

Manual 14H - Inverter Based Resource Interconnection Requirements

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Interconnection Analysis

Planning Committee

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- FERC issued order 901 directing NERC to develop new or modified reliability standards to address reliability gaps related to inverter-based resources
- NERC publishes PRC-029 (effective date 10-1-2026) to ensure that IBRs Ride-through to support the Bulk Power System during and after defined frequency and voltage excursions.
- PJM is proposing manual 14H revision to adopt IEEE 2800 requirements
 - Phase I: General definitions, ride-through (voltage & frequency), associated ride-through protection requirements, primary frequency response

- PJM is proposing manual 14H revisions to utilize a Detailed Reference approach for adopting IEEE 2800-2022, citing exceptions
- Manual 14H sections identified for updates as part of Phase 1 of IEEE-2800 adoption effort:
 - Section 9: Generator Interconnection Requirements, Rights and Obligations
 - New Attachment K: Interconnection Requirements for Inverter-Based Resources (“IBR Interconnection Requirements”)

- 9.15 Requirements for Inverter-Based Resources
 - Provides an overview of the types of new service requests these requirements would apply to and the applicable date
 - Definition of an Inverter-Based Resource
 - Specifies that the requirements shall apply to voltage source converter high-voltage direct current (VSC-HVDC) transmission facility
 - Specifies that the requirements shall apply to IBR's interconnecting with the transmission and sub-transmission systems

- Provides the scope of the IBR requirements
- Provides background on the development of IEEE-2800-2022 standard
- PJM Tariff/IEEE-2800 Definition Cross Reference
- Applicable Technical Requirements and Standards
 - Lists each sub-section from IEEE-2800 that will be adopted by PJM during Phase 1
- Application Notes
 - Lists PJM specifications or exceptions to certain requirements in IEEE-2800

- IEEE-2800 Section 4.1.2
 - Project Developer or Surplus Project Developer shall submit an “Ambient Air Ticket” to PJM to request IBR short term rating (ISR) greater than the IBR continuous rating (ICR).
- IEEE-2800 Section 4.10
 - PJM does not utilize “Permit Service” flag. Project Developer or Surplus Project Developer shall notify PJM before entering service based on requirements listed in PJM Manual 14D.
 - The enter service criteria shall use the default values for applicable voltages and applicable frequency specified in the table below

Enter service criteria	Default setting
Applicable voltage, minimum value	0.9 p.u.
Applicable voltage, maximum value	1.05 p.u.
Applicable frequency, minimum value	58.8 Hz
Applicable frequency, maximum value	60.12 Hz

- Parameters for Primary Frequency Response for *IBR plant*

Parameter	Units	Default value	Ranges of available settings	
			Minimum	Maximum
dbOF	Hz	$0.06\% \times f_{nom}$	$0.025\% \times f_{nom}$	$1.6\% \times f_{nom}$
dbUF	Hz	$0.06\% \times f_{nom}$	$0.025\% \times f_{nom}$	$1.6\% \times f_{nom}$
Droop for under-frequency		5%	2%	5%
Droop for over-frequency		5%	2%	5%

