



PARAMETER VERIFICATION REPORTS (ERCOT model quality effort)

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About Verification Reports

- Purpose:
 - To confirm dynamic model matches field settings
 - To expand the NERC MOD-026/027 efforts
 - Requires confirmation of PROTECTION MODELS (voltage, frequency, V/Hz)
 - Requests numerical confirmation of key control gains
- Implemented with PGRR-085 (effective 3/1/2021)
- Planning Guide 5.5 and 6.2
- Required:
 - 30 days following and again 1-2 years after Part 3 approval
 - 30 days following a setting change at the plant
 - Every 10 years
 - By 3/1/2023 for existing plants ([market notice](#))

Helpful Resource

- “About Verification Report” document within the Model Quality Guide package posted at:
<https://www.ercot.com/services/rq/re>
Direct link → https://www.ercot.com/files/docs/2021/04/20/Model_Quality_Guide.zip

About Verification Report Requirement

ERCOT Transmission Planning 1/5/2023

Questions? Contact: dynamicmodels@ercot.com Please don't submit models to this email address.
Model Submission instructions are at the end of this document.

Verification Reports are different from MOD-026/027 studies and are required from all resources according to [Planning Guide 5.5](#) and [Planning Guide 6.2\(5\)\(b\)](#) according to the following timeframes:

- New Resources (commissioning after 3/1/2021):
 - Within 30 days of receiving Part 3 approval
 - No earlier than 12 months and no later than 24 months after receiving Part 3 approval
- Existing Resources (commissioning before 3/1/2021):
 - By 3/1/2023 but not before 3/1/2022
- All resources (regardless of commissioning date)
 - A minimum of every ten years
 - Within 30 days of making a setting change at the plant

Verification reports should be uploaded to R100-RS and included with the following attachments per [Planning Guide 6.2](#) and per the [DWG Procedure Manual](#):

- Dynamic Template (which contains your up-to-date PSS/E / TSAT model)
 - For user-defined models (UDM), also include library files for PSS/E version 33 and version 35 (.dll files), library files for TSAT (.dll and .tudm files) and a TSAT case (.pfb or .raw file and .dyr or .dat file). The TSAT case should be set up using equipment names instead of bus numbers. (A TSAT case is optional for generic models.)
 - Blank templates are downloadable from <https://www.ercot.com/services/rq/re>
- Model Quality Test (MQT) report for the dynamic (PSS/E) model if any changes were made to the model since the last submission. Synchronous (conventional) plants can usually submit their MOD-026/027 studies in lieu of a MQT report provided these studies meet the MQT goals.
- MQT simulation files (.raw or .sav and .dyr).
- PSCAD model (required for most IBRs; some pre-2015 IBRs that never before provided a PSCAD model are not required unless requested by ERCOT)
 - Model Quality Test report for the PSCAD model. It is recommended to overlay the PSCAD and PSS/E MQT plots. ERCOT will check for a match; overlaying the plots helps the RE catch any mismatch prior to submission.
 - PSCAD model Guideline checklist. Blank checklists are available in the Model Quality Guide downloadable from <https://www.ercot.com/services/rq/re>
- Generally, you should update both the dynamic and PSCAD models at the same time to ensure model consistency. However, if the PSCAD model is delayed then provide the dynamic model (PSS/E and TSAT) first with a time estimate for the PSCAD model.
- Helpful instructions are in the Model Quality Guide downloadable from <https://www.ercot.com/services/rq/re>

The goal of the Verification requirement is to ensure our models match actual equipment settings. [This](#) [summarizes MOD-026/027 studies which only check small signal behavior through measurements](#). The Verification requirement focuses on [tunable numerical settings](#). For example, “The exciter model

MOD-026/027 reports and Verification

- NERC MOD-026/027 reports provide supplemental but incomplete evidence.
 - For conventional synchronous facilities:
 - These are generally sufficient at verifying the exciter and governor models. The report may have also checked the excitation limiters and gen saturation. The report is less strong at checking the power system stabilizer thus it is much more effective to confirm the PSS settings on the actual equipment console.
 - Thus, a typical conventional verification report will reference NERC MOD studies plus directly check
 - Protection settings
 - Power system stabilizer settings
 - Governor droop setting
 - Inertia value against documentation
 - If the NERC MOD studies are more than 2 years old, the report should include a brief explanation of any adjustments the plant operator made to the facility since the report was commissioned that might impact the results.
 - For inverter-based facilities, MOD-026/027 reports have limited value
 - Generally, only capable of confirming a few main gains such as primary AVR gain and governor droop
 - Incapable of confirming protection settings and fast / large signal response such as voltage ride through
 - Best to request OEM to confirm settings match either PSS/E or PSCAD model (preferably PSCAD)
 - OEM should describe when and how settings were checked and for how many units at the site

Common Oversights

- Forgetting to submit your model with the Verification report
 - Models should be submitted in Template format
 - If making a model update, also submit a Model Quality Test report¹
 - IBRs not updating their PSCAD model when updating their PSS/E model
- Unclear reference back to the PSS/E model
 - Report tables should include parameter index number, and better yet, list parameters in the same order as the PSS/E model
- Not including a brief write up
 - How and when were the field equipment settings checked? For IBR plants, how many inverters/turbines were checked?
- Not checking **protection relays** and confirming that the most limiting protection relays are correctly modeled
 - If other relays may cause the plant to trip (such as feeder) then these should be modeled also and can be included in the miscellaneous section of the Template and in your example Dyr file

¹ Refer to Model Quality Guide posted at <https://www.ercot.com/services/rq/re>

Verification Reports and the Odessa Event

- The Odessa event found many plants not riding through a disturbance when their models indicated they could ride through
- Some of this may be traced back to the model not matching the field settings. Verification exercises can help
- IBR plants needing to update their PSCAD models will need to run a PSCAD Model Quality Test where the Voltage Ride Through capability will be assessed.
 - Also, the plant will need to fill out a Guideline Checksheet to certify that the PSCAD model contains all relevant modeling detail. This Checksheet is available in the Model Quality Guide package and should generally only be completed by the OEM.

FAQ

Can I get an extension?

Unfortunately, no. Please keep ERCOT updated on your progress and ETA.

Do you have an example report?

No, it's open format

Are my MOD-026/027 reports sufficient?

Refer to slide 4

My OEM is unwilling or out of business (IBRs)

Please document these challenges in the Verification report and put forth a best effort to confirm the model through alternative arrangements. ERCOT will review. ERCOT may request verification using online response to grid faults in the future.

My conventional plant is too small for MOD-026/027 requirement

Please verify according to available documentation and equipment settings

My IBR has multiple OEMs. Can I submit multiple Verification reports?

Yes

PSCAD Test Tool

- ERCOT is developing a new tool for testing IBR PSCAD models
- Tool will also test NOGRR245 proposal (new VRT curves)
- Beta version will be released in ~ 1 week. Feedback welcome.

Questions

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