**[Registered Entity Name]**

**NERC ID: [NCRXXXXX]**

**MOD-026-1 – Verification of Models and Data for Generator Excitation Control System or Plant Volt/Var Control Functions, R2**

**1st Quarter 2022 Self-Certification**

# Instructions

1. Populate the cover page by adding your entity’s name and NERC identification number.
2. Complete thetasks listed under **Assessment Guidance**.
3. Log into **Align** and complete your self-certification response.
4. Submit via the Secure Evidence Locker (SEL) with the reference ID in Align as part of the self-certification response :
	1. This completed Worksheet; and
	2. Specific evidence requested within this document. Please make sure to use unique file names for each evidence file submitted, and identify within your narratives which specific evidence files support each conclusion made. These references and the use of unique file names helps facilitate and expedite MRO’s review of the Self-Certification work that has been performed.
	3. Any internal control information related to the Reliability Standard and Requirement in scope with supporting documentation of design and implementation of the internal control(s). Internal control information may impact your Compliance Oversight Plan and future monitoring frequency and methods of applicable Standards.

# Scope

**MOD-026-1- Verification of Models and Data for Generator Excitation Control System or Plant Volt/Var Control Functions, R2**

***R2.*** *Each Generator Owner shall provide for each applicable unit, a verified generator excitation control system or plant volt/var control function model, including documentation and data (as specified in Part 2.1) to its Transmission Planner in accordance with the periodicity specified in MOD-026 Attachment 1. [Violation Risk Factor: Medium] [Time Horizon: Long-term Planning]*

***2.1.*** *Each applicable unit’s model shall be verified by the Generator Owner using one or more models acceptable to the Transmission Planner. Verification for individual units less than 20 MVA (gross nameplate rating) in a generating plant (per Section 4.2.1.2, 4.2.2.2, or 4.2.3.2) may be performed using either individual unit or aggregate unit model(s), or both. Each verification shall include the following:*

***2.1.1.*** *Documentation demonstrating the applicable unit’s model response matches the recorded response for a voltage excursion from either a staged test or a measured system disturbance,*

***2.1.2.*** *Manufacturer, model number (if available), and type of the excitation control system including, but not limited to static, AC brushless, DC rotating, and/or the plant volt/var control function (if installed),*

***2.1.3.*** *Model structure and data including, but not limited to reactance, time constants, saturation factors, total rotational inertia, or equivalent data for the generator,*

***2.1.4.*** *Model structure and data for the excitation control system, including the closed loop voltage regulator if a closed loop voltage regulator is installed or the model structure and data for the plant volt/var control function system,*

***2.1.5.*** *Compensation settings (such as droop, line drop, differential compensation), if used, and*

***2.1.6.*** *Model structure and data for power system stabilizer, if so equipped.*

***M2.*** *The Generator Owner must have and provide dated evidence it verified each generator excitation control system or plant volt/var control function model according to Part 2.1 for each applicable unit and a dated transmittal (e.g., electronic mail message, postal receipt, or confirmation of facsimile) as evidence it provided the model, documentation, and data to its Transmission Planner, in accordance with Requirement R2.*

# Purpose:

To verify that the generator excitation control system or plant volt/var control function[[1]](#footnote-1) model (including the power system stabilizer model and the impedance compensator model) and the model parameters used in dynamic simulations accurately represent the generator excitation control system or plant volt/var control function behavior when assessing Bulk Electric System (BES) reliability.

# Applicability:

**4.1 Functional Entities:**

**4.1.1** Generator Owner

**4.1.2** Transmission Planner

**4.2 Facilities:**

For the purpose of the requirements contained herein, Facilities that are directly connected to the Bulk Electric System (BES) will be collectively referred as an “applicable unit” that meet the following:

**4.2.1** Generation in the Eastern or Quebec Interconnections with the following characteristics:

**4.2.1.1** Individual generating unit greater than 100 MVA (gross nameplate rating).

**4.2.1.2** Individual generating plant consisting of multiple generating units that are directly connected at a common BES bus with total generation greater than 100 MVA (gross aggregate nameplate rating).

**4.2.2** Generation in the Western Interconnection with the following characteristics:

**4.2.2.1** Individual generating unit greater than 75 MVA (gross nameplate rating).

**4.2.2.2** Individual generating plant consisting of multiple generating units that are directly connected at a common BES bus with total generation greater than 75 MVA (gross aggregate nameplate rating).

**4.2.3** Generation in the ERCOT Interconnection with the following characteristics:

**4.2.3.1** Individual generating unit greater than 50 MVA (gross nameplate rating).

**4.2.3.2** Individual generating plant consisting of multiple generating units that are directly connected at a common BES bus with total generation greater than 75 MVA (gross aggregate nameplate rating).

