under paragraph 5.2.1 is limited to the content of the proposed Generator Monitoring Plan and is conducted for the purpose of confirming suitability of the Generator Monitoring Plan for monitoring ongoing compliance with a Transmission Connected Generating System's Registered Generator Performance Standards.



- 5.2.4. Where a Market Participant has submitted a proposed Generator Monitoring Plan that includes evidence of compliance with the applicable Registered Generator Performance Standards, AEMO's approval of the proposed Generator Monitoring Plan extends to the Generator Monitoring Plan itself but does not include AEMO's approval or acceptance of the compliance, or lack thereof, with any part of the Registered Generator Performance Standards for that Facility.
- 5.2.5. AEMO's approval of a proposed Generator Monitoring Plan does not waive the requirements of any other necessary processes, arrangements, and approvals (e.g., approval for Outages) being undertaken to execute the testing and monitoring regime in accordance with the approved Generator Monitoring Plan.
- 5.2.6. AEMO's approval of a proposed Generator Monitoring Plan does not include AEMO's acceptance of any obligations or responsibilities related to the implementation of the approved Generator Monitoring Plan.
- 5.2.7. Where a Generator Monitoring Plan has been submitted prior to a Transmission Connected Generating System having Registered Generator Performance Standards for each Technical Requirement, it may be assessed by AEMO, but it will not be approved by AEMO until the Proposed Generator Performance Standards become Registered Generator Performance Standards.
- 5.2.8. In assessing whether to approve or reject a proposed Generator Monitoring Plan, AEMO will consider:
- (a) the requirements described in clauses 1.41.12, 3A.6.5 and 3A.6.6, where applicable; and
  - (b) whether the Generator Monitoring Plan demonstrates compliance with the Generator Monitoring Plan Requirements described in paragraph 3.
- 5.2.9. Where a modification has been made to a proposed Generator Monitoring Plan following a rejection notification by AEMO, made in accordance with clause 1.41.14 or 3A.6.8, AEMO will assess the proposed Generator Monitoring Plan and advise the Market Participant of the outcome of its assessment in accordance with the requirements and timeframe specified in paragraphs 5.2.1 and 5.2.2.
- 5.2.10. A Generator Monitoring Plan submitted by a Market Participant, including a Generator Monitoring Plan containing amendments and updates requested by AEMO in accordance with clause 1.41.14(c) or 3A.6.8(b), is not an approved Generator Monitoring Plan until it has been assessed and approved by AEMO in accordance with paragraph 5.2.1, and AEMO has issued a notice to the Market Participant that the Generator Monitoring Plan has been approved under paragraph 5.2.2.
- 5.2.11. Where there is an existing approved Generator Monitoring Plan, this existing approved Generator Monitoring Plan remains in effect and, must be complied with by a Market Participant to the extent reasonably possible, until a new Generator Monitoring Plan, including a Generator Monitoring Plan containing amendments and updates requested by AEMO in accordance with clause 1.41.14(c) or 3A.6.8(b), has been assessed and approved by AEMO in accordance with paragraph 5.2.1 and AEMO has issued a notice to the Market Participant that the submitted Generator Monitoring Plan has been approved under paragraph 5.2.2.

- 5.2.12. A Transmission Connected Generating System must only have one approved Generator Monitoring Plan in effect at any time. An approved Generator Monitoring Plan remains effective until such time that:
- (a) it has been superseded by another approved Generator Monitoring Plan as described in paragraph 5.2.11;
  - (b) the Network Operator issues an exemption notice to the Market Participant responsible for the Transmission Connected Generating System under clause 3A.3.1; or
  - (c) the Transmission Connected Generating System is de-registered under the WEM Rules.
- 5.2.13. Where there is a transfer of ownership or registration of a Transmission Connected Generating System under the WEM Rules, the approved Generator Monitoring Plan continues to be in effect until such time it has been superseded by another approved Generator Monitoring Plan. The transferee assumes all obligations related to the Generator Monitoring Plan for the Transmission Connected Generating System, including obtaining and retaining the relevant evidence of compliance, as described in paragraph 3.8, upon completion of the transfer of ownership.

## 6. Generator Monitoring Plans for Existing Transmission Connected Generating Systems

### 6.1. Generator Monitoring Plan Submission

- 6.1.1. Market Participants must submit a proposed Generator Monitoring Plan to AEMO for Facilities with Existing Transmission Connected Generating Systems via the process described in the Generator Monitoring Plan Template, or another process approved by AEMO.
- 6.1.2. When submitting a proposed Generator Monitoring Plan under paragraph 6.1.1, if applicable, Market Participants may also include a copy of an Existing Monitoring Plan for AEMO to consider when assessing the proposed Generator Monitoring Plan for approval.

### 6.2. Approval Process

- 6.2.1. AEMO will follow the processes specified in paragraph 5.2 for assessment and approval of a proposed Generator Monitoring Plan for an Existing Transmission Connected Generating System.
- 6.2.2. Once approved, a Generator Monitoring Plan for an Existing Transmission Connected Generating System must continue to meet all Generator Monitoring Plan Requirements specified in paragraph 3.
- 6.2.3. Where a proposed Generator Monitoring Plan submitted under paragraph 6.1 does not include an Existing Monitoring Plan, AEMO will consider the Generator Monitoring Plan Requirements (as specified in paragraph 3) in assessing and approving the proposed Generator Monitoring Plan.

