Leading VAr Changes

3.2 Supplier Qualification

The NYISO requires that VSS suppliers meet the following criteria. Each resource must:

- Be able to produce and absorb Reactive Power within its tested reactive capability range
  - *If the resource is precluded from running in "lead" mode in which it can absorb reactive power, then the unit is not eligible to provide Voltage Support Services.*
  - *The requirement to absorb Reactive Power may be set aside by the NYISO with input from the Transmission Owner in whose Transmission District the Resource is located. To grant an exemption from the requirement that the Resource be able to absorb Reactive Power, the NYISO shall have determined that: 1) physical limitations render the resource as configured in the transmission system unable to absorb Reactive Power; 2) the ability of the resource to produce Reactive Power is needed for system reliability; and 3) for purposes of system reliability the resource does not need to have the ability to absorb Reactive Power.*

- Be able to maintain a specific voltage level under both steady-state and post-contingency operating conditions, subject to the limitation of its tested reactive capability

- Be able to automatically respond to voltage control signals; for a generator, a functioning Automatic Voltage Regulator (AVR) is required

- Be under the operational control of the NYISO, a Transmission Owner, or an External Control Area operator

- Successfully perform a Reactive Power (MVAr) capability tests in accordance with the NYISO Procedures described below

In order to qualify to receive payments as a VSS Supplier the candidate Supplier, including previously disqualified VSS Suppliers that must re-qualify, must:

- complete a VSS Qualification Form. That form is provided as Attachment A of this manual. The Qualification Form must:

  - be completed by a representative of the Supplier and signed by a Vice-President (or equivalent signing authority) of the corporation

  - include a statement of intent to provide Voltage Support Services and attach documentation that the synchronous generator or synchronous condenser has an automatic voltage regulator (AVR). This documentation shall include the voltage regulator block diagram and associated data, the manufacturer's model number and specifications, and a generator reactive capability data sheet ("D-curve").

- return the Voltage Support Service Suppliers Qualification Form, and supporting data to:

  Manager, Auxiliary Market Operations

New York Independent System Operator, Inc.
3890 Carman Road
Schenectady, NY 12303

3.6 Reactive Power Capability Testing or Demonstration

The purpose of the Reactive Power capability testing or demonstration is to establish a uniform procedure of determining, confirming, and documenting the Reactive Power capability of VSS Suppliers for real-time system voltage control. VSS suppliers must have a functioning automatic voltage regulator (AVR). The procedures set forth below provide the NYISO with accurate and timely information on the Reactive Power capability of the VSS Suppliers. The demonstration also provides confirmation that the supplier's AVR is in proper working condition and that the supplier is able to automatically adjust its reactive power production or consumption to properly control voltage.

Each year resources that participate in VSS must be tested to demonstrate both Lagging and Leading Reactive Power capability or must provide data collected during actual operation to demonstrate both Lagging and Leading Reactive Power capability. If granted an exemption for absorbing Reactive Power as described in section 3.6.6 of this manual, a resource is not required to demonstrate Leading Reactive Power capability. In all cases, the Supplier's AVR must be enabled and providing automatic voltage control during the demonstration period. Tests may take the form of demonstration of Reactive Power capability based upon actual generator output data or tests conducted pursuant to the procedures set forth in this Manual. Tests must be coordinated with the NYISO and the Transmission Owner (TO) in whose service territory the unit is located. Test data reports must be submitted electronically by the VSS Supplier within ten (10) business days of the test to the NYISO for review and acceptance. The demonstrated performance of the Lagging Reactive Power capability tests is the basis for compensation to Suppliers of VSS.

Definitions

Lagging MVAr — Reactive Power that is generated out of a generator and into the power system. By convention, lagging MVAr is a positive (+) number.
Leading MVAr — Reactive Power that is absorbed by a generator out of the power system. By convention, leading MVAr is a negative (-) number.

3.6.1 Frequency, Timing, and Other Requirements

At least once each calendar year each Resource providing Voltage Support Service must test or demonstrate both Lagging and Leading Reactive Capability. If granted an exemption for absorbing Reactive Power as described in section 3.6.6 of this manual, a resource is not required to demonstrate Leading Reactive Power capability. The demonstrated *Gross* Lagging MVAr capability will be the basis for compensation in the next compensation (calendar) year.

Small units at the same site may apply test results from one unit to another unit at the same site. In order to qualify for this treatment, the units must be electrically identical and must be less than 60 MW nameplate capacity. Qualification to apply test results from one unit to another requires one-time submittal of the D-curve and registration information for each unit, along with a request for this treatment, and pre-approval by the Manager, Auxiliary Market Operations. Each year, a test result form must be submitted for each unit that is requesting this

treatment. The test form must reference the PTID of the unit at the site that actually performed the test and the date and time of the test.

