Implementation Plan

AMERICAN ELECTRIC

RELIABILITY CORPORATION

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 <u>that it</u> is connected to within the Transmission system.

Requirements R1 though R6 continue to apply to the Generator Owner to avoid a potential gap in situations where this entity owns load responsive protective relays subject to transmission line relay loadability (PRC-023). These situations could be the result of a current configuration or future changes or additions in transmission configurations.

The proposed PRC-023-3 standard also includes two new Requirements, R7 and R8 to address load-responsive protective relay loadability in cases where the Distribution Provider or Transmission Owner owns generator interconnection Facilities or generator step-up (GSU) transformers. The implementation time for Requirements R7 and R8 comports with the periods established in the proposed PRC-025-1 Implementation Plan.

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, and an implementation period for new Requirements R7 and R8.

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, <u>except Requirement R1</u>, <u>Criterion 6 which will</u> <u>remain in force until the effective date of PRC-025-1.</u>

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:

			Implementation Date		
Requirement	Applicability	Jurisdictions where Regulatory Approval is Required	Jurisdictions where No Regulatory Approval is Required		
	Each Transmission Owner, Generator Owner, and Distribution Provider with 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 calendar quarter after Board of Trustees adoption, or as otherwise made effective pursuant to the laws applicable to such ERO governmental authorities		
R1	 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		

		Implementation Date		
Requirement	Applicability	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 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	

			Implementation Date		
Requirement	Applicability	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 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		

		Implementation Date		
Requirement	Applicability	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	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	

Implementation Plan for PRC-023-3, Requirements R7 and R8

Load-responsive protective relays subject to the standard

Each Transmission Owner and Distribution Provider that owns load-responsive protective relays applicable to this standard shall be 100% compliant on the following dates:

		Implemen	Implementation Date		
Requirement Applicability		Jurisdictions where Regulatory Approval is Required	Jurisdictions where No Regulatory Approval is Required		
BZ	Each Transmission Owner and Distribution Provider shall set their load responsive relays in	Where determined by the Transmission Owner and Distribution Provider that replacement or removal is not necessary, the first day 48 months after applicable regulatory approvals	Where determined by the Transmission Owner and Distribution Provider that replacement or removal is not necessary, the first day 48 months after Board of Trustees adoption, or as otherwise made effective pursuant to the laws applicable to such ERO governmental authorities		
	accordance with PRC-023- 3, Attachment C at the terminals of the generator interconnection Facility.	Where determined by the Transmission Owner and Distribution Provider that replacement or removal is necessary, the first day 72 months after applicable regulatory approvals	Where determined by the Transmission Owner and Distribution Provider that replacement or removal is necessary, the first day 72 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			
		J urisdictions-where Regulatory-Approval is Required	Jurisdictions where No Regulatory Approval is Required		
88	Transmission Owner and Distribution Provider shall set their load responsive relays in accordance with	Where determined by the Transmission Owner and Distribution Provider that replacement or removal is not necessary, the first day 48 months after applicable regulatory approvals	Where determined by the Transmission Owner and Distribution Provider that replacement or removal is not necessary, the first day 48 months after Board of Trustees adoption, or as otherwise made effective pursuant to the laws applicable to such ERO governmental authorities		
	PRC 023 3, Attachment C at the terminals of the generator step-up transformer.	Where determined by the Transmission Owner and Distribution Provider that replacement or removal is necessary, the first day 72 months after applicable regulatory approvals	Where determined by the Transmission Owner and Distribution Provider that replacement or removal is necessary, the first day 72 months after Board of Trustees adoption, or as otherwise made effective pursuant to the laws applicable to such ERO governmental authorities		



Each Transmission Owner and Distribution Provider that owns load-responsive protective relays that become applicable to this standard, not because of the actions of the Transmission Owner and Distribution Provider including, but not limited to changes in NERC Registration Criteria, Bulk Electric System (BES) definition, or any other non Generator Owner action, shall be 100% compliant on the following dates:

		Implementation Date			
Requirement Applicability		J urisdictions where Regulatory Approval is Required	Jurisdictions where No Regulatory Approval is Required		
R7	Each Transmission Owner and Distribution Provider shall set their load responsive relays in accordance with PBC 023-	Where determined by the Transmission Owner and Distribution Provider that replacement or removal is not necessary, the first day 48 months beyond the date the load-responsive protective relays become applicable to the standard	Where determined by the Transmission Owner and Distribution Provider that replacement or removal is not necessary, the first day 48 months beyond the date the load-responsive protective relays become applicable to the standard		
	3, Attachment C at the terminals of the generator interconnection Facility.	Where determined by the Transmission Owner and Distribution Provider that replacement or removal is necessary, the first day 72 months beyond the date the load-responsive protective relays become applicable to the standard	Where determined by the Transmission Owner and Distribution Provider that replacement or removal is necessary, the first day 72 months beyond the date the load-responsive protective relays become applicable to the standard		