6.2.4. Where a proposed Generator Monitoring Plan submitted under paragraph 6.1 includes an Existing Monitoring Plan, AEMO will assess the Existing Monitoring Plan as if it is part of the proposed Generator Monitoring Plan, subject to the requirements specified in clauses 1.41.9 and 1.41.10.

### 6.3. Requests for extension from having a proposed Generator Monitoring Plan

6.3.1. Where a Market Participant requests the date for the submission of a proposed Generator Monitoring Plan be extended by AEMO in accordance with clauses 1.41.3 and 1.41.4, the new date for the submission is the later of:

- (a) the date indicated in clause 1.41.2; and
- (b) a date approved by AEMO in accordance with clause 1.41.3.

6.3.2. When a Market Participant requests the date for the submission of a proposed Generator Monitoring Plan be extended by AEMO under paragraph 6.3.1, the request must include the following and may include further information, as determined necessary by the Market Participant:

- (a) identification of the Existing Transmission Connected Generating System to be covered by the proposed Generator Monitoring Plan;
- (b) detailed reasons why an extension is necessary, including why the Market Participant considers that it has made reasonable progress on completing a proposed Generator Monitoring Plan for one or more of its Existing Transmission Connected Generating Systems;
- (c) the date the Market Participant expects the proposed Generator Monitoring Plan to be submitted;
- (d) the remaining actions the Market Participant must take to complete and submit the proposed Generator Monitoring Plan; and
- (e) where the Market Participant is yet to establish Registered Generator Performance Standards for the Existing Transmission Connected Generating System, evidence of progress towards attaining Registered Generator Performance Standards for the Existing Transmission Connected Generating System.

6.3.3. In determining whether a request for extending the submission deadline for a proposed Generator Monitoring Plan for an Existing Transmission Connected Generating System is to be approved or rejected, AEMO will consider, where relevant:

- (a) the information provided in the request;
- (b) the number of previous requests to extend the submission deadline and the extent of any previous changes to submissions dates approved by AEMO;
- (c) whether the requested period of extension is reasonable;
- (d) whether the Existing Transmission Connected Generating System is still progressing with achieving Registered Generator Performance Standards;
- (e) the risks that the relevant Existing Transmission Connected Generating System poses to Power System Security and Power System Reliability, considering the size, location,

- technology type, and expected frequency and duration of operation of the Existing Transmission Connected Generating System;
  - (f) the complexity in developing the Generator Monitoring Plan, in particular, the testing and monitoring regime, considering factors such as the age and technology type of the relevant Existing Transmission Connected Generating System;
  - (g) its obligation under clause 1.41.3; and
  - (h) any other information AEMO considers relevant.
- 6.3.4. Where a Market Participant has made a request for extension in accordance with clause 1.41.3, AEMO will notify the Market Participant whether the request is approved or rejected, in accordance with clause 1.41.5, by email to the Market Participant, or by another method specified by AEMO on the WEM Website.

## 6.4. Requests for extension from having an approved Generator Monitoring Plan

- 6.4.1. Where a Market Participant requests an extension to the date by which they must have a Generator Monitoring Plan approved by AEMO in accordance with clauses 1.39.9 and 1.39.10, the new date for the submission is the later of:
- (a) the date indicated in clause 1.39.7; or
  - (b) a date as extended by AEMO in accordance with clause 1.39.9.
- 6.4.2. When a Market Participant requests the date for approval of a Generator Monitoring Plan to be extended by AEMO under 6.4.1, the request must include the following and may include further information, as determined necessary by the Market Participant:
- (a) identification of the Existing Transmission Connected Generating System to be covered by the proposed Generator Monitoring Plan;
  - (b) detailed reasons why an extension is necessary, including why the Market Participant considers that it has made reasonable progress on obtaining approval of a Generator Monitoring Plan for one or more of its Existing Transmission Connected Generating Systems;
  - (c) the date on which the Market Participant expects the Generator Monitoring Plan to be approved, having regard to the assessment and approval process described in paragraph 5.2;
  - (d) the remaining actions the Market Participant and AEMO will take to obtain approval of the Generator Monitoring Plan; and
  - (e) where the Market Participant is yet to establish Registered Generator Performance Standards for the Existing Transmission Connected Generating System, evidence of progress towards attaining Registered Generator Performance Standards for the Existing Transmission Connected Generating System.

- 6.4.3. In determining whether a request for extending the date for approval of a Generator Monitoring Plan by AEMO for an Existing Transmission Connected Generating System is to be approved or rejected, AEMO will consider, where relevant:
- (a) The information provided in the request;
  - (b) the number of previous requests to extend the approval deadline and the extent of any previous changes to approval dates approved by AEMO;
  - (c) whether the requested period of extension is reasonable;
  - (d) whether the Existing Transmission Connected Generating System is still progressing with achieving Registered Generator Performance Standards;
  - (e) the risks that the relevant Existing Transmission Connected Generating System poses to Power System Security and Power System Reliability, considering the size, location, technology type, and expected frequency and duration of operation of the Existing Transmission Connected Generating System;
  - (f) complexity in developing the Generator Monitoring Plan, in particular, the testing and monitoring regime, considering factors such as the age and technology type of the relevant Existing Transmission Connected Generating System;
  - (g) its obligation under clause 1.39.9; and
  - (h) any other information AEMO considers relevant.
- 6.4.4. Where a Market Participant has made a request for extension in accordance with clause 1.39.9, AEMO will notify the Market Participant whether the request is approved or rejected in accordance with clause 1.39.11, by email to the Market Participant, or by another method specified by AEMO on the WEM Website.

