NOGRR 245 VS. NERC PRC-029-2: WHY AN ERCOT IBR OWES BOTH

An ERCOT regional operating guide and a continent-wide NERC Reliability Standard, built on a shared IEEE 2800 ancestor but enforced by different authorities against different curves, at different buses, with different evidence. This brief maps where they overlap, where they diverge, and why satisfying one does not discharge the other.

> NOGRR 245 and PRC-029-2 are two separate legal obligations imposed by two different authorities, each with its own enforcement process, its own applicability rules, its own compliance evidence, and ride-through curves that overlap but are **not numerically identical** and are **not even measured at the same point on your plant.** Satisfying one regime does not, as a matter of law or engineering, satisfy the other. A large generator in ERCOT wears two hats at once: it is an ERCOT **Resource Entity** (bound by the Nodal Operating Guides) and a NERC-registered **Generator Owner** (bound by NERC Reliability Standards). NOGRR 245 governs the first hat; PRC-029-2 governs the second.

1 The two regimes at a glance

DIMENSION	ERCOT NOGRR 245	NERC PRC-029-2
What it is	A Nodal Operating Guide Revision Request: revised text inside ERCOT's Nodal Operating Guides, a binding document under the ERCOT Protocols.	A NERC Reliability Standard: a continent-wide, FERC-approved enforceable standard under Federal Power Act § 215.
Sections created / revised	NOG §§ 2.6.2.1 (frequency RT), 2.9.1 / 2.9.1.1 / 2.9.1.2 (voltage RT), 2.11-2.13 (reporting, exemptions, post-failure actions).	The standalone standard PRC-029-2: Requirements R1 through R4 plus Attachments 1 and 2.
Who approves it	ERCOT stakeholder process, ERCOT Board, then the Public Utility Commission of Texas (PUCT).	NERC Board of Trustees, then FERC (PRC-029-1: Order No. 909, July 24, 2025; PRC-029-2: letter order, Docket RD26-10-000, September 30, 2026).
Reach & enforcer	ERCOT region only; monitored by ERCOT (RIOO submissions), with violations referred to the PUCT Reliability Monitor; appeals to PUCT.	Entire U.S. NERC footprint; enforced in ERCOT by Texas RE under the CMEP (audits, penalties).
Regulated party	Resource Entity for each transmission-connected IBR / WGR.	NERC-registered Generator Owner (GO).
In force	**In effect now.** PUCT-effective Oct 1, 2024; reporting milestone Apr 1, 2025; "maximize capability" by Dec 31, 2025.	**Effective Oct 1, 2026**, with PRC-029-1 retired immediately prior. Design elements of R1-R3: Oct 1, 2026 (BES IBRs); Jan 1, 2027 (non-BES). Operation elements: once PRC-028-1 disturbance monitoring is in place. R4 documentation: see § 5.
Reference basis	Incorporates IEEE 2800-2022 §§ 5, 7, 9 by reference (for "Preferred" resources).	Built on IEEE 2800-2022 but defines its own Attachments, sub-requirements, and exceptions.

Different bodies, different processes, different territory, different enforcers, different dates. **ERCOT cannot grant you NERC compliance, and NERC cannot grant you ERCOT compliance.** The rest of this brief shows that the engineering obligations diverge just as sharply as the paperwork.

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2 The ride-through curves, side by side

All curves share the IEEE 2800-2022 lineage, so they look similar. They are not. **Every NOGRR value is referenced at the Point of Interconnection Bus (POIB); every PRC-029 value is referenced at the high-side of the main power transformer (MPT-HS).** Where a gen-tie sits between those buses, the per-unit voltage differs by the gen-tie impedance drop, so an identical number is not an identical requirement. Bold cells mark where a regime diverges from the others.

VOLTAGE RIDE-THROUGH (VRT) · MINIMUM DURATIONS, SHOWN AS wind / solar·storage

VOLTAGE (PU)	NOGRR PREFERRED @POIB	NOGRR LEGACY @POIB	PRC-029-2 @MPT-HS
V > 1.20	may trip	may trip	may trip
1.175 - 1.20	1.0 s	**0.2 s**	1.0 s
1.15 - 1.175	1.0 s	**0.5 s**	1.0 s
1.10 - 1.15	1.0 s	1.0 s	1.0 s
1.05 - 1.10	**continuous**	**continuous**	**1800 s (30 min)**
0.90 - 1.05	**continuous**	**continuous**	**continuous**
0.70 - 0.90	3.0 / 6.0 s	linear *	3.0 / 6.0 s
0.50 - 0.70	2.5 / 3.0 s	linear *	2.5 / 3.0 s
0.25 - 0.50	1.2 s	linear *	1.2 s
0.10 - 0.25	tail †	linear *	0.16 / 0.32 s
0.0 - 0.10	tail † to floor	linear * (0.15 s @0V)	0.16 / 0.32 s (permissive)

* **Legacy low-voltage** is one continuous linear function (V+0.084375)/0.5625, all resource types: 0.15 s at 0 V rising to 1.75 s at 0.9 pu. † **Preferred low-voltage tail** follows the same slope down to a floor of 0.16 s (wind, V<0.005625) or 0.32 s (solar·storage, V<0.095625). PRC-029's 0-0.10 pu band is a defined **permissive region** where current blocking is allowed; ERCOT has no equivalent permissive concept.

