G.10 NERC Standard PRC-023 – Transmission Relay Loadability

Background

The purpose of the standard is to ensure that 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. There are a number of requirements that specify how protective relays should be set so that they will not limit loadability of a circuit. One of the requirements of the Standard (R6) is for the Planning Coordinator to determine the facilities that must comply with requirements R1 through R5 of NERC standard PRC-023-2.

In accordance with Attachment B of PRC-023-2, the following circuits are subject to Requirement R6:

- transmission lines operated at 100 kV to 200 kV and transformers with low voltage terminals connected at 100 kV to 200 kV
- transmission lines operated below 100kV and transformers with low voltage terminals connected below 100 kV that are part of the BES
- PJM will identify any facilities that must meet Requirements 1 through 5 of the standard to prevent potential cascade tripping that may occur when protective relay settings limit transmission loadability. The Planning Coordinator shall maintain a list of circuits subject to PRC-023-2 per application of Attachment B and provide the list of facilities to all Regional Entities, Reliability Coordinators, Transmission Owners, Generator Owners, and Distribution Providers within 30 days of establishment of the initial list and within 30 days of any changes to the list.

Process to determine PRC-023 Critical Facilities

As part of the development of the RTEP once each calendar year PJM staff will determine what facilities are applicable to the PRC-023-2 standard. The test will monitor all required facilities in accordance with Attachment B of PRC-023-2 as described below.

NERC Standard PRC-023-2 Transmission Relay Loadability - Attachment B

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

- The circuit is a monitored Facility of a permanent flowgate in the Eastern Interconnection, a major transfer path within the Western Interconnection as defined by the Regional Entity, or a comparable monitored Facility in the Québec Interconnection, that has been included to address reliability concerns for loading of that circuit, as confirmed by the applicable Planning Coordinator.
- The circuit is a monitored Facility of an IROL, where the IROL was determined in the planning horizon pursuant to FAC-010.
The circuit forms a path (as agreed to by the Generator Operator and the transmission entity) to supply off-site power to a nuclear plant as established in the Nuclear Plant Interface Requirements (NPIRs) pursuant to NUC-001.

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:

- Simulate double contingency combinations selected by engineering judgment, without manual system adjustments in between the two contingencies (reflects a situation where a System Operator may not have time between the two contingencies to make appropriate system adjustments).
- For circuits operated between 100 kV and 200 kV evaluate the post-contingency loading, in consultation with the Facility owner, against a threshold based on the Facility Rating assigned for that circuit and used in the power flow case by the Planning Coordinator.
- When more than one Facility Rating for that circuit is available in the power flow case, the threshold for selection will be based on the Facility Rating for the loading duration nearest four hours.
- The threshold for selection of the circuit will vary based on the loading duration assumed in the development of the Facility Rating.
  - If the Facility Rating is based on a loading duration of up to and including four hours, the circuit must comply with the standard if the loading exceeds 115% of the Facility Rating.
  - If the Facility Rating is based on a loading duration greater than four and up to and including eight hours, the circuit must comply with the standard if the loading exceeds 120% of the Facility Rating.
  - If the Facility Rating is based on a loading duration of greater than eight hours, the circuit must comply with the standard if the loading exceeds 130% of the Facility Rating.
- The Radially operated circuits serving only load are excluded.

The circuit is selected by the Planning Coordinator based on technical studies or assessments, other than those specified in the NERC Standard PRC-023-2 Transmission Relay Loadability - Attachment B Criteria above, in consultation with the Facility Owner.

The circuit is mutually agreed upon for inclusion by the Planning Coordinator and the Facility owner.