

## Introduction

The North American Electric Reliability Corporation (NERC) has adopted several standards to increase Bulk Electric System reliability by confirming the accuracy of the equipment models used in system planning studies. These standards require the periodic verification of model accuracy through testing, analysis, and data reporting. Responding to these standards requires specific testing and analysis skills that may not be readily available with in-house staffing.

GE's Energy Consulting organization offers NERC Model Verification Services (MVS) to provide generation owners with a convenient and cost-effective solution for implementing these standards. GE has more than 15 years of experience implementing similar standards to develop implementation techniques for the NERC standards. The goal of these techniques is to provide accurate results with a minimum disruption of the generation operation.

### Benefits of Using GE Energy Consulting

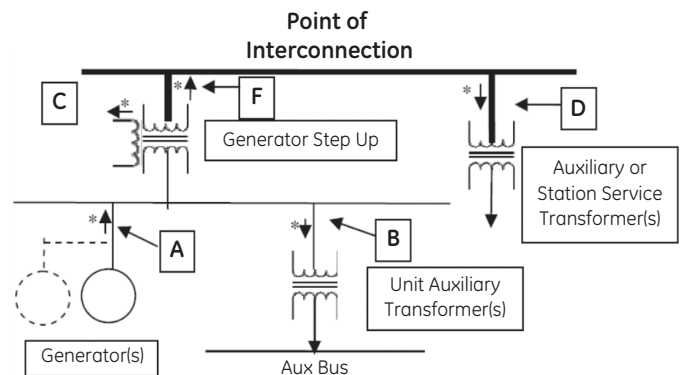
- **Experience:** Proven track record with over 1500 unit tests safely performed on all major manufacturers' equipment.
- **Expertise:** Pioneers in power system modeling and analysis; developers of PSLF power system simulation software.
- **Efficiency:** Refined test procedures require minimal generator test time.
- **Education:** Our experts provide new understanding of equipment capabilities and limitations.

## MOD-025-2

NERC standard MOD-025-2 addresses the "Verification and Data Reporting of Generator Real and Reactive Power Capability and Synchronous Condenser Reactive Power Capability". The standard applies to individual generating units or synchronous condensers with capacities greater than 20 MVA (gross nameplate rating) and generation plants with capacities greater than 75 MVA (gross aggregate nameplate rating). The MOD-025-2 requirements include (among other things):

- ✓ Verification of the maximum continuous real power output (generators only)
- ✓ Verification of the maximum continuous lagging reactive power output
- ✓ Verification of the maximum leading reactive power output
- ✓ Generation of a simplified one-line diagram showing generator and auxiliary real and reactive power flows
- ✓ Calculation of transformer losses
- ✓ Analysis to compare test results to manufacturer's thermal limits
- ✓ Submission of data reporting forms

The complete standard is available at the NERC web site ("Reliability Standards" at [www.nerc.com](http://www.nerc.com)).



\* Positive numbers indicate power flow in direction of arrow; negative numbers indicate power flow in opposite direction of arrow.

Example of Required Simplified One-Line Diagram



## Model Verification Service MVS-025

GE Energy Consulting offers the MVS-025 service to assist generator and synchronous condenser owners in satisfying the NERC MOD-025-2 requirements. The service typically includes the following:

### Prior to Test

- ✓ Work with generator owner to retrieve relevant station design data
- ✓ Evaluate suitability of existing measurement equipment
- ✓ Prepare detailed test procedure

### At site

- ✓ Final review of test procedure with operators
- ✓ Connect additional data recording equipment if necessary
- ✓ Conduct test

*Note: MOD-025 testing is often conducted in conjunction with MOD-026 and MOD-027 testing.*

### After the Test

- ✓ Analyze data
- ✓ Prepare final report with all required NERC recording forms

NERC MOD-025-2 DATA REPORTING FORM									
<b>REPORTING ENTITY</b>									
Organization Name		American Energy							
Plant Name		Big Boy	Unit Name / #		#3				
<b>REPORTING PERSON</b>									
Name		G.E. Engineer		Company		GE			
Telephone #		518-123-4321		Email		GE.Engineer@ge.com			
<b>MACHINE RATINGS</b>									
MVA		202.7		Power Factor		0.9375			
Terminal Voltage (kV)		18.0		Stator Current (A)		6,500			
Field Voltage (V)		375		Field Current (A)		880			
Exciter Field Voltage (V)		---		Exciter Field Current (A)		---			
<b>TEST RESULTS AT MAXIMUM OUTPUT (LAG)</b>									
Time	Gross MW	Gross Mvar	Vt kV	Field Volts	Field Amps	Aux Bus Voltage	Power Factor	Tested MVA	Limit
7:18	200.6	27.8	18.14	283	818	4,310	0.99	202.5	Cap Curve
8:18	196.8	29.7	18.26	278	813	4,305	0.99	199.0	
Test Date		18-Oct-2012							
<b>TEST RESULTS AT MINIMUM OUTPUT (LEAD)</b>									
Time	Gross MW	Gross Mvar	Vt kV	Field Volts	Field Amps	Aux Bus Voltage	Power Factor	Tested MVA	Limit

Example of Required Data Reporting Form

## GE Energy Consulting

For nearly a century, a core group of leading GE technical and business experts has focused on solving the electric power industry's most pressing challenges—driving the evolution of electric power systems with greater affordability, reliability, and efficiency. GE's Energy Consulting team provides innovative solutions across the entire spectrum of power generation, delivery, and utilization.

For more than 15 years, GE Energy Consulting has performed model verification services on more than 1,500 units from all major generator manufacturers. The accumulated expertise from this experience allows Energy Consulting to perform the testing with the highest degree of efficiency and safety.

[www.geenergyconsulting.com](http://www.geenergyconsulting.com)



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