

# Reliability Standard Audit Worksheet<sup>1</sup>

## PRC-027-1 – Coordination of Protection Systems for Performance During Faults

*This section to be completed by the Compliance Enforcement Authority.*

**Audit ID:** Audit ID if available; or REG-NCRnnnnn-YYYYMMDD  
**Registered Entity:** Registered name of entity being audited  
**NCR Number:** NCRnnnnn  
**Compliance Enforcement Authority:** Region or NERC performing audit  
**Compliance Assessment Date(s)<sup>2</sup>:** Month DD, YYYY, to Month DD, YYYY  
**Compliance Monitoring Method:** [On-site Audit | Off-site Audit | Spot Check]  
**Names of Auditors:** Supplied by CEA

### Applicability of Requirements

	BA	DP	GO	GOP	IA	LSE	PA	PSE	RC	RP	RSG	TO	TOP	TP	TSP
R1		X <sup>3</sup>	X									X			
R2		X <sup>3</sup>	X									X			
R3		X <sup>3</sup>	X									X			

### Legend:

Text with blue background:	Fixed text – do not edit
Text entry area with Green background:	Entity-supplied information
Text entry area with white background:	Auditor-supplied information

<sup>1</sup> NERC developed this Reliability Standard Audit Worksheet (RSAW) language in order to facilitate NERC’s and the Regional Entities’ assessment of a registered entity’s compliance with this Reliability Standard. The NERC RSAW language is written to specific versions of each NERC Reliability Standard. Entities using this RSAW should choose the version of the RSAW applicable to the Reliability Standard being assessed. While the information included in this RSAW provides some of the methodology that NERC has elected to use to assess compliance with the requirements of the Reliability Standard, this document should not be treated as a substitute for the Reliability Standard or viewed as additional Reliability Standard requirements. In all cases, the Regional Entity should rely on the language contained in the Reliability Standard itself, and not on the language contained in this RSAW, to determine compliance with the Reliability Standard. NERC’s Reliability Standards can be found on NERC’s website. Additionally, NERC Reliability Standards are updated frequently, and this RSAW may not necessarily be updated with the same frequency. Therefore, it is imperative that entities treat this RSAW as a reference document only, and not as a substitute or replacement for the Reliability Standard. It is the responsibility of the registered entity to verify its compliance with the latest approved version of the Reliability Standards, by the applicable governmental authority, relevant to its registration status.

The NERC RSAW language contained within this document provides a non-exclusive list, for informational purposes only, of examples of the types of evidence a registered entity may produce or may be asked to produce to demonstrate compliance with the Reliability Standard. A registered entity’s adherence to the examples contained within this RSAW does not necessarily constitute compliance with the applicable Reliability Standard, and NERC and the Regional Entity using this RSAW reserves the right to request additional evidence from the registered entity that is not included in this RSAW. Additionally, this RSAW includes excerpts from FERC Orders and other regulatory references. The FERC Order cites are provided for ease of reference only, and this document does not necessarily include all applicable Order provisions. In the event of a discrepancy between FERC Orders, and the language included in this document, FERC Orders shall prevail.

<sup>2</sup> Compliance Assessment Date(s): The date(s) the actual compliance assessment (on-site audit, off-site spot check, etc.) occurs.

<sup>3</sup> Distribution Provider that owns Protection Systems installed for the purpose of detecting faults on BES elements and isolating those faulted elements.

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**Findings**

**(This section to be completed by the Compliance Enforcement Authority)**

Req.	Finding	Summary and Documentation	Functions Monitored
R1			
R2			
R3			

Req.	Areas of Concern

Req.	Recommendations

Req.	Positive Observations

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**Subject Matter Experts**

Identify the Subject Matter Expert(s) responsible for this Reliability Standard.

