

ISO Rules

Part 500

Division 502 Technical Requirements

Section 502.16 Aggregated Generating Facilities

Operating Requirements



Expedited Filing Draft

September 7, 2017

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

ISO Rules

Part 500

Division 502 Technical Requirements

Section 502.16 Aggregated Generating Facilities

Operating Requirements



the **ISO** in accordance with subsection 3(4) no later than one (1) **business day** after making such a determination.

- (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*.

ISO Rules

Part 500

Division 502 Technical Requirements

Section 502.16 Aggregated Generating Facilities

Operating 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**.

(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.

ISO Rules

Part 500

Division 502 Technical Requirements

Section 502.16 Aggregated Generating Facilities

Operating Requirements



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
 - (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).

ISO Rules

Part 500

Division 502 Technical Requirements

Section 502.16 Aggregated Generating Facilities

Operating Requirements



(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.

(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

ISO Rules

Part 500

Division 502 Technical Requirements

Section 502.16 Aggregated Generating Facilities

Operating Requirements



- (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;
 - (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**.

ISO Rules

Part 500

Division 502 Technical Requirements

Section 502.16 Aggregated Generating Facilities

Operating Requirements



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**.

Revision History

| Date | Description |
|------------|-----------------|
| XXXX-XX-XX | Initial release |