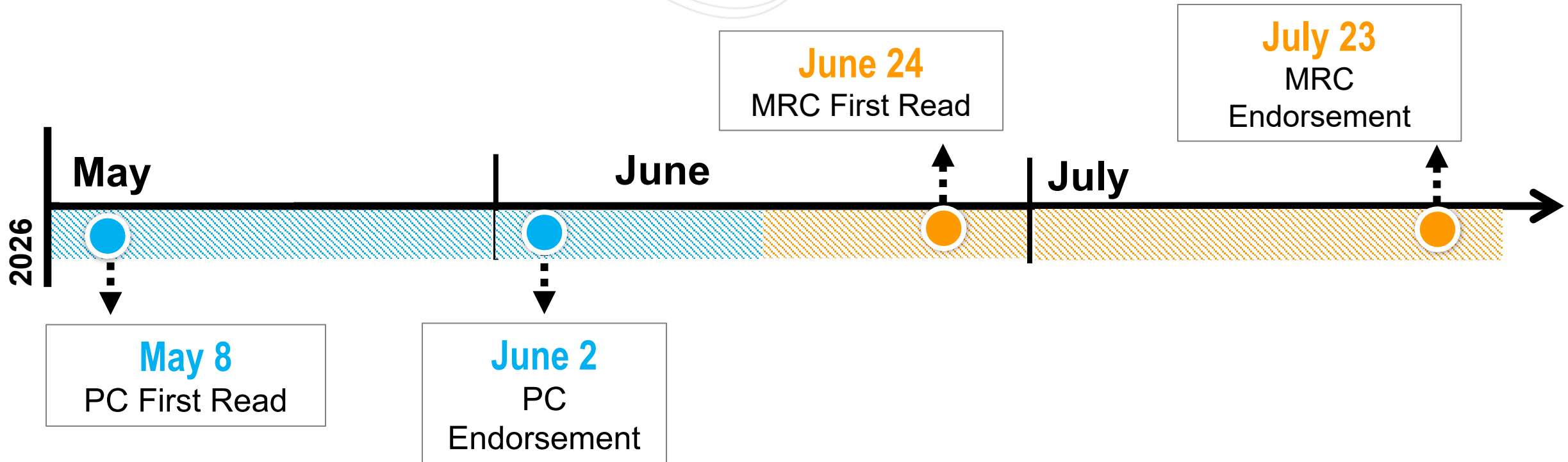
- Voltage ride-through capability for plants **without** auxiliary load limitations

Applicable voltage (p.u.)	Minimum ride-through time (s)	Operation Mode
$V > 1.20$	NA	May ride-through or may trip
$1.20 \geq V > 1.10$	1	Mandatory
$1.10 \geq V > 1.05$	1800	Continuous
$1.05 \geq V \geq 0.90$	∞	Continuous
$0.90 > V \geq 0.70$	6	Mandatory
$0.70 > V \geq 0.50$	3	Mandatory
$0.50 > V \geq 0.25$	1.2	Mandatory
$0.25 > V \geq 0.10$	0.32	Mandatory
$V < 0.10$	0.32	Permissive

- Voltage ride-through capability for plants **with** auxiliary load limitations

Applicable voltage (p.u.)	Minimum ride-through time (s)	Operation Mode
$V > 1.20$	NA	May ride-through or may trip
$1.20 \geq V > 1.10$	1	Mandatory
$1.10 \geq V > 1.05$	1800	Continuous
$1.05 \geq V \geq 0.90$	∞	Continuous
$0.90 > V \geq 0.70$	3.00	Mandatory
$0.70 > V \geq 0.50$	2.50	Mandatory
$0.50 > V \geq 0.25$	1.2	Mandatory
$0.25 > V \geq 0.10$	0.16	Mandatory
$V < 0.10$	0.16	Permissive

- Frequency disturbance ride-through requirements.
(Application Note 6)
 - Subclause 7.3.2.1: The IBR *plant* shall meet the requirements for frequency disturbance ride-through requirements as defined in Clause 7.3.2.1 (General requirements and exceptions) **with the exception to any reference of section 6.2 (fast frequency response)** of the IEEE-2800 standard.
 - Subclause 7.3.2.3: The IBR *plant* shall meet the requirements for frequency disturbance ride-through requirements as defined in Clause 7.3.2.3 (Frequency disturbances within the mandatory operation region) **with the exception to any reference of section 6.2 (fast frequency response)** of the IEEE-2800 standard.



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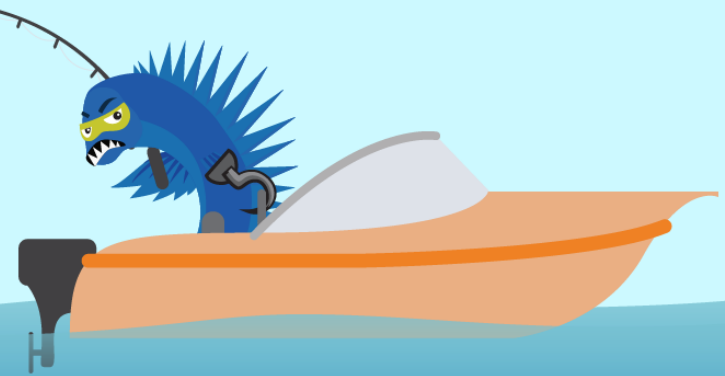
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