**Registered Entity Response (Required; Insert additional rows if needed):**

SME Name	Title	Organization	Requirement(s)

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**R1 Supporting Evidence and Documentation**

- R1.** Each Transmission Owner, Generator Owner, and Distribution Provider shall establish a process for developing new and revised Protection System settings for BES Elements, such that the Protection Systems operate in the intended sequence during Faults. The process shall include:
  - 1.1.** A review and update of short-circuit models for the BES Elements under study.
  - 1.2.** A review of the developed Protection System settings.
  - 1.3.** For Protection System settings applied on BES Elements that electrically join Facilities owned by separate functional entities (Transmission Owners, Generator Owners, and Distribution Providers), provisions to:
    - 1.3.1.** Provide the proposed Protection System settings to the owner(s) of the electrically-joined Facilities.
    - 1.3.2.** Respond to any owner(s) that provided its proposed Protection System settings pursuant to Requirement R1, Part 1.3.1 by identifying any coordination issue(s) or affirming that no coordination issue(s) were identified.
    - 1.3.3.** Verify that identified coordination issue(s) associated with the proposed Protection System settings for the associated BES Elements are addressed prior to implementation.
    - 1.3.4.** Communicate with the other owner(s) of the electrically-joined Facilities regarding revised Protection System settings resulting from unforeseen circumstances that arise during:
      - 1.3.4.1** Implementation or commissioning.
      - 1.3.4.2** Misoperation investigations.
      - 1.3.4.3** Maintenance activities.
      - 1.3.4.4** Emergency replacements required as a result of Protection System component failure.
- M1.** Acceptable evidence may include, but is not limited to, dated electronic or hard copy documentation to demonstrate that the responsible entity established a process to develop settings for its Protection Systems, in accordance with Requirement R1.

**Registered Entity Response (Required):**

**Compliance Narrative:**

Provide a brief explanation, in your own words, of how you comply with this Requirement. References to supplied evidence, including links to the appropriate page, are recommended.

**Evidence Requested<sup>1</sup>:**

**Provide the following evidence, or other evidence to demonstrate compliance.**

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The entity's documented process (that includes Part 1.1 through Part 1.3) to develop new and revised Protection System settings for its BES Protection Systems to operate in the intended sequence during Faults.

**Registered Entity Evidence (Required):**

The following information is requested for each document submitted as evidence. Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.

File Name	Document Title	Revision or Version	Document Date	Relevant Page(s) or Section(s)	Description of Applicability of Document

**Audit Team Evidence Reviewed (This section to be completed by the Compliance Enforcement Authority):**


**Compliance Assessment Approach Specific to PRC-027-1, R1**

*This section to be completed by the Compliance Enforcement Authority*

	Review entity's documented process to develop new and revised Protection System settings for its BES Protection Systems to operate in the intended sequence during Faults, and verify that it includes:
	(Part 1.1) A review and update of short-circuit models for the BES Elements under study.
	(Part 1.2) A review of the developed Protection System settings.
	(Part 1.3) For Protection System settings applied on BES Elements that electrically join Facilities owned by separate functional entities (Transmission Owners, Generator Owners, and Distribution Providers), provisions to:
	(Part 1.3.1) Provide the owners of the electrically-joined Facilities the proposed Protection System settings.
	(Part 1.3.2) Respond to the owners regarding the proposed Protection System settings. The response shall identify any coordination issue(s) or affirm that no coordination issue(s) were identified.
	(Part 1.3.3) Verify that any identified coordination issue(s) associated with the proposed Protection System settings for the associated Elements are addressed prior to implementation.
	(Part 1.3.4) Communicate with the other owners of the electrically-joined Facilities regarding revised Protection System settings resulting from unforeseen circumstances that arise during:
	(Part 1.3.4.1) Implementation or commissioning.
	(Part 1.3.4.2) Misoperation investigations.
	(Part 1.3.4.3) Maintenance activities.
	(Part 1.3.4.4) Emergency replacements required due to Protection System component failure.

**Note to Auditor:** In cases where a single protective relaying group performs coordination work for separate functional entities within an organization, the communication aspects of Requirement R1, Part 1.3 can be demonstrated by internal documentation.

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**Auditor Notes:**

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**R2 Supporting Evidence and Documentation**

**R2.** Each Transmission Owner, Generator Owner, and Distribution Provider shall, for each BES Element with Protection System functions identified in Attachment A:

- Option 1: Perform a Protection System Coordination Study in a time interval not to exceed six calendar years; or
- Option 2: Compare present Fault current values to an established Fault current baseline and perform a Protection System Coordination Study when the comparison identifies a 15 percent or greater deviation in Fault current values (either three phase or phase to ground) at a bus to which the Element is connected, all in a time interval not to exceed six calendar years;<sup>4</sup> or,
- Option 3: A combination of the above.

