

## Standard Development Timeline

*This section is maintained by the drafting team during the development of the standard and will be removed when the standard becomes effective.*

### Development Steps Completed

1. SAR [and supporting package](#) posted for comment on July 19, 2013.
2. [Draft standard posted for initial comments and ballot from July 19, 2013 to September 3, 2013.](#)

### Description of Current Draft

~~This is the second posting of the proposed draft standard. This proposed draft standard will be posted for a 45-day formal comment period and parallel ballot. This draft standard is concluding informal development and will move to formal development when authorized by the Standards Committee.~~

Anticipated Actions	Anticipated Date
<del>SAR Authorized by the Standards Committee</del>	July
<del>Additional 45-Day SAR Comment Period with and Initial Ballot Open</del>	<del>October/November 2013</del> July
<del>Nomination Period Opens</del>	July
<del>Standard Drafting Team Appointed</del>	July
<del>Initial Comment and Initial Ballot Closes</del>	August
<del>Final Ballot Opens</del>	<del>December 2013</del> October
<del>Final Ballot Closes</del>	October
<del>NERC Board of Trustees BOT Adoption</del>	<del>December 2013</del> November
Filing to Applicable Regulatory Authorities	December <a href="#">2013</a>

### Effective Dates

~~In those jurisdictions where regulatory approval is required, this standard shall become effective on the first day of the first calendar quarter after applicable regulatory approval or as otherwise made effective pursuant to the laws applicable to such ERO governmental authorities. In those jurisdictions where no regulatory approval is required, this standard~~

~~shall become effective on the first day of the first calendar quarter after Board of Trustees approval.~~

### Version History

Version	Date	Action	Change Tracking
1	6/18/2007	Initial Standard is FERC approved	
2	1/10/2011	FERC approved added LSEs and Controllable Load to the standard.	
3	6/20/2013	WECC Variance is approved by FERC	

Definitions of Terms Used in the Standard

*This section includes all newly defined or revised terms used in the proposed standard. Terms already defined in the Reliability Standards Glossary of Terms are not repeated here. New or revised definitions listed below become approved when the proposed standard is approved. When the standard becomes effective, these defined terms will be removed from the individual standard and added to the Glossary.*

None.

## A. Introduction

1. **Title:** Voltage and Reactive Control
2. **Number:** VAR-001-4
3. **Purpose:** To ensure that voltage levels, reactive flows, and reactive resources are monitored, controlled, and maintained within limits in real time to protect equipment and the reliable operation of the Interconnection.
4. **Applicability:**
  - 4.1. Transmission Operators
  - ~~4.2. Reliability Coordinators~~
  - ~~4.3.4.2.~~ Generator Operators within the Western Interconnection (for the WECC Variance)
5. **Effective Date:**
  - 5.1. The standard shall become effective on the first day of the first calendar quarter after the date that the standard is approved by an applicable governmental authority or as otherwise provided for in a jurisdiction where approval by an applicable governmental authority is required for a standard to go into effect. Where approval by an applicable governmental authority is not required, the standard shall become effective on the first day of the first calendar quarter after the date the standard is adopted by the NERC Board of Trustees or as otherwise provided for in that jurisdiction.

## Requirements and Measures

~~**Rationale for R1:** This requirement will allow each Transmission Operator (TOP) to establish its own policies and procedures, and the criteria for periodic updates will be individualized based on the stability of each TOP's regions. The language is refined to show that coordination with neighboring TOPs is required. It also states TOP shall provide data to the Reliability Coordinator (RC) for its monitoring functions to respond to address the FERC directive in P 1855 of Order No. 693, which directed NERC to add RC monitoring to the VAR standards. P 1868 requires NERC to add more "detailed and definitive requirements to include more detailed and definitive requirements on "established limits" and "sufficient reactive resources" and identify acceptable margins (i.e. voltage and/or reactive power margins)."~~

