

# NERC PRC-023-6

## Proposed Changes

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# R6 Elements Effective Date

## **SAR Scope as approved by the NERC Standards Committee included:**

Clarify how much time an entity has between the Requirement R6 identification and implementation of relay settings.

## **The revised standard proposes an Effective Date as part of the changes:**

See Implementation Plan. *As provided therein, each Generator Owner, Transmission Owner, and Distribution Provider that owns circuits that become applicable to this standard pursuant to Requirement R6 shall become compliant with R1 through R5 on the 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.*

# R6 Timing

**The Planning Coordinator uses Requirement R6 to identify BES Elements subject to the PRC-023 standard < 200 kV:**

If any of the following criteria apply to a circuit, the applicable entity must comply with the standard for that circuit.

None of the listed criteria identify a time-line for compliance following identification of the Element as subject to PRC-023, though B4 is the most specific.

**B4.** The circuit is identified through the following sequence of power flow analyses performed by the Planning Coordinator **for the one-to-five-year planning horizon:** [emphasis added]

The SDT proposes that an entity be allowed up to 39 months from the initial identification, if the year when the Element becomes subject to PRC-023 as identified by the Planners is less than 39 months from notification.

# R2 Retirement Effective Date

**SAR Scope as approved by the NERC Standards Committee included:**

Retire or modify Requirement R2.

**The revised standard proposes:**

**R2. Reserved.** ~~Each Transmission Owner, Generator Owner, and Distribution Provider shall set its out-of-step blocking elements to allow tripping of phase protective relays for faults that occur during the loading conditions used to verify transmission line relay loadability per Requirement R1. [Violation Risk Factor: High] [Time Horizon: Long Term Planning]~~

**... and becomes effective**

Where approval by an applicable governmental authority is required, Reliability Standard PRC-023-6 shall become effective on the later of: (i) the first day of the first calendar **quarter** after the effective date of the applicable governmental authority's order approving the standard or as otherwise provided for by the applicable governmental authority; or (ii) the effective date of Reliability Standard PRC-023-5.

**Just stop tracking whatever you were tracking.**

# Att A, Item 2.3 Retirement Effective Date

**SAR Scope as approved by the NERC Standards Committee included:**

Remove or modify Attachment A, Item 2.3 exclusion

**The revised Attachment A, Item 2.3 proposes:**

**2.3. Reserved.** ~~Protection systems intended for protection during stable power swings.~~

**... and becomes effective**

Where approval by an applicable governmental authority is required, Reliability Standard PRC-023-6 shall become effective on the later of: (i) the first day of the first calendar **quarter** after the effective date of the applicable governmental authority's order approving the standard or as otherwise provided for by the applicable governmental authority; or (ii) the effective date of Reliability Standard PRC-023-5.

**Just stop tracking whatever you were tracking for R2 at the beginning of the next quarter.**

# Justify R2 Retirement [1]

**Detailed discussion is in the Technical Rational. Short version includes**

Fault condition regulated by R2 is a subset of faults regulated by R1 and requires the same entity response.

- R1 includes the phrase “... prevent its phase protective relay settings from limiting transmission system loadability *while maintaining reliable protection of the BES for all fault conditions.*” (emphasis added).
- R2 singles out a specific fault condition when it specifies that the applicable entity “shall set its out-of-step blocking elements to allow tripping of phase protective relays *for faults that occur during the loading conditions* used to verify transmission line relay loadability per Requirement R1.” (emphasis added).

R2 does not add to the “... all fault conditions” identified in R1. So if an entity failed to comply with R2, they would also fail to comply with R1.

# Justify R2 Retirement [2]

An error in the “Determination and Application of Practical Relaying Loadability Ratings,” Appendix C, January 9, 2007 documentation of power swing blocking capabilities appears to have suggested development of R2.

