NERC
NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

Standards Authorization Request Form

When completed, please email this form to:
sarcomm@nerc.com

NERC welcomes suggestions to improve the reliability of the bulk power system through improved Reliability Standards. Please use this form to submit your request to propose a new or a revision to a NERC Reliability Standard.

Request to propose a new or a revision to a Reliability Standard			
Title of Proposed Standard:	PRC-025-1 – Generator Relay Loadability		
Date Submitted:	August 25, 2016		
SAR Requester Information for #1			
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SAR Requester Information for #3			
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Request to propose a new or a revision to a Reliability Standard			
SAR Requester Information for #4			
Name:	Éric Loiselle, ing.		
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SAR Type (Check as many as applicable)			
☐ New Standard ☒ Revision to Existing Standard		☐ Withdrawal of Existing Standard ☒ Urgent Action	

SAR Information

Industry Need (What is the industry problem this request is trying to solve?):

This SAR proposes revising PRC-025-1 for four specific problems.

1. Prevent instances of non-compliance for conditions where the Generator Owner may be prevented from achieving the margin specified by the standard for dispersed generation resources (DGR).
2. Prevent a lowering of reliability and potential non-compliance where the Generator Owner might apply a non-standard relay element application and undermine the goal of the standard.
3. Prevent a lowering of reliability where the Generator Owner might only apply part of the Table 1 application(s) thereby misapplying the loadability margins to relays for the stated application(s).
4. Prevent a lowering of dependability of protective relays directional toward the transmission system at generating facilities that are remote to the transmission network.

Purpose or Goal (How does this request propose to address the problem described above?):

Consider revising the PRC-025-1 standard through the standards development process to: (1) provide alternative loadability Options for Table 1 specific to DGR; (2) address the inclusion or exclusion of the 50 element (i.e., instantaneous), (3) review Table 1 for proper application where there is more than one application for the available Option(s), and (4) provide alternative or additional Options for Table 1 specific to relay applications that are directional toward the transmission system where the interconnecting transmission line impedance may be a factor in determining the maximum reactive output of the generators and associated relay settings.

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Identify the Objectives of the proposed standard's requirements (What specific reliability deliverables are required to achieve the goal?):

This SAR proposes the need for revising PRC-025-1 for four specific problems.

1. PRC-025-1, Table 1 requires setting the overcurrent relay of a Protection System applied to an asynchronous generating unit or an Element utilized in the aggregation of DGR to a margin greater than 130% of the calculated current derived from the maximum aggregate nameplate MVA output at rated power factor. This may result in instances of non-compliance due manufacturer requirements or physical limitations of DGR and may result in an overly conservative relay setting. Consider revising the standard to provide alternative options for setting the overcurrent element of a Protection System applied to an asynchronous generating unit and an Element utilized in the aggregation of DGR.
2. There is potential for Generator Owners to apply a pick up setting of the 50 element (i.e., instantaneous overcurrent) of a Protection System, which is not applicable to the standard, that is lower than the minimum pick up established by the standard for the 51 element (i.e., time delayed overcurrent). The 50 element is generally not used in the generator applications where the 51 element is found in the standard. Consider revising the standard to address the inclusion or exclusion of the 50 element for the various overcurrent applications within Table 1.
3. There is potential for Generator Owners not to apply loadability margins to all load-responsive protective relays in Table 1 of PRC-025-1 under the "Application" column that may affect loadability. For example, the Application column from Table 1 (Options 4, 5, and 6):

   > *"Asynchronous generating unit(s) (including inverter-based installations), **or** Elements utilized in the aggregation of dispersed power producing resources."*

   The above clause is separated by an "or" conjunction and may lead the Generator Owner to set one particular application and not the other. This may create a gap in achieving the goal of the standard when loadability margins are not applied to relays on certain Elements. Consider revising the standard to make it clear whether either or both of the listed Elements in the Application column of Options 1-6 must meet the criteria of the particular Option.
4. In the case of remote generating facilities that are electrically weak at its connection to the transmission network, the maximum reactive power required by the specific Table 1 Options is too high to be observed in any recoverable stressed condition. This is due to the system impedance (mainly line impedance) restricting the maximum reactive power output by the generator, no matter the generator characteristics. Lastly, applying the existing Table 1 Options for relay applications directional toward the transmission system results in an overly

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conservative relay setting and could require reducing the backup protection coverage in order to comply with the stressed system condition anticipated by the standard.

Brief Description (Provide a paragraph that describes the scope of this standard action.)

The PRC-025-1 standard became effective on October 1, 2014 and has a phased implementation of five and seven years (i.e., 2019 or 2021) depending on the scope of work required by the Generator Owner. During the early stages of implementation, the above four problems were revealed by industry. The scope of work will be to consider providing (1) an alternative loadability margin for DGR, (2) revision that includes or excludes 50 element for overcurrent applications, (3) clarification of the application of the Elements in Table 1 of PRC-025-1 for each option that has two applicable Elements separated by an “or” conjunction, and (4) alternative or additional Option(s) (e.g., calculation or method) for determining loadability settings for relays that are directional toward the transmission.

Detailed Description (Provide a description of the proposed project with sufficient details for the standard drafting team to execute the SAR. Also provide a justification for the development or revision of the standard, including an assessment of the reliability and market interface impacts of implementing or not implementing the standard action.)