**M2.** Acceptable evidence may include, but is not limited to, dated electronic or hard copy documentation to demonstrate that the responsible entity performed Protection System Coordination Study(ies) and/or Fault current comparisons in accordance with Requirement R2.

**Registered Entity Response (Required):**

**Compliance Narrative:**

Provide a brief explanation, in your own words, of how you comply with this Requirement. References to supplied evidence, including links to the appropriate page, are recommended.

**Evidence Requested<sup>1</sup>:**

<b>Provide the following evidence, or other evidence to demonstrate compliance.</b>
Evidence of either (1) a review of existing Protection Systems demonstrated by a Protection System Coordination Study for each BES Element with Protection System functions identified in Attachment A performed within the six calendar year time frame, or (2) the Fault current comparison and results for each BES Element with Protection System functions identified in Attachment A performed within a six calendar year time frame, as well as any resulting PSCS when the Fault current comparison deviated by 15% or more, or a combination of the two.

**Registered Entity Evidence (Required):**

**The following information is requested for each document submitted as evidence. Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.**

File Name	Document Title	Revision or Version	Document Date	Relevant Page(s) or Section(s)	Description of Applicability of Document

<sup>4</sup> The initial Fault current baseline(s) shall be established by the effective date of this Reliability Standard and updated each time a Protection System Coordination Study is performed. If an initial baseline was not established by the effective date of this Reliability Standard because of the previous use of an alternate option or the installation of a new Element, the entity may establish the baseline by performing a Protection System Coordination Study.

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**Audit Team Evidence Reviewed (This section to be completed by the Compliance Enforcement Authority):**


**Compliance Assessment Approach Specific to PRC-027-1, R2**

*This section to be completed by the Compliance Enforcement Authority*

For all, or a sample, review evidence and verify each Protection System Coordination Study of a BES Element with Protection System functions identified in Attachment A was performed according to one of the following options: <ul style="list-style-type: none"><li>• Option 1: On a time interval not to exceed six calendar years; or</li><li>• Option 2: When the comparison of present Fault current values to an established Fault current baseline identifies a 15 percent or greater deviation in Fault current values (either three phase or phase to ground) at a bus to which the Element is connected, all in a time interval not to exceed six calendar years; or</li><li>• Option 3: A combination of the above.</li></ul>
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**Note to Auditor:** If an entity chooses Option 1, no initial Protection System Coordination Study is required as a baseline. The entity effectively has six years from the effective date of the Standard to complete this.

**Auditor Notes:**

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**R3 Supporting Evidence and Documentation**

- R3.** Each Transmission Owner, Generator Owner, and Distribution Provider shall utilize its process established in Requirement R1 to develop new and revised Protection System settings for BES Elements.
- M3.** Acceptable evidence may include, but is not limited to, dated electronic or hard copy documentation to demonstrate that the responsible entity utilized its settings development process established in Requirement R1, as specified in Requirement R3.

**Registered Entity Response (Required):**

**Compliance Narrative:**

Provide a brief explanation, in your own words, of how you comply with this Requirement. References to supplied evidence, including links to the appropriate page, are recommended.

**Evidence Requested:**

<b>Provide the following evidence, or other evidence to demonstrate compliance.</b>
Evidence, for all or an auditor selected sample, the entity reviewed and updated the information required to develop new or revised Protection System settings for BES Elements in accordance with its process (identified in R1 Part 1.1). Such information required to coordinate Protection Systems may, but is not required to, include short-circuit databases, line and transformer impedances, station configurations, current and voltage transformer ratios, adjacent Protection System settings, and relay and control functional drawings.
Evidence, for all or an auditor selected sample, of entity’s review of Protection System settings (identified in R1 Part 1.2).
Evidence, for all or an auditor selected sample, such as, but not limited to, emails or other correspondence, of coordination of proposed Protection System settings applied on BES Elements that electrically join Facilities owned by separate functional entities prior to implementation of any proposed Protection System changes (identified in R1 Part 1.3).

