

# ISO Rules

## Part 500

### Division 502 Technical Requirements

#### Section 502.16 Aggregated Generating Facilities

##### Operating Requirements



#### Applicability

- 1 Section 502.16 applies to:
  - (a) the **operator** of an **aggregated generating facility** that is directly connected to the **transmission system** or to a **transmission facility** within the service area of the City of Medicine Hat, including an **aggregated generating facility** situated within an industrial complex that is directly connected to the **transmission system** or to a **transmission facility** within the service area of the City of Medicine Hat;
  - (b) the **legal owner** of an **aggregated generating facility** that is directly connected to the **transmission system** or to a **transmission facility** within the service area of the City of Medicine Hat, including an **aggregated generating facility** situated within an industrial complex that is directly connected to the **transmission system** or to a **transmission facility** within the service area of the City of Medicine Hat; and
  - (c) the **ISO**.

#### Requirements

##### Functional Specification

- 2(1)** The **ISO** may issue a written functional specification containing further details, direction and discrete work requirements and specifications for the design, construction and operation of any wind **aggregated generating facilities** and associated **transmission system** connection facilities.
- (2)** The functional specification must be generally consistent with the provisions of this section 502.16 but may contain material variances approved of by the **ISO** based upon its discrete analysis of any one or more of the technical, economic, safety, operational and system reliability requirements related to the specific facility project.

##### Requirements to Operate and Maintain an Aggregated Generating Facility

- 3(1)** This subsection 3 does not apply to:
  - (a) excitation systems;
  - (b) **voltage regulating systems**; or
  - (c) power system stabilizers,

as the applicable requirements are set out in **reliability standard** VAR-002-AB, *Generator Operation for Maintaining Network Voltages*.

- (2)** The **legal owner** of an **aggregated generating facility** must operate and maintain the **aggregated generating facility** to comply with the relevant technical design parameters applicable to the **aggregated generating facility** under section 502.1 of the **ISO rules**, *Aggregated Generating Facilities Technical Requirements*, for so long as the **aggregated generating facility** remains connected to the **transmission system** or a **transmission facility** in the service area of the City of Medicine Hat.
- (3)** The **operator** of an **aggregated generating facility** must, if it determines that any **aggregated generating facility** equipment required to meet the applicable technical requirements referred to in subsection 3(2) has become unavailable or is otherwise no longer meeting those requirements, report to the **ISO** in accordance with subsection 3(4) no later than one (1) **business day** after making such a determination.

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- (4) A report to the **ISO** as required by subsection 3(3) must include:
- (a) a description of the cause of the equipment unavailability or the reason that the equipment no longer meets the applicable technical design requirements;
  - (b) a plan to address the problem, including testing; and
  - (c) the expected date and time when the equipment will be repaired.
- (5) The **operator** of an **aggregated generating facility** must, if the **aggregated generating facility** equipment is not repaired by the expected date and time provided in the report described in subsection 3(4)(c), report to the **ISO** no later than one (1) **business day** after the original expected date and time of the reason why the **aggregated generating facility** equipment was not repaired at the expected date and time, and provide the **ISO** with a revised date and time for repair.
- (6) The **operator** of an **aggregated generating facility** must report to the **ISO** no later than one (1) **business day** after the equipment described in subsection 3(3) has been repaired.
- (7) If the **ISO** provides written notice to the **legal owner** of an **aggregated generating facility** detailing evidence that the observed performance of the **aggregated generating facility** is not consistent with any of the applicable technical requirements, the **legal owner** must submit to the **ISO** a written report, in accordance with subsection 13, demonstrating that the **aggregated generating facility** is capable of meeting those requirements.
- (8) The **legal owner** must submit a report pursuant to subsection 3(7) no later than sixty (60) **business days** after receipt of the **ISO**'s written notice.
- (9) Notwithstanding subsection 3(8), the **legal owner** of an **aggregated generating facility** is not required to provide the report if, between the date the **ISO** delivers the written notice and the deadline date for the submission of the report:
- (a) the **legal owner** demonstrates to the satisfaction of the **ISO** that the lack of consistency described in subsection 3(7) was caused by equipment problems for the **aggregated generating facility** that the **legal owner** corrected prior to the deadline date for the submission of the report; and
  - (b) the **ISO** provides written notice to the **legal owner** that the report is not required.

#### Requirements for Governor System

4 Subject to subsection 3, the **operator** of an **aggregated generating facility** must, if the **aggregated generating facility** is equipped with a **governor system**, only operate the **aggregated generating facility** with the **governor system** in service, in droop mode, and free to respond to frequency changes.

#### Requirements for Operation at Maximum Authorized Real Power

5(1) The **operator** of an **aggregated generating facility** must not operate the **aggregated generating facility** above the **maximum authorized real power** provided to the **ISO** in accordance with section 502.1 of the **ISO rules**, *Aggregated Generating Facilities Technical Requirements*.

(2) Notwithstanding subsection 5(1), the **ISO** may, during supply shortfall events, request that the **operator** of an **aggregated generating facility** operate above the **maximum authorized real power** of the **aggregated generating facility**.

