Comparison of Ride-Through Requirements in NERC PRC-029-1 and IEEE 2800-2022

Spring 2025 i2X FIRST Hybrid Workshop

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Grid Operations and Planning
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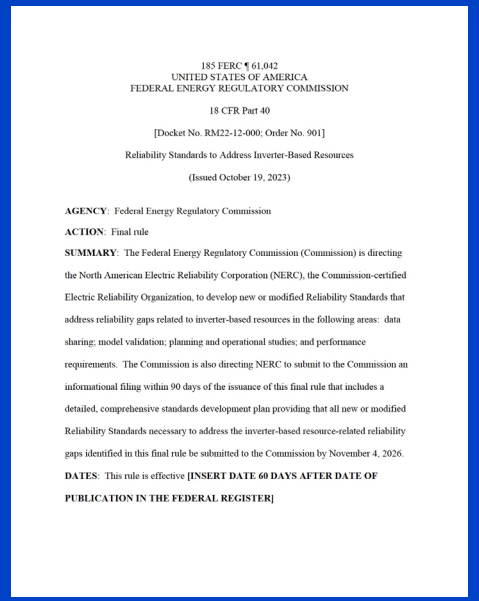
March 17, 2025

Acknowledgement: Reigh Walling, WES Consulting

FERC Order 901 Reliability Standards to Address Inverter-Based Resources (RM22-12)



185 FERC ¶ 61,042
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

18 CFR Part 40

[Docket No. RM22-12-000; Order No. 901]

Reliability Standards to Address Inverter-Based Resources

(Issued October 19, 2023)

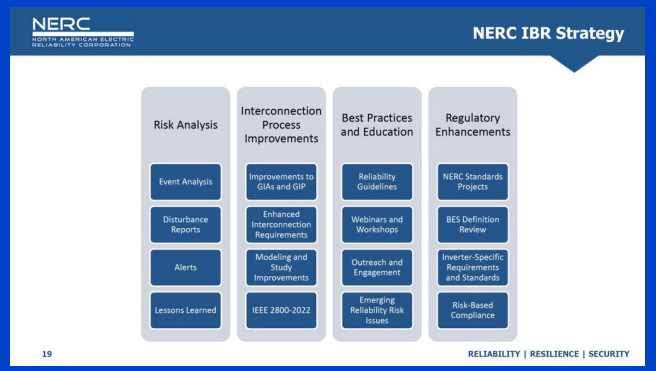
AGENCY: Federal Energy Regulatory Commission

ACTION: Final rule

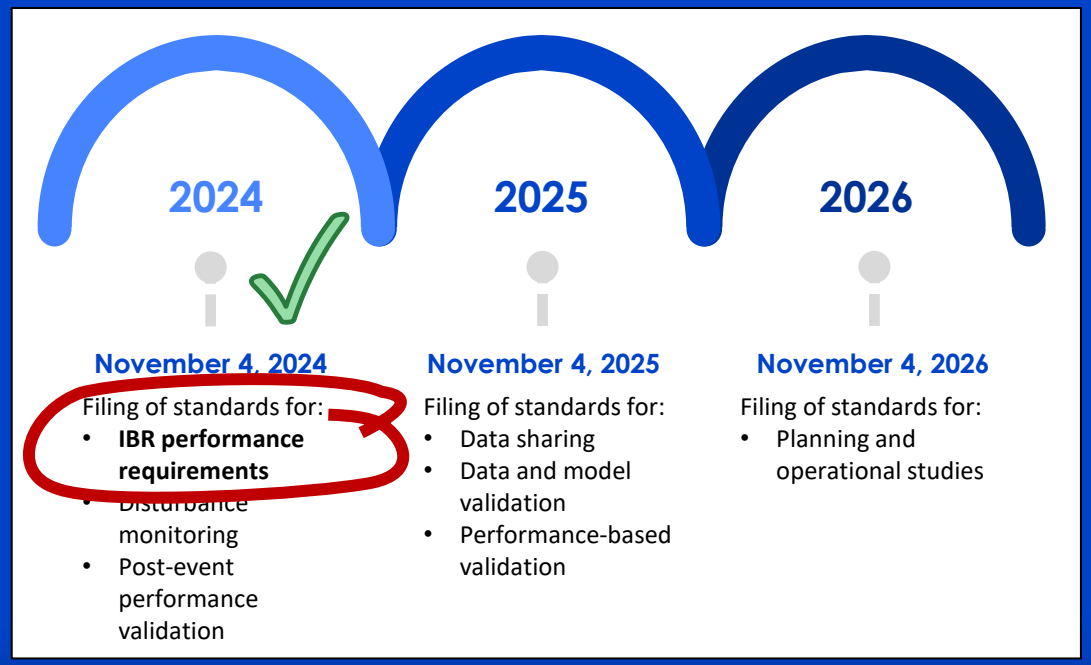
SUMMARY: The Federal Energy Regulatory Commission (Commission) is directing the North American Electric Reliability Corporation (NERC), the Commission-certified Electric Reliability Organization, to develop new or modified Reliability Standards that address reliability gaps related to inverter-based resources in the following areas: data sharing; model validation; planning and operational studies; and performance requirements. The Commission is also directing NERC to submit to the Commission an informational filing within 90 days of the issuance of this final rule that includes a detailed, comprehensive standards development plan providing that all new or modified Reliability Standards necessary to address the inverter-based resource-related reliability gaps identified in this final rule be submitted to the Commission by November 4, 2026.

