

**Reliability Standard Audit Worksheet[[1]](#footnote-1)**

# PRC-023-3 – Transmission Relay Loadability

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

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| **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)[[2]](#footnote-2):** | 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**

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|  | **BA** | **DP** | **GO** | **GOP** | **IA** | **LSE** | **PC/PA** | **PSE** | **RC** | **RP** | **RSG** | **TO** | **TOP** | **TP** | **TSP** |
| **R1** |  | X[[3]](#footnote-3) | X3 |  |  |  |  |  |  |  |  | X3 |  |  |  |
| **R2** |  | X3 | X3 |  |  |  |  |  |  |  |  | X3 |  |  |  |
| **R3** |  | X3 | X3 |  |  |  |  |  |  |  |  | X3 |  |  |  |
| **R4** |  | X3 | X3 |  |  |  |  |  |  |  |  | X3 |  |  |  |
| **R5** |  | X3 | X3 |  |  |  |  |  |  |  |  | X3 |  |  |  |
| **R6** |  |  |  |  |  |  | X |  |  |  |  |  |  |  |  |

**Legend:**

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| 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 |

Findings

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

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| **Req.** | **Finding** | **Summary and Documentation** | **Functions Monitored** |
| **R1** |  |  |  |
| **R2** |  |  |  |
| **R3** |  |  |  |
| **R4** |  |  |  |
| **R5** |  |  |  |
| **R6** |  |  |  |

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| **Req.** | **Areas of Concern** |
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| **Req.** | **Recommendations** |
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| **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):**

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| **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 use any one of the following criteria (Requirement R1, criteria 1 through 13) for any specific circuit terminal to prevent its phase protective relay settings from limiting transmission system loadability while maintaining reliable protection of the BES for all fault conditions. Each Transmission Owner, Generator Owner, and Distribution Provider shall evaluate relay loadability at 0.85 per unit voltage and a power factor angle of 30 degrees.

Criteria:

* 1. Set transmission line relays so they do not operate at or below 150% of the highest seasonal Facility Rating of a circuit, for the available defined loading duration nearest 4 hours (expressed in amperes).
  2. Set transmission line relays so they do not operate at or below 115% of the highest seasonal 15-minute Facility Rating[[4]](#footnote-4) of a circuit (expressed in amperes).
  3. Set transmission line relays so they do not operate at or below 115% of the maximum theoretical power transfer capability (using a 90-degree angle between the sending-end and receiving-end voltages and either reactance or complex impedance) of the circuit (expressed in amperes) using one of the following to perform the power transfer calculation:
* An infinite source (zero source impedance) with a 1.00 per unit bus voltage at each end of the line.
* An impedance at each end of the line, which reflects the actual system source impedance with a 1.05 per unit voltage behind each source impedance.
  1. Set transmission line relays on series compensated transmission lines so they do not operate at or below the maximum power transfer capability of the line, determined as the greater of:
* 115% of the highest emergency rating of the series capacitor.
* 115% of the maximum power transfer capability of the circuit (expressed in amperes), calculated in accordance with Requirement R1, criterion 3, using the full line inductive reactance.
  1. Set transmission line relays on weak source systems so they do not operate at or below 170% of the maximum end-of-line three-phase fault magnitude (expressed in amperes).
  2. Not used.
  3. Set transmission line relays applied at the load center terminal, remote from generation stations, so they do not operate at or below 115% of the maximum current flow from the load to the generation source under any system configuration.
  4. Set transmission line relays applied on the bulk system-end of transmission lines that serve load remote to the system so they do not operate at or below 115% of the maximum current flow from the system to the load under any system configuration.
  5. Set transmission line relays applied on the load-end of transmission lines that serve load remote to the bulk system so they do not operate at or below 115% of the maximum current flow from the load to the system under any system configuration.
  6. Set transformer fault protection relays and transmission line relays on transmission lines terminated only with a transformer so that the relays do not operate at or below the greater of:
* 150% of the applicable maximum transformer nameplate rating (expressed in amperes), including the forced cooled ratings corresponding to all installed supplemental cooling equipment.
* 115% of the highest operator established emergency transformer rating.

