

Unofficial Comment Form

Project 2010-13.3 – Relay Loadability: Stable Power Swings

Please **DO NOT** use this form for submitting comments. Please use the electronic form [electronic form](#) to submit comments on the Standard. The electronic comment form must be completed by **8:00 p.m. EST Monday October 6, 2014**.

If you have questions please contact Scott Barfield-McGinnis, Standards Developer at scott.barfield@nerc.net or by telephone at 404-446-9689.

<http://www.nerc.com/pa/Stand/Pages/Project2010133Phase3of-RelayLoadabilityStablePowerSwings.aspx>

Background Information

This posting is soliciting formal comment.

This is Phase 3 of a three-phased standard development that is focused on developing a new Reliability Standard, PRC-026-1 – Relay Performance During Stable Power Swings, to address protective relay operations due to stable power swings. The March 18, 2010, FERC Order No. 733, approved Reliability Standard PRC-023-1 – Transmission Relay Loadability. In this Order, FERC directed NERC to address three areas of relay loadability that include modifications to the approved PRC-023-1, development of a new Reliability Standard to address generator protective relay loadability, and a new Reliability Standard to address the operation of protective relays due to stable power swings. This project's SAR addresses these directives with a three-phased approach to standard development.

Phase 1 focused on making the specific modifications to PRC-023-1 and was completed in the approved Reliability Standard PRC-023-2, which became mandatory on July 1, 2012. Phase 2 focused on developing a new Reliability Standard, PRC-025-1 – Generator Relay Loadability, to address generator protective relay loadability; Phase 2 is currently awaiting regulatory approval. This Phase 3 of the project focuses on developing a new Reliability Standard, PRC-026-1 – Relay Performance During Stable Power Swings, to address protective relay operations due to stable power swings. This Reliability Standard will establish requirements aimed at preventing protective relays from tripping unnecessarily due to stable power swings by requiring the Transmission Owners and Generator Owners to assess the security of protective relay systems that are susceptible to operation during power swings, and take actions to improve security for stable power swings where such actions would not compromise dependable operation for faults and unstable power swings.

You do not have to answer all questions. Enter comments in simple text format. Bullets, numbers, and special formatting will not be retained.

Summary of revisions from Draft 1 to Draft 2

Purpose Statement

The standard's purpose was revised from ensuring "relays do not trip" to "relays are expected to not trip" ... in response to stable power swings during non-Fault conditions.

Applicability

The Reliability Coordinator and Transmission Planner were removed from the standard to address concerns about overlap and potential gaps when identifying Elements.

Applicability for the Generator Owner and Transmission Owner was augmented to refer to an appended "Attachment A" which describes load-responsive protective relays that are included in the standard and associated exclusions.

Requirements

Requirement R1 was revised substantively to remove the Reliability Coordinator and Transmission Planner functions. The drafting team concurred that having the Planning Coordinator as the single source for identifying Elements prevents potential duplication of work and a possible gap should an entity believe another is making the identification and notification. The Requirement now allows a full calendar year to notify the respective Generator Owner and Transmission Owner of an identified Element. This was done to eliminate the burden of providing notification each January. The following are changes to each of the original four criteria and the addition of a fifth criterion.

1. Added "angular" to clarify that this is not referring to other constraints such as voltage. Also replaced "Special Protection System (SPS)" with "Remedial Action Scheme (RAS)" to comport with expected changes to these NERC defined terms.
2. Clarified that criterion 2 applies only to "monitored" Elements of a System Operating Limit (SOL). Also, added "angular" to clarify that this is not referring to other constraints such as voltage.
3. Revised the "islanding" criterion to remove ambiguity about islands that formed during planning assessments. Islanding is now associated with an Element that forms the boundary of an island due to angular instability within an underfrequency load shedding (UFLS) assessment. Also, added "angular" to clarify that this is not referring to other constraints such as voltage.
4. Replaced the term "Disturbance," because it generally refers to an actual and not simulated event, with the phrase "simulated disturbance." The lowercase term "disturbance" was considered to be consistent with the new TPL-001-4 standard, but it was determined that its usage would continue

to create questions so “simulated” was added. The phrase “stable or unstable” was inserted to clarify that both are applicable to power swings because the goal of the standard is to identify Elements susceptible to either.

5. This criterion was added as a mechanism to require the Planning Coordinator to continue identifying any Element previously reported by a Generator Owner due to a stable or unstable power swing during an actual system Disturbance or the Transmission Owner due to a stable or unstable power swing during an actual system Disturbance or islanding event. Reported Elements will continue to be identified by the Planning Coordinator until the Planning Coordinator determines the Element is no longer susceptible to power swings.

Requirement R2 was revised to remove the Generator Owner performance because the Generator Owner does not “island.” Also, the January 1, 2003 date was removed due to industry confusion and concern about compliance with such a date and how enforcement would be handled should an entity not have good records. In order to maintain continuity of actual Disturbances and to raise awareness of power swing and islanding events, the Transmission Owner is required to report the affected Element to its Planning Coordinator. The only timeframe assigned to the Requirement is following the identification of the Disturbance which was due to a stable or unstable power swing for reporting to the Planning Coordinator. There is no requirement to review the Protection System operation as such activities are addressed by other NERC Reliability Standards.

