NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Implementation Plan

PRC-023-3 – Transmission Relay Loadability

Project 2010-13.2 Phase II Relay Loadability

Requested Approvals

- PRC-023-3 – Transmission Relay Loadability

Requested Retirements

- PRC-023-2 – Transmission Relay Loadability

Prerequisite Approvals

- PRC-025-1 – Generator Relay Loadability*
  *A supplemental SAR was approved by the Standards Committee at their January 16-17, 2013 meeting to authorize the drafting team to make changes to PRC-023-2 to comport with the proposed draft PRC-025-1 – Generator Relay Loadability in order to establish a bright line between the applicability of load-responsive protective relays in the current transmission and the proposed generator relay loadability standards.

Revisions to Defined Terms in the NERC Glossary

- None

Background

The generator relay loadability standard drafting team and industry stakeholders raised a concern that there is no bright line to clearly distinguish which load-responsive protective relays pertain to the existing PRC-023-2 – Transmission Relay Loadability standard, effective in the United States on July 1, 2012, and the proposed PRC-025-1 – Generator Relay Loadability standard. To resolve this concern, the drafting team proposed to modify the applicability section of PRC-023-2. The standard drafting team clarified, for each functional entity, the applicability of PRC-023-2 by tying applicability to the terminal the load-responsive protective relay that it is connected to within the Transmission system.

General Considerations

It is expected that the implementation period for PRC-023-2 will have been achieved, in part, by the time PRC-023-3 is adopted by the NERC Board of Trustees and by the time of other approvals by applicable

governmental authorities. The proposed PRC-023-3 Implementation Plan now reflects specific milestone dates that are known time periods consistent with PRC-023-2.

Applicable Entities

- Distribution Provider
- Generator Owner
- Planning Coordinator
- Transmission Owner

Effective Date

New Standard

PRC-023-3	First day of the first calendar quarter beyond the date that this standard is approved by applicable regulatory authorities, or in those jurisdictions where regulatory approval is not required, the standard becomes effective on the first day of the first calendar quarter beyond the date this standard is approved by the NERC Board of Trustees, or as otherwise made effective pursuant to the laws applicable to such ERO governmental authorities.

Standards for Retirement

PRC-023-2	Midnight of the day immediately prior to the Effective Date of PRC-023-3 – Transmission Relay Loadability in the particular jurisdiction in which the new standard is becoming effective, except Requirement R1, Criterion 6 which will remain in force until the effective date of PRC-025-1.

Implementation Plan for Definitions

No definitions are proposed as a part of this standard.

Implementation Plan for PRC-023-3, Requirements R1 through R6

Each Distribution Provider, Generator Owner, Planning Coordinator, and Transmission Owner applicable to this standard shall be 100% compliant on the following dates:

Requirement	Applicability	Implementation Date	
		Jurisdictions where Regulatory Approval is Required	Jurisdictions where No Regulatory Approval is Required
R1	Each Transmission Owner, Generator Owner, and Distribution Provider with load-responsive phase protection systems on transmission lines operating at 200 kV and above and transformers with low voltage terminals connected at 200 kV and above, except as noted below.	First day of the first calendar quarter, after applicable regulatory approvals	First day of the first calendar quarter after Board of Trustees adoption, or as otherwise made effective pursuant to the laws applicable to such ERO governmental authorities
	• For supervisory elements as described in PRC-023-3 - Attachment A, Section 1.6	The later of July 1, 2014 or first day of the first calendar quarter after applicable regulatory approvals	First day of the first calendar quarter after Board of Trustees adoption, or as otherwise made effective pursuant to the laws applicable to such ERO governmental authorities
	• For switch-on-to-fault schemes as described in PRC-023-3 - Attachment A, Section 1.3	First day of the first calendar quarter after applicable regulatory approvals	First day of the first calendar quarter after Board of Trustees adoption, or as otherwise made effective pursuant to the laws applicable to such ERO governmental authorities