DATES: This rule is effective **[INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**

https://www.ferc.gov/media/e-1-rm22-12-000



NERC IBR Webinar Series
https://www.nerc.com/comm/RSTC/Pages/IRPS.aspx



- Effective on December 29, 2023
  - Issued October 19, 2023 (link), published in federal register on October 30, 2023.
  - NERC published a work plan (link) on January 17, 2024.
- Directs NERC to develop new or modified Reliability Standards that address the following reliability gaps related to inverter-based resources:
  a. Data sharing
  b. Model validation
  c. Planning and operational studies
  d. **Performance requirements**
- Very ambitious, 3-year timeline, given that NERC Reliability Standards must be approved by industry stakeholders.
  - FERC sees a need to have all the directed Reliability Standards effective and enforceable well in advance of 2030.

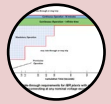
➢ **FERC** acknowledged potential value of IEEE 2800-2022 requirements and plant conformity assessment per P2800.2 but **declined to incorporate IEEE standards by reference.**

- IEEE 2800-2022 and P2800.2 could inform requirements for Items b. (Model validation) and d. (Performance requirements) and possibly expedite the NERC Reliability Standards drafting and balloting process. However, **NERC has stated that their standards cannot refer to IEEE or other industry standards.**

NERC Reliability Standards Affected by FERC Order 901

Std Family / Number	Standard Title	Purpose	Milestone	EPRI SME
Protection and Control (PRC)				
PRC-002-5	Disturbance Monitoring and Reporting Requirements	To have adequate data available to facilitate analysis of Bulk Electric System (BES) Disturbances.	2 ✔	Manish P.
PRC-024-3	Frequency and Voltage Protection Settings for Synchronous Generators and Synchronous Condensers	To set protection such that generating resource(s) remain connected during defined frequency and voltage excursions in support of the BES.	2 ✔	Manish P.
PRC-028	Disturbance Monitoring and Reporting Requirements for Inverter-Based Resources	To set requirements for disturbance monitoring and reporting of inverter-based resources	2 ✔	Manish P.
Focus PRC-029	Frequency and Voltage Ride-through Requirements for Inverter-Based Generating Resources	To ensure that Inverter-Based Resources (IBRs) remain connected and perform operationally as expected to support of the Bulk Power System (BPS) during and after defined frequency and voltage excursions.	2 ✔	Manish P.
PRC-030	Unexpected Inverter-Based Resource Event Mitigation	To ensure that analysis is conducted by GOs for potential abnormal performance events	2 ✔	Manish P.
PRC-019-3	Coordination of Generating Unit or Plant Capabilities, Voltage Regulating Controls, and Protection	To verify coordination of generating unit Facility or synchronous condenser voltage regulating controls, limit functions, equipment capabilities and Protection System settings.	3	Manish P.
Facilities Design, Connections, and Maintenance				
FAC-001-4	Facility Interconnection Requirements	To avoid adverse impacts on the reliability of the Bulk Electric System, TOs and applicable GOs must document and make facility interconnection requirements available so that entities seeking to interconnect will have the necessary information.	3	Jens B.
FAC-002-4	Facility Interconnection Studies	To study the impact of interconnecting new or changed facilities on the Bulk Electric System	3	Jens B.
Modeling, Data, and Analysis				
MOD-032-2	Data for Power System Modeling and Analysis	To establish consistent modeling data requirements and reporting procedures for development of planning horizon cases necessary to support analysis of the reliability of the interconnected transmission system.	3,4	[Deepak R.]
MOD-031-3	Demand and Energy Data	To provide authority for applicable entities to collect demand, energy and related data to support reliability studies and assessments and to enumerate the responsibilities and obligations of requestors and respondents of that data.	3	[Jose C.]
