

**Comparison between NERC VAR-501-WECC -1 and Alberta VAR-501-WECC-AB-1
Power System Stabilizer**

Section	NERC VAR-501-WECC -1	Alberta VAR-501-WECC-AB-1	Reason for Difference¹
Purpose	To ensure that Power System Stabilizers (PSS) on synchronous generators shall be kept in service.	The purpose of this reliability standard is to ensure that power system stabilizers on synchronous generators are kept in service.	
Applicability	4.1. Generator Operators	This reliability standard applies to: <ul style="list-style-type: none"> • Operators of synchronous generating units connected to the transmission system. • GFOs of synchronous generating units connected to the transmission system. 	Requirements added to the Alberta reliability standard for GFOs.
Effective Date	On the first day of the first quarter, after applicable regulatory approval.	Ninety calendar days after the date of approval by the Commission.	
Requirement	R1. Generator Operators shall have PSS in service 98% of all operating hours for synchronous generators equipped with PSS. Generator Operators may exclude hours for R1.1 through R1.12 to achieve the 98% requirement. <i>[Violation Risk Factor: Medium]</i>	R1 Each operator of a synchronous generating unit equipped with a power system stabilizer must have the power system stabilizer in service 98% of all operating hours excluding the operating hours listed in requirements R 1.1 to 1.12, inclusive:	Reworded for clarity and consistency.

¹ The following revisions have been made throughout this proposed reliability standard:

- Identified the responsible entities in Alberta.
- Applied a consistent writing style and added clarity.
- Changed passive terms such as "shall" to "must".
- Developed measures specific to the requirements.

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	<i>[Time Horizon: Operations Assessment]</i>		
Measure		MR1 Documentation shows that the calculated availability is within the percentage requirements specified in requirement R1, and excluded hours were included correctly in the calculation.	
Requirement	R1.1. The synchronous generator operates for less than five percent of all hours during any calendar quarter.	R1.1 The operating hours during which the synchronous generating unit operates for less than five per cent of all hours during any calendar quarter.	Clarified for all sub-requirements that all hours as identified in the NERC sub-requirements are operating hours.
Measure		MR1.1 Records or logs exist and confirm a generator did not operate over the percentage of hours as specified in requirement R1.1.	
Requirement	R1.2. Performing maintenance and testing up to a maximum of seven calendar days per calendar quarter.	R1.2 The operating hours during which maintenance or testing on the power system stabilizer was performed, up to a maximum of seven calendar days per calendar quarter.	Reworded for clarity and consistency.

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Measure		MR1.2 Records or logs exist and confirm that maintenance or testing activities were performed for hours excluded.	
Requirement	R1.3. PSS exhibits instability due to abnormal system configuration.	R1.3 The operating hours during which power system stabilizer exhibits instability due to abnormal system configuration.	Reworded for clarity and consistency.
Measure		MR1.3 Records or logs exist and confirm that operations and /or conditions specified in requirement R1.3 were present for hours excluded.	
Requirement	R1.4. Unit is operating in the synchronous condenser mode (very near zero real power level).	R1.4 The operating hours during which the synchronous generating unit is operating in the synchronous condenser mode (very near zero real power level).	Reworded for clarity and consistency.
Measure		MR1.4 Records or logs exist and confirm operations and/or conditions as specified in requirement R1.4 were present for hours excluded.	
Requirement	R1.5. Unit is generating less power than its design limit for effective PSS operation.	R1.5 The operating hours during which the synchronous generating unit is generating less power than its design limit for effective power system stabilizer operation.	Reworded for clarity and consistency.

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Measure		MR1.5 Records or logs exist and confirm that operations and/or conditions as specified in requirement R1.5 were present for hours excluded.	
Requirement	R1.6. Unit is passing through a range of output that is a known “rough zone” (range in which a hydro unit is experiencing excessive vibration).	R1.6 The operating hours during which the synchronous generating unit is passing through a range of output that is a known “rough zone” (including without limitation, a range in which a synchronous generating unit is experiencing excessive vibration).	Reworded for clarity and consistency.
Measure		MR1.6 Records or logs exist and confirm that operations and/or conditions specified in requirement R1.6 were present for hours excluded.	
Requirement	R1.7. The generator AVR is not in service.	R1.7 The operating hours during which the synchronous generating unit’s automatic voltage regulator is not in service.	Reworded for clarity and consistency.