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(3) The **ISO** must, when the additional **real power** referred to in subsection 5(2) is no longer required, notify the **operator** of the **aggregated generating facility** to return the **aggregated generating facility** to a value at or below the **maximum authorized real power**.

#### Operating Requirements for the Synchrophasor Measurement and Sequence of Event Devices

6 The **legal owner** of an **aggregated generating facility** must retain any available synchrophasor measurements and sequence of event records for a minimum period of one (1) calendar year.

#### Operating Data Requests

7(1) The **ISO** may request, by way of written notice, operating data from the **legal owner** of an **aggregated generating facility**.

(2) The **legal owner** of an **aggregated generating facility** must:

- (a) submit the operating data requested by the **ISO**, if available, no later than five (5) **business days** after receipt of the notice set out in subsection 7(1); or
- (b) if the operating data requested by the **ISO** is not available, advise the **ISO** in writing no later than five (5) **business days** after receipt of the notice set out in subsection 7(1).

#### Reactive Current Compensation Setting

8(1) The **ISO** must provide the **legal owner** of an **aggregated generating facility** with one hundred and eighty (180) **days**' notice in writing that a change to the reactive current compensation settings of the **aggregated generating facility** is required.

(2) The **legal owner** of an **aggregated generating facility** that is equipped with reactive current compensation settings must, upon receiving a notice in writing from the **ISO** referenced in subsection 8(1):

- (a) make a change to the reactive current compensation settings of the **aggregated generating facility** on or before the date specified by the **ISO**; and
- (b) provide written confirmation to the **ISO** that it has done so.

(3) The **legal owner** of an **aggregated generating facility** that is not equipped with reactive current compensation settings must, upon receiving a notice in writing from the **ISO** referenced in subsection 8(1), advise the **ISO** in writing that it is not equipped with such settings on or before the date specified by the **ISO**.

#### Testing Applicability

9 The following subsections 10 and 11 are only applicable to the **legal owner** of an **aggregated generating facility** that has a **maximum authorized real power** equal to or greater than 9 MW.

#### Baseline Testing

10(1) The **legal owner** of an **aggregated generating facility** must perform baseline testing, including model validation, in accordance with subsection 10(2), to validate the following **aggregated generating facility** models as applicable to the technology used in the **aggregated generating facility**:

- (a) generator or convertor;
- (b) **excitation system** including the:
  - (i) **voltage regulating system** or **automatic voltage regulator** in voltage control mode; and

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- (ii) **reactive power** resources;
  - (c) power system stabilizer for an **aggregated generating facility** equipped with a power system stabilizer;
  - (d) turbine-**governor system** or **real power** controller; and
  - (e) other **aggregated generating facility** models as the **ISO** requests.
- (2) The **legal owner** of an **aggregated generating facility** must perform baseline testing when any modification is made that changes the modelled behaviour of the **aggregated generating facility** with respect to the **transmission facilities**.
- (3) The **legal owner** of an **aggregated generating facility** is only required to perform testing on those portions of the models that are affected by the modifications described in subsection 10(2).
- (4) The **legal owner** of an **aggregated generating facility** must perform **reactive power** verification, in accordance with subsection 12 as part of the baseline testing.
- (5) The results of the baseline testing performed pursuant to subsection 10(2) must be reported to the **ISO** in accordance with subsection 13.

#### Model Revalidation Testing

- 11(1)** The **legal owner** of an **aggregated generating facility** must, for each model referenced in subsection 11(2) and as applicable to the technology used in the **aggregated generating facility**, perform model revalidation testing no later than five (5) calendar years from the date of the most recently completed baseline testing or model revalidation testing.
- (2) Model revalidation testing must consist of the following **aggregated generating facility** models:
- (a) **excitation system** including the **voltage regulating system** or **automatic voltage regulator** in voltage control mode;
  - (b) power system stabilizer for an **aggregated generating facility** equipped with a power system stabilizer; and
  - (c) turbine-**governor system** or **real power** controller.
- (3) Where the **ISO** provides written notice to the **legal owner** of an **aggregated generating facility** stating that the modelled response of the **aggregated generating facility** is not consistent with the observed response, the **legal owner** must perform model revalidation testing of the **aggregated generating facility** in accordance with subsection 11(2).
- (4) The **legal owner** of an **aggregated generating facility** must provide to the **ISO** the written results of any model revalidation testing no later than sixty (60) **business days** after receipt of the notice described in subsection 11(3).
- (5) Notwithstanding subsection 11(4), the **legal owner** of an **aggregated generating facility** is not required to perform the revalidation testing if, between the date the **ISO** delivers the written notice and the deadline date for the submission of model revalidation testing results:
- (a) the **legal owner** demonstrates to the satisfaction of the **ISO** that the lack of consistency described in subsection 11(3) was caused by equipment problems for the **aggregated generating facility** that the **legal owner** corrected prior to the revalidation testing date; and
  - (b) the **ISO** provides written notice to the **legal owner** that the revalidation testing results are not required.