MOD-025-2	Verification and Data Reporting of Generator Real and Reactive Power Capability and Synchronous Condenser Reactive Power Capability	To ensure that accurate information on generator gross and net Real and Reactive Power capability and synchronous condenser Reactive Power capability is available for planning models used to assess BES reliability.	3	[Manish P.]
MOD-026-1	Verification of Models and Data for Generator Excitation Control System or Plant Volt/Var Control Functions	To verify that the generator excitation control system or plant volt/var control function model (including the power system stabilizer model and the impedance compensator model) and the model parameters used in dynamic simulations accurately represent the generator excitation control system or plant volt/var control function behavior when assessing BES reliability	3	[Manish P.]
MOD-027-1	Verification of Models and Data for Turbine/Governor and Load Control or Active Power/Frequency Control Functions	To verify that the turbine/governor and load control or active power/frequency control model and the model parameters, used in dynamic simulations that assess BES reliability, accurately represent generator unit real power response to system frequency variations.	3	[Manish P.]
MOD-033-2	Steady-State and Dynamic System Model Validation	To establish consistent validation requirements to facilitate the collection of accurate data and building of planning models to analyze the reliability of the interconnected transmission system.	3	Nazila R.
Transmission Planning				
TPL-001-5.1	Transmission System Planning Performance Requirements	Establish Transmission system planning performance requirements within the planning horizon to develop a BES that will operate reliably over a broad spectrum of System conditions and following a wide range of probable Contingencies.	4	[Jens B.]
TOP-003-6.1	Transmission Operator and Balancing Authority Data and Information Specification and Collection	To ensure that each Transmission Operator and Balancing Authority has the data and information it needs to plan, monitor, and assess the operation of its Transmission Operator Area or Balancing Authority Area	3	[Deepak R.]
Interconnection Reliability Operations and Coordination				
IRO-010-5	Reliability Coordinator Data and information Specification and Collection	To prevent instability, uncontrolled separation, or Cascading outages that adversely impact reliability by ensuring each Reliability Coordinator has the data and information it needs to plan, monitor and assess the operation of its Reliability Coordinator Area.	3	[Deepak R.]

PRC-029 (IBR Ride-Through Standard) – Draft 4

Std Family / Number		Standard Title	Purpose	Milestone	EPRI SME
Protection and Control (PRC)					
	PRC-002-5	Disturbance Monitoring and Reporting Requirements	To have adequate data available to facilitate analysis of Bulk Electric System (BES) Disturbances.	2 ✓	Manish P.
	PRC-024-3	Frequency and Voltage Protection Settings for Synchronous Generators and Synchronous Condensers	To set protection such that generating resource(s) remain connected during defined frequency and voltage excursions in support of the BES.	2 ✓	Manish P.
	PRC-028	Disturbance Monitoring and Reporting Requirements for Inverter-Based Resources	To set requirements for disturbance monitoring and reporting of inverter-based resources	2 ✓	Manish P.
Focus	PRC-029	Frequency and Voltage Ride-through Requirements for Inverter-Based Generating Resources	To ensure that Inverter-Based Resources (IBRs) remain connected and perform operationally as expected to support of the Bulk Power System (BPS) during and after defined frequency and voltage excursions.	2 ✓	Manish P.
	PRC-030	Unexpected Inverter-Based Resource Event Mitigation	To ensure that analysis is conducted by GOs for potential abnormal performance events	2 ✓	Manish P.
	PRC-019-3	Coordination of Generating Unit or Plant Capabilities, Voltage Regulating Controls, and Protection	To verify coordination of generating unit Facility or synchronous condenser voltage regulating controls, limit functions, equipment capabilities and Protection System settings.	3	Manish P.

