

ISO Rules

Part 500 Facilities

Division 503 Technical & Operating Requirements

Section 503.4 Voltage Regulation



Applicability

- 1 Section 503.4 applies to:
 - (a) the **legal owner** of a **generating unit, aggregated facility, or energy storage resource** that is directly connected to the **transmission system** or to **transmission facilities** within the City of Medicine Hat, including a **generating unit, aggregated facility, or energy storage resource** situated within an industrial complex that is directly connected to the **transmission system**; and
 - (b) the **ISO**.

Requirements

Voltage Regulation

- 2(1) The **legal owner** must ensure that the **generating unit, aggregated facility, or energy storage resource** has a continuously variable, continuously acting, closed loop, centralized **automatic voltage regulator** or **voltage regulating system** that:
 - (a) compares a measured voltage to a set point;
 - (b) controls any dynamic **reactive power** resources needed to meet the requirements of this Section 503.4;
 - (c) is designed to be continuously in service and controlling while the **generating unit, aggregated facility, or energy storage resource** is electrically connected to the **transmission system**;
 - (d) is capable of operating in a voltage set point control mode, to the exclusion of any other modes;
 - (e) is capable of manual set point adjustments to a value between 0.95 per unit and 1.05 per unit of the nominal voltage at the following point of control:
 - (i) the stator winding terminal, for a **generating unit** or synchronous **energy storage resource**; or
 - (ii) the **collector bus**, for an **aggregated facility**; or
 - (iii) at an alternative point of control for a facility that implements reactive current compensation in accordance with subsection 3(1);and
 - (f) is able to achieve, under non-**disturbance** conditions, a steady state voltage regulation of plus or minus 0.5% of the voltage set point at the point of control.
- (2) The **legal owner** must design a **generating unit, aggregated facility, or energy storage resource** such that the point of control for the **automatic voltage regulator** is not at the high voltage side of the **transmission system** step-up transformer.
- (3) The **legal owner** of a **generating unit** or synchronous **energy storage resource** must not use stator current limiters for the **generating unit** or **energy storage resource**.
- (4) The **legal owner** of an **aggregated facility** or **energy storage resource** must ensure that the **aggregated facility** or **energy storage resource** is calibrated such that a change in **reactive power** will achieve 95% of its final value no sooner than 0.1 seconds and no later than one second following a step change in voltage.
- (5) The **legal owner** of an **aggregated facility** must ensure the **aggregated facility** is able to regulate voltage at the **voltage regulation system** or **automatic voltage regulator** point of control under both

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non-disturbance and disturbance conditions.

(6) The **legal owner** of an **aggregated facility** must ensure the **voltage regulating system** for the **aggregated facility** measures voltage that represents the overall voltage response of the **aggregated facility**.

(7) The **legal owner** of an **aggregated facility** must ensure that the **aggregated facility** is designed such that, when the **voltage regulation system** requires the switching of a shunt reactive device, the switching operation is delayed by 10 seconds.

Reactive Current Compensation Setting

3(1) The **legal owner** must, if 2 or more **automatic voltage regulators** or **voltage regulating systems** have:

- (a) a common point of measurement; or
- (b) separate points of measurement connected by a low impedance bus,

implement reactive current compensation in each **automatic voltage regulator** or **voltage regulating system**.

(2) The **legal owner** must ensure that the **voltage regulating system** of an **aggregated facility** is capable of:

- (a) adjustable gain, or reactive droop compensation adjustable from 0% to 10%; and
- (b) reactive current compensation.

(3) The **ISO** must specify in the functional specification for the **aggregated facility** whether the reactive current compensation in the **voltage regulating system** or **automatic voltage regulator** must be implemented.

Variance to Reactive Current Compensation

4(1) The **legal owner** must submit a request in writing to the **ISO** for approval to use a reactive current compensation feature in the **automatic voltage regulator** or **voltage regulating system** that has a point of control not listed in subsection 2(1)(e).

(2) The **ISO** must make a decision on its approval and notify the **legal owner** in writing of the decision no later than 90 **days** after the date of receiving the submission set out in subsection 4(1).

ISO Notice to Change Reactive Current Compensation Setting

5(1) The **ISO** must provide a **legal owner** with 180 **days**' written notice that a change to the reactive current compensation settings is required.

(2) The **legal owner** must, upon receiving the notice from the **ISO**:

- (a) make a change to the reactive current compensation settings on or before the date specified in the notice; and
- (b) provide written confirmation to the **ISO** that the change has been implemented.

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(3) The **legal owner** of an **aggregated facility** that is not equipped with reactive current compensation must, notwithstanding subsection 5(2), advise the **ISO** in writing that it is not equipped with such settings on or before the date specified by the **ISO**.

Revision History

Date	Description
2024-04-01	Initial release.