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- (6) Notwithstanding subsection 11(1):
- (a) the **legal owner** may make a request in writing to the **ISO** for a deferral of model validation testing for no more than one (1) year, if within that year there is a planned change to equipment; and
  - (b) the **ISO** must reply in writing within sixty (60) **business days** of receiving such a request.
- (7) The results of any model revalidation testing performed pursuant to subsections 11(1) and 11(3) must be reported to the **ISO** in accordance with the requirements of subsection 13.

#### Reactive Power Verification Testing

**12(1)** The **legal owner** of an **aggregated generating facility** must, subject to subsection 12(3), perform **reactive power** verification testing of the **aggregated generating facility** at the **maximum authorized real power** for the **aggregated generating facility** at regular intervals no later than five (5) calendar years from the date of the prior **reactive power** verification or re-verification testing.

(2) The **reactive power** verification testing for the **aggregated generating facility** for the **maximum authorized real power** must achieve:

- (a) the **gross reactive power** at 0.90 lagging **power factor**; and
- (b) the **gross reactive power** at 0.95 leading **power factor**.

(3) The **legal owner** of an **aggregated generating facility** may test the **aggregated generating facility** at values other than the **maximum authorized real power**, but only if ambient conditions or **transmission system** limits do not allow the **aggregated generating facility** to achieve the **maximum authorized real power** or the **reactive power** requirements.

(4) Where the **ISO** provides written notice to the **legal owner** of an **aggregated generating facility** that the observed response of the **aggregated generating facility** is not consistent with the **reactive power** requirements for that **aggregated generating facility**, the **legal owner** must perform **reactive power** re-verification testing in accordance with subsection 12(2).

(5) Subject to the exception in subsection 12(6), the **legal owner** of an **aggregated generating facility** must provide the **reactive power** re-verification testing results to the **ISO** no later than sixty (60) **business days** after receipt of the notice described in subsection 13(4).

(6) Notwithstanding subsection 12(5), the **legal owner** of an **aggregated generating facility** is not required to perform the **reactive power** re-verification testing if, between the date the **ISO** delivers the written notice and the deadline date for the submission of the testing results:

- (a) the **legal owner** demonstrates to the satisfaction of the **ISO** that the lack of consistency described in subsection 12(4) was caused by equipment problems for the **aggregated generating facility** that the **legal owner** corrected prior to the testing date; and
- (b) the **ISO** provides written notice to the **legal owner** that the report is not required.

(7) The results of any **reactive power** re-verification testing performed pursuant to subsections 12(1) or 12(3) must:

- (a) be reported to the **ISO** in accordance with subsection 13; and
- (b) include a **reactive power** capability curve showing:
  - (i) over-excitation limiter or equivalents;

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- (ii) under-excitation limiters or equivalent; and
- (iii) any other limiting factors.

#### Model Validation and Reactive Power Verification Reporting

**13(1)** The **legal owner** of an **aggregated generating facility** must submit all test results referred to in this section 502.16 to the **ISO** in the form of reports that meet the requirements specified by the **ISO**.

**(2)** In addition to any other reporting requirements specified in this section 502.16 the **legal owner** of an **aggregated generating facility** must, unless otherwise specified in this section 502.16, submit a separate model validation and **reactive power** verification report in accordance with subsection 13(1) to the **ISO** no later than one hundred and eighty (180) **days** after the date of completion of each of:

- (a) the first connection of an **aggregated generating facility** to the **transmission system** or a **transmission facility** within the service area of the City of Medicine Hat;
- (b) the first connection of an **aggregated generating facility** to the **transmission system** or a **transmission facility** within the service area of the City of Medicine Hat upon completion of any modification described in subsections 10(2);
- (c) the in-service date of any increased **maximum authorized real power** of an **aggregated generating facility**;
- (d) the completion of model revalidation testing other than that required in subsection 11(3); and
- (e) the completion of any **reactive power** verification or re-verification testing other than that required in subsection 12(4).

#### Power Quality

**14(1)** The **ISO** must assess voltage unbalance concerns in accordance with the specifications set out in the *International Electrotechnical Commission 61000-3-13, Electromagnetic compatibility (EMC) – Part 3-13: Limits - Assessment of emission limits for the connection of unbalanced installations to MV, HV and EHV power systems* at the **point of connection** of the **aggregated generating facility** to the **transmission system** or a **transmission facility** within the service area of the City of Medicine Hat.

**(2)** The **legal owner** and the **operator** of an **aggregated generating facility** must assist the **ISO** in a power quality investigation.

#### Operator Availability

**15** The **legal owner** of an **aggregated generating facility** must have a designated personnel available twenty four (24) hours a **day** every **day** of the calendar year for contact and communication with the **ISO**, in accordance with all applicable **ISO rules** and **reliability standards**.

#### Aggregated Generating Facility Disconnection

**16** The **operator** of an **aggregated generating facility** must not, after the connecting breaker or feeder breaker of the **aggregated generating facility** has been opened or tripped, electrically reconnect to the **transmission facility** without prior approval from the **ISO**.

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**Revision History**

<b>Date</b>	<b>Description</b>
2018-09-01	Initial release