## 7. Non-compliance

### 7.1. Non-compliance reporting and verification

- 7.1.1. For the purposes of this WEM Procedure, non-compliance by a Transmission Connected Generating System includes a failure to comply with:
- (a) an applicable Registered Generator Performance Standard, including where a Transmission Connected Generating System is unable to, or suspected to be unable to, perform in accordance with its Registered Generator Performance Standards;
  - (b) an applicable Generator Monitoring Plan, including where a Market Participant has been, or will be, unable to complete all tests and monitoring, as well as fulfill all data recording and reporting requirements specified in the approved Generator Monitoring Plan; or
  - (c) an applicable Rectification Plan, including where a Market Participant has not met or complied with, or may not be able to meet or comply with, all requirements of an approved Rectification Plan.
- 7.1.2. A Market Participant must self-report any non-compliance or suspected non-compliance of its Transmission Connected Generating System, as described in paragraph 7.1.1, to AEMO in accordance with relevant processes described in clause 3A.10, including providing all relevant information and documents associated with the non-compliance.

- 7.1.3. AEMO may request any additional information and documents held by the Market Participant or able to be accessed by the Market Participant that are relevant to a non-compliance, in addition to those provided under paragraph 7.1.2.
- 7.1.4. Market Participants must provide information and documents requested under paragraph 7.1.3 via email, or another method outlined in AEMO's request, and within the timeframe stipulated by AEMO in its request.
- 7.1.5. Where a Market Participant is requested by AEMO in writing to undertake testing, in accordance with clause 3A.9.4, to determine whether a Facility is compliant with its Registered Generator Performance Standards:
- (a) AEMO may propose any reasonable tests described in Appendix B and Appendix C, or any other tests that are consistent with the principles and requirements set out in paragraphs 2.3 and 2.4;
  - (b) AEMO may outline details of the evidence of compliance it requires in order to be satisfied compliance has been achieved;
  - (c) AEMO will specify a reasonable timeframe during which a test proposed in paragraph 7.1.5(a) must be undertaken, and a reasonable timeframe for which evidence of compliance requested under paragraph 7.1.5(b) must be submitted to AEMO; and
  - (d) prior to determining the reasonable timeframes under paragraph 7.1.5(c), AEMO may, but is not required to, consult the Market Participant,
- the Market Participant must undertake the testing, as requested by AEMO under this paragraph 7.1.5, subject to paragraph 7.1.6 and 7.1.10.
- 7.1.6. Where testing has been requested by AEMO under paragraph 7.1.5, a Market Participant may propose alternative tests or timeframes for AEMO to consider, and AEMO may agree to the proposed alternative tests or timeframes, where it is satisfied that these alternatives will still support the relevant compliance status being established conclusively, and there are no unacceptable risks to Power System Security and Power System Reliability.
- 7.1.7. Where a Market Participant is required to verify compliance of a Transmission Connected Generating System with Registered Generator Performance Standards by conducting testing under paragraph 7.1.5 and 7.1.6, the Market Participant must conduct testing under an approved GPS Test Procedure and Commissioning Test Plan produced in accordance with paragraph 2.1.1.
- 7.1.8. Where a Market Participant is required to demonstrate compliance by conducting testing under an approved GPS Test Procedure and Commissioning Test Plan, and following testing being undertaken, if AEMO cannot reasonably conclude that the Transmission Connected Generating System is compliant with the applicable Registered Generator Performance Standard, the Transmission Connected Generating System will be deemed to be non-compliant.
- 7.1.9. Where AEMO determines it is not feasible to conduct the required tests due to risks to Power System Security or Power System Reliability, or any other risks deemed by AEMO to be significant enough to prevent the tests from being undertaken, the Transmission Connected Generating System will be not deemed to be noncompliant because testing has not been undertaken.

- 7.1.10. Where a Market Participant is required to demonstrate compliance by conducting testing under an approved GPS Test Procedure and Commissioning Test Plan, and AEMO determines that it is not feasible to conduct the required tests, AEMO may, at its discretion, consider an alternative method of determining compliance with a Registered Generator Performance Standard.
- 7.1.11. AEMO may require that the Test Data and outcomes of testing conducted by a Market Participant under paragraphs 7.1.5 and 7.1.6 be included in the applicable approved Generator Monitoring Plan and submitted to AEMO in accordance with paragraph 4.2.3(c).
- 7.1.12. A Market Participant determined by AEMO, or through self-reporting, to be non-compliant or suspected to be non-compliant, may propose a Rectification Plan to AEMO in accordance with clause 3A.11.

