

## Standard Authorization Request Form

Title of Proposed Standard	Relay Loadability Order 733
Request Date	8/5/2010
SC Approval Date	8/12/2010
Revised Date	11/1/2010

<b>SAR Requester Information</b>		<b>SAR Type</b> <i>(Check a box for each one that applies.)</i>	
Name	Stephanie Monzon	<input checked="" type="checkbox"/>	New Standard
Primary Contact	Stephanie.monzon@nerc.net	<input checked="" type="checkbox"/>	Revision to existing Standard
Telephone	610-608-8084	<input type="checkbox"/>	Withdrawal of existing Standard
Fax			
E-mail	Stephanie.monzon@nerc.net	<input type="checkbox"/>	Urgent Action

**Purpose** As the ERO, NERC must address all directives in Orders issued by FERC. On March 18, 2010 FERC issued Order No. 733 which approved Reliability Standard PRC-023-1 – Transmission Relay Loadability, and also directed NERC, as the Electric Reliability Organization (“ERO”), to develop certain modifications to the PRC-023-1 standard through its Reliability Standards development process, to be completed by specific deadlines. Attachment 1 to the SAR contains the directives and associated deadlines. The Order also directed development of two new Reliability Standards to address issues related to generator relay loadability and the operation of protective relays due to power swings. The standards-related directives in Order 733 are aimed at closing some reliability-related gaps in the scope of PRC-023-1.

**Industry Need**

FERC directed NERC to develop modifications related to Relay Loadability by specific deadlines in Order No. 733. Attachment 1 to the SAR contains the directives and associated deadlines.

PRC-023-1 Directed Modifications

The Commission directed a number of changes to the approved standard including a test to be applied by Planning Coordinators to determine applicability to elements operated at less than 200 kV. This test will be included in PRC-023-1 either in the form of a Requirement or as an attachment to the standard.

Generator Step-up and Auxiliary Transformers

The Commission directed the ERO to develop a new Reliability Standard addressing generator relay loadability, with its own individual timeline, and not a revision to an existing Standard.

Protective Relays Operating Unnecessarily Due to Stable Power Swings

The Commission observed that PRC-023-1 does not address stable power swings, and pointed out that currently available protection applications and relays, such as pilot wire differential, phase comparison and blinder-blocking applications and relays, and impedance relays with non-circular operating characteristics, are demonstrably less susceptible to operating unnecessarily because of stable power swings. Given the availability of alternatives, the Commission stated that the use of protective relay systems that cannot differentiate between faults and stable power swings constitutes miscoordination of the protection system and is inconsistent with entities’ obligations under existing Reliability Standards.

In this Final Rule the Commission decided not to direct the ERO to modify PRC-023-1 to address stable power swings. However, because both NERC and the U.S.-Canada Power System Outage Task Force have identified undesirable relay operation due to stable power swings as a reliability issue, the Commission directed the ERO to develop a Reliability Standard that requires use of protective relay systems that can differentiate between faults and stable power swings and, when necessary, phases out protective relays that cannot meet this requirement.

**Brief Description**

This SAR’s scope includes three standard development phases to address the standards-related directives in Order No. 733 directives. Phase I is focused on making the specific modifications to PRC-023-1 that were identified in the order; Phase II is focused on developing a new standard to address generator relay loadability; and Phase III is focused on developing requirements that address protective relay operations due to power swings.

### Detailed Description

Phase I: Develop modifications to PRC-023-1- Transmission Relay Loadability by March 18, 2011 to address the following directives from Order 733:

- p. 60 . . . modify PRC-023-1 to apply an “add in” approach to sub-100 kV facilities that are owned or operated by currently-Registered Entities or entities that become Registered Entities in the future, and are associated with a facility that is included on a critical facilities list defined by the Regional Entity.
- p. 69 . . . modify Requirement R3 of the Reliability Standard to specify the test that planning coordinators must use to determine whether a sub-200 kV facility is critical to the reliability of the Bulk-Power System.
- p 162 . . . consider “islanding” strategies that achieve the fundamental performance for all islands in developing the new Reliability Standard addressing stable power swings.
- p. 186 . . . require that transmission owners, generator owners, and distribution providers give their transmission operators a list of transmission facilities that implement sub-requirement R1.2.
- p. 203 . . . modify sub-requirement R1.10 so that it requires entities to verify that the limiting piece of equipment is capable of sustaining the anticipated overload for the longest clearing time associated with the fault.
- P. 224... direct the ERO to document, subject to audit by the Commission, and to make available for review to users, owners and operators of the Bulk-Power System, by request, a list of those facilities that have protective relays set pursuant sub-requirement R1.12.
- p. 237 . . . modify the Reliability Standard to add the Regional Entity to the list of entities that receive the critical facilities list. [sub-requirement R3.3]
- p. 244 . . . include section 2 of Attachment A in the modified Reliability Standard as an additional Requirement with the appropriate violation risk factor and violation severity level.
- p. 264 . . . revise section 1 of Attachment A to include supervising relay elements on the list of relays and protection systems that are specifically subject to the Reliability Standard.
- p. 283 . . . modify the Reliability Standard to include an implementation plan for sub-100 kV facilities.
- p. 284 . . . remove the exceptions footnote from the “Effective Dates” section.