Appendix C concluded that “if (and as long as) a system load condition operates the out-of-step blocking relay, the distance relay will be prevented from operating for a subsequent fault condition! **A timer can be added such that the relay issues a trip if the out of step timer does not reset within a defined time.**”

- Tripping should not occur during the identified load conditions unless a fault actually occurs on the element. A timer can't detect such faults.
- No discussion why the “... subsequent fault condition!” that became R2 is excluded from “... all fault conditions” that has always been part of R1. This left the impression that there is no acceptable technical solution.
- The incomplete discussion of power swings appears to have convinced FERC to direct a separate requirement on PSB.
- The present SDT suggests, among other edits, adding a list of available methods that can reset PSB function during an event to allow trips during a “subsequent fault.”

# Justify R2 Retirement [3]

An PRC-023-1 Attachment 2 reference to PSB schemes as “shall be evaluated” turned into the Requirement R2.

- A commenter on PRC-023-1 was concerned that the SDT did not recognize that the PSB can be reset to allow detection of faults after the PSB function asserts. The SDT response did not acknowledge that resetting of the PSB function is even possible.
- Comments on PRC-023-2 conceded FERC’s directive to develop a PSB requirement, and the SDT agreed.
- No one questioned whether “... all fault conditions” in R1 already included the faults intended to be detected by the new R2.

# Justify R2 Retirement [4]

The primary intent of this standard is to address a security aspect of the protection system. Adding a dependability focused requirement results in confusion in setting the protective relays.

The Purpose of PRC-023 is:

**Purpose:** Protective relay settings shall not limit transmission loadability; not interfere with system operators' ability to take remedial action to protect system reliability and; be set to reliably detect all fault conditions and protect the electrical network from these faults.

PRC-023 emphasizes security of the transmission system to avoid unnecessary trips during heavy load conditions (no fault). The Purpose and R1 includes language that protection be provided for "... all fault conditions" (dependability). Requirement R2 carves out a separate dependability item "... to allow tripping of phase protective relays for faults that occur during the loading conditions" as in R1.

Dependability language in R1 balances of the intent of R1 (security), so mentioning dependability in R1 does not cause confusion. Retiring R2 makes the standard more focused and clear.

# Justify R2 Retirement [5]

Roughly 10 years of experience shows that neither compliance, system operations, nor system disturbances regulated by R2 has had any significant impact on system reliability. In addition, whatever the original risk addressed by Requirement R2, that is now reduced due to subsequent Protection System upgrades.

- Experience is not a perfect guide to judging the necessity of Requirement R2, but does provide useful perspective.
- Two R2 compliance violations (about a year after the effective date) do not appear to have imposed any risk to the Bulk Power System.
- None of the multiple event reports on the NERC web site indicted that R2 either improved or detracted from system performance during any of these major system disturbances.
- One entity upgraded 161 or 471 (34%) low capability PSB applications in 2011 to high capability relays with only 19 of 699 (2.7%) of the affected line terminals by 2022 still controlled by low capability relays; a second entity has converted all of its PSB application to high capability relays; a third entity has converted all 345 kV and 230 kV terminals, with only a single electromechanical PSB scheme still in service at 115 kV.

# Justify Retirement of Att A, Item 2.3

Attachment A Item 2.3 excludes “Protection systems intended for protection during stable power swings” and references “Protection systems installed specifically to separate portions of the system that are experiencing stable power swings relative to each other in order to maintain desirable performance relative to voltage, frequency, and power oscillations”. Research indicates that the referenced Florida schemes no longer exist. PRC-026 covers stable power swings adequately. Since Item 2.3 is an exclusion, there is no overlap with PRC-026.

Power systems generally should not be intentionally separated during stable power swings. It is the understanding of the present Standard Drafting Team that the example scheme from Florida is no longer used.

The original drafting team comment response seems to say that exclusion 2.3 should never have been included

Where out of step tripping or blocking relays are applied independently within the system they must comply with the standard.

The present Standard Drafting Team asserts that Attachment A, Item 2.3 can be safely retired without creating a reliability gap.

# Where do we go from here?

- NERC Standards Committee reviews (hopefully approves) the revised standard September 21.
- NERC post for public comments in early October.
- NERC Webex in late October.
- Industry votes in mid-November (approve!).
- SDT develops response to comments in early December.
- NERC BOT approves in January/February(?), files with FERC?
- FERC decides on its own schedule.

*Questions?*

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