Requirement	Applicability	Implementation Date	
		Jurisdictions where Regulatory Approval is Required	Jurisdictions where No Regulatory Approval is Required
R1 (continued)	Each Transmission Owner, Generator Owner, and Distribution Provider with circuits identified by the Planning Coordinator pursuant to Requirement R6	Later of the first day of the first calendar quarter 39 months following notification by the Planning Coordinator of a circuit's inclusion on a list of circuits per application of Attachment B, or the first day of the first calendar year in which any criterion in Attachment B applies, unless the Planning Coordinator removes the circuit from the list before the applicable effective date	Later of the first day of the first calendar quarter 39 months following notification by the Planning Coordinator of a circuit's inclusion on a list of circuits per application of Attachment B, or the first day of the first calendar year in which any criterion in Attachment B applies, unless the Planning Coordinator removes the circuit from the list before the applicable effective date
R2 and R3	Each Transmission Owner, Generator Owner, and Distribution Provider with load-responsive phase protection systems on transmission lines operating at 200 kV and above and transformers with low voltage terminals connected at 200 kV and above	First day of the first calendar quarter after applicable regulatory approvals	First day of the first calendar quarter after Board of Trustees adoption, or as otherwise made effective pursuant to the laws applicable to such ERO governmental authorities

Requirement	Applicability	Implementation Date	
		Jurisdictions where Regulatory Approval is Required	Jurisdictions where No Regulatory Approval is Required
R2 and R3 continued	Each Transmission Owner, Generator Owner, and Distribution Provider with load-responsive phase protection systems on circuits identified by the Planning Coordinator pursuant to Requirement R6	Later of the first day of the first calendar quarter 39 months following notification by the Planning Coordinator of a circuit's inclusion on a list of circuits per application of Attachment B, or the first day of the first calendar year in which any criterion in Attachment B applies, unless the Planning Coordinator removes the circuit from the list before the applicable effective date	Later of the first day of the first calendar quarter 39 months following notification by the Planning Coordinator of a circuit's inclusion on a list of circuits per application of Attachment B, or the first day of the first calendar year in which any criterion in Attachment B applies, unless the Planning Coordinator removes the circuit from the list before the applicable effective date
R4	Each Transmission Owner, Generator Owner, and Distribution Provider that chooses to use Requirement R1 criterion 2 as the basis for verifying transmission line relay loadability	First day of the first calendar quarter six months after applicable regulatory approvals	First day of the first calendar quarter six months after Board of Trustees adoption, or as otherwise made effective pursuant to the laws applicable to such ERO governmental authorities

Requirement	Applicability	Implementation Date	
		Jurisdictions where Regulatory Approval is Required	Jurisdictions where No Regulatory Approval is Required
R5	Each Transmission Owner, Generator Owner, and Distribution Provider that sets transmission line relays according to Requirement R1 criterion 12	First day of the first calendar quarter after applicable regulatory approvals	First day of the first calendar quarter after Board of Trustees adoption, or as otherwise made effective pursuant to the laws applicable to such ERO governmental authorities
R6 **(including parts 6.1 and 6.2)**	Each Planning Coordinator shall conduct an assessment by applying the criteria in Attachment B to determine the circuits in its Planning Coordinator area for which Transmission Owners, Generator Owner, and Distribution Providers must comply with Requirements R1 through R5	Later of January 1, 2014 or the first day of the first calendar quarter after applicable regulatory approvals	First day of the first calendar quarter after Board of Trustees adoption, or as otherwise made effective pursuant to the laws applicable to such ERO governmental authorities

Revisions or Retirements to Already Approved Standards

The following table identifies the sections of the approved standard that shall be added, retired, or revised when this standard is implemented. If the drafting team is recommending revisions, those changes are identified by the "Proposed Replacement" column.