Both Lagging MVAr and Leading MVAr capability must be tested or demonstrated during the Summer capability period (May 1 through October 31, inclusive). Failure to test or demonstrate the resource's Reactive Power capability will result in the disqualification of the resource in the next compensation year. If granted an exemption for absorbing Reactive Power as described in section 3.6.6 of this manual, a resource is not required to demonstrate Leading Reactive Power capability. The Supplier's AVR must be enabled and providing automatic voltage control during the demonstration period.

Lagging MVAr capability testing will normally be performed during on-peak hours. The VSS Supplier must operate at maximum Lagging MVAr for at least one hour for the test to be acceptable.

The Leading MVAr testing will normally be performed during off-peak hours. The VSS Supplier must operate at maximum Leading MVAr for at least one hour for the test to be acceptable.

A VSS Supplier may schedule additional MVAr tests during the Summer capability period, however; only one test at a time may be scheduled. When scheduling an additional Reactive Capability Test, the VSS Supplier must again follow the test procedures given below. The VSS Supplier will be placed at the end of the queue for scheduling requests when requesting additional tests during a given capability period.

3.6.2 Test Procedure for Generators

Reactive Power capability tests are to be carried out under normal operating conditions. Extreme measures that might overstate a unit's reactive capability must be avoided. For example, measurements should be made with the unit operating with normal hydrogen pressure (or other normal coolant conditions).

Both leading and lagging MVAr are to be measured at the generator terminal (gross) and, if metered data is available, at the point of interconnection (net). If a generator's gross metered data does not reflect its ability to absorb MVArs from the power system, the net metered data at the point of interconnection may be submitted in addition to gross metered data to demonstrate the leading MVAr capability.

The lagging MVAr test must be performed at a net real power level of 90% (or greater) of,

- the generator's Dependable Maximum Net Capability (DMNC), that is in effect at the time of the test, for ICAP providers and non-ICAP providers with a valid DMNC test. The DMNC value that is tested to must correspond to the DMNC recorded in the Automated ICAP Market System.
- the generator's nameplate value for non-ICAP providers without a valid DMNC test.

The leading MVAr test should be performed at the generator's minimum MW level (consistent with a real power level typical for off-peak or light load conditions).

The Transmission Owner is responsible for coordinating the test with the respective plant. Each Transmission Owner shall notify the NYISO at least one hour prior to the initiation of generator MVAr testing. The NYISO in turn notifies any other affected Transmission Owners. Test procedures are set forth below:

1. The VSS Supplier must notify the NYISO and the Transmission Owner (TO), at least five (5) business days prior to the day that the test is to be performed if the Supplier is a generator sized 100 MW or larger. Other VSS Suppliers must also notify the NYISO and TO of their plan to test, but a five-day notification is not required, though it is encouraged. The following information must be included in the notification of intent to perform a Reactive Capability test:
   - VSS Supplier name (as listed in the NYISO MIS)
   - VSS Supplier point identifier (PTID – a five digit number)
   - Net operating capability of the unit (MW)
   - VSS Supplier operator company name
   - Transmission Owner area
   - Test requested (lagging or leading)
   - Date and time of the test start
   - Name and telephone number of the person requesting the test

   A generator that is normally scheduled in the DAM and is operating within 100 MW of its normal operating capability may perform the MVAr test without the 5-day prior notification. If a generator's normal operating capability is less than 100 MW, the 5-day prior notification is also not required but is still recommended.
2. The NYISO will notify the VSS Supplier of the status of the request three (3) business days prior to the planned test date. It should be noted that test approvals are subject to a NYISO reliability review and the NYISO reserves the right to cancel or terminate the test at any time. The TO may also request that the NYISO cancel or terminate the test at any time should local reliability criteria be violated. The NYISO will document all approvals, cancellations, and terminations including the party responsible and reason for implementing the cancellation or termination.
3. On the day prior to the scheduled date of the Reactive Capability Test, generators with a normal MW operating capability of 100 MW or greater must bid energy into the Day-Ahead Market (DAM). The bid must be structured to ensure that the generator is scheduled at the appropriate MW level for the hours requested to perform the Reactive Capability Test. The VSS Supplier must notify the NYISO (notify NYISO Generation Scheduling at (518) 356-6050) by hour 14:00 of the prior business day that the unit has been scheduled in the DAM, and that the test will be conducted as scheduled. If the generator is not scheduled, then the Reactive Capability Test is cancelled. If the generator has a net operating capability of less than 100 MW or if the generator is a quick start unit that can be committed by the Real-Time Commitment (RTC), a DAM bid is not required. The VSS Supplier must still notify the NYISO and the TO, by hour 14:00 of the prior business day, of the intent to perform a Reactive Capability Test.
4. On the day of the scheduled Reactive Capability Test, the VSS Supplier, through the TO, must request permission from the NYISO System Operator to perform the

test at least three (3) hours prior to the test start time. The generator must also bid energy into the Hour-Ahead Market (if not previously committed in the DAM) to ensure that the generator is scheduled at the appropriate MW level for the hours requested to perform the Reactive Capability Test. The NYISO System Operator will approve or deny the request, through the TO, at least two (2) hours prior to the scheduled test, allowing time for any desired Hour-Ahead Market bid adjustments. The NYISO will document all approvals, cancellations and terminations of the tests. The log will include the name of the party and reason for implementing the cancellation or termination.