- **EPRI submitted multiple rounds of technical comments** supporting alignment with IEEE 2800-2022
  - In last round, added additional recommendation: *Consider revising Requirement R4 to allow hardware limitation exemptions for IBRs that have signed interconnection agreements, and not just IBRs that are in-service, as of the effective date of the standard.*
- Draft 4 ballot closed on **Friday, October 4, 2024** (link) and draft **was approved with ~78%**.
- **~43 pages** of comments. **There was no final ballot.** NERC submitted approved draft for **FERC review/approval**.
- The voting statistics are listed below, and the details can be accessed on the Ballot Results page.

	Ballot	Non-binding Poll
	Quorum / Approval	Quorum / Supportive Opinions
PRC-024-4	90.77% / 86.41%	
Results PRC-029-1	89.51% / 77.88%	86.85% / 73.6%
Implementation Plan	88.56% / 77.89%	N/A

Industry stakeholder comments increased alignment of approved draft with IEEE 2800-2022. Standard met FERC's deadline on November 4, 2024 (Milestone 2).

FERC Seeks Stakeholder Comments by Mid-February 2025

https://www.ferc.gov/news-events/news/ferc-proposes-approve-first-standards-protect-grid-clean-energy-transition

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NEWS RELEASES

FERC Proposes to Approve First Standards to Protect Grid for Clean Energy Transition

December 19, 2024

Item E-10 | Docket No. RM25-3

FERC today proposed to approve the first of an expected suite of new reliability standards to protect the grid as the nation makes the transition to expanded use of clean energy technologies.

Today's Notice of Proposed Rulemaking marks the latest in the Commission's series of grid reliability orders pertaining to inverter-based resources (IBRs), issued over the last two years. The NOPR is intended to ensure reliability of the grid by accommodating the rapid integration of new power generation technologies, known as IBRs, that include solar photovoltaic, wind, fuel cell and battery storage resources and comprise a significant portion of new generating capacity projected to come online over the next decade.

The NOPR covers the first two of a suite of new North American Electric Reliability Corporation (NERC) reliability standards that are intended to comprehensively address IBR data sharing, model validation, planning and operational studies, and performance requirements. Today's order concerns the ability of IBRs to "ride through" frequency and voltage excursions like faults on the transmission system, and seeks more information on exemptions for certain IBRs. Comments are due 60 days after publication in the *Federal Register*.

The Commission directed NERC to develop the standards over a three-year period in Order No. 901, issued in October 2023.

IBRs use power electronic devices to change the direct current power produced by generators into alternating current power that is then transmitted on the bulk electric system. In certain cases, these resources respond to grid disturbances differently from traditional generation resources such as hydropower, nuclear, coal or natural gas plants. Most mandatory reliability standards were developed for traditional generation resources, so this new suite of rules is important to ensure IBRs support reliability in the same manner as traditional generation resources.

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December 20, 2024

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Summaries | December 2024 Commission Meeting

December 19, 2024

NEWS RELEASES

Chairman Phillips Names Rosenthal Deputy Director in Office of Public

➢ **EPRI is currently considering submission of comments.**

Applicability of Standard

PRC-029-1

Facilities:

4.2.1. Bulk Electric System (BES) IBRs

4.2.2. Non-BES IBRs that either have or contribute to an aggregate nameplate capacity of greater than or equal to 20 MVA, connected through a system designed primarily for delivering such capacity to a common point of connection at a voltage greater than or equal to 60 kV.