Already Approved Standard	Proposed Replacement
PRC-023-2 **4.1.** Functional Entity **4.1.1** Transmission Owners with load-responsive phase protection systems as described in PRC-023-2 - Attachment A, applied to circuits defined in 4.2.1 *(Circuits Subject to Requirements R1 – R5).* **4.1.2** Generator Owners with load-responsive phase protection systems as described in PRC-023-2 - Attachment A, applied to circuits defined in 4.2.1 *(Circuits Subject to Requirements R1 – R5).* **4.1.3** Distribution Providers with load-responsive phase protection systems as described in PRC-023-2 - Attachment A, applied to circuits defined in 4.2.1*(Circuits Subject to Requirements R1 – R5)*, provided those circuits have bi-directional flow capabilities. **4.1.4** Planning Coordinators	**PRC-023-3** **4.1.** Functional Entity **4.1.1** Transmission Owner~~s~~ with load-responsive phase protection systems as described in PRC-023-~~2~~3 - Attachment A, applied at the terminals of the circuits defined in 4.2.1 *(Circuits Subject to Requirements R1 – R5).* **4.1.2** Generator Owner~~s~~ with load-responsive phase protection systems as described in PRC-023-3 - Attachment A, applied at the terminals of the circuits defined in 4.2.1 *(Circuits Subject to Requirements R1 – R5).* **4.1.3** Distribution Provider~~s~~ with load-responsive phase protection systems as described in PRC-023-~~2~~3 - Attachment A, applied at the terminals of the circuits defined in 4.2.1 *(Circuits Subject to Requirements R1 – R5)*, provided those circuits have bi-directional flow capabilities. **4.1.4** Planning Coordinator~~s~~
Notes: The change in the proposed PRC-023-3 Applicability, Section 4.1, Functional Entity creates a bright line between those load-responsive protective relays that are applicable to PRC-023-3 – Transmission Relay Loadability and the proposed PRC-025-1 – Generator Relay Loadability. This is evident by the minor changes to the Applicability text to distinguish the applicability of the relays by which "terminal" the load-responsive protective relay is connected to within the Transmission system. Applicability is established by ownership of the load-responsive protective relays, not the Facilities.	

Already Approved Standard	Proposed Replacement
PRC-023-2 **4.2.** Circuits **4.2.1** Circuits Subject to Requirements R1 – R5 **4.2.1.1** Transmission lines operated at 200 kV and above. **4.2.1.2** Transmission lines operated at 100 kV to 200 kV selected by the Planning Coordinator in accordance with R6. **4.2.1.3** Transmission lines operated below 100 kV that are part of the BES and selected by the Planning Coordinator in accordance with R6. **4.2.1.4** Transformers with low voltage terminals connected at 200 kV and above. **4.2.1.5** Transformers with low voltage terminals connected at 100 kV to 200 kV selected by the Planning Coordinator in accordance with R6. **4.2.1.6** Transformers with low voltage terminals connected below 100 kV that are part of the BES and selected by the Planning Coordinator in accordance with R6. **4.2.2** Circuits Subject to Requirement R6	**PRC-023-3** **4.2.** Circuits **4.2.1** Circuits Subject to Requirements R1 – R5 **4.2.1.1** Transmission lines operated at 200 kV and above, except ~~lines~~Elements that connect the GSU transformer(s) to the Transmission system that are used exclusively to export energy directly from a BES generating unit or generating plant ~~to the network~~. Elements may also supply generating plant loads. **4.2.1.2** Transmission lines operated at 100 kV to 200 kV selected by the Planning Coordinator in accordance with Requirement R6. **4.2.1.3** Transmission lines operated below 100 kV that are part of the BES and selected by the Planning Coordinator in accordance with Requirement R6. **4.2.1.4** Transformers with low voltage terminals connected at 200 kV and above. **4.2.1.5** Transformers with low voltage terminals connected at 100 kV to 200 kV selected by the Planning Coordinator in accordance with Requirement R6. **4.2.1.6** Transformers with low voltage terminals connected below 100 kV that are part of the BES and selected by the Planning Coordinator in accordance with Requirement R6. **4.2.2** Circuits Subject to Requirement R6

Already Approved Standard	Proposed Replacement
4.2.2.1 Transmission lines operated at 100 kV to 200 kV and transformers with low voltage terminals connected at 100 kV to 200 kV **4.2.2.2** Transmission lines operated below 100 kV and transformers with low voltage terminals connected below 100 kV that are part of the BES	**4.2.2.1** Transmission lines operated at 100 kV to 200 kV and transformers with low voltage terminals connected at 100 kV to 200 kV, except ~~lines and transformers~~Elements that connect the GSU transformer(s) to the Transmission system that are used exclusively to export energy directly from a BES generating unit or generating plant ~~to the network~~. Elements may also supply generating plant loads. **4.2.2.2** Transmission lines operated below 100 kV and transformers with low voltage terminals connected below 100 kV that are part of the BES, except ~~lines and transformers~~Elements that connect the GSU transformer(s) to the Transmission system that are used exclusively to export energy directly from a BES generating unit or generating plant ~~to the network~~. Elements may also supply generating plant loads.

