

1. Purpose

The purpose of this **reliability standard** is to ensure **generating units** and **aggregated generating facilities** provide **reactive power** support and voltage control, within generating facility capabilities, in order to protect equipment and maintain reliable operation of the **interconnected electric system**.

2. Applicability

This **reliability standard** applies to:

- (a) the **legal owner** of a **generating unit** that has a **maximum authorized real power** greater than or equal to 5 MW and where the **generating unit** is:
 - (i) connected to a switchyard at which **system access service** is provided to:
 - (A) the **generating unit**; or
 - (B) an industrial complex of which the **generating unit** is a part; or
 - (ii) directly connected to **transmission facilities** within the City of Medicine Hat;
- (b) the **operator** of a **generating unit** that has a **maximum authorized real power** greater than or equal to 5 MW and where the **generating unit** is:
 - (i) connected to a switchyard at which system access service is provided to:
 - (A) the **generating unit**; or
 - (B) an industrial complex of which the **generating unit** is a part; or
 - (ii) directly connected to **transmission facilities** within the City of Medicine Hat;
- (c) the **legal owner** of an **aggregated generating facility** that has a **maximum authorized real power** greater than or equal to 5 MW and is:
 - (i) connected to a switchyard at which **system access service** is provided to:
 - (A) the **aggregated generating facility**; or
 - (B) an industrial complex of which the **aggregated generating facility** is a part; or
 - (ii) directly connected to transmission facilities within the City of Medicine Hat; and
- (d) the **operator** of an **aggregated generating facility** that has a **maximum authorized real power** greater than or equal to 5 MW and is:
 - (i) connected to a switchyard at which **system access service** is provided to:
 - (A) the **aggregated generating facility**; or
 - (B) an industrial complex of which the **aggregated generating facility** is a part; or
 - (ii) directly connected to **transmission facilities** within the City of Medicine Hat.

Notwithstanding subsections (c) and (d) above, this **reliability standard** does not apply to the **legal owner** of an **aggregated generating facility** or the **operator** of an **aggregated generating facility** that meets the criteria listed in Appendix 1 of VAR-001-AB.

3. Requirements

R1 The **operator** of a **generating unit** and **operator** of an **aggregated generating facility** must, while a **generating unit** or **aggregated generating facility** is electrically connected to the **transmission system**, operate the **generating unit** or **aggregated generating facility** with its **automatic voltage regulator** or **voltage regulating system** in service and in automatic voltage control mode, or in a different control mode as instructed by the **ISO** unless:

- (a) the **generating unit** or **aggregated generating facility** is exempted by the **ISO**;
- (b) the **operator** of a **generating unit** or **operator** of an **aggregated generating facility** has notified the **ISO** in accordance with requirement R3 that the **generating unit** or **aggregated generating**

- facility** is not being operated in automatic voltage control mode or in the control mode that was instructed by the **ISO** for a reason other than start-up, shutdown, or testing. Such reasons may include a forced or unplanned change in control mode;
- (c) the **generating unit** or **aggregated generating facility** is being operated during start-up or shut-down in accordance with the procedure of the **operator** of a **generating unit** or **operator** of an **aggregated generating facility**; or
 - (d) the **operator** of a **generating unit** or the **operator** of an **aggregated generating facility** has previously obtained approval from the **ISO** allowing the **generating unit** or **aggregated generating facility** to be in a testing mode.
- R2** Unless exempted by the **ISO**, each **operator** of a **generating unit** and each **operator** of an **aggregated generating facility** must, upon receiving an instruction from the **ISO** regarding voltage levels or **reactive power**, comply with that instruction.
- R2.1** Each **operator** of a **generating unit** and each **operator** of an **aggregated generating facility** must, when:
- (a) the **automatic voltage regulator** of a **generating unit** or the **voltage regulating system** of an **aggregated generating facility** is out of service; or
 - (b) the **generating unit** does not have an **automatic voltage regulator**, or the **aggregated generating facility** does not have a **voltage regulating system**,
- use an alternative method to control the generator **reactive power** output to comply with an instruction from the **ISO** regarding voltage levels or **reactive power**.
- R2.2** Notwithstanding requirement R2, where the **operator** of a **generating unit** or the **operator** of an **aggregated generating facility** cannot comply with an instruction to modify voltage, the **operator** of a **generating unit** or the **operator** of an **aggregated generating facility** must provide an explanation for why the instruction cannot be met.
- R2.3** Each **operator** of a **generating unit** and **operator** of an **aggregated generating facility** that does not monitor the voltage or **reactive power** at the location specified in an instruction or **directive** from the **ISO** must have a methodology for converting the voltage or **reactive power** at the location specified by the **ISO**.
- R3** Each **operator** of a **generating unit** and **operator** of an **aggregated generating facility** must notify the **ISO** within 30 minutes after a status or control mode change of the **automatic voltage regulator**, **voltage regulating system**, alternative voltage controlling device or power system stabilizer, as applicable, on any **generating unit** or **aggregated generating facility**.
- R3.1** If the status or control mode has been restored within 30 minutes of such change, then the **operator** of a **generating unit** or **operator** of an **aggregated generating facility** is not required to notify the **ISO** of the status or control mode change.
- R3.2** If a **generating unit** or an **aggregated generating facility** is in testing, start-up, shut-down or offline mode, requirement R3 does not apply.
- R3.3** If a **generating unit** or an **aggregated generating facility** is operating below the safe and stable level for power system stabilizer operation, then the **operator** of a **generating unit** or **operator** of an **aggregated generating facility** is not required to notify the **ISO** of a change in status of the power system stabilizer caused by the low output level of the **generating unit** or **aggregated generating facility**.
- R4** Each **operator** of a **generating unit** and **operator** of an **aggregated generating facility** must notify the **ISO** within 30 minutes after becoming aware of a change in **reactive power** capability due to factors other than a status or control mode change described in requirement R3, or unless:
- R4.1** the capability has been restored within 30 minutes of the **operator** of a **generating unit** or **operator** of an **aggregated generating facility** becoming aware of such change, then the **operator** is not required to notify the **ISO** of the change in **reactive power** capability; or