## **7.2. Non-compliance with Rectification Plans**

- 7.2.1. A Market Participant must report to AEMO, in accordance with the processes in paragraph 7.1.2 and clause 3A.11.9, that it has not met or complied with, or may not be able to meet or comply with, an approved Rectification Plan and must include all information and documents relevant to the non-compliance in this report.
- 7.2.2. AEMO may make a written request for any additional information and documents that are available to the Market Participant that are relevant to a non-compliance with an approved Rectification Plan, in addition to those provided under paragraph 7.2.1, and the Market Participant must provide the requested information within the timeframe stipulated by AEMO in its request, unless otherwise agreed with AEMO.

## Appendix A. Relevant clauses of the WEM Rules

Table 3 details:

- (a) the head of power clauses in the WEM Rules under which the Procedure has been developed; and
- (b) each clause in the WEM Rules requiring an obligation, process or requirement be documented in a WEM Procedure, where the obligation, process or requirement has been documented in this Procedure.

**Table 3 Relevant clauses of the WEM Rules**

Clause
1.41.6
3A.6.2
3A.9.1



## Appendix B. Testing Requirements

Table 4 outlines the tests that must be undertaken by Market Participants in order to establish compliance as part of a GPS Test Procedure in accordance with paragraph 2.3.2(b).

If appropriate, these tests may also be included in a Generator Monitoring Plan in accordance with paragraph 3.6.3(c).

**Table 4 Testing requirements**

Technical Requirement	Test Descriptions	Frequency of obtaining evidence of compliance for GMP
A12.2. Active Power Capability	<ul style="list-style-type: none"> <li>• Test the Generating Unit or Generating System at the Rated Maximum Active Power output level or another relevant Active Power output level specified in the Registered Generator Performance Standard, at a range of ambient temperatures, including the Maximum Temperature defined in Appendix 12.1 of WEM Rules where practically possible, and under a range of relevant operating arrangements within the Generating System;</li> <li>• The relevant operating arrangements, ambient temperature on-site on the day of testing and location where temperature is measured must be recorded.</li> </ul> <p><i>Note: A Market Participant must demonstrate the intent to undertake tests during a period where the temperature is forecast to be high.</i></p>	Every 3 years (or as agreed by AEMO)
A12.3. Reactive Power Capability	<ul style="list-style-type: none"> <li>• Test the reactive power output of the Generating System at the maximum Active Power specified in the Registered Generator Performance Standard, at the Connection Point or another agreed location;</li> <li>• Repeat the tests at multiple steps of Active Power output level, which typically include Rated Minimum Active Power output level or 25%, 50% and 75% of maximum Active Power output levels. The selected Active Power levels must be sufficient to reasonably establish the Reactive Power Capability in both supply and absorb regions on the Reactive Power Capability curve; and</li> <li>• The relevant operating arrangements within the Generating System, ambient temperature on-site on the day of testing and location where temperature is measured must be recorded.</li> </ul>	Every 3 years (or as agreed by AEMO)

Technical Requirement	Test Descriptions	Frequency of obtaining evidence of compliance for GMP
A12.4. Voltage and Reactive Power Control	<ul style="list-style-type: none"> <li>• Perform voltage reference step change in an open circuit and when generating system is connected to the system, with and without power system stabiliser in service;</li> <li>• Perform voltage control tests by implementing manual variation of Generating Unit open circuit voltage and testing the over-excitation limiter and under-excitation limiter or their equivalents for asynchronous generating systems;</li> <li>• Perform Reactive Power step response tests both in the under-excitation and over-excitation operating region and load rejection (reactive power) tests; and</li> <li>• Perform both lagging and leading Power Factor step response tests, in 0.025 steps from unity to 0.95 or another Power Factor specified by AEMO.</li> </ul>	Every 3 years (or as agreed by AEMO)
A12.5. Active Power Control	<ul style="list-style-type: none"> <li>• Perform Active Power step response tests, with different pre-step Active Power levels. The steps may be repeated with other additional step sizes; and</li> <li>• Perform tests to demonstrate that for a loss of communications, Remote Monitoring Equipment or Remote Control Equipment, the last received Active Power dispatch level is maintained.</li> </ul>	Every 3 years (or as agreed by AEMO)
A12.6. Inertia and Frequency Control	<ul style="list-style-type: none"> <li>• Perform speed or frequency step tests, for frequency step sizes both within the Frequency Dead Band and outside the Frequency Dead Band;</li> <li>• frequency control tests must include:                             <ul style="list-style-type: none"> <li>○ different pre-step Active Power levels.</li> <li>○ different sizes of frequency step changes.</li> <li>○ different levels of energy source availability.</li> </ul> </li> </ul>	Every 3 years (or as agreed by AEMO)
A12.7. Disturbance Ride Through for a Frequency Disturbance	<ul style="list-style-type: none"> <li>• Where possible, perform speed or frequency setpoint tests such that the speed for frequency setpoints are set to just below the over-frequency disconnection settings and just above the under-frequency disconnection settings and is sustained for a period longer than defined in the disconnection settings. The tests must be performed for all disconnection settings, unless proven not feasible; and</li> <li>• Any other equivalent tests appropriate to the technology of a Transmission Connected Generating System.</li> </ul>	Every 3 years (or as agreed by AEMO)