In Phase I of the project, the NERC Relay Loadability standard drafting team will either modify the PRC-023-1 Reliability Standard to incorporate the directed modifications or will propose equally efficient and effective alternative approaches that address the Commission's reliability-related concerns. *(In parallel with this effort, NERC plans to convene a panel of industry subject matter experts to develop a straw man proposal for the test Planning Coordinators must use to identify sub-200 kV facilities that are critical to the reliability of the Bulk Power System. The panel will collect industry feedback on the straw man test using the current standards development process that will be incorporated into Requirement R3 of PRC-023-1 by the Standard Drafting Team.)*

### Phase II: Develop a new Standard Addressing Generator Relay Loadability

In Phase II of the project, a new Reliability Standard will be developed by the end of 2012 to address the subject of generator relay loadability in support of NERC's filing indicating it would develop such a standard and to address the following directive from Order No. 733:

- p. 108 . . . consider the PSEG Companies' suggestion in developing a Reliability Standard that addresses generator relay loadability.

As indicated in NERC's Order No. 733 clarification and rehearing request, NERC believes adding additional requirements to the PRC-023 standard in addition to developing a new Reliability Standard to address generator relay loadability could lead to confusion over applicability and the possibility of conflicting requirements. Therefore, NERC proposed in its clarification and rehearing request to address the issue of generator relay loadability in a new Reliability Standard, separate and distinct from the PRC-023 Reliability Standard, which is intended to address relays that protect transmission elements. Subject to the Commission's response to NERC's pending clarification and rehearing request, NERC plans to address generator relay loadability in a new Reliability Standard for applications where the relays are set with a shorter reach to protect the generator and the generator step-up transformer, and for applications where the relays are set with a longer reach to provide backup protection for transmission system faults. The standard drafting team will use relevant sections of the NERC technical reference document, Power Plant and Transmission System Protection Coordination Section 3.1 and Appendix E to develop the requirements by which generator relay loadability will be assessed.

Phase III: Development of a New Standard Addressing the Issue of Protective Relay Operations Due To Power Swings

In Phase III of the project, a new Reliability Standard will be developed to address the subject of protective relay operations due to power swings to address the following directive from Order No. 733 by the end of 2014:

- p. 150 - develop a Reliability Standard that requires the use of protective relay systems that can differentiate between faults and stable power swings and, when necessary, phases out protective relay systems that cannot meet this requirement.

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**Reliability Functions**

<b>The Standard will Apply to the Following Functions</b> <i>(Check box for each one that applies.)</i>		
<input type="checkbox"/>	Reliability Assurer	Monitors and evaluates the activities related to planning and operations, and coordinates activities of Responsible Entities to secure the reliability of the bulk power system within a Reliability Assurer Area and adjacent areas.
<input checked="" type="checkbox"/>	Reliability Coordinator	Responsible for the real-time operating reliability of its Reliability Coordinator Area in coordination with its neighboring Reliability Coordinator's wide area view.
<input type="checkbox"/>	Balancing Authority	Integrates resource plans ahead of time, and maintains load-interchange-resource balance within a Balancing Authority Area and supports Interconnection frequency in real time.
<input type="checkbox"/>	Interchange Authority	Ensures communication of interchange transactions for reliability evaluation purposes and coordinates implementation of valid and balanced interchange schedules between Balancing Authority Areas.
<input checked="" type="checkbox"/>	Planning Coordinator	Assesses the longer-term reliability of its Planning Coordinator Area.
<input type="checkbox"/>	Resource Planner	Develops a >one year plan for the resource adequacy of its specific loads within its portion of the Planning Coordinator's Area.
<input checked="" type="checkbox"/>	Transmission Owner	Owns and maintains transmission facilities.
<input type="checkbox"/>	Transmission Operator	Ensures the real-time operating reliability of the transmission assets within a Transmission Operator Area.
<input type="checkbox"/>	Transmission Planner	Develops a >one year plan for the reliability of the interconnected Bulk Electric System within the Transmission Planner Area.
<input type="checkbox"/>	Transmission Service Provider	Administers the transmission tariff and provides transmission services under applicable transmission service agreements (e.g., the pro forma tariff).
<input checked="" type="checkbox"/>	Distribution Provider	Delivers electrical energy to the End-use customer.
<input checked="" type="checkbox"/>	Generator Owner	Owns and maintains generation facilities.
<input type="checkbox"/>	Generator Operator	Operates generation unit(s) to provide real and reactive power.
<input type="checkbox"/>	Purchasing-Selling Entity	Purchases or sells energy, capacity, and necessary reliability-related services as required.
<input type="checkbox"/>	Load-Serving Entity	Secures energy and transmission service (and reliability-related services) to serve the End-use Customer.