R4.2 a **generating unit** or an **aggregated generating facility** is in testing, start-up, shut-down or offline mode, requirement R4 does not apply.

R5 Each **legal owner** of a **generating unit** and each **legal owner** of an **aggregated generating facility** whose step-up transformer for connecting to the **transmission system** or auxiliary transformer has primary voltages equal to or greater than the **generating unit** terminal voltage must provide any one or more of the following to the **ISO** within 30 **days** of a request:

- (a) tap settings;
- (b) available fixed tap ranges; and
- (c) impedance data.

R6 Each **legal owner** of a **generating unit** and each **legal owner** of an **aggregated generating facility** that has a step-up transformer, with off-load taps for connecting to the **transmission system** must, change the tap positions according to the specifications the **ISO** provides.

R6.1 Each **legal owner** of a **generating unit** and each **legal owner** of an **aggregated generating facility** that cannot comply with requirement R6 must notify the **ISO** within 30 **days** of the **ISO** providing the specifications and must include the technical justification along with the notice.

4. Measures

The following measures correspond to the requirements identified in section 3 of this **reliability standard**. For example, MR1 is the measure for requirement R1.

MR1 Evidence of operating the **generating unit** or **aggregated generating facility** in automatic voltage control mode as required in requirement R1 exists. Evidence may include exemption letters, data files, start-up or shut-down procedures, **operator** logs, voice recordings, e-mail, or other equivalent evidence.

MR2 Evidence of complying with an instruction as required in requirement R2 exists. Evidence may include data files, **operator** logs, or other equivalent evidence.

MR2.1 Evidence of using an alternative method to control generator **reactive power** output as required in requirement R2.1 exists. Evidence may include data files, **operator** logs, voice recordings, or other equivalent evidence.

MR2.2 Evidence of providing an explanation to the **ISO**, as required in requirement R2.2 exists. Evidence may include voice recordings, **operator** logs, or other equivalent evidence.

MR2.3 Evidence of having a methodology as required in requirement R2.3 exists. Evidence may include a documented methodology, or other equivalent evidence.

MR3 Evidence of notifying the **ISO** within 30 minutes of any status or control mode change as required in requirement R3 exists. Evidence may include data logs, SCADA logs, voice recordings, **operator** logs, or other equivalent evidence.

MR4 Evidence of notifying the **ISO** within 30 minutes of becoming aware of a change in reactive power capability as required in requirement R4 exists. Evidence may include voice recordings, **operator** logs, or other equivalent evidence.

MR5 Evidence of providing the **ISO** with information on its step-up and auxiliary transformers, as required in requirement R5 exists. Evidence may include dated written or electronic records, or other equivalent evidence.

MR6 Evidence of changing step-up transformer taps in accordance with the **ISO's** specifications as required in requirement R6 exists. Evidence may include written or electronic records, or other equivalent evidence.

MR6.1 Evidence of notifying the **ISO** as required in requirement R6.1 exists. Evidence may include written or electronic notifications, or other equivalent evidence.

Alberta Reliability Standard Generator Operation for Maintaining Network Voltages VAR-002-AB-4.1



Revision History

Date	Description
2021-06-24	Initial release.