10.1 Set load-responsive transformer fault protection relays, if used, such that the protection settings do not expose the transformer to a fault level and duration that exceeds the transformer’s mechanical withstand capability[[5]](#footnote-5).

* 1. For transformer overload protection relays that do not comply with the loadability component of Requirement R1, criterion 10 set the relays according to one of the following:
* Set the relays to allow the transformer to be operated at an overload level of at least 150% of the maximum applicable nameplate rating, or 115% of the highest operator established emergency transformer rating, whichever is greater, for at least 15 minutes to provide time for the operator to take controlled action to relieve the overload.
* Install supervision for the relays using either a top oil or simulated winding hot spot temperature element set no less than 100° C for the top oil temperature or no less than 140° C for the winding hot spot temperature[[6]](#footnote-6).
  1. When the desired transmission line capability is limited by the requirement to adequately protect the transmission line, set the transmission line distance relays to a maximum of 125% of the apparent impedance (at the impedance angle of the transmission line) subject to the following constraints:

1. Set the maximum torque angle (MTA) to 90 degrees or the highest supported by the manufacturer.
2. Evaluate the relay loadability in amperes at the relay trip point at 0.85 per unit voltage and a power factor angle of 30 degrees.
3. Include a relay setting component of 87% of the current calculated in Requirement R1, criterion 12 in the Facility Rating determination for the circuit.
   1. Where other situations present practical limitations on circuit capability, set the phase protection relays so they do not operate at or below 115% of such limitations.

M1. Each Transmission Owner, Generator Owner, and Distribution Provider shall have evidence such as spreadsheets or summaries of calculations to show that each of its transmission relays is set according to one of the criteria in Requirement R1, criterion 1 through 13 and shall have evidence such as coordination curves or summaries of calculations that show that relays set per criterion 10 do not expose the transformer to fault levels and durations beyond those indicated in the standard. (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[[7]](#endnote-1):

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| **Provide the following evidence, or other evidence to demonstrate compliance.** |
| List of relays subject to Requirement R1. |
| Spreadsheets or summaries of calculations to show that each of entity’s transmission relays is set according to one of the criteria in Requirement R1. |

Registered Entity Evidence (Required):

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

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Compliance Assessment Approach Specific to PRC-023-3, R1

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

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|  | (R1) For all, or a sample of, relays, review evidence and verify entity evaluated relay loadability at 0.85 per unit voltage and a power factor angle of 30 degrees. |
|  | (R1) For all, or a sample of, relays, review evidence and verify the entity used any one of the criteria (Requirement R1, criteria 1 through 13) for any specific circuit terminal. |
| **Note to Auditor:** See section 4.2 of Reliability Standard for circuits subject to Requirements R1 – R5. | |

Auditor Notes:

R2 Supporting Evidence and Documentation

**R2.** 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.

**M2.** Each Transmission Owner, Generator Owner, and Distribution Provider shall have evidence such as spreadsheets or summaries of calculations to show that each of its out-of-step blocking elements is set 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. (R2)

**Registered Entity Response (Required):**

**Question:** Does entity apply out-of-step blocking elements?  Yes  No

If Yes, proceed to Evidence Requested section below. If No, Requirement R2 is not applicable.

[Note: A separate spreadsheet or other document may be used. If so, provide the document reference below.]

**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 Requestedi:

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| **Provide the following evidence, or other evidence to demonstrate compliance.** |
| List of relays subject to Requirement R2. |
| Spreadsheets or summaries of calculations to show that each of its out-of-step blocking elements is set to allow tripping of phase protective relays as described in Requirement R2. |

Registered Entity Evidence (Required):

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

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Compliance Assessment Approach Specific to PRC-023-3, R2

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

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|  | (R2) For all, or a sample of, relays verify the entity 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. |
| **Note to Auditor:** See section 4.2 of Reliability Standard for circuits subject to Requirements R1 – R5. | |

Auditor Notes:

R3 Supporting Evidence and Documentation

R3. Each Transmission Owner, Generator Owner, and Distribution Provider that uses a circuit capability with the practical limitations described in Requirement R1, criterion 7, 8, 9, 12, or 13 shall use the calculated circuit capability as the Facility Rating of the circuit and shall obtain the agreement of the Planning Coordinator, Transmission Operator, and Reliability Coordinator with the calculated circuit capability.