**Rationale for R1:** P 1868 of Order No. 693 requires NERC to add more "detailed and definitive requirements on "established limits" and "sufficient reactive resources", and identify acceptable margins (i.e. voltage and/or reactive power margins)." Since Order No. 693 was issued, several FAC and TOP standards have become enforceable to add more requirements around voltage limits. More specifically, FAC-011 and FAC-014 require that System Operating Limits ("SOLs") and reliability margins are established. The definition of SOLs must include both: 1) Voltage Stability Ratings (Applicable pre- and post-Contingency Voltage Stability) and 2) System Voltage Limits (Applicable pre- and post-Contingency Voltage Limits). Therefore, for reliability reasons Requirement R1 now requires a Transmission Operator (TOP) to set voltage or Reactive Power schedules with associated tolerance bands. Further, since neighboring areas can affect each other greatly, each TOP must also provide a copy of these schedules to its Reliability Coordinator (RC) and adjacent TOP upon request.

- R1.** Each Transmission Operator shall specify a system voltage schedule (which is either a range or a target value with an associated tolerance band) as part of its plan to operate within System Operating Limits and Interconnection Reliability Operating Limits~~have documented policies or procedures that are implemented to establish, monitor, and control voltage levels and Reactive Power flows (Mvar flows) within limits as defined below.~~ *[Violation Risk Factor: High] [Time Horizon: Operational Planning/Operations]*
- 1.1.** ~~These documented policies or procedures shall include criteria used in system assessments. The criteria for the assessments shall include established steady-state limits, voltage stability limits and associated operating margins, and voltage schedules along with associated tolerance bands.~~
- 1.1.** Each Transmission Operator shall provide a copy of the voltage schedules and associated tolerance bands to its Reliability Coordinator and these documented policies or procedures to adjacent Transmission Operators within 30 calendar days of a request.
- 1.2.** ~~Each Transmission Operator shall provide a copy of these documented policies or procedures to its Reliability Coordinator.~~

**M1.** The Transmission Operator shall have evidence that it specified system voltage schedules using either a range or a target value with an associated tolerance band.

~~— The Transmission Operator shall have evidence of documented voltage schedules and associated tolerance bands.~~

~~For part policies or procedures as specified in Requirement 1.1—As stated in R1, the Transmission Operator shall have policies and procedures must detail how criteria for steady state and voltage stability limits are used in the Transmission Operator’s assessments of the system. In order to demonstrate the Transmission Operator is implementing the policies or procedures, the Transmission Operator must be able to provide evidence that the proves voltage schedules and associated tolerance bands is currently being monitored. Such evidence may include, but is not limited to: 1) proof that points are telemetered, 2) alarms are functioning, and 3) during events of low or high voltage the policies and procedures are being followed to respond to control voltage levels. The Transmission Operator must also provide evidence that the policies or procedures were provided to its Reliability Coordinator and communicated to adjacent Transmission Operators within 30 days of a request and to its Reliability Coordinator. Evidence may include, but is not limited to, emails, website postings, and meeting minutes. Simply posting a copy of the policies or procedure on a public website is not sufficient if the Transmission Operator and Reliability Coordinator were not notified as to where to find the policies or procedures.~~

**Rationale for R2:**

P 1875 from Order No. 693 directed NERC to include requirements to run voltage stability analysis periodically. The informal ad hoc group and industry participants concluded that the best models and tools are the ones that have been proven over time, and that the requirement should not require any utility to purchase new online simulations tools. Therefore, the new requirement does not specify when to use online tools. The sub-requirements detail the real-time and day-ahead assessments necessary under R1. The existing VAR-001 also requires a list of sufficient reactive resources; this was retained in the proposed requirement as FERC determined in a letter order that this list answered the directive in P 1868 to detail the list of "sufficient reactive resources." Controllable load is specifically included to answer FERC's directive in P 1879.