IEEE 2800

The IEEE 2800 applies to IBRs connected to meshed and radial transmission and sub-transmission system, however, it remains silent regarding plant rating (MVA, kV). The applicability of standard remains at the discretion of the authority governing interconnection requirements.

Applicability of Requirements

- PRC-029-1 applies to existing IBR as well as new IBR, with exceptions for existing IBR exclusively for clearly documented hardware-based limitations. No exceptions for IBR plants already in interconnection queue or under construction.
- Specification of grid conditions for which ride-through requirements apply (IEEE 2800-2022, Clause 4.1.1) is not included in draft PRC-029-1.
- Literal interpretation means IBRs must ride through ANY degradation of system strength; e.g., N-2, N-3.
- Exceptions could be permitted if IBRs fail to ride through outside of specified abnormal conditions, or after significant changes in the transmission network.

PRC-029-1 Requirement R1

R1. Each Generator Owner shall ensure the design and operation is such that each IBR meets or exceeds Ride-through requirements, in accordance with the "must Ride-through[1] zone" as specified in Attachment 1, except in the following conditions: *[Violation Risk Factor: High] [Time Horizon: Operations Assessment]*

- The IBR needed to electrically disconnect in order to clear a fault;
- The voltage at the high-side of the main power transformer[2] went outside an accepted hardware limitation, in accordance with Requirement R4;
- The instantaneous positive sequence voltage phase angle change is more than 25 electrical degrees at the high-side of the main power transformer and is initiated by a non-fault switching event on the transmission system[3]; or
- The Volts per Hz (V/Hz) at the high-side of the main power transformer exceed 1.1 per unit for longer than 45 seconds or exceed 1.18 per unit for longer than 2 seconds.

Same in IEEE 2800

Specific to PRC-029-1. IEEE 2800 is a forward looking standard

Similar to IEEE 2800

IEEE 2800 does not specify "definitive" V/Hz limit

PRC-029-1 Requirement R1

PRC-029-1 does not recognize that ride-through duration is cumulative over a 3600 second time window

Table 1: Voltage Ride-through Requirements for AC-Connected Wind IBR [13]

Voltage (per unit)[14]	Operation Region	Minimum Ride-Through Time (sec)
> 1.20	N/A[15]	N/A
≥ 1.10	Mandatory Operation Region	1.0
> 1.05	Continuous Operation Region	1800
≤ 1.05 and ≥ 0.90	Continuous Operation Region	Continuous
< 0.90	Mandatory Operation Region	3.00
< 0.70	Mandatory Operation Region	2.50
< 0.50	Mandatory Operation Region	1.20
< 0.25	Mandatory Operation Region	0.16
< 0.10	Permissive Operation Region	0.16

PRC-029-1 does not include exception for self-protection when negative-sequence voltage exceeds specified threshold and duration

Per IEEE 2800, the IBR plant shall be considered compliant with this standard if the post-disturbance apparent current of the IBR plant is not less than 90% of the pre-disturbance apparent current.

This is not included in PRC-029-1

PRC-029-1 does not exclude interconnection at 500 kV nominal voltage

PRC-029-1 sets a uniform cumulative duration period of 10 second for all ride-through region. Effectively requires IBR to withstand an unlimited number of disturbances spaced > 10 seconds apart.

PRC-029-1 Requirement R1

PRC-029-1, Attachment 1, Item #7

At any given voltage value, each IBR shall Ride-through unless the time duration at that voltage has exceeded the specified minimum Ride-through time duration. If the voltage is continuously varying over time, it is necessary to add the duration within each band of Tables 1 and 2 over any 10 second time period

IEEE 2800, clause 7.2.2.1

IBR plant shall ride through a voltage disturbance event wherein the *applicable voltage* exceeds or is less than the voltage range representing the *continuous operation region*, except for voltage magnitude deviations more severe than the voltage thresholds and persisting for greater than the associated durations as specified

Table 1: Voltage Ride-through Requirements for AC-Connected Wind IBR [13]