Notes: The change in the proposed PRC-023-3 Applicability, Section 4.1 Facilities, creates a bright line between those Facilities that are applicable to PRC-023-3 – Transmission Relay Loadability and those Facilities in the proposed PRC-025-1 – Generator Relay Loadability. This is achieved by excluding Elements that connect the GSU transformer(s) to the Transmission system that are used exclusively to export energy directly from a BES generating unit or generating plant while allowing these Elements to also supply generating plant loads. Plant loads may include situations like pumped storage facilities where the generating plant also serves as a load for pumping.

The above applicability items for Section 4.2 "Circuits" that are subject to the standard were modified to exclude those ~~lines and transformers~~Elements that connect the GSU transformer(s) to the Transmission system that are used exclusively to export energy directly from a BES generating unit or generating plant ~~to the network~~. Elements may also supply generating plant loads. The added text reads: "except ~~lines and transformers~~Elements that connect the GSU transformer(s) to the Transmission system that are used exclusively to export energy directly from a BES generating unit or generating plant ~~to the network~~. Elements may also supply generating plant loads" and is found in Sections 4.2.1.1, 4.2.2.1, and 4.2.2.2. This eliminates an overlap with ~~the proposed changes in~~ PRC-025-1 and places the performance for lines and transformers that are used exclusively to export energy directly from a BES generating unit or generating plant to the network under the proposed PRC-025-1~~.~~ with the understanding that these Elements may also supply generating plant loads.

Already Approved Standard	Proposed Replacement
PRC-023-2 (Retirement) R1, Criterion 6. – "Set transmission line relays applied on transmission lines connected to generation stations remote to load so they do not operate at or below 230% of the aggregated generation nameplate capability."	**PRC-025-1 (New)** **New Requirement** R1. Each Generator Owner, Transmission Owner, and Distribution Provider shall apply settings that are in accordance with PRC-025-1 – Attachment 1: Relay Settings, on each load-responsive protective relay while maintaining reliable fault protection. *[Violation Risk Factor: High] [Time Horizon: Long-Term Planning]* *Attachment 1: Relay Settings, Table 1: Relay Loadability Evaluation Criteria, Options 14 through 19. (See standard for details)
Notes: The Transmission Owner and Distribution Provider were added to the Applicability of the proposed PRC-025-1 and excluded ~~lines~~Elements that connect the GSU transformer(s) to the Transmission system that are used exclusively to export energy directly from a ~~Bulk Electric System (~~BES~~)~~ generating unit or generating plant ~~to the network; therefore~~. Elements may also supply generating plant loads. Therefore, Requirement R1, Criterion 6 has been removed from the proposed standard PRC-023-3 because this criterion is now replaced (i.e., superseded) by the proposed PRC-025-1 – Generator Relay Loadability standard, Requirement R1 and its Attachment 1: Attachment 1: Relay Settings, Table 1: Relay Loadability Evaluation Criteria, Options 14 through 19. Applicability concerning generation Facilities is now addressed in the proposed PRC-025-1. Although, Requirement R1, Criterion 6 is not shown in the proposed PRC-023-3, it remains auditable while each entity assures its compliance with the proposed PRC-025-1 criteria according to the provided Implementation Plan(s).	
PRC-023-2 (Retirement) R1, Attachment A, exclusion 2.4. "Generator protection relays that are susceptible to load."	**None.**
Notes: This exclusion has been superseded by the proposed PRC-025-1 standard that pertains to these relays. The proposed PRC-023-3 standard does not include any criteria that are relevant to generator protection relays. The proposed PRC-025-1 standard establishes specific criteria for generator load-responsive protective relays, and renders this exclusion unnecessary.	