5. Upon beginning the test, the VSS Supplier must notify the NYISO System Operator, through the TO, that the Reactive Capability Test has started.
6. The NYISO will log that the VSS Supplier is performing a Reactive Capability Test.
7. Upon completion of the test, the VSS Supplier must notify the NYISO System Operator, through the TO, that the test is complete. The NYISO will log the completion time and the name of the generator plant personnel reporting the test.

3.6.6 Exemption of Requirement to Absorb Reactive Power

The following three conditions must be met in order for the NYISO to grant an exemption from the requirement to absorb Reactive Power.

1. The ability of the resource to produce Reactive Power must be determined by the NYISO to be needed for reliable system operation.

2. The ability of the resource to absorb Reactive Power must be determined by the NYISO to not be necessary for reliable system operation.

3. The resource must be unable, due to system configuration, to absorb Reactive Power.

The NYISO will review a request for exemption with the Transmission Owner in whose Transmission District the Resource is located and determine whether the request will be granted. An exemption will not be granted over the objection of the Transmission Owner, except upon the approval of the President and Chief Executive Officer of the NYISO. Exemptions that are granted will be reviewed annually with the Transmission Owner in whose Transmission District the resource is located.

All requests for exemptions from absorbing Reactive Power must be made in writing to the Manager of Auxiliary Market Operations at the NYISO. These requests must include the specific resource(s) and the basis for requesting the exemption. Additional documentation may be required during the NYISO review. A request for exemption must be signed by an officer of the organization owning the resource (or equivalent signing authority) and can be submitted to the following e-mail box or address:

vss_test_results@nyiso.com

Manager, Auxiliary Market Operations

New York Independent System Operator, Inc.
3890 Carman Road
Schenectady, NY 12303

Requests for exemptions from absorbing Reactive Power must be submitted prior to the end of the test period.

Changes other than Leading VAr Changes

3.2 Supplier Qualification

The NYISO requires that VSS suppliers meet the following criteria. Each resource must:

- Be able to produce and absorb Reactive Power within its tested reactive capability range
  - *If the resource is precluded from running in "lead"mode in which it can absorb reactive power, then the unit is not eligible to provide Voltage Support Services.*
- Be able to maintain a specific voltage level under both steady-state and post-contingency operating conditions, subject to the limitation of its tested reactive capability
- Be able to automatically respond to voltage control signals; for a generator, a functioning Automatic Voltage Regulator (AVR) is required
- Be under the operational control of the NYISO, a Transmission Owner, or an External Control Area operator
- Successfully perform a Reactive Power (MVAr) capability tests in accordance with the NYISO Procedures described below

In order to qualify to receive payments as a VSS Supplier the candidate Supplier, including previously disqualified VSS Suppliers that must re-qualify, must:

- complete a VSS Qualification Form. That form is provided as Attachment A-1 of this manual. The Qualification Form must:
  - be completed by a representative of the Supplier and signed by a Vice-President (or equivalent signing authority) of the corporation
  - include a statement of intent to provide Voltage Support Services
  - have generator documentation attached, including the manufacturer's model number or equivalent data as determined by the NYISO, manufacturer's specifications, a block diagram and associated data, and a generator reactive capability datasheet ("D-curve")
  - have documentation that the synchronous generator or synchronous condenser has an automatic voltage regulator (AVR). This documentation shall include the AVR manufacturer model number, manufacturer's specifications, voltage regulator block diagram and associated data
  - ~~include a statement of intent to provide Voltage Support Services and attach documentation that the synchronous generator or synchronous condenser has an automatic voltage regulator (AVR). This documentation shall include the voltage regulator block diagram and associated data, the manufacturer's model number and specifications, and a generator reactive capability data sheet ("D-curve").~~
- return the Voltage Support Service Suppliers Qualification Form, and supporting data to the following e-mail box or address:

  vss_test_results@nyiso.com

  Manager, Auxiliary Market Operations

New York Independent System Operator, Inc.
3890 Carman Road
Schenectady, NY 12303

3.61 Frequency, Timing, and Other Requirements

At least once each calendar year each Resource providing Voltage Support Service must test or demonstrate both Lagging and Leading Reactive Capability. The demonstrated *Gross* Lagging MVAr capability will be the basis for compensation in the next compensation (calendar) year.