Technical Requirement	Test Descriptions	Frequency of obtaining evidence of compliance for GMP
A12.8. Disturbance Ride Through for a Voltage Disturbance	<ul style="list-style-type: none"> <li>Where possible, perform voltage setpoint tests with the voltage setpoints at just below the upper voltage disconnection settings and just above the lower voltage disconnection settings, and sustain for a period longer than defined in the disconnection settings. The tests must be performed for all disconnection settings, unless proven not feasible; and</li> <li>Any other equivalent tests as appropriate to the technology of a Generating System.</li> </ul>	Every 3 years (or as agreed by AEMO)
A12.9. Disturbance Ride Through for Multiple Disturbances	<ul style="list-style-type: none"> <li>Any tests as appropriate to the technology of a Generating System.</li> </ul>	Every 3 years (or as agreed by AEMO)
A12.10. Disturbance Ride Through for Partial Load Rejection	<ul style="list-style-type: none"> <li>Perform load rejection tests at different levels of Active Power output, typically including 25%, 50% and 100% of Maximum Rated Active Power with overspeed protection or its equivalent set up.</li> </ul>	Every 3 years (or as agreed by AEMO)
A12.11. Disturbance Ride Through for Quality of Supply	<ul style="list-style-type: none"> <li>Where possible, switching in/out harmonic filters and/or reactor banks that trigger a disturbance to the flicker, harmonics and negative phase sequence voltage and is within the planning levels specified in the Technical Rules.</li> </ul>	Every 3 years (or as agreed by AEMO)
A12.12. Quality of Electricity Generated	<ul style="list-style-type: none"> <li>Direct measurements and continuous monitoring of harmonics, flicker and negative sequence voltage under a selected range of power system conditions, including possible permutations of operating arrangements within the Generating System, using power quality recording devices; and</li> <li>the tests must be such that harmonics, flicker and negative sequence voltage contribution by the Generating System can be reasonably derived from the measurements, including repeat tests, as required, such that contribution by the Generating System can be reasonably established.</li> </ul>	Annually (or as agreed by AEMO)
A12.13. Generation Protection Systems	<ul style="list-style-type: none"> <li>Test the relevant sub-systems by means of secondary injection into protection system relays.</li> </ul>	Every 5 years or longer depending on the self-diagnostic mechanism available (or as agreed by AEMO). <i>Note: The self-diagnostic mechanism must be specified and outlined in the Generator Monitoring Plan to support the proposed frequency of testing for generation Protection Systems.</i>
A12.14. Remote Monitoring Requirements	<ul style="list-style-type: none"> <li>Test availability and continual functionality of relevant sub-systems of Remote Monitoring Equipment routinely.</li> </ul>	Annually (or as agreed by AEMO)

Technical Requirement	Test Descriptions	Frequency of obtaining evidence of compliance for GMP
A12.15. Remote Control Requirements	<ul style="list-style-type: none"> <li>• Test availability and continual functionality of relevant sub-systems of Remote Control Equipment.</li> </ul>	Annually (or as agreed by AEMO)
A12.16. Communications Equipment Requirements	<ul style="list-style-type: none"> <li>• Routinely test the availability of communication links, including any redundancies;</li> <li>• Routinely test relevant sub-systems, including power backup or uninterruptible power supply system;</li> <li>• Test end-to-end communication delay from the time the signal is issued from AEMO to the Generating Units; and</li> <li>• Test routine and emergency control telephone calls, as described in Appendix 12.16.3.2 of the WEM Rules.</li> </ul>	Annually (or as agreed by AEMO)
A12.17. Generation System Model	<ul style="list-style-type: none"> <li>• Verify various aspects of the modelled technical performance, as demonstrated by a generation system model against all mandatory tests specified in Appendix B.</li> </ul>	Every 3 years and/or immediately after modelled performance requiring validation has been identified in accordance with the Network Operator's WEM Procedure published in accordance with clause 3A.4.2

## Appendix C. Monitoring Requirements

Table 5 details monitoring methods that may be undertaken by a Market Participant to establish ongoing verification of compliance with Registered Generator Performance Standards as part of a Generator Monitoring Plan in accordance with paragraph 3.6.3(a) and 3.6.3(b).

**Table 5 Monitoring Requirements**

Technical Requirement	Monitoring method descriptions	Suggested monitoring frequency
A12.2. Active Power Capability	<ul style="list-style-type: none"> <li>Monitor and assess the Active Power level using Monitoring Data at the Measurement Location under all relevant operating arrangements within the Generating System.</li> <li>Continuous recording of operating arrangements, ambient temperature on-site and location where temperature is measured.</li> </ul>	Continuous monitoring with assessment performed annually.
A12.3. Reactive Power Capability	<ul style="list-style-type: none"> <li>Monitor and assess the Reactive Power Capability using SCADA data at the required location for all relevant operating arrangements within the Generating System.</li> <li>Operating arrangements, ambient temperature on-site and location where temperature is measured continuously recorded.</li> <li>Monitor the occurrence of any over/under excitation limits.</li> </ul>	Continuous monitoring with assessment performed annually.
A12.4. Voltage and Reactive Power Control	<ul style="list-style-type: none"> <li>Monitor and assess in-service performance of voltage, Reactive Power or Power Factor using high speed recorders during every event involving a significant variation to voltage, Reactive Power and/or Power Factor.</li> </ul>	Continuous monitoring with assessment undertaken whenever relevant disturbance takes place.
A12.5. Active Power Control	<ul style="list-style-type: none"> <li>Monitor and assess in-service Active Power response to target Active Power levels continuously.</li> </ul>	Continuous monitoring with assessment performed annually.
A12.6. Inertia and Frequency Control	<ul style="list-style-type: none"> <li>Monitor and assess in-service performance using high speed recorders, for every event involving a significant variation to system frequency.</li> </ul>	Continuous monitoring with assessment undertaken whenever relevant disturbance takes place.