***Reliability and Market Interface Principles***

<b>Applicable Reliability Principles</b> <i>(Check box for all that apply.)</i>	
<input checked="" type="checkbox"/>	1. Interconnected bulk power systems shall be planned and operated in a coordinated manner to perform reliably under normal and abnormal conditions as defined in the NERC Standards.
<input type="checkbox"/>	2. The frequency and voltage of interconnected bulk power systems shall be controlled within defined limits through the balancing of real and reactive power supply and demand.
<input checked="" type="checkbox"/>	3. Information necessary for the planning and operation of interconnected bulk power systems shall be made available to those entities responsible for planning and operating the systems reliably.
<input type="checkbox"/>	4. Plans for emergency operation and system restoration of interconnected bulk power systems shall be developed, coordinated, maintained and implemented.
<input type="checkbox"/>	5. Facilities for communication, monitoring and control shall be provided, used and maintained for the reliability of interconnected bulk power systems.
<input type="checkbox"/>	6. Personnel responsible for planning and operating interconnected bulk power systems shall be trained, qualified, and have the responsibility and authority to implement actions.
<input type="checkbox"/>	7. The security of the interconnected bulk power systems shall be assessed, monitored and maintained on a wide area basis.
<input type="checkbox"/>	8. Bulk power systems shall be protected from malicious physical or cyber attacks.
<b>Does the proposed Standard comply with all of the following Market Interface Principles?</b> <i>(Select 'yes' or 'no' from the drop-down box.)</i>	
1. A reliability standard shall not give any market participant an unfair competitive advantage. Yes	
2. A reliability standard shall neither mandate nor prohibit any specific market structure. Yes	
3. A reliability standard shall not preclude market solutions to achieving compliance with that standard. Yes	
4. A reliability standard shall not require the public disclosure of commercially sensitive information. All market participants shall have equal opportunity to access commercially non-sensitive information that is required for compliance with reliability standards. Yes	

**Standards Authorization Request Form**

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***Related Standards***

<b>Standard No.</b>	<b>Explanation</b>
PRC-023-1	Order No. 733 approved Reliability Standard PRC-023-1 – Transmission Relay Loadability, and directed NERC, as the Electric Reliability Organization (“ERO”), to develop certain modifications to the PRC-023-1 standard through its Reliability Standards development process, to be completed by specific deadlines.
New Reliability Standard	Development of a New Standard Addressing Generator Relay Loadability
New Reliability Standard	Development of a New Standard Addressing the Issue of Protective Relay Operations Due To Power Swings

***Related SARs***

<b>SAR ID</b>	<b>Explanation</b>

***Regional Variances***

<b>Region</b>	<b>Explanation</b>
ERCOT	
FRCC	
MRO	
NPCC	
SERC	
RFC	
SPP	
WECC	

## Attachment 1 - Order No. 733 – Action Plan and Timetable

Order No. 733 approved Reliability Standard PRC-023-1 – Transmission Relay Loadability, and directed NERC, as the Electric Reliability Organization (“ERO”), to develop certain modifications to the PRC-023-1 standard through its Reliability Standards development process, to be completed by specific deadlines and directed NERC to develop requirements to address issues related to Relay Loadability. The Order also directed development of two new Reliability Standards to address issues related to generator relay loadability and the operation of protective relays due to power swings. The following table lists the FERC directives in Order No. 733 and for each directive associates it with a project phase. Note that some of the tasks within each phase will be managed by NERC staff, not the standard drafting team.

Note that the scope of the SAR is limited to addressing the directives highlighted in the table below.