Small units at the same site may apply test results from one unit to another unit at the same site. In order to qualify for this treatment, the units must be electrically identical and must be less than 60 MW nameplate capacity. Qualification to apply test results from one unit to another requires one-time submittal of the D-curve and registration information for each unit, along with a request for this treatment, and pre-approval by the Manager, Auxiliary Market Operations. The form to request this treatment is provided as Attachment A-2. Each year, a test result form must be submitted for each unit that is requesting this treatment. The test form must reference the PTID of the unit at the site that actually performed the test and the date and time of the test.

Both Lagging MVAr and Leading MVAr capability must be tested or demonstrated during the Summer capability period (May 1 through October 31, inclusive). Failure to test or demonstrate the resource's Reactive Power capability will result in the disqualification of the resource in the next compensation year. The Supplier's AVR must be enabled and providing automatic voltage control during the demonstration period.

Lagging MVAr capability testing will normally be performed during on-peak hours. The VSS Supplier must operate at maximum Lagging MVAr for at least one hour for the test to be acceptable.

The Leading MVAr testing will normally be performed during off-peak hours. The VSS Supplier must operate at maximum Leading MVAr for at least one hour for the test to be acceptable.

A VSS Supplier may schedule additional MVAr tests during the Summer capability period, however; only one test at a time may be scheduled. When scheduling an additional Reactive Capability Test, the VSS Supplier must again follow the test procedures given below. The VSS Supplier will be placed at the end of the queue for scheduling requests when requesting additional tests during a given capability period.

Attachment A

Voltage Suport Service Qualification Forms

~~**Attachment A.VSS Qualification Request Form**~~

Voltage Support Services
Qualifications Request Form

- _____Attached to this form is documentation that demonstrates that the resource(s) listed below have an Automatic Voltage Regulator (AVR), including voltage regulator, block diagram and associated data, manufacturer's model number and specifications, and a generator reactive capability data sheet ("D-curve").
- _____Attached to this form is a completed NYISO Reactive Power Capability Test Report documenting that the resource(s) listed below have successfully performed Reactive Power capability testing during current calendar year.

The resource(s) listed below will participate in Voltage Support Ancillary Service under the direction of the NYISO and agree to comply with all applicable rules and procedures associated with NYISO voltage and Reactive Power control.

Resource	*Type (Generator or Synchronous Condenser, etc.)*	*Location*	*NYISO ICAP DMNC or Nameplate*	*NYISO MIS PTID*	*Generator MW Capability*

Market Participant Information:

_____

Officer's Signature Date

New York ISO Approval:

_____

Manager, Auxiliary Market Operations Date

Attachment A-1
VSS Qualification Form

Attached to this form is:

- _____ Generator or synchronous condenser documentation, including the manufacturer's model number or equivalent data as determined by the NYISO, manufacturer's specifications, a block diagram and associated data, and a generator reactive capability data sheet ("D-curve")
- _____ Documentation that demonstrates that the resource(s) listed below have an Automatic Voltage Regulator (AVR), including AVR manufacturer model number, manufacturer's specifications, a voltage regulator block diagram and associated data.

The resource(s) listed below will participate in Voltage Support Ancillary Service under the direction of the NYISO and agree to comply with all applicable rules and procedures associated with NYISO voltage and Reactive Power control.

Unit Name	Station Name	Generator's Transmission Owner	NYISO MIS PTID	Type (Generator, Synchronous Condenser, etc.)	NYISO ICAP DMNC or Nameplate Rating	Generator Model and Number	AVR Model Number

Market Participant Signature: _____ Date: _____

Title: _____ Organization: _____

NYISO Approval: _____

Title: _____ Date: _____

Attachment A-2
Request for Identical Treatment

For a resource's Voltage Support Service test to be applied to identical resources, the following criteria must be met:

- Resources must be rated at less than 60MW manufacturer's nameplate
- Resources must be at the same site
- Resources must be electrically identical
- Resources must be stand alone (not part of a combined cycle unit, etc.)

The resources listed below are identical and are requesting that the test results from one resource apply to all the resources listed.

Unit Name	Station Name	NYISO MIS PTID	Type (Gen, Sync Cond, etc.)	Manufacturer	Model #	Nameplate MW	Nameplate MVar	Rated Power Factor	Interface Bus Name

Market Participant Signature: _____ Date: _____

Title: _____ Organization: _____

NYISO Approval: _____

Title: _____ Date: _____

Attachment B

~~Generator~~ MVAr Capability Test Forms