Technical Requirement	Monitoring method descriptions	Suggested monitoring frequency
<p>A12.7. Disturbance Ride Through for a Frequency Disturbance</p>	<ul style="list-style-type: none"> <li>• Monitor and assess performance of a Generating System, using high speed recorders, for every event involving a significant variation in system frequency, including events that result in both the Generating System or any Generating Unit(s) within a Generating System disconnecting and events where the Generating System remains connected;</li> <li>• time of the event, frequency, as recorded by the Generating System, and the response of the Generating System, during fault and post-fault, must be recorded; and/or</li> <li>• investigate every disconnection of a Generating System, or any Generating Unit(s) within a Generating System that occurs during a significant frequency disturbance, which includes where the relevant Protection Systems activate (which may be based on protection relay activity logs).</li> </ul>	<p>Continuous monitoring with assessment undertaken whenever relevant disturbance takes place.</p>
<p>A12.8. Disturbance Ride Through for a Voltage Disturbance</p>	<ul style="list-style-type: none"> <li>• Monitor and assess performance of a Generating System, using high speed recorders, for every event involving significant variation in voltage, as recorded by the Generating System, including events that result in both the Generating System or any Generating Unit(s) within a Generating System disconnecting and events where the Generating System remains connected;</li> <li>• time of the event, voltage as recorded by the Generating System, and the response of the Generating System, during fault and post-fault, must be recorded; and/or</li> <li>• investigate every disconnection of a Generating System, or any Generating Unit(s) within a Generating System that occurs during a significant voltage disturbance, which includes where the relevant Protection Systems activate (which may be based on protection relay activity logs).</li> </ul>	<p>Continuous monitoring with assessment undertaken whenever relevant disturbance takes place.</p>

Technical Requirement	Monitoring method descriptions	Suggested monitoring frequency
A12.9. Disturbance Ride Through for Multiple Disturbances	<ul style="list-style-type: none"> <li>• Monitor and assess performance of a Generating System, using high speed recorders, for every event involving significant variation in voltage, as recorded by the Generating System, including events that result in both the Generating System or any Generating Unit(s) within a Generating System disconnecting and events where the Generating System remains connected;</li> <li>• time of the event, voltage, as recorded by the Generating System, and the response of the Generating System, during a fault and post-fault, must be recorded; and/or</li> <li>• investigate every disconnection of a Generating System or any Generating Unit(s) within a Generating System that occurs.</li> </ul>	Continuous monitoring with assessment undertaken whenever relevant disturbance takes place.
A12.10. Disturbance Ride Through for Partial Load Rejection	<ul style="list-style-type: none"> <li>• Monitor and assess performance of a Generating System, using high speed recorders, for every event involving sudden and significant reduction in Active Power, including events that result in both the Generating System disconnecting and where the Generating System remains connected;</li> <li>• time of the event, frequency, as recorded by the Generating System, and the response of the Generating System, during a fault and post-fault, must be recorded; and/or</li> <li>• investigate every disconnection of a Generating System or any Generating Unit(s) within a Generating System that occurs during significant frequency disturbances, which includes where the relevant Protection Systems activate (which may be based on protection relay activity logs).</li> </ul>	Continuous monitoring with assessment undertaken whenever relevant disturbance takes place.
A12.11. Disturbance Ride Through for Quality of Supply	<ul style="list-style-type: none"> <li>• Investigate every disconnection of a Generating System or any generating unit(s) within a Generating System, including verifying the applied settings of the Protection Systems; and/or</li> <li>• monitor and measure harmonics, flicker and negative sequence voltage continuously under a selected range of power system conditions, including a range of operating arrangements within the Generating System, using a power quality recording device.</li> </ul>	Continuous monitoring with assessment undertaken whenever relevant disturbance takes place.