Requirement R3 is a new requirement created from the previous Requirement R2 specifically for the Generator Owner. In order to maintain continuity of actual Disturbances and to raise awareness of power swing events, the Generator Owner is required to report the affected Element to its Planning Coordinator. The only timeframe assigned to the Requirement is following the identification of the Disturbance which was due to a stable or unstable power swing for reporting to the Planning Coordinator. There is no requirement to review the Protection System operation as such activities are addressed by other NERC Reliability Standards.

Requirement R4 (previously R3) has been rewritten substantially to eliminate multiple and varying activities such as, demonstrate, develop, and obtain agreement. The Requirement was further simplified to reference PRC-026-1 – Attachment B which contains the criteria for evaluating load-responsive protective relays by the Generator Owner and Transmission Owner. The timing for evaluating load-responsive protective relays, initially, is 12 full calendar month. As identified Elements are reported year after year, the Generator Owner and Transmission Owner are only required to re-evaluate its load-responsive protective relays applied on the terminals of the identified Element where the previous evaluation had not been performed in the last three calendar years. This reduced the burden to the entities over Draft 1.

Requirement R5 was added to address the requirement for developing a Corrective Action Plan (CAP) that was contained in the previous Draft 1, Requirement R3.

Requirement R6 was previously R4 and only received comportsing updates to references due to numbering changes.

PRC-026-1 – Attachment A

The PRC-026-1 – Attachment A was added to the standard due to stakeholder confusion about load-responsive protective relays and to provide specific exclusions. The attachment is referenced in the Applicability section of the standard.

PRC-026-1 – Attachment B

The PRC-026-1 – Attachment B was added to the standard to remove the “Criteria” for evaluating load-responsive protective relays from within Requirement R4 and provide it in a self-contained place for referencing by Requirement R4. Among other things, the criteria found in the attachment received these modifications:

1. The sending and receiving voltages were changed to 0.7 to 1.0 from 0 to 1.0 per unit. This increases the lens characteristic that the impedance characteristic (e.g., zone 2) must be completely contained within. It was determined that using the 0.7 per unit is not in conflict with other NERC Reliability Standards or accepted industry practice for setting protective relays.
2. In developing the lens characteristic formed in the impedance (R-X) plane that connects the endpoints of the total system impedance, the criteria now requires the “parallel transfer impedance” to be removed.
3. Although previously addressed within the standards’ Application Guidelines, criteria as to whether the transient or sub-transient may be used are now specified. The criteria are further defined as the “saturated (transient or sub-transient) reactance. The option to use either transient or sub-transient is provided to entities because either will provide a lens characteristic that is sufficiently conservative to determine the relay’s susceptibility to tripping in response to a stable power swing. Also, providing this option reduces the burden on entities from changing which value it uses when it is already using one or the other preset in software applications. Saturated reactances are specified since they result in lower system impedances. Most notable, the criteria now requires the “parallel transfer impedance” to be removed when using the criteria to determine the relay’s susceptibility to tripping in response to a stable power swing.
4. The attachment now includes an additional Criteria B which provides criteria for overcurrent-based protective relays. Like the original criteria for impedance-based relays, it uses the 120 degree system separation angle, all Elements in service, and saturated (transient or sub-transient) reactance. This criteria also requires the “parallel transfer impedance” to be removed.

You do not have to answer all questions. Enter All Comments in Simple Text Format.

Please note that the official comment form **does not** retain formatting (even if it appears to transfer formatting when you copy from the unofficial Word version of the form into the official electronic

comment form). If you enter extra carriage returns, bullets, automated numbering, symbols, bolding, italics, or any other formatting, that formatting will not be retained when you submit your comments.

- Separate discrete comments by idea, e.g., preface with (1), (2), etc.
- Use brackets [] to call attention to suggested inserted or deleted text.
- Insert a “check” mark in the appropriate boxes by double-clicking the gray areas.
- **Do not use** formatting such as extra carriage returns, bullets, automated numbering, bolding, or italics.
- **Please do not repeat other entity’s comments.** Select the appropriate item to support another entity’s comments. An opportunity to enter additional or exception comments will be available.
- If supporting other’s comments, be sure the other party submits comments.

Questions

1. Do you agree with the Applicability changes to PRC-026-1 (e.g., removal of the Reliability Coordinator and Transmission Planner)? If not, please explain why an entity is not appropriate and/or suggest an alternative that should identify the Elements according to the criteria.

Yes

No

Comments:

2. Do you agree that the revisions to Requirement R1 improved clarity while remaining consistent with the focused approach of using the Criteria which came from recommendations in the PSRPS technical document¹ (pg. 21 of 61)? If not, please explain why and provide an alternative, if any.