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Measure		MR1.7 Records or logs exist and confirm that operations and/or conditions specified in requirement R1.7 were present for hours excluded.	
Requirement	R1.8. Due to component failure, the PSS may be out of service up to 60 consecutive days for repair per incident.	R1.8 The operating hours up to 60 consecutive days per incident, during which the power system stabilizer is out of service for repair due to a component failure.	Reworded for clarity and consistency.
Measure		MR1.8 Records or logs exist and confirm that operations and/or conditions specified in requirement R1.8 were present for hours excluded.	
Requirement	R1.9. Due to a component failure, the PSS may be out of service up to one year provided the Generator Operator submits documentation identifying the need for time to obtain replacement parts and if required to schedule an outage.	R1.9 The operating hours up to one year during which the power system stabilize had a component failure, provided the GFO has submitted documentation identifying the need for time to obtain replacement parts and if required to schedule an outage.	Our assumption is that real-time conditions are for generator operator and non-real-time conditions belong to the owner.

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Measure		MR1.9 Records, logs, and/or other documentation exists and confirms that operations and/or conditions as specified in requirement R1.9 were present for hours excluded.	
Requirement	R1.10. Due to a component failure, the PSS may be out of service up to 24 months provided the Generator Operator submits documentation identifying the need for time for PSS replacement and to schedule an outage.	R1.10 The operating hours up to 24 months during which the power system stabilizer had a component failure, provided the GFO of such unit has submitted documentation identifying the need for time to replace the power system stabilizer and to schedule an outage.	Responsibilities have been divided such that real-time conditions apply to operators of generating units and non-real-time conditions apply to the owner.
Measure		MR1.10 Records, logs, and/or other documentation exists and confirms that operations and/or conditions as specified in requirement R1.10 were present for hours excluded.	
Requirement	R1.11. The synchronous generator has not achieved Commercial Operation.	R1.11 The operating hours during which the synchronous generating unit has not achieved commercial operation.	Reworded for clarity and consistency.

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Measure		MR1.11 Records or logs exist and confirm that operations and/or conditions as specified in requirement R1.11 were present for hours excluded.	
Requirement	R1.12. The Transmission Operator directs the Generator Operator to operate the synchronous generator, and the PSS is unavailable for service.	R1.12 The operating hours during which the ISO has directed an operator of a synchronous generating unit to operate such unit, and the power system stabilizer is unavailable for service.	Reworded for clarity and consistency.

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Section	NERC VAR-501-WECC -1	Alberta VAR-501-WECC-AB-1	Reason for Difference ¹
Measure	<p>M1. Generators Operators shall provide quarterly reports to the compliance monitor and have evidence for each synchronous generator of the following:</p> <p>M1.1 The number of hours the synchronous generator was on line.</p> <p>M1.2 The number of hours the PSS was out of service with generator on line.</p> <p>M1.3 The PSS in service percentage</p> <p>M1.4 If excluding PSS out of service hours as allowed in R1.1 through R1.12, provide:</p> <p>M1.4.1 The number of hours excluded, and</p> <p>M1.4.2 The adjusted PSS in-service percentage.</p> <p>M2. If excluding hours for R1.1 through R1.12, provide:</p> <p>M2.1 The date of the outage</p> <p>M2.2 Supporting documentation for each requirement that applies</p>	<p>MR1.12 Records or logs exist and confirm that operations and/or conditions as specified in requirement R1.12 were present for hours excluded.</p>	<p>Note: Reporting requirements are covered in OPP 702 and the 2009 Terms and Conditions of Service.</p>
Requirement	<p>R2. Generator Operators shall have documentation identifying the number of hours excluded for each requirement in R1.1 through R1.12.</p>	<p>R2. Each GFO must have documentation identifying the number of operating hours excluded for each requirement R1.1 through R1.12, inclusive.</p>	<p>Our assumption is that real-time conditions are for generator operator and non-real-time conditions belong to the owner.</p>

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	<i>[Violation Risk Factor: Low] [Time Horizon: Operations Assessment]</i>		
Measure		MR2 Documentation identifies and reports hours excluded for each eligible exclusion as specified in requirements R1.1 to R1.12.	
Compliance	To view the compliance section D of the NERC reliability standard follow this link: http://www.nerc.com/files/VAR-501-WECC-1.pdf		There is no compliance section currently proposed in the Alberta Reliability Standards. A compliance program is under development for Alberta Reliability Standards that recognizes the compliance monitoring and enforcement structure in Alberta. This approach is deemed consistent with the existing ISO Rules.
Regional Differences	None identified.		Not applicable in Alberta



Proposed Terms for the Consolidate Authoritative Document Glossary:

None

Defined Terms Used in this Standard:

(As included in the Consolidated Authoritative Document Glossary)

- automatic voltage regulator
- commercial operation
- Commission
- day
- generating facility owner (GFO)
- ISO
- outage
- power system stabilizer
- reliability standard
- system