Voltage (per unit)[14]	Operation Region	Minimum Ride-Through Time (sec)
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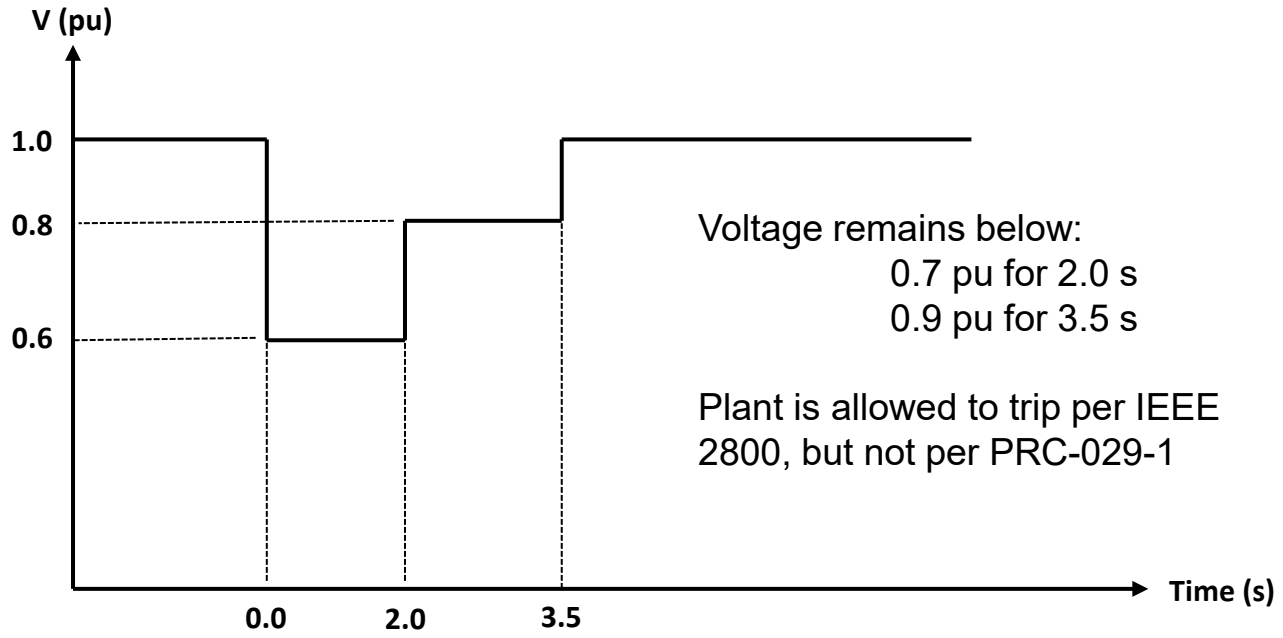

PRC-029-1 Requirement R1

Attachment 1

8. The specified duration of the mandatory operation regions and the permissive operation regions in Tables 1 and 2 is cumulative over one or more disturbances within any 10 second time period.
9. The IBR may trip for more than four deviations of the applicable voltage at the high-side of the main power transformer outside of the continuous operation region within any 10 second time period.

Table 1: Voltage Ride-through Requirements for AC-Connected Wind IBR [13]

Voltage (per unit)[14]	Operation Region	Minimum Ride-Through Time (sec)
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< 0.10	Permissive Operation Region	0.16

PRC-029-1 sets a uniform cumulative duration period of 10 second for all ride-through region. Effectively requires IBR to withstand an unlimited number of disturbances spaced > 10 seconds apart.

The consecutive voltage deviation requirement (clause 7.2.2.4) in IEEE 2800 is complex but allows an “out” when number of consecutive voltage deviations exceed a specified threshold over 120-second and 30-minute periods.