Yes

No

Comments: Comments regarding requirement R1 can be found in the response to Question 8. Additionally, suggest clarifying requirement R1 by adding the wording “for all design criteria events” so as to make it read:

R1. Each Planning Coordinator shall, for all design criteria events, at least once each calendar year, identify each Element in its area that meets one or more of the following criteria and provide notification to the respective Generator Owner and Transmission Owner, if any:

¹ NERC System Protection and Control Subcommittee, *Protection System Response to Power Swings*, August 2013, “PSRPS Report,” http://www.nerc.com/comm/PC/System%20Protection%20and%20Control%20Subcommittee%20SPCS%2020/SPCS%20Power%20Swing%20Report_Final_20131015.pdf

3. The previous Requirement R2 was split into Requirement R2 for the Transmission Owner and Requirement R3 for the Generator Owner in order to clarify the performance for identifying Elements that trip. Did this revision improve the understanding of what is required? If not, please explain why the Requirement(s) need additional clarification.

Yes
 No

Comments: Comments regarding requirements R2 and R3 can be found in the response to Question 8.

Splitting requirement R2 into two requirements adds clarity.

4. Requirement R4 (previously R3) contained multiple activities (e.g., demonstrate, develop a Corrective Action Plan, obtain agreement) and was ambiguous. Do you agree that the revision to Requirement R4 now provides a clearer understanding of what is required by the Generator Owner and Transmission Owner for an identified Element? Note: The Criterion is now found in PRC-026-1 – Attachment B, Criteria A and B. If not, please explain why the Requirement is not clear.

Yes
 No

Comments: Requirement R4 continues to be a combined TO/GO requirement. For clarity, R4 should also be split into two requirements--one to address the GO obligations by applicable requirement, another to address the TO obligations by applicable requirement.

5. The new Requirement R5 (previously R4) and the new Requirement R6 address Corrective Action Plans (CAP), if any. Do you agree this is an improvement over having the development of the CAP comingled with other Requirement? If not, please explain.

Yes
 No

Comments: A CAP is developed to correct a problem after the requirements of a standard are implemented. The Implementation Plan should address meeting the obligations of the standard's requirements. The Implementation Plan would also address the annual identification of Elements. This would allow for the removal of requirements R5 and R6.

Generator Owners and Transmission Owners need more time subsequent to the identification of load-responsive protective relays to perform a thorough evaluation. The requirement should provide at least 180 days to perform the evaluation. This will allow for a more complete response than can be obtained in 60 days.

If the CAP is kept, the Generator or Transmission Owner should provide a copy of the initial Corrective Action Plan and status updates to the Planning Coordinator. The length of time an entity has to complete corrective actions should be specified. 180 calendar days is a realistic length of time.

6. Does the “Application Guidelines and Technical Basis” provide sufficient guidance, basis for approach, and examples to support performance of the requirements? If not, please provide specific detail that would improve the Guidelines and Technical Basis.

Yes

No

Comments:

7. The Implementation Plan for the proposed standard has been revised, based on comments, to account for factors such as the initial influx of identified Elements and ongoing burden of entities to identify Elements and re-evaluate Protection Systems. Does the implementation plan provide sufficient time for implementing the standard? If not, please provide a justification for changing the proposed implementation period and for which Requirement.

Yes

No

Comments: Twelve months is not adequate to prepare for this standard as written. The Drafting Team should change the Implementation Plan to 24 months.

The implementation could be improved by adding when the performance of requirement R1 is due. Is the PC supposed to complete its R1 analysis based on the effective date of the Standard 12 months after FERC approval, or 12 months after FERC approves the Standard then the PC has to complete the study for the calendar year? This can be difficult depending on when FERC approves the Standard. We suggest the revision to 24 months and stating that the PC is expected to complete the identification required by R1 in the calendar year that the requirement becomes effective. This removes the concern of what month FERC approves the Standard.

8. If you have any other comments on PRC-026-1 that have not been stated above, please provide them here:

Comments: The wording of the Purpose should not have been changed. The existing wording "do not trip" is definitive; the proposed wording "...are expected to..." leaves room for questioning. If the proposed wording is kept, suggest that the Purpose read:

To ensure that load-responsive protective relays are not expected to trip in response to stable power swings during non-Fault conditions.

Regarding requirements R1, R2 and R3, to be consistent with the format of other NERC standards, the Criteria/Criterion listings should be made Parts of requirements R1, R2 and R3.

Requirement R1 has the Planning Coordinator notifying the respective Generator Owner and Transmission Owner but a specific time period to complete the notification following the identification of an Element is not specified. This may appear as a gap in the process. The Planning Coordinator should have 30 days to notify the TO and GO.

PRC-026 leaves out the use of transfer limits to correct for stable power swings. Transfer limits are an important tool for use in power system operations, and should be mentioned in a Rationale Box.

Entities should not be exempted from the standard because of the linkage to Attachment A. Attachment A should not exclude Relay elements supervised by power swing blocking. Entities may install out of step blocking in order to be exempted from the standard. An entity may install Out of Step Blocking equipment without validating that it is set correctly because PRC-026 would not apply.

Measure M3 is missing the word "meet". Measure M3 should read:

M3. Each Generator Owner shall have dated evidence that demonstrates identification of the Element(s), if any, which meet the criterion in Requirement R3. Evidence may include, but is not limited to, the following documentation: emails, facsimiles, records, reports, transmittals, lists, or spreadsheets.