Technical Requirement	Monitoring method descriptions	Suggested monitoring frequency
A12.12. Quality of Electricity Generated	<ul style="list-style-type: none"> <li>Refer to relevant tests in Appendix B.</li> </ul>	Continuous, or periodically with each monitoring period being sufficiently long to capture a range of power system conditions.
A12.13. Generation Protection Systems	<ul style="list-style-type: none"> <li>Investigate every disconnection of a Generating System, or any Generating Unit(s) within a Generating System; and/or</li> <li>investigate every Protection System failure, especially where a Protection System has not operated the way it is designed to; and/or</li> <li>routinely verify the applied settings of the Protection Systems; and/or</li> <li>test the relevant sub-systems by means of secondary injection into Protection System relays.</li> </ul>	Continuous monitoring with assessment undertaken whenever relevant disturbances take place.
A12.14. Remote Monitoring Requirements	<ul style="list-style-type: none"> <li>Continuously monitor the availability and continual functionality of Remote Monitoring Equipment by means of an automated monitoring and logging system; and/or</li> <li>continuously monitor the availability and continual functionality of all specified signals, as required by Appendix 12.14.3.3 of the WEM Rules.</li> </ul>	Continuous monitoring with assessment performed annually.
A12.15. Remote Control Requirements	<ul style="list-style-type: none"> <li>Continuously monitor the availability and functionality of Remote Control Equipment by means of an automated monitoring and logging system or an equivalent means.</li> </ul>	Continuous monitoring with assessment performed annually.
A12.16. Communications Equipment Requirements	<ul style="list-style-type: none"> <li>Continuously monitor the availability and functionality of communications equipment by means of an automated monitoring and logging system.</li> </ul>	Continuous monitoring with assessment performed annually.
A12.17. Generation System Model	<ul style="list-style-type: none"> <li>Verify simulated technical performance against Test Data, Monitoring Data and Disturbance Data captured as part of the Generator Monitoring Plan.</li> </ul>	Whenever modelled technical performances requiring verification have been identified and when disturbances are deemed appropriate for verification of a modelled technical performance.



## Appendix D. Compliance Verification mechanisms

Table 6 provides compliance verification mechanisms that must be considered by Market Participants for ongoing verification of the Generating System’s Registered Generator Performance Standards. This table serves as a guide to assist development of relevant testing and monitoring regimes in the Generator Monitoring Plan. For detailed examples of verification of compliance, refer to the latest Generating Monitoring Plan Template published on the WEM Website.

**Table 6 Verification of Compliance Mechanism**

Technical Requirement	Verification of compliance
A12.2. Active Power Capability	<ul style="list-style-type: none"> <li>• Test Data and Monitoring Data are recorded at the location specified in the Registered Generator Performance Standard.</li> <li>• Test Data and Monitoring Data that verifies the Generating System meets:                             <ul style="list-style-type: none"> <li>○ the Temperature Dependency Data in the Registered Generator Performance Standard;</li> <li>○ its Rated Maximum Active Power output level for all operating conditions specified in the Registered Generator Performance Standard; and</li> <li>○ any other conditions forming part of the Registered Generator Performance Standard.</li> </ul> </li> </ul>
A12.3. Reactive Power Capability	<ul style="list-style-type: none"> <li>• Test Data and Monitoring Data are recorded at the location specified in the Registered Generator Performance Standard.</li> <li>• Test Data and Monitoring Data are recorded with all Control System, Protection System and other limiting devices in service.</li> <li>• Test Data and Monitoring Data that verifies the Generating System meets:                             <ul style="list-style-type: none"> <li>○ the Generator Performance Chart in the Registered Generator Performance Standard;</li> <li>○ the Dispatch of the full range of Active Power capability and Reactive Power Capability in accordance with the Registered Generator Performance Standard; and</li> <li>○ any other conditions forming part of the Registered Generator Performance Standard.</li> </ul> </li> </ul>

Technical Requirement	Verification of compliance
A12.4. Voltage And Reactive Power Control	<ul style="list-style-type: none"> <li>• Test Data, Disturbance Data and Monitoring Data are recorded with all Control System, Protection System and other limiting devices in service.</li> <li>• Disturbance Data and Monitoring Data from Control Systems include the key variables in the Registered Generator Performance Standard</li> <li>• Test Data and/or Monitoring Data that verifies the Generating System:                             <ul style="list-style-type: none"> <li>○ operates for all control modes in the Registered Generator Performance Standard; and</li> <li>○ meets the procedure for switching between control modes in the Registered Generator Performance Standard.</li> </ul> </li> <li>• Test Data, Monitoring Data and Disturbance Data that verifies control modes meets the Control System performance requirements in the Registered Generator Performance Standard.</li> </ul>
A12.5. Active Power Control	<ul style="list-style-type: none"> <li>• Test Data and/or Monitoring Data that verifies compliance with all Active Power control requirements in the Registered Generator Performance Standard.</li> <li>• Disturbance Data and Monitoring Data of every Generating System disconnection that verifies compliance with the relevant disconnection settings in the Registered Generator Performance Standard.</li> <li>• Test Data and/or Monitoring Data that verifies that Active Power ramping meets the ramping requirements in the Registered Generator Performance Standard.</li> </ul>
A12.6. Inertia and Frequency Control	<ul style="list-style-type: none"> <li>• Test Data and/or Monitoring Data that verifies the Frequency Dead Band on each Generating Unit, or Generating System, as applicable, complies with the Registered Generator Performance Standard.</li> <li>• Disturbance Data and Monitoring Data of every Generating System disconnection that verifies compliance with the relevant disconnection settings in the Registered Generator Performance Standard.</li> <li>• Test Data and/or Disturbance Data of frequency excursions that verifies the frequency response meets the control ranges, response times and sustain times in the Registered Generator Performance Standard.</li> </ul>
A12.7. Disturbance Ride Through for a Frequency Disturbance	<ul style="list-style-type: none"> <li>• Disturbance Data is recorded at the location specified in the Registered Generator Performance Standard.</li> <li>• Disturbance Data and Monitoring Data of every Generating System disconnection that verifies compliance with the relevant disconnection settings in the Registered Generator Performance Standard.</li> <li>• Disturbance Data of large frequency disturbances that verifies the Generating System:                             <ul style="list-style-type: none"> <li>○ maintains CUO within the frequency envelope in the Registered Generator Performance Standard.</li> <li>○ maintains CUO within the RoCoF limits in the Registered Generator Performance Standard.</li> </ul> </li> </ul>