PRC-029-1 Requirement R2

R2. Each Generator Owner shall ensure the design and operation is such that the voltage performance for each IBR adheres to the following during a voltage excursion, unless a documented hardware limitation exists in accordance with Requirement R4. *[Violation Risk Factor: High] [Time Horizon: Operations Assessment]*

2.1. While the voltage at the high-side of the main power transformer remains within the continuous operation region as specified in Attachment 1, each IBR shall:

2.1.1 Continue to deliver the pre-disturbance level of Real Power or available Real Power[4], whichever is less.[5]

2.1.2 Continue to deliver Reactive Rower up to its Reactive Power limit and according to its controller settings.

2.1.3 Prioritize Real Power or Reactive Power when the voltage is less than 0.95 per unit, the voltage is within the continuous operating region, and the IBR cannot deliver both Real Power and Reactive Power due to a current limit or Reactive Power limit, unless otherwise specified through other mechanisms by an associated Transmission Planner, Planning Coordinator, Reliability Coordinator, or Transmission Operator.

A step change in voltage will stimulate a transient response. As written, perhaps, not allowed.

Similar to requirements in IEEE 2800. But IEEE 2800 also specifies reactive power capability requirement, which is voltage dependent.

PRC-029-1 remains silent regarding “reactive power capability requirement”, which is OK, given the scope of the standard. But without it, this requirement has a room for interpretation

PRC-029-1 Requirement R2

2.2. While voltage at the high-side of the main power transformer is within the mandatory operation region as specified in Attachment 1, each IBR shall exchange current, up to the maximum capability to provide voltage support, on the affected phases during both symmetrical and asymmetrical voltage disturbances, either under[6]:

- Reactive Power priority by default; or
- Real Power priority if required through other mechanisms by an associated Transmission Planner, Planning Coordinator, Reliability Coordinator, or Transmission Operator.

What is maximum current capability of an IBR?

Implies current injection on a phase-by-phase basis.
Think about L-G fault with "delta" connected transformer on transmission side

What does "provide voltage support, on the affected phases" mean when operating in Real power priority?

In IEEE 2800, the fault current injection requirements apply at IBR unit terminals. The primary reason being that the control that dictates characteristic of fault current injection reside in IBR units.

- The IBR unit is required to inject current, up to IBR unit's maximum current rating, dependent on voltage deviation from nominal at the IBR unit terminal. The IBR unit does not have any information about the voltage on the high-side of the main power transformer.
- The winding configuration of IBR unit and main power transformer further complicates this during unbalanced faults on the transmission system.
- During unbalanced faults, IBR unit is required to inject negative-sequence current dependent on terminal negative-sequence voltage.

PRC-029-1 Requirement R2

2.3. While voltage at the high-side of the main power transformer is within the permissive operation region, as specified in Attachment 1, each IBR may operate in current blocking mode if necessary to avoid tripping. Otherwise, each IBR shall follow the requirements for the mandatory operation region in Requirement R2.2.

2.3.1 If an IBR enters current blocking mode, it shall restart current exchange in less than or equal to five cycles of positive sequence voltage returning to a continuous operation region or mandatory operation region.

IBR is allowed to enter the current blocking mode for a L-G fault. But for a L-G fault, positive-sequence voltage remains > 10%. Perhaps, this is a conflicting requirement.

Lowest or highest L-G or L-L voltage

Regions are defined based on L-G and L-L voltages

Table 1: Voltage Ride-through Requirements for AC-Connected Wind IBR [13]

Voltage (per unit)[14]	Operation Region	Minimum Ride-Through Time (sec)
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IEEE 2800 allows current blocking too when applicable voltage is within permissive operation region. The restart current exchange requirement is also based on the “applicable voltage (L-G or L-L)” entering continuous or mandatory operation region.

PRC-029-1 Requirement R2

2.4. Each IBR shall not itself cause voltage at the high-side of the main power transformer to exceed the applicable high voltage thresholds and time durations in its response as voltage recovers from the mandatory or permissive operation regions to the continuous operation region.

The IEEE 2800 has a similar requirement in subclause 8.3.2 (Limitation of overvoltage over one fundamental frequency period) but it is embedded in the power quality clause. The limitation of OV requirement does not align with high-voltage ride-through requirement. One interpretation of requirement in IEEE 2800 is that IBR plant is allowed to cause applicable voltage on high-side of the main power transformer to rise to say 1.27 per unit for up to 6 cycles.