Requirement Applicability		Implementation Date			
		Jurisdictions where Regulatory Approval is Required	Jurisdictions where No Regulatory Approval is Required		
RS	Transmission Owner and Distribution Provider shall set their load responsive relays in accordance with PRC-023-3, Attachment C at the terminals of the generator step-up transformer.	Where determined by the Transmission Owner and Distribution Provider that replacement or removal is not necessary, the first day 48 months beyond the date the load-responsive protective relays become applicable to the standard Where determined by the Transmission Owner and Distribution Provider that replacement or removal is necessary, the first day 72 months beyond the date the load-responsive protective relays become applicable to the standard	Where determined by the Transmission Owner and Distribution Provider that replacement or removal is not necessary, the first day 48 months beyond the date the load-responsive protective relays become applicable to the standardWhere determined by the Transmission Owner and Distribution Provider that replacement or removal is necessary, the first day 72 months beyond the date the load-responsive protective relays become applicable to the standard		

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" columnin bold blue with underlining for additions and for deletions in bold red with a strikeout.

Already Approved Standard	Proposed Replacement
PRC-023-2	PRC-023-3
4.1. Functional Entity	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).	4.1.1 Transmission Owners 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, 4.2.3, or 4.2.4 (Circuits Subject
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 (<i>Circuits Subject to Requirements R1 – R5</i>).	 to Requirements R1 – R5, R7, and R8). 4.1.2 Generator Owners with load-responsive phase protection systems as described in PRC-023-3 - Attachment A, applied at the
4.1.3 Distribution Providers with load-responsive phase protection systems as described in PRC-023-2 - Attachment A, applied to circuits	terminals of the circuits defined in 4.2.1 (Circuits Subject to Requirements R1 – R5).
 defined in 4.2.1(<i>Circuits Subject to Requirements R1 – R5</i>), provided those circuits have bi-directional flow capabilities. 4.1.4 Planning Coordinators 	4.1.3 Distribution Providers 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, 4.2.3, or 4.2.4 (<i>Circuits Subject to Requirements R1 – R5, R7, and R8</i>), provided those circuits have bidirectional flow capabilities.
	4.1.4 Planning Coordinators

Notes: The change in the proposed PRC-023-3 Applicability, <u>Section 4.1, Functional Entity</u> 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. <u>Applicability is established by ownership of the load-responsive protective</u>

Proposed Replacement

relays, not the Facilities.

Alrea	dy Approved Standard			Proposed Replacement
PRC-023-2		PRC-0	23-3	
4.2. Circuits		New a	pplica k	bility
4.2.1 Circuits Sub	ect to Requirements R1 – R5	4.2	Circuit	its
<u>4.2.1.1 Tran</u>	smission lines operated at 200 kV and		4.2.1	Circuits Subject to Requirements R1 – R5
<u>abov</u>				4.2.1.1 Transmission lines operated at 200 kV and
	smission lines operated at 100 kV to 200 kV			above, except lines that are used exclusively to
	<u>ted by the Planning Coordinator in</u> rdance with R6.			export energy directly from a Bulk Electric
	smission lines operated below 100 kV that			System (BES) generating unit or generating plant to the network.
	part of the BES and selected by the Planning			4.2.1.2 Transmission lines operated at 100 kV to 200 kV
	dinator in accordance with R6.			selected by the Planning Coordinator in
4.2.1.4 Tran	sformers with low voltage terminals			accordance with <u>Requirement</u> R6.
conr	ected at 200 kV and above.			4.2.1.3 Transmission lines operated below 100 kV that
<u>4.2.1.5 Tran</u>	sformers with low voltage terminals			are part of the BES and selected by the Planning
	ected at 100 kV to 200 kV selected by the			Coordinator in accordance with <u>Requirement R6</u> .
	ning Coordinator in accordance with R6.			4.2.1.4 Transformers with low voltage terminals connected at 200 kV and above.
	sformers with low voltage terminals			
	ected below 100 kV that are part of the BES selected by the Planning Coordinator in			4.2.1.5 Transformers with low voltage terminals connected at 100 kV to 200 kV selected by the
	rdance with R6.			Planning Coordinator in accordance with
	ect to Requirement R6			Requirement R6.
	smission lines operated at 100 kV to 200 kV			4.2.1.6 Transformers with low voltage terminals
	transformers with low voltage terminals			connected below 100 kV that are part of the BES
conr	ected at 100 kV to 200 kV			and selected by the Planning Coordinator in
<u>4.2.2.2 Tran</u>	smission lines operated below 100 kV and			accordance with <u>Requirement</u> R6.