Paragraph	Text	Project Phase/ Timeline
60	With respect to sub-100 kV facilities, we adopt the NOPR proposal and direct the ERO to modify PRC-023-1 to apply an “add in” approach to sub-100 kV facilities that are owned or operated by currently-Registered Entities or entities that become Registered Entities in the future, and are associated with a facility that is included on a critical facilities list defined by the Regional Entity. We also direct that additions to the Regional Entities’ critical facility list be tested for their applicability to PRC-023-1 and made subject to the Reliability Standard as appropriate.	Phase I -- by March 18, 2011
69	Finally, pursuant to section 215(d)(5) of the FPA, we direct the ERO to modify Requirement R3 of the Reliability Standard to specify the test that planning coordinators must use to determine whether a sub-200 kV facility is critical to the reliability of the Bulk-Power System. We direct the ERO to file its test, and the results of applying the test to a representative sample of utilities from each of the three Interconnections, for Commission approval no later than one year from the date of this Final Rule.	Phase I -- Note NERC’s pending request for rehearing filed on April 19, 2010 regarding this directive.
97	Finally, commenters argue that there should be some mechanism for entities to challenge criticality determinations. We agree that such a mechanism is appropriate and direct the ERO to develop an appeals process (or point to a process in its existing procedures) and submit it to the Commission no later than one year after the date of this Final Rule.	Phase I – by March 18, 2011
105	In light of the ERO’s statement that within two years it expects to submit to the Commission a proposed Reliability Standard addressing generator relay loadability, we direct the ERO to submit to the Commission an updated and specific timeline explaining when it expects to develop and submit this proposed Standard.	Phase II – by the end of 2012
108	Finally, the PSEG Companies suggest that the ERO consider whether a generic rating percentage can be established for generator step-up transformers and, if so, determine that percentage. Although we do not adopt the NOPR proposal, we encourage the ERO to consider the PSEG Companies’ suggestion in developing a Reliability Standard that addresses generator relay loadability.	Phase II – by the end of 2012
150	However, because both NERC and the Task Force have identified undesirable relay operation due to stable power swings as a reliability issue, we direct the ERO to develop a Reliability Standard that requires the use of protective relay systems that can differentiate between faults and stable power swings and,	Phase III – by the end of 2014

## Attachment 1 - Order No. 733 – Action Plan and Timetable

Paragraph	Text	Project Phase/ Timeline
	when necessary, phases out protective relay systems that cannot meet this requirement. We also direct the ERO to file a report no later than 120 days of this Final Rule addressing the issue of protective relay operation due to power swings. The report should include an action plan and timeline that explains how and when the ERO intends to address this issue through its Reliability Standards development process.	
162	We agree with the PSEG Companies and direct the ERO to consider “islanding” strategies that achieve the fundamental performance for all islands in developing the new Reliability Standard addressing stable power swings.	Phase I – by March 18, 2011
186	However, we will adopt the NOPR proposal to direct the ERO to modify PRC-023-1 to require that transmission owners, generator owners, and distribution providers give their transmission operators a list of transmission facilities that implement sub-requirement R1.2.	Phase I – by March 18, 2011
203	We adopt the NOPR proposal and direct the ERO to modify sub-requirement R1.10 so that it requires entities to verify that the limiting piece of equipment is capable of sustaining the anticipated overload for the longest clearing time associated with the fault.	Phase I – by March 18, 2011
224	While we are not adopting the NOPR proposal, we direct the ERO to document, subject to audit by the Commission, and to make available for review to users, owners and operators of the Bulk-Power System, by request, a list of those facilities that have protective relays set pursuant sub-requirement R1.12.	Phase I – by March 18, 2011
237	We adopt the NOPR proposal and direct the ERO to modify the Reliability Standard to add the Regional Entity to the list of entities that receive the critical facilities list. [sub-requirement R3.3]	Phase I – by March 18, 2011
244	We adopt the NOPR proposal and direct the ERO to include section 2 of Attachment A in the modified Reliability Standard as an additional Requirement with the appropriate violation risk factor and violation severity level.	Phase I – by March 18, 2011
264	After further consideration, and in light of the comments, we will not direct the ERO to remove any exclusion from section 3, except for the exclusion of supervising relay elements in section 3.1. Consequently, we direct the ERO to revise section 1 of Attachment A to include supervising relay elements on the list of relays and protection systems that are specifically subject to the Reliability Standard.	Phase I – by March 18, 2011
283	Additionally, in light of our directive to the ERO to expand the Reliability Standard’s scope to include sub-100 kV facilities that Regional Entities have already identified as necessary to the reliability of the Bulk-Power System through inclusion in the Compliance Registry, we direct the ERO to modify the Reliability Standard to include an implementation plan for sub-100 kV facilities.	Phase I – by March 18, 2011

## Attachment 1 - Order No. 733 – Action Plan and Timetable

Paragraph	Text	Project Phase/ Timeline
284	We also direct the ERO to remove the exceptions footnote from the “Effective Dates” section.	Phase I – by March 18, 2011
297	Finally, we direct the ERO to assign a “high” violation risk factor to Requirement R3.	Filed with the Commission on April 19, 2010
308	Consequently, we direct the ERO to assign a single violation severity level of “severe” for violations of Requirement R1.	Filed with the Commission on April 19, 2010
310	Accordingly, we direct the ERO to change the violation severity level assigned to Requirement R2 from “lower” to “severe” to be consistent with Guideline 2a.	Filed with the Commission on April 19, 2010
311	Finally, we direct the ERO to assign a “severe” violation severity level to Requirement R3.	Filed with the Commission on April 19, 2010