Lowest or highest L-G or L-L voltage

Table 1: Voltage Ride-through Requirements for AC-Connected Wind IBR [13]

Voltage (per unit)[14]	Operation Region	Minimum Ride-Through Time (sec)
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< 0.25	Mandatory Operation Region	0.16
< 0.10	Permissive Operation Region	0.16

Factors affecting post-fault behavior:

- Other plants in close vicinity
- System operating condition (peak, shoulder, off-peak, etc.) along with transmission outages, status of capacitor banks, etc.
- Type of contingency itself
- The active power recovery following a disturbance

The IBR plant owner usually does not have system data to evaluate post-fault system dynamics and to determine if plant's behavior is or not a contributing factor to overvoltage.

PRC-029-1 Requirement R2

2.5. Each IBR shall restore Real Power output to the pre-disturbance or available level[7] (whichever is lesser) within 1.0 second when the voltage at the high-side of the main power transformer returns from the mandatory operation region or permissive operation region (including operating in current blocking mode) to the continuous operation region, as specified in Attachment 1, unless an associated Transmission Planner, Planning Coordinator, Reliability Coordinator, or Transmission Operator requires a lower post-disturbance Real Power level requirement or requires a different post-disturbance Real Power restoration time through other mechanisms.[8]

Requirement in PRC-029 may be a bit more flexible.

IEEE 2800, clause 7.2.2.1

IBR plant shall have capability to restore active power output to 100% of pre-disturbance level at an average rate equal to 100% of IBR active power rating divided by specified active power recovery time.

The IEEE 2800 is very specific as it requires restoration of active power based on a "***ramp***".

The default active power recovery time shall be 1.0 s. The active power recovery time shall be configurable within a range between 1.0 s and 10 s.

IEEE 2800 includes an important exception which is not in PRC-029: Flexibility for wind plants when WTG changes the pitch of blade to reduce overspeed during a disturbance.

A Transmission Entity may allow such an exception.

PRC-029-1 Attachment 1

Numbered item #10 states that "*instantaneous trip settings based on instantaneously calculated voltage measurements with less than filtering lengths of one cycle (16.6 ms) are not permissible.*"

- This means that protection based on voltage transient in sub-cycle timeframe is not allowed, which is typically employed within IBR units.
- The IEEE 2800 has a similar requirement in clause 9.3, but it only applies to protection that has the possibility of disrupting the power output of the entire IBR plant.

Transient OV ride-through - requirement or an exception?

- PRC-029 does not include TrOV ride-through requirements like in IEEE 2800 clause 7.2.3, which is OK.
- But TrOV ride-through requirement could be seen as an exception to VRT requirement based on fundamental-frequency phasor component of applicable voltage.
- For example, IEEE 2800 allows tripping of IBR for a TrOV of 1.75 per unit for 0.3 ms, even though fundamental-frequency phasor component of applicable voltage remains within mandatory operation region. But same is perhaps not permitted in PRC-029.

PRC-029-1 Requirement R3

R3. Each Generator Owner shall ensure the design and operation is such that each IBR meets or exceeds Ride-through requirements during a frequency excursion event whereby the System frequency remains within the "must Ride-through zone" according to Attachment 2 and the absolute rate of change of frequency (RoCoF)[9] magnitude is less than or equal to 5 Hz/second, unless a documented hardware limitation exists in accordance with Requirement R4. *[Violation Risk Factor: High] [Time Horizon: Operations Assessment]*

System Frequency (Hz)	Minimum Ride-Through Time (sec)
> 61.8	May trip
> 61.2	299
≤ 61.2 and ≥ 58.8	Continuous
< 58.8	299
< 57.0	May trip

A couple of quick observations:

- PRC-029-1 does not specify frequency regulation performance requirements when frequency is within continuous or mandatory operation regions, which are included in detail in IEEE 2800.

  Perhaps same approach could have been taken for VRT performance requirements

- PRC-029-1 exempts VRT requirement if the frequency is outside of FRT requirements (attachment 1, numbered item #6), but does not exempt FRT requirement if the voltage is outside of VRT requirement.

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