**Rationale for R2:**

P 1875 from Order No. 693 directed NERC to include requirements to run voltage stability analysis periodically, using online techniques where commercially available and offline tools when online tools are not available. This standard does not require the periodic voltage stability analysis because such analysis is now required pursuant to the SOL methodology in the FAC standards. TOP standards also require the TOP to operate within SOLs and Interconnection Reliability Operating Limits ("IROL"). The VAR standard drafting team ("SDT") and industry participants also concluded that the best models and tools are the ones that have been proven and the standard should not add a requirement for a responsible entity to purchase new online simulations tools. Thus, the VAR SDT simplified the requirements to ensuring sufficient reactive resources are online or scheduled. Controllable load is specifically included to answer FERC's directive in Order No. 693 at P 1879.

- R2.** Each Transmission Operator ~~and Reliability Coordinator~~ shall ~~schedule~~ ~~perform assessments on their respective areas in order to ensure~~ sufficient reactive resources ~~are available for scheduling to regulate~~ ~~maintain~~ voltage ~~levels~~ ~~stability~~ under normal and ~~Contingency~~ ~~contingency~~ conditions. Transmission Operators can provide sufficient reactive resources through various means including, but not limited to, reactive generation scheduling, transmission line and reactive resource switching, and using controllable load. in order to provide the voltage levels as defined in Requirement R1. [Violation Risk Factor: High] [Time Horizon: Real-time Operations, Same-day Operations, and Operational Planning]
- M2.** Each Transmission Operator shall have evidence of scheduling sufficient reactive resources based on their assessments of the system. For the operational planning time horizon, Transmission Operators shall provide copies of assessments used as the basis for how resources were scheduled.

**Rationale for R3:**

Similar to Requirement R2, the VAR SDT determined that for reliability purposes, the TOP must ensure sufficient voltage support is provided in Real-time in order to operate within an SOL.

**R3.** Each Transmission Operator shall operate or direct the ~~Real~~real-time operation of ~~-~~devices ~~necessary~~ to regulate transmission voltage and reactive flow ~~as necessary.~~ *[Violation Risk Factor: High] [Time Horizon: Real-time Operations, Same-day* ~~necessary to regulate transmission voltage and reactive flow which may include, but is not limited to reactive generation scheduling; transmission line and reactive resource switching; controllable load; and, if necessary, load shedding, to maintain system voltages within established limits.~~*Operations, and Operational Planning]*

~~3.1.~~ As a result of the assessments, each Transmission Operator shall ensure that sufficient reactive resources have been scheduled to meet acceptable day-ahead voltage limits identified in Requirement R1. Sufficient reactive resources may include, but is not limited to reactive generation scheduling; transmission line and reactive resource switching; and controllable load.

~~M1-M3.~~ Each Transmission Operator ~~and Reliability Coordinator~~ shall have evidence ~~that actions of~~ current or past studies used to schedule sufficient reactive resources. Each Transmission Operator shall also provide proof that additional resources were ~~taken to operate~~ scheduled when necessary. During a real-time event where voltage must be adjusted, a Transmission Operator shall show evidence to show directions were given to adjust the operation of capacitive and inductive resources ~~as needed in Real-time.~~ This may include directions to Generator Operators to: 1) provide additional voltage support; 2) bring resources on-line; or 3) ~~operate within new tolerance bands or to~~ make manual adjustments. ~~if necessary.~~ Transmission Operators shall also have evidence to show proof of directing new resources to come online. Those resources can include, but is not limited to capacitor banks, switching, adjusting controllable load, and when necessary load can be shed. For the day-ahead scheduling, Transmission Operators shall provide copies of ~~provide~~ day-ahead studies used to schedule enough resources to meet expected voltage requirements.



**Rationale for R4:**

The VAR SDT received significant feedback on instances when a TOP would need the flexibility for defining exemptions for generators. These exemptions can be tailored as the TOP deems necessary for the specific area's needs. The goal of this requirement is to provide a TOP the ability to exempt a Generator Operator (GOP) from: 1) a voltage or Reactive Power schedule, 2) a setting on the AVR, or 3) any VAR-002 notifications based on the TOP's criteria. Feedback from the industry detailed many system events that would require these types of exemptions which included, but are not limited to: 1) maintenance during shoulder months, 2) scenarios where two units are located within close proximity and both cannot be in voltage control mode, and 3) large system voltage swings where it would harm reliability if all GOP were to notify their respective TOP of deviations at one time. Also, in an effort to improve the requirement, the sub-requirements containing an exemption list were removed from the currently enforceable standard because this created more compliance issues with regard to how often the list would be updated and maintained.