Already Approved Standard	Proposed Replacement
transformers with low voltage terminals connected	4.2.2 Circuits Subject to Requirement R6
below 100 kV that are part of the BES None.	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 <u>, except lines that</u> <u>are used exclusively to export energy directly</u> <u>from a Bulk Electric System (BES) generating unit</u> <u>or generating plant to the network</u> .
	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, <u>except lines that are used exclusively to export</u> <u>energy directly from a Bulk Electric System (BES)</u> <u>generating unit or generating plant to the</u> <u>network</u> .
	 4.2.3 Circuits Subject to Requirement R7 4.2.3.1 Transmission lines that are used solely to export energy directly from a BES generating unit or generating plant to the network.
	4.2.4 Circuits Subject to Requirement R8
	4.2.2.2 Transformers with low voltage terminals connected below 200 kV, including generator step-up transformers, that are used solely to export energy directly from a BES generating unit or generating plant to the network.

Notes: The change in the proposed PRC-023-3 Applicability, Section 4.1 Facilities, creates a bright line between those Facilities that are applicable

Proposed Replacement

to PRC-023-3 – Transmission Relay Loadability and those Facilities in the proposed PRC-025-1 – Generator Relay Loadability. The above applicability items for Section 4.2 "Circuits" that are subject to the standard were modified to exclude those lines and transformers that are used exclusively to export energy directly from a BES generating unit or generating plant to the network. The added text reads: "except lines and transformers that are used exclusively to export energy directly from a BES generating unit or generating plant to the network" 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. **Notes:** The above two new applicability items for circuits subject to the standard were added to address to situations where the Distribution Provider or Transmission Owner own either generator interconnection Facilities or generator step up (GSU) transformers, respectively.

PRC-023-2 (Retirement)

R1, Criterion 6. – <u>"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."_{τ}</u>

PRC-025-1 (New)023-3

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]

R7. Each Transmission Owner and Distribution Provider shall set their load responsive relays in accordance with PRC 023-3, Attachment C at the terminals of the generator interconnection Facility. [Violation Risk Factor: High] [Time Horizon: Long Term Planning].

Notes: The Transmission Owner and Distribution Provider were added to the Applicability of the proposed PRC-025-1 and excluded lines that are used exclusively to export energy directly from a Bulk Electric System (BES) generating unit or generating plant to the network; 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-

Proposed Replacement

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). **Notes:** This new requirement is included to address a gap concerning generator step-up (GSU) transformers where the Transmission Owner or Distribution Provider has applied loadresponsive protective relays. Referencing the proposed Applicability section 4.2.4, Circuits Subject to Requirement R8, this requirement closes the gap for those transformers that have low voltage terminals connected below 200 kV. Currently, only those Transmission system transformers with low voltage terminals connected at 200 kV and above are applicable to the Transmission Owner or Distribution Provider or transformers with low voltage terminals under 200 kV if the Planning Coordinator determines (in accordance with requirement R6) that they should be subject to PRC 023 3. This is identified by in the proposed Applicability 4.2.1.4. This requirement eliminates the gap between the proposed PRC 023 -3 and PRC 025 1 so that generator step up (GSU) transformers (i.e., where the Transmission system transformer is the transmission line termination – Criterion 10) apply to the Transmission Owner or Distribution Provider or transmission line Generator Owner in the proposed PRC 025 1.

Circuits subject to R8 are primarily GSU transformers and also include "aggregated generator transformers" – those connecting wind farms, and photovoltaic sites.

PRC-023-2 (Retirement)	None.	
R1, Attachment A, exclusion 2.4. "Generator protection relays that are susceptible to load." None.	PRC-023-3	
	New Requirement	
	R8. Transmission Owner and Distribution Provider shall set their load responsive relays in accordance with PRC 023-3, Attachment C at the terminals of the generator step up transformer. [Violation Risk Factor: High] [Time Horizon: Long Term Planning].	
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. Notes: The above new Requirement R7 addresses a gap		

between the proposed PRC-023-3 and PRC-025-1 standards. This requirement applies to the condition where the Transmission Owner or

Proposed Replacement

Distribution Provider apply load-responsive protective relays on a generator interconnection Facility(ies). Rather than add Transmission Owner and Distribution Provider to the proposed PRC-025-1, it was equally and efficient to include the same loadability criteria as the proposed PRC-025-1 in the proposed PRC-023-3 standard. Requirement R7 proposes to replace the current PRC-023-2, Requirement R1, Criterion 6 with a new requirement. Criterion 6 for setting the load-responsive protective relays so they do not operate at or below 230% now has additional flexibility in setting such relays according to Attachment C which is referenced in this new Requirement, R7. The 230% criterion comports with the loadability criteria found in the proposed PRC 023-3 Attachment C. The Transmission Owner and Distribution Provider in the proposed PRC 023-3 will have the same options for setting its load-responsive protective relays when applied on generator interconnection Facility(ies) as the Generator Owner in the proposed PRC 025-1.