1. Consider revising the PRC-025-1 standard concerning #1 above through the standards development process to provide a means to determine alternative loadability Options for Table 1 of the standard specific to DRG equipment where there could be a manufacturer requirement or physical equipment limitation. Similar to the provisions already contained in the standard, consider methods that would eliminate the potential for non-compliance and/or a violation of manufacturer specifications. For example: (a) a provision could allow a margin consistent with the manufacturer’s requirements or based on the limitation of the equipment; (b) a provision to allow the DRG output to be studied through simulation (e.g., similar to Options 1c and 2c) and the relays to be set with an appropriate margin determined through the standard development process; (c) a provision to exempt equipment with fixed limitations installed prior to the effective date of PRC-025-1 or other justifiable date; and/or (d) any other equally effective and efficient method to accomplish the goal.
2. Consider revising the PRC-025-1 standard concerning #2 above to address the inclusion or exclusion of the 50 element (i.e., instantaneous overcurrent) of a Protection System with or without intentional time delay. Newer techniques in generator protection applications may result in a gap due to non-traditional applications of generator overcurrent relays.

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3. Consider revising the PRC-025-1 standard concerning #3 above through the standards development process to bring awareness and clarification whether either or both of the Elements listed in the “Application” column of Table 1, Options 1-6 are to have loadability margins applied to the load-responsive protective relays. 4. Consider revising the PRC-025-1 standard concerning #4 above through the standards development process to provide a means to determine alternative loadability Option(s) for Table 1 of the standard specific to relays directional toward the transmission system. Similar to the provisions already contained in the standard, consider: (a) alternative Options for relay settings where the interconnecting transmission line impedance has a significant impact the maximum reactive output of the generating facility and the associated relay settings, (b) the technical validity of the existing options in the presence of significant transmission line impedance between generation and the network, and/or (c) any other equally effective and efficient method to address the problem of significant line impedance effecting how phase protective relays are set not limit generator loadability while maintaining reliable protection of the BES for all fault conditions.

Reliability Functions	
The Standard will Apply to the Following Functions (Check each one that applies.)	
☐ Reliability Coordinator	Responsible for the real-time operating reliability of its Reliability Coordinator Area in coordination with its neighboring Reliability Coordinator’s wide area view.
☐ Balancing Authority	Integrates resource plans ahead of time, and maintains load-interchange-resource balance within a Balancing Authority Area and supports Interconnection frequency in real time.
☐ Interchange Authority	Ensures communication of interchange transactions for reliability evaluation purposes and coordinates implementation of valid and balanced interchange schedules between Balancing Authority Areas.
☐ Planning Coordinator	Assesses the longer-term reliability of its Planning Coordinator Area.
☐ Resource Planner	Develops a one year plan for the resource adequacy of its specific loads within a Planning Coordinator area.

Reliability Functions		
☐	Transmission Planner	Develops a one year plan for the reliability of the interconnected Bulk Electric System within its portion of the Planning Coordinator area.
☐	Transmission Service Provider	Administers the transmission tariff and provides transmission services under applicable transmission service agreements (e.g., the pro forma tariff).
☒	Transmission Owner	Owns and maintains transmission facilities.
☐	Transmission Operator	Ensures the real-time operating reliability of the transmission assets within a Transmission Operator Area.
☒	Distribution Provider	Delivers electrical energy to the end-use customer.
☒	Generator Owner	Owns and maintains generation facilities.
☐	Generator Operator	Operates generation unit(s) to provide real and reactive power.
☐	Purchasing-Selling Entity	Purchases or sells energy, capacity, and necessary reliability-related services as required.
☐	Market Operator	Interface point for reliability functions with commercial functions.
☐	Load-Serving Entity	Secures energy and transmission service (and reliability-related services) to serve the end-use customer.

Reliability and Market Interface Principles	
Applicable Reliability Principles (Check all that apply).	
☒	1. Interconnected bulk power systems shall be planned and operated in a coordinated manner to perform reliably under normal and abnormal conditions as defined in the NERC Standards.
☐	2. The frequency and voltage of interconnected bulk power systems shall be controlled within defined limits through the balancing of real and reactive power supply and demand.
☐	3. Information necessary for the planning and operation of interconnected bulk power systems shall be made available to those entities responsible for planning and operating the systems reliably.
☐	4. Plans for emergency operation and system restoration of interconnected bulk power systems shall be developed, coordinated, maintained and implemented.
☐	5. Facilities for communication, monitoring and control shall be provided, used and maintained for the reliability of interconnected bulk power systems.

Reliability and Market Interface Principles	
☐	6. Personnel responsible for planning and operating interconnected bulk power systems shall be trained, qualified, and have the responsibility and authority to implement actions.
☐	7. The security of the interconnected bulk power systems shall be assessed, monitored and maintained on a wide area basis.
☐	8. Bulk power systems shall be protected from malicious physical or cyber attacks.

Does the proposed Standard comply with all of the following Market Interface Principles?	Enter (yes/no)
1. A reliability standard shall not give any market participant an unfair competitive advantage.	Yes
2. A reliability standard shall neither mandate nor prohibit any specific market structure.	Yes
3. A reliability standard shall not preclude market solutions to achieving compliance with that standard.	Yes
4. A reliability standard shall not require the public disclosure of commercially sensitive information. All market participants shall have equal opportunity to access commercially non-sensitive information that is required for compliance with reliability standards.	Yes

Related Standards	
Standard No.	Explanation
None.	

Related SARs	
SAR ID	Explanation
None.	

Related SARs	

Regional Variances	
Region	Explanation
ERCOT	None.
FRCC	None.
MRO	None.
NPCC	None.
RFC	None.
SERC	None.
SPP	None.
WECC	None.

Version History

Version	Date	Owner	Change Tracking
1	June 3, 2013		Revised
1	August 29, 2014	Standards Information Staff	Updated template