Technical Requirement	Verification of compliance
A12.8. Disturbance Ride Through for a Voltage Disturbance	<ul style="list-style-type: none"> <li>• Disturbance Data is recorded at the location specified in the Registered Generator Performance Standard.</li> <li>• Disturbance Data and Monitoring Data of every Generating System disconnection that verifies compliance with the relevant disconnection settings in the Registered Generator Performance Standard.</li> <li>• Disturbance Data of large voltage disturbances that verifies the Generating System maintains CUO within the voltage envelope in the Registered Generator Performance Standard.</li> </ul>
A12.9. Disturbance Ride Through for Multiple Disturbances	<ul style="list-style-type: none"> <li>• Disturbance Data is measured at the location specified in the Registered Generator Performance Standard.</li> <li>• Disturbance Data and Monitoring Data of every Generating System disconnection that verifies compliance with the relevant disconnection settings in the Registered Generator Performance Standard.</li> <li>• Disturbance Data with a series of multiple disturbances within any five-minute period that verifies the Generating System maintains CUO for every applicable disturbance and up to the number specified in the Registered Generator Performance Standard.</li> <li>• Disturbance Data for each occurrence of a fault referred to in Appendix 12.9.3.2 of the WEM Rules that verifies the Generating System maintains CUO and meets the Registered Generator Performance Standard with respect to:                             <ul style="list-style-type: none"> <li>○ reactive current contribution during the fault.</li> <li>○ reactive current response during and after clearance of the fault.</li> <li>○ Active Power response after clearance of the fault.</li> </ul> </li> </ul>
A12.10. Disturbance Ride Through for Partial Load Rejection	<ul style="list-style-type: none"> <li>• Disturbance Data that verifies the Generating System maintains CUO during and following a sudden reduction in required Active Power generation in the power system, and the Active Power generation meets the Registered Generator Performance Standard.</li> </ul>
A12.11. Disturbance Ride Through for Quality of Supply	<ul style="list-style-type: none"> <li>• Disturbance Data and Monitoring Data of every Generating System disconnection that verifies that the disconnection is not caused by voltage fluctuation, harmonic voltage distortion or voltage unbalance conditions at the Connection Point within the levels specified for flicker, harmonics and negative phase sequence voltage in the Technical Rules.</li> </ul>
A12.12. Quality of Electricity Generated	<ul style="list-style-type: none"> <li>• Monitoring Data that verifies the voltage imbalance, voltage fluctuation and harmonic voltage distortion produced by the Generating System at the Connection Point does not exceed the allocated limits in the Registered Generator Performance Standard.</li> </ul>

Technical Requirement	Verification of compliance
A12.13. Generation Protection Systems	<ul style="list-style-type: none"> <li>Disturbance Data of Protection System faults that verifies the Generating System meets the protection requirements in the Registered Generator Performance Standard.</li> <li>Disturbance Data and Monitoring Data that verifies anti-islanding protection operates in accordance with the Registered Generator Performance Standard.</li> <li>Disturbance Data and Monitoring Data that verifies the Generating System's relevant Protection Schemes operates in accordance with the Registered Generator Performance Standard.</li> </ul>
A12.14. Remote Monitoring Requirements	<ul style="list-style-type: none"> <li>Test Data and Monitoring Data that verifies all Remote Monitoring Equipment installed is in accordance with the Registered Generator Performance Standard.</li> </ul>
A12.15. Remote Control Requirements	<ul style="list-style-type: none"> <li>Test Data and Monitoring Data that verifies all Remote Control Equipment installed is in accordance with the Registered Generator Performance Standard.</li> </ul>
A12.16. Communications Equipment Requirements	<ul style="list-style-type: none"> <li>Test Data and Monitoring Data that verifies communication links between the Remote Monitoring Equipment and Remote Control Equipment is in accordance with the Registered Generator Performance Standard.</li> <li>Test Data and/or Monitoring Data that demonstrate the primary speech communication channel is in accordance with the Registered Generator Performance Standard.</li> </ul>
A12.17. Generation System Model	<ul style="list-style-type: none"> <li>Updates to modelling data to meet the requirements in the Registered Generator Performance Standard are in accordance with Western Power's WEM Procedure: Generation System Model Submission and Maintenance.</li> <li>Test Data, Monitoring Data and Disturbance Data overlayed with simulation data that verifies the observed performance of the Generation System matches the predicted performance of the Generation System using the generation system model.</li> <li>Updates to the generation system model to meet the requirements in the Registered Generator Performance Standard are made in accordance with the WEM Procedure: Generation System Model Submission and Maintenance.</li> </ul>