**M3.** Each Transmission Owner, Generator Owner, and Distribution Provider with transmission relays set according to Requirement R1, criterion 7, 8, 9, 12, or 13 shall have evidence such as Facility Rating spreadsheets or Facility Rating database to show that it used the calculated circuit capability as the Facility Rating of the circuit and evidence such as dated correspondence that the resulting Facility Rating was agreed to by its associated Planning Coordinator, Transmission Operator, and Reliability Coordinator. (R3)

**Registered Entity Response (Required):**

**Question:** Does entity have transmission relays set according to Requirement R1, criterion 7, 8, 9, 12, or 13?  Yes  No

If Yes, proceed to Evidence Requested section below. If No, Requirement R3 is not applicable.

[Note: A separate spreadsheet or other document may be used. If so, provide the document reference below.]

**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 Requestedi:

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| **Provide the following evidence, or other evidence to demonstrate compliance.** |
| List of relays using a circuit capability with the practical limitations described in Requirement R1, criterion 7, 8, 9, 12, or 13. |
| Spreadsheets or Facility Rating database to show that entity calculated circuit capability as the Facility Rating of the circuit. |
| Evidence such as dated correspondence that the calculated circuit capability used as the Facility Rating was agreed to by its associated Planning Coordinator, Transmission Operator, and Reliability Coordinator. |

Registered Entity Evidence (Required):

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

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Compliance Assessment Approach Specific to PRC-023-3, R3

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

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|  | (R3) For all, or a sample of, relays with practical limitations as described in Requirement R1, criterion 7, 8, 9, 12, and 13, examine evidence and verify the entity used calculated circuit capability as the Facility Rating of the circuit. |
|  | (R3) For each relay selected above, verify the entity obtained the agreement of the Planning Coordinator, Transmission Operator, and Reliability Coordinator with the calculated circuit capability. |
| **Note to Auditor:** See section 4.2 of Reliability Standard for circuits subject to Requirements R1 – R5. Relay sample set should come from the list of relays in Requirement R1 that apply criteria 7, 8, 9, 12, or 13. | |

Auditor Notes:

R4 Supporting Evidence and Documentation

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 shall provide its Planning Coordinator, Transmission Operator, and Reliability Coordinator with an updated list of circuits associated with those transmission line relays at least once each calendar year, with no more than 15 months between reports.

M4. Each Transmission Owner, Generator Owner, or Distribution Provider that sets transmission line relays according to Requirement R1, criterion 2 shall have evidence such as dated correspondence to show that it provided its Planning Coordinator, Transmission Operator, and Reliability Coordinator with an updated list of circuits associated with those transmission line relays within the required timeframe. The updated list may either be a full list, a list of incremental changes to the previous list, or a statement that there are no changes to the previous list. (R4)

**Registered Entity Response (Required):**

**Question:** Did entity use Requirement R1 criterion 2 as the basis for verifying transmission line relay loadability for any transmission line relays?  Yes  No

If Yes, proceed to Evidence Requested section below. If No, Requirement R4 is not applicable.

[Note: A separate spreadsheet or other document may be used. If so, provide the document reference below.]

**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 Requestedi:

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| **Provide the following evidence, or other evidence to demonstrate compliance.** |
| List of circuits associated with transmission line relays using Requirement R1 criterion 2 as the basis for verifying transmission line relay loadability. |
| Evidence such as dated correspondence that show entity provided its Planning Coordinator, Transmission Operator, and Reliability Coordinator with an updated list of circuits associated with those transmission line relays within the timeframe established in Requirement R4. |

Registered Entity Evidence (Required):

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

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Compliance Assessment Approach Specific to PRC-023-3, R4