**Rationale for R4.**

~~These exemptions offer TOPs the option to exempt certain generators during maintenance or system events when those units are not able to maintain voltage schedules. Sub-requirements containing an exemption list were removed from the existing standard because this created more compliance issues with regard to how often the list would be updated and maintained.~~

- R4.** The Transmission Operator shall specify the criteria that will exempt generators from compliance with the requirements defined in Requirement R5, part 5.1.4 and any associated notification requirements. *[Violation Risk Factor: Lower] [Time Horizon: Operations Planning]*
- ~~If in the event~~ a Transmission Operator ~~determines that~~approves a generator ~~has satisfied as~~ satisfying the exemption criteria, it shall notify the associated Generator Operator.
- M4.** Each Transmission Operator shall have evidence of the documented criteria for generator exemptions. ~~For part 4.1, the~~The Transmission Operator shall also have evidence to show that, for each generating unit in its area that is exempt from: 1) following a voltage or Reactive Power schedule, 2) from having its automatic voltage regulator (AVR) in service or from being in voltage control mode, or 3) from having to make any notifications, the associated Generator Operator was notified of this exemption. ~~following a voltage or Reactive Power schedule, the associated Generator Owner was notified of this exemption in accordance with Requirement 3. Temporary exemptions may be provided to generators during scenarios where notifications/communications are not necessary due to a system event that prevents a Generator Operator from maintaining a schedule. Similarly, when an Automatic Voltage Regulator (AVR) is malfunctioning, which prevents a Generator Operator from maintaining a voltage schedule and tolerance band, temporary exemptions may be provided. For temporary exemptions, evidence showing the exemptions were granted must be provided. If the exemptions were given verbally from the Transmission Operator, the phone recordings or emails commemorating the phone~~

~~call must be provided. For temporary exemptions, the evidence of communication must also include the timeframe for how long the exemption will last.~~

**Rationale for R5:**

The new requirement provides transparency regarding the criteria used by the TOP to establish the voltage schedule. This requirement also provides a vehicle for the TOP to use appropriate granularity when setting notification requirements for deviation from the voltage or Reactive Power schedule. Additionally, this requirement provides clarity regarding a “tolerance band” as specified in the voltage schedule and the control dead-band in the generator’s excitation system.

Voltage Schedule tolerances are the bandwidth that accompanies the voltage target in a voltage schedule, should reflect the anticipated fluctuation in voltage at the Generation Operator’s facility during normal operations, and be based on the TOP’s assessment of N-1 and credible N-2 system contingencies. The voltage schedule’s bandwidth should not be confused with the control dead-band that is programmed into a Generation Operator’s automatic voltage regulator’s control system, which should be adjusting the AVR prior to reaching either end of the voltage schedule’s bandwidth.

**Rationale for R5:**

The new requirement adds “tolerance band” in order to provide more detailed information when establishing limits.

- R5.** Each Transmission Operator shall specify a voltage or Reactive Power schedule (which is either a range, or a target value with an associated ~~and~~ tolerance band) ~~(at either the high voltage side or low voltage side of the Generator Step-Up transformer at the TOP's discretion)~~ at the interconnection point between the generator facility and the Transmission Operator’s discretion ~~Owner's facilities to be maintained by each generator.~~ *[Violation Risk Factor: Medium]*  
*[Time Horizon: Operations Planning]*
- 5.1.** The Transmission Operator shall provide the voltage or Reactive Power schedule ~~and tolerance band~~ to the associated Generator Operator and direct the Generator Operator to comply with the schedule in automatic voltage control mode (the AVR is in service and controlling voltage).
- 5.2.** The Transmission Operator shall provide the Generator Operator with the notification requirements for deviations from the voltage or Reactive Power schedule.
- 5.3.** The Transmission Operator shall provide the criteria used to develop voltage schedules and associated tolerance bands to the Generator Operator within 30 days of receiving a request.