**Registered Entity Evidence (Required):**

**The following information is requested for each document submitted as evidence. Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.**

File Name	Document Title	Revision or Version	Document Date	Relevant Page(s) or Section(s)	Description of Applicability of Document

**Audit Team Evidence Reviewed (This section to be completed by the Compliance Enforcement Authority):**

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**Compliance Assessment Approach Specific to PRC-027-1, R3**

*This section to be completed by the Compliance Enforcement Authority*

	Review evidence and verify the entity implemented the following processes established in accordance with Requirement R1:
	A review and update of short-circuit models for the BES Elements under study (identified in R1 Part 1.1).
	A review of the developed Protection System settings. (identified in R1 Part 1.2).
	For Protection System settings applied on BES Elements that electrically join Facilities owned by separate functional entities (Transmission Owners, Generator Owners, and Distribution Providers), procedures identified in Requirement R1 Part 1.3 to:
	Provide the owners of the electrically-joined Facilities the proposed Protection System settings.
	Respond to the owners regarding the proposed Protection System settings. The response shall identify any coordination issue(s) or affirm that no coordination issue(s) were identified.
	Verify that any identified coordination issue(s) associated with the proposed Protection System settings for the associated Elements are addressed prior to implementation.
	Communicate with the other owners of the electrically-joined Facilities regarding revised Protection System settings resulting from unforeseen circumstances that arise during: <ul style="list-style-type: none"><li>• Implementation or commissioning.</li><li>• Misoperation investigations.</li><li>• Maintenance activities.</li><li>• Emergency replacements required due to Protection System component failure.</li></ul>
<b>Note to Auditor:</b> Evidence of implementation provides reasonable assurance that the processes established in Requirement R1 are occurring.	
In cases where a single protective relaying group performs coordination work for separate functional entities within an organization, the communication aspects of Requirement R1, Part 1.3 can be demonstrated by internal documentation.	

**Auditor Notes:**

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**Additional Information:**

**Reliability Standard**

Insert embedded Standard file here and Implementation Plan (if required)

*The RSAW developer should provide the following information without hyperlinks. Update the information below as appropriate.*

In addition to the Reliability Standard, there is an applicable Implementation Plan available on the NERC Web Site. (Remove this statement if embedded file included)

In addition to the Reliability Standard, there is background information available on the NERC Web Site.

Capitalized terms in the Reliability Standard refer to terms in the NERC Glossary, which may be found on the NERC Web Site.

**Sampling Methodology [If developer deems reference applicable]**

Sampling is essential for auditing compliance with NERC Reliability Standards since it is not always possible or practical to test 100% of either the equipment, documentation, or both, associated with the full suite of enforceable standards. The Sampling Methodology Guidelines and Criteria (see NERC website), or sample guidelines, provided by the Electric Reliability Organization help to establish a minimum sample set for monitoring and enforcement uses in audits of NERC Reliability Standards.

**Regulatory Language [Developer to ensure RSAW has been provided to NERC Legal for links to appropriate Regulatory Language – See example below]**

E.g. FERC Order No. 742 paragraph 34: “Based on NERC’s.....

E.g. FERC Order No. 742 Paragraph 55, Commission Determination: “We affirm NERC’s.....

**Selected Glossary Terms [If developer deems applicable]**

The following Glossary terms are provided for convenience only. Please refer to the NERC web site for the current enforceable terms.

Protection System Coordination Study

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## DRAFT NERC Reliability Standard Audit Worksheet

### Revision History for RSAW

Version	Date	Reviewers	Revision Description
1	04/15/2015	RSAW Task Force, Standards Drafting Team, NERC Compliance Assurance	New Document
2	8/11/2015	RSAW Task Force, Standards Drafting Team, NERC Compliance Assurance	Revised RSAW to align with revised draft of Reliability Standard – Posting 29 July 2015

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<sup>i</sup> Items in the Evidence Requested section are suggested evidence that may, but will not necessarily, demonstrate compliance. These items are not mandatory and other forms and types of evidence may be submitted at the entity's discretion.