**4.2.4** For all Interconnections:

* A technically justified[[2]](#footnote-2) unit that meets NERC registry criteria but is not otherwise included in the above Applicability sections 4.2.1, 4.2.2, or 4.2.3 and is requested by the Transmission Planner.

# Assessment Guidance

**MOD-026-1- Verification of Models and Data for Generator Excitation Control System or Plant Volt/Var Control Functions**

1. Populate Tab 1 of file **MOD-026\_R2\_Testing\_Workbook Q1 2022.xlsx** with all applicable units as defined in Section 4.2 of the standard. If you do not own applicable units or this requirement is not applicable to you, skip to step 6.
2. Select a random sample from the population identified in Tab 1, using the following sampling logic (a random sample may be selected using statistical functions available in Microsoft Excel, through use of RAT-STATS <https://oig.hhs.gov/compliance/rat-stats/index.asp>, or other statistical tool). Use the sample result to populate Tab 2.
	1. Select eight of your applicable units if your total population is nine or greater;
	2. If eight or fewer total applicable units exist in the population, select the entire population.

Fill in Table 1 with the evidence of the sampling process used, including:

Evidence of the sampling process or tool utilized to create the sample (e.g. what are your samples and how are they created).

|  |
| --- |
| **Table 1: Sampling of Tab 1** |
| **File Contents** | **File Name / Page(s)** |
| **Statistical Function Output** |  |
| **Comments** |  |

1. For each sampled applicable unit in Tab 2, please provide:
	1. Documentation, model and data that shows you verified the generator excitation control system or plant volt/var control function model according to Part 2.1. Provide the file names in Tab 2 and upload these files via the SEL.
	2. Dated evidence to show that you provided model, data and documentation to your Transmission Planner. Provide the file names in Tab 2 and upload these files via the SEL.
2. In Table 2 below, please respond “yes” or “no” to the question “Have you completed Requirement R2 of MOD-026-1 for at least 50 percent of your applicable unit gross MVA per Interconnection by 7/1/2020?”

|  |
| --- |
| **Table 2: Have you completed Requirement R2 of MOD-026-1 for at least 50 percent of your applicable unit gross MVA per Interconnection by 7/1/2020?** |
| **Response (Yes/No)** |  |
| **Comments** |  |

1. Please describe and provide internal controls your organization has developed for MOD-026-1 R2. If undocumented, provide a narrative of your MOD-026-1 program. Also provide sample implementation of the internal controls.

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| --- |
| **Table 3: Internal controls for MOD-026-1 R2** |
| **File(s) Contents** | **File Name / Page(s)** |
| **Internal Control Documents** |  |
| **Response** |  |

1. Does the evidence provided meet all elements of the requirement listed?

☐ Yes, respond “Compliant” for R2 to the Self-Certification in Align. Upload supporting documentation to the SEL.

☐ No, respond “Non-Compliant” for R2 to the Self-Certification in Align. Include comments supporting the “Non-Compliant” response. Upload supporting documentation to the SEL.

☐ Do not own, respond “Do Not Own” for R2 to the Self-Certification in Align. Include comments supporting the “Do Not Own” response. Upload supporting documentation to the SEL.

☐ Do not meet the applicability requirements of the full standard, respond “Not-Applicable” for R2 to the Self-Certification in Align. Include comments supporting the “Not-Applicable” response. Upload supporting documentation to the SEL. This response should not be used if the circumstance within the standard or requirement language did not happen. This response should only be used if the requirement or standard is not applicable at all to the entity (such as not registered for the function).

# Document Submittals

MRO requires copies of the following be submitted with the self-certification response to the SEL:

1. This completed worksheet;
2. All files as detailed in Tables 1, and 3; and
3. Completed *MOD-026\_R2\_Testing\_Workbook Q1 2022.xlsx* and the associated evidence files

Please make sure to use unique file names for each evidence file submitted, and identify within your responses to the steps above which specific evidence files support each conclusion made. These references and the use of unique file names helps facilitate and expedite MRO’s review of the Self-Certification work that has been performed.

All other data related to the registered entity’s analysis and self-certification response are to be retained for at least 180 days after the submission date. MRO staff may request submission of additional information at a later date to verify accuracy of self-certification submittals.

1. Excitation control system or plant volt/var control function:

a. For individual synchronous machines, the generator excitation control system includes the generator, exciter, voltage regulator, impedance compensation and power system stabilizer.

b. For an aggregate generating plant, the volt/var control system includes the voltage regulator & reactive power control system controlling and coordinating plant voltage and associated reactive capable resources. [↑](#footnote-ref-1)
2. Technical justification is achieved by the Transmission Planner demonstrating that the simulated unit or plant response does not match the measured unit or plant response. [↑](#footnote-ref-2)