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

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|  | (R4) During the compliance monitoring period, review evidence and verify the entity that chooses to use Requirement R1 criterion 2 as their basis, provided the updated list of circuits associated with those transmission line relays to the Planning Coordinator, Transmission Operator, and the Reliability Coordinator. |
|  | (R4) Duringthe compliance monitoring period, review evidence and verify that the entity provided the updated list at least once each calendar year, with no more than 15 months between reports to the Planning Coordinator, Transmission Operator, and the Reliability Coordinator. |
| **Note to Auditor:** See section 4.2 of Reliability Standard for circuits subject to Requirements R1 – R5.  Relay sample set should come from the list of relays in Requirement R1 that apply criteria 2.  The updated list may either be a full list, a list of incremental changes to the previous list, or a statement that there are no changes to the previous list. | |

Auditor Notes:

R5 Supporting Evidence and Documentation

R5. Each Transmission Owner, Generator Owner, and Distribution Provider that sets transmission line relays according to Requirement R1 criterion 12 shall provide an updated list of the circuits associated with those relays to its Regional Entity at least once each calendar year, with no more than 15 months between reports, to allow the ERO to compile a list of all circuits that have protective relay settings that limit circuit capability

M5. Each Transmission Owner, Generator Owner, or Distribution Provider that sets transmission line relays according to Requirement R1, criterion 12 shall have evidence such as dated correspondence that it provided an updated list of the circuits associated with those relays to its Regional Entity within the required timeframe. The updated list may either be a full list, a list of incremental changes to the previous list, or a statement that there are no changes to the previous list. (R5)

**Registered Entity Response (Required):**

**Question:** Did entity use Requirement R1 criterion 12 as the basis for setting any transmission line relays?  Yes  No

If Yes, proceed to Evidence Requested section below. If No, Requirement R4 is not applicable.

[Note: A separate spreadsheet or other document may be used. If so, provide the document reference below.]

**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 Requestedi:

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| **Provide the following evidence, or other evidence to demonstrate compliance.** |
| List of circuits associated with transmission line relays using Requirement R1 criterion 12. |

Registered Entity Evidence (Required):

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

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Compliance Assessment Approach Specific to PRC-023-3, R5

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|  | (R5) During the compliance monitoring period, review evidence and verify the entity that sets transmission line relays according to Requirement R1 criterion 12 provided the list of circuits associated with those relays to the Regional Entity. |
|  | (R5) During the compliance monitoring period, review evidence and verify that the entity provided the updated list at least once each calendar year, with no more than 15 months between reports, to the Regional Entity. |
| **Note to Auditor:** See section 4.2 of Reliability Standard for circuits subject to Requirements R1 – R5.  The updated list may either be a full list, a list of incremental changes to the previous list, or a statement that there are no changes to the previous list.  Relay sample set should come from the set of relays in Requirement R1 that apply criteria 12.  Auditors should obtain entity’s list(s) of circuits associated with Requirement R1 criterion 12 relays directly from Regional Entity. | |

Auditor Notes:

R6 Supporting Evidence and Documentation

R6. Each Planning Coordinator shall conduct an assessment at least once each calendar year, with no more than 15 months between assessments, by applying the criteria in PRC-023-3, Attachment B to determine the circuits in its Planning Coordinator area for which Transmission Owners, Generator Owners, and Distribution Providers must comply with Requirements R1 through R5. The Planning Coordinator shall:

* 1. Maintain a list of circuits subject to PRC-023-3 per application of Attachment B, including identification of the first calendar year in which any criterion in PRC-023-3, Attachment B applies.
  2. Provide the list of circuits to all Regional Entities, Reliability Coordinators, Transmission Owners, Generator Owners, and Distribution Providers within its Planning Coordinator area within 30 calendar days of the establishment of the initial list and within 30 calendar days of any changes to that list.