**M5.** The Transmission Operator shall have evidence of a documented voltage or Reactive Power Schedule and tolerance band.

For part 5.1, theThe Transmission Operator shall have evidence it provided a voltage or Reactive Power schedule and tolerance band as specified in Requirement 4 to the applicable Generator Operators, and that the Generator Operator was directed to comply with the schedule in automatic voltage control mode, unless exempted. ~~The. For real time directives,~~ evidence shall~~may~~ include written records, email, or voice recordings. ~~recorded phone logs.~~

For part 5.2,

~~**R6.** The Transmission Operator shall know the status of all transmission Reactive Power resources, automatic voltage regulators, and power system stabilizers in their system. [Violation Risk Factor: Medium] [Time Horizon: Operations]~~

~~The~~ Transmission Operator shall have evidence it provided notification requirements for deviations from the voltage or Reactive Power schedule and associated tolerance band. The evidence shall~~to show~~ Reactive Power resources are being monitored. Evidence may include written records, email, or voice recordings, ~~but is not limited to screen shots of EMS/SCADA data, alarms, and phone logs.~~ ~~In the event the monitoring system does not work, each Transmission Operator should have a protocol in place to show these resources are being monitored.~~

For part 5.3, the Transmission Operator shall have evidence it provided the criteria used to develop voltage schedules and associated tolerance bands within 30 days of receiving a request by a Generator Operator.

#### **Rationale for R6:**

Although tap settings are first established prior to interconnection, this requirement could not be deleted because no other standard addresses when a tap setting must be adjusted. If the tap setting is not properly set, then the amount of VARs produced by a unit can be affected.

#### **Rationale for R6:**

Since power system stabilizers (PSS) equipment is not highlighted in any other standard, the VAR standard is the appropriate place to ensure the equipment is being monitored. This requirement is not duplicative of the TOP standards because the voltage regulators and power system stabilizer are highlighted.

~~**R7-R6.**~~ After consultation with the Generator Owner regarding necessary step-up transformer tap changes and the implementation schedule, the Transmission Operator shall provide documentation to the Generator Owner specifying the required tap changes, a timeframe for

making the changes, and technical justification for these changes. *[Violation Risk Factor: Lower]*  
*[Time Horizon: Operations [Planning](#)]*

~~M2-M6~~. The Transmission Operator shall have evidence that it provided documentation to the Generator Owner when a change was needed to a generating unit's step-up transformer tap in accordance with the requirement [and that it consulted with the Generator Owner](#).

## **C. Compliance**

### **1. Compliance Monitoring Process:**

#### **1.1. Compliance Enforcement Authority:**

As defined in the NERC Rules of Procedure, “Compliance Enforcement Authority” refers to means NERC or the Regional Entity in their respective roles of monitoring and enforcing compliance with the NERC Reliability Standards.

#### **1.2. Evidence Retention:**

The following evidence retention periods identify the period of time a registered entity is required to retain specific evidence to demonstrate compliance. For instances in which the evidence retention period specified below is shorter than the time since the last audit, the Compliance Enforcement Authority may ask the registered entity to provide other evidence to show that it was compliant for the full time period since the last audit.

The Transmission Operator shall retain evidence for Measures 1 through 4 for 12 months. The Compliance Monitor shall retain any audit data for three years.

#### **1.3. Compliance Monitoring and Assessment Processes:**

As defined in the NERC Rules of Procedure, “Compliance Monitoring and Assessment Processes” refers to the identification of the processes that will be used to evaluate data or information for the purpose of assessing performance or outcomes with the associated reliability standard.