M6. Each Planning Coordinator shall have evidence such as power flow results, calculation summaries, or study reports that it used the criteria established within PRC-023-3, Attachment B to determine the circuits in its Planning Coordinator area for which applicable entities must comply with the standard as described in Requirement R6. The Planning Coordinator shall have a dated list of such circuits and shall have evidence such as dated correspondence that it provided the list to the Regional Entities, Reliability Coordinators, Transmission Owners, Generator Owners, and Distribution Providers within its Planning Coordinator area within the required timeframe. (R6)

**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 Requestedi:

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| **Provide the following evidence, or other evidence to demonstrate compliance.** |
| Power flow results, calculation summaries, or study reports that entity used criteria established within PRC-023-3, Attachment B to determine the circuits in its area for which applicable entities must comply with the standard as described in Requirement R6. |
| Dated list of such circuits and evidence such as dated correspondence that it provided the list to the Regional Entities, Reliability Coordinators, Transmission Owners, Generator Owners, and Distribution Providers within its area and required timeframe. |

Registered Entity Evidence (Required):

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

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Compliance Assessment Approach Specific to PRC-023-3, R6

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

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|  | (R6) Verify that the entity conducted an assessment by applying the criteria in PRC-023-3 Attachment B to determine the circuits in its Planning Coordinator area for which Transmission Owners, Generator Owners, and Distribution Providers must comply with Requirements R1 through R5. |
|  | (R6) Verify that the entity has conducted the assessment at least once each calendar year, with no more than 15 months between assessments. |
|  | (R6 Part 6.1) Verify that the entity has a current list of such circuits subject to PRC-023-3, including identification of the first calendar year in which any criterion in Attachment B applies. |
|  | (R6 Part 6.2) Verify the entity provided the list to the appropriate Distribution Providers, Generator Owners, Transmission Owners, and Reliability Coordinators within 30 calendar days of establishment of the list and 30 calendar days of any changes to the list. |
| **Note to Auditor:** Circuits subject to Requirement R6 are related to 1) Transmission lines operated at 100 kV to 200 kV and transformers with low voltage terminals connected at 100 kV to 200 KV2) Transmission lines operated below 100 kV and transformers with low voltage terminals connected below 100 kV that are part of the BES, except 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. Elements may also supply generating plant loads.. | |

Auditor Notes:

Additional Information:

Reliability Standard



The full text of PRC-023-3 may be found on the NERC Web Site (www.nerc.com) under “Program Areas & Departments”, “Reliability Standards.”

In addition to the Reliability Standard, there is an applicable Implementation Plan available on the NERC Web Site.

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

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

Regulatory Background

PRC-023-1 was approved by FERC in Order 733 on March 18, 2010. In its approval, FERC directed the ERO to make modifications to the Standard regarding a number of issues. In Order 733-A, FERC denied rehearing on a number of issues and made clarifications regarding directives issued in Order 733. Order 759 approved PRC-023-2 and addressed a number of directives issued in Order 733 and provided for the consistent identification of operationally critical circuits that operated below 200 kV. In Order 799, additional directives from Order 733 were addressed and eliminated compliance overlaps with PRC-025-1.

Order No. 799. *Generator Relay Loadability and Revised Transmission Relay Loadability Standards*, 148 FERC ¶ 61,042 (2014).

<http://www.nerc.com/FilingsOrders/us/FERCOrdersRules/Final%20Rule%20PRC-025-1%20and%20PRC-023-3.pdf>

P 2 In approving the Standard, FERC found that “the revisions to PRC-023-2 are appropriate in that they clarify the applicability of the two standards governing relay loadability (PRC-025-1 and PRC-023-3), and prevent potential compliance overlap by eliminating potential inconsistencies.”

P 13 NERC explained in its Supplemental Filing that these changes [to PRC-023-2] were identified during development of PRC-025-1 as “necessary to establish bright-line distinction between the applicability of load-responsive protective relays in the transmission and generator relay loadability Reliability Standards.”

P 15 NERC explained in its Supplemental Filing that the two relay loadability standards, as revised, would be based on the location where the relays are applied and not on the intended functions[.]”

**Order No. 759.** *Transmission Relay Loadability Standard*, 138 FERC ¶ 61,197 (2012).

<http://www.nerc.com/FilingsOrders/us/FERCOrdersRules/Order_Approving_PRC-023-2_2012.3.15.pdf>

P 1 In approving the Standard, FERC stated, “The Reliability Standard requires transmission owners, generation owners, and distribution providers to set load-responsive phase protective relays according to specific criteria to ensure that the relays reliably detect – and protect the electric network from – fault conditions, but do not limit transmission loadability or interfere with system operators’ ability to protect system reliability.

n.1 In the context of PRC-023-2, “loadability” refers to the ability of protective relays to refrain from operating under all permissible loading conditions on all applicable transmission lines and transformers.