#### **1.4. Additional Compliance Information:**

None

Table of Compliance Elements

R #	Time Horizon	VRF	Violation Severity Levels			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
R1	<del>Operations</del> <u>Operational Planning</u>	High	<del>N/A</del> The Transmission Operator has documented criteria for assessments, but has provided a copy to only one of the parties that should have received a copy (either a neighboring TOPs or its RC).	<del>N/A</del> The Transmission Operator has documented policies and procedures, but has not provided copies to either the neighboring TOPs or its RC.	<del>N/A</del> The Transmission Operator has documented policies or procedures, but none of the sub-requirements were followed.	The Transmission Operator has <u>not specified a system voltage schedule.</u>
R2	<u>Real-time Operations, Same-day Operations, and Operational Planning</u>	High	N/A	<del>N/A</del> The Transmission Operator only performs day-ahead assessments and only schedules day-ahead resources.	<u>The Transmission Operator does not schedule sufficient reactive resources as necessary to avoid violating an SOL.</u> N/A	The Transmission Operator does not <u>schedule perform assessments and therefore does not have policies and procedures implemented to have sufficient reactive resources as necessary to avoid violating an IROL</u> Mvars. A lack of real-time operations is also severe.

R #	Time Horizon	VRF	Violation Severity Levels			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
R3	<u>Real-time Operations, Same-day Operations, and Operational Planning</u>	<del>High</del> <u>Lower</u>	N/A	N/A	<u>The Transmission Operator does not operate or direct any real-time operation of devices as necessary to avoid violating an SOL. N/A</u>	<u>The Transmission Operator does not operate or direct any real-time operation of devices as necessary to avoid violating an IROL have exemption criteria.</u>
R4	<u>Operations Planning</u>	<u>Lower</u> <del>Medium</del>	N/A	N/A	<u>The Transmission Operator has exemption criteria and notified the Generator Operator, but the Transmission Operator does not have evidence provides voltage or Reactive Power schedules to only some of the notification GOPs.</u>	<u>The Transmission Operator does not have exemption criteria provide voltage or Reactive Power schedules and tolerance bands at all.</u>

R #	Time Horizon	VRF	Violation Severity Levels			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
R5	Operations <u>Planning</u>	<del>Medium</del> <u>Lower</u>	N/A	The Transmission Operator <u>provides</u> <del>is-unaware-of</del> the <u>criteria for voltage schedules after 30 days of request status in a stable area.</u>	The Transmission Operator <u>provides</u> <del>does not</del> <u>voltage or Reactive Power schedules to some, but</u> <del>does not</del> <u>all, Generator Operators know the status of important equipment in weaker areas that were identified in assessments as part of R1.</u>	<u>The Transmission Operator does not provide voltage or Reactive Power schedules.</u>  <u>Or</u> <u>The Transmission Operator did not provide the Generator Operator with the notification requirements for deviations from the voltage or Reactive Power schedule. N/A</u>
R6	Operations <u>Planning</u>	<u>Lower</u>	Either the technical justification or timeframe are not provided.	<del>Neither the technical justification nor the timeframe are provided. N/A</del>	N/A	<del>N/A</del> <u>Neither the technical justification nor the timeframe are provided.</u>



## D. Regional Variances

The following Interconnection-wide variance shall be applicable in Regional Variance for the Western Electricity Coordinating Council (WECC) and replaces, in their entirety, Requirements R3 and R4. Please note that Requirement R3 is deleted and R4 is replaced with the following requirements.

### Requirements

E.A.13 Each Transmission Operator shall issue any one of the following types of voltage schedules to the Generator Operators for each of their generation resources that are on-line and part of the Bulk Electric System within the Transmission Operator Area: *[Violation Risk Factor: Medium] [Time Horizon: Operations Planning and Same-day Operations]*

- A voltage set point with a voltage tolerance band and a specified period.
- An initial volt-ampere reactive output or initial power factor output with a voltage tolerance band for a specified period that the Generator Operator uses to establish a generator bus voltage set point.
- A voltage band for a specified period.