P 36 In the discussion of the Standard, FERC stated, “The Reliability Standard meets the directives outlined in Order No. 733, and further contributes to the reliability of the Bulk-Power System by requiring load-responsive phase protection relay settings that will provide essential facility protection for faults while not limiting transmission loadability or interfering with system operators’ ability to protect system reliability. In addition, the Reliability Standard provides for the consistent identification of operationally critical circuits that operated below 200 kV that must comply with the Requirements of the Standard.”

P 43 FERC clarified that “…to the extent that non-load responsive relays are not covered by Reliability Standard PRC-023-2, however we decline to direct NERC to include the assets in the exclusion list of Section 3 of Attachment A as the exclusion list should be limited to protection systems that would otherwise be subject to the Standard.”

**Order No. 733-A.** *Order on Rehearing, Clarification, and Request for an Extension of Time*, 134 FERC ¶ 61,127 (2011).

<http://www.nerc.com/FilingsOrders/us/FERCOrdersRules/Order%20No%20733-A_TRL_Std_2.18.11.pdf>

P 63 In the order, FERC clarifies that, “Our primary concern in requiring the planning coordinators to create base cases is to ensure that the study is robust enough to capture all facilities between 100 and 20 kV that are critical to the operation of the bulk electric system.”

**Order No. 733.** *Transmission Relay Loadability Standard*, 130 FERC ¶ 61,221 (2010).

<http://www.nerc.com/FilingsOrders/us/FERCOrdersRules/Order-733_PRC-023-1_03182010.pdf>

P 5 In the order approving PRC-023-1, FERC stated, “Reliability Standard PRC-023-1 requires transmission owners, generator owners, and distribution providers to set load-responsive phase protection relays according to specific criteria in order to ensure that the relays reliably detect and protect the electric network from all fault conditions, but do not operate during non-fault load conditions.”

P 112 FERC reiterated that “the requirements of PRC-023-1 apply to all protection systems as described in Attachment A that are intended to provide protection to facilities defined in section 4.1.1 through 4.1.4 of the Reliability Standard, regardless of whether the protections systems provide primary or secondary protection and regardless of their physical location.”

P 113 “In this Reliability Standard, the Commission is referring to the first type of relays; i.e. relays that are applied to provide back-up protection to Bulk-Power System elements and that would sense increased current flow due to a fault on a Bulk-Power System transmission circuit.”

Revision History for RSAW

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| --- | --- | --- | --- |
| **Version** | **Date** | **Reviewers** | **Revision Description** |
| 1 | 08/29/2014 | NERC Compliance, RSAWTF, CMFG, ECEMG | New Document |
|  |  |  |  |
|  |  |  |  |

1. 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. [↑](#footnote-ref-1)
2. Compliance Assessment Date(s): The date(s) the actual compliance assessment (on-site audit, off-site spot check, etc.) occurs. [↑](#footnote-ref-2)
3. Entity 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 of the Reliability Standard. For DPs, applicable circuits must have bi-directional flow capabilities. [↑](#footnote-ref-3)
4. When a 15-minute rating has been calculated and published for use in real-time operations, the 15-minute rating can be used to establish the loadability requirement for the protective relays. [↑](#footnote-ref-4)
5. As illustrated by the “dotted line” in IEEE C57.109-1993 - *IEEE Guide for Liquid-Immersed Transformer Through-Fault-Current Duration,* Clause 4.4, Figure 4. [↑](#footnote-ref-5)
6. IEEE standard C57.91, Tables 7 and 8, specify that transformers are to be designed to withstand a winding hot spot temperature of 180 degrees C, and Annex A cautions that bubble formation may occur above 140 degrees C. [↑](#footnote-ref-6)
7. 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. [↑](#endnote-ref-1)