E.A.14 Each Transmission Operator shall provide one of the following voltage schedule reference points for each generation resource in its Area to the Generator Operator. *[Violation Risk Factor: Medium] [Time Horizon: Operations Planning and Same-day Operations]*

- The generator terminals.
- The high side of the generator step-up transformer.
- The point of interconnection.
- A location designated by mutual agreement between the Transmission Operator and Generator Operator.

E.A.15 Each Generator Operator shall convert each voltage schedule specified in Requirement E.A.13 into the voltage set point for the generator excitation system. *[Violation Risk Factor: Medium] [Time Horizon: Operations Planning and Same-day Operations]*

E.A.16 Each Generator Operator shall provide its voltage set point conversion methodology from the point in Requirement E.A.14 to the generator terminals within 30 calendar days of request by its Transmission Operator. *[Violation Risk Factor: Medium] [Time Horizon: Operations Planning]*

E.A.17 Each Transmission Operator shall provide to the Generator Operator, within 30 calendar days of a request for data by the Generator Operator, its transmission equipment data and operating data that supports development of the voltage set point conversion methodology. *[Violation Risk Factor: Lower] [Time Horizon: Operations Planning]*

**E.A.18** Each Generator Operator shall meet the following control loop specifications if the Generator Operator uses control loops external to the Automatic Voltage Regulators (AVR) to manage MVar loading: [Violation Risk Factor: Medium] [Time Horizon: Real-time Operations]

**E.A.18.1.**Each control loop's design incorporates the AVR's automatic voltage controlled response to voltage deviations during System Disturbances.

**E.A.18.2.**Each control loop is only used by mutual agreement between the Generator Operator and the Transmission Operator affected by the control loop.

**Measures<sup>1</sup>**

**M.A.13** Each Transmission Operator shall have and provide upon request, evidence that it provided the voltage schedules to the Generator Operator. Dated spreadsheets, reports, voice recordings, or other documentation containing the voltage schedule including set points, tolerance bands, and specified periods as required in Requirement E.A.13 are acceptable as evidence.

**M.A.14** The Transmission Operator shall have and provide upon request, evidence that it provided one of the voltage schedule reference points in Requirement E.A.14 for each generation resource in its Area to the Generator Operator. Dated letters, e-mail, or other documentation that contains notification to the Generator Operator of the voltage schedule reference point for each generation resource are acceptable as evidence.

**M.A.15** Each Generator Operator shall have and provide upon request, evidence that it converted a voltage schedule as described in Requirement E.A.13 into a voltage set point for the AVR. Dated spreadsheets, logs, reports, or other documentation are acceptable as evidence.

**M.A.16** The Generator Operator shall have and provide upon request, evidence that within 30 calendar days of request by its Transmission Operator it provided its voltage set point conversion methodology from the point in Requirement E.A.14 to the generator terminals. Dated reports, spreadsheets, or other documentation are acceptable as evidence.

**M.A.17** The Transmission Operator shall have and provide upon request, evidence that within 30 calendar days of request by its Generator Operator it provided data to support development of the voltage set point conversion methodology. Dated reports, spreadsheets, or other documentation are acceptable as evidence.

~~M.A.13~~**M.A.18** If the Generator Operator uses outside control loops to manage MVar loading, the Generator Operator shall have and provide upon request, evidence that it met the control loop specifications in sub-parts E.A.18.1 through E.A.18.2. Design specifications with identified agreed-upon control loops, system reports, or other dated documentation are acceptable as evidence.~~VAR-001-3 is retained.~~

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<sup>1</sup>The number for each measure corresponds with the number for each requirement, i.e. M.E.A.13 means the measure for Requirement E.A.13.

**[E. Interpretations](#)**

None.

**[F. Associated Documents](#)**

None.

**Guidelines and Technical Basis**

For technical basis for each requirement, please ~~review~~ see the [rationale provided](#) ~~VAR White Paper~~ for [each requirement](#) ~~further technical information~~.