FREQUENCY RIDE-THROUGH (FRT) · MINIMUM DURATIONS

FREQUENCY (HZ)	NOGRR 245 @POIB	PRC-029-2 @MPT-HS
f > 61.8	may trip	may trip
61.6 - 61.8	299 s	299 s
61.2 - 61.6	**540 s**	299 s
58.8 - 61.2	**continuous**	**continuous**
58.4 - 58.8	**540 s**	299 s
57.0 - 58.4	299 s	299 s
f < 57.0	may trip	may trip

RoCoF: PRC-029 R3 additionally requires ride-through while |RoCoF| ≤ 5 Hz/s (averaged over ≥ 0.1 s, excluding the fault). The NOG instead **bars** RoCoF as a basis for tripping during faults and recovery (NOG 2.9.1.1(7)) and requires any installed RoCoF protection to allow ride-through to the equipment's maximum (NOG 2.6.2.1(3)).

THE THREE PLACES THE CURVES ACTUALLY BITE

(1) Frequency: NOGRR adds 540 s tiers at 61.2-61.6 / 58.4-58.8 Hz where PRC-029 needs only 299 s, so a unit tuned to PRC-029 at, say, 58.6 Hz **fails** ERCOT. **(2) High voltage:** PRC-029 caps 1.05-1.10 pu at 30 min where NOGRR rides continuously, and Legacy ERCOT plants need only 0.2 s / 0.5 s above 1.15 pu, and at most 1.75 s on the low-voltage line between 0.25 and 0.90 pu, where PRC-029 requires 1.0 s and 1.2 to 6.0 s, so a Legacy plant set to the ERCOT minimum fails PRC-029. **(3) The bus:** even identical durations are scored at different nodes, so neither demonstration substitutes for the other.

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3 Requirement by requirement: what each standard makes you do

Below the curves is where the regimes diverge most, and where the premise "I pass one, so I pass the other" breaks down hardest. PRC-029 writes **explicit numeric clauses** for behavior that NOGRR mostly satisfies by reference to IEEE 2800. Several PRC-029 obligations (current on the affected phases in asymmetrical disturbances, the five-cycle restart, the power-priority choice below 0.95 pu) are **written into PRC-029 itself**, while ERCOT covers similar ground for Preferred resources only by reference to IEEE 2800.

3.1 PERFORMANCE DURING THE DISTURBANCE

BEHAVIOR	NOGRR 245	PRC-029-2
Ride-through zones & structure	Stay on inside the VRT / FRT curves at the POIB; trip only outside the profile; a single 0.90-1.10 pu continuous band.	Attachment 1 defines continuous, mandatory and permissive operation regions at the MPT high-side, which together form the must ride-through zone; R1 lists four exceptions (see § 3.2).
Current injection during the fault	NOG 2.9.1.1(4): must inject current to ride through; no reduction of active current except for voltage support or intermittent resource availability.	**R2.2:** exchange current up to maximum capability to provide voltage support, on the **affected phases**, during both **symmetrical and asymmetrical voltage disturbances**. For Preferred resources, ERCOT reaches this through IEEE 2800 Section 7 by reference.
Reactive vs. real-power priority	Per ERCOT / TSP direction; reactive prioritization relative to the voltage change at the POIB.	**R2.1.3:** below 0.95 pu in the continuous region, an IBR that cannot deliver both Real and Reactive Power must prioritize one of them, unless the TP / PC / RC / TOP specifies otherwise. **R2.2:** in the mandatory region, Reactive Power priority by default, Real Power priority if the TP / PC / RC / TOP requires it.
Momentary cessation / current blocking	NOG 2.9.1.1(5) bars controls from preventing current exchange during required ride-through; details follow IEEE 2800 § 7 by reference (Preferred). Explicit momentary-cessation tables exist only for distribution DGR / DESR.	**R2.3** allows current blocking inside the permissive region, and footnote 3 allows it for non-fault phase jumps above 25 degrees; **R2.3.1** hard-codes restart of current exchange within **≤ 5 cycles** of voltage returning to the mandatory / continuous region.
Real-power recovery	NOG 2.9.1.1(4): return to pre-disturbance real power within 1 s of voltage recovery (ERCOT may allow slower).	**R2.5:** restore real power to the pre-disturbance / available level within 1.0 s of return to the continuous region (TP / PC / RC / TOP may require a lower level or a different time).

The intent is aligned: stay connected, inject supporting current, recover quickly. But the **evidence you must produce is not**. PRC-029 writes its own per-phase current duty and a five-cycle restart limit into the standard, where ERCOT relies on IEEE 2800 by reference for Preferred resources, while ERCOT sets active-current reductions for reactive support relative to the POIB voltage change, and PRC-029-2 requires a Real-or-Reactive priority choice below 0.95 pu in the continuous region.

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3.2 PROTECTION BOUNDARIES AND THE PERMITTED EXITS

MECHANISM	NOGRR 245	PRC-029-2
Phase-angle jump	NOG 2.9.1.1(7): you may **not** use a phase-angle-jump measurement as a basis for tripping during fault conditions and subsequent recovery.	**R1, third exception:** an instantaneous positive-sequence phase-angle change **> 25 electrical degrees** at the MPT high-side from a non-fault switching event is a **permitted reason to leave** ride-through. The two rules cover different events: ERCOT addresses fault conditions and recovery, PRC-029-2 addresses non-fault switching.
Over- / under-frequency & RoCoF	NOG 2.6.2.1: FRT curve at the POIB with the extra 540 s tiers; NOG 2.9.1.1(7) / 2.9.1.2(7): RoCoF barred as a trip basis during faults and recovery.	**R3:** FRT curve at the MPT high-side, plus an explicit RoCoF ride-through duty while **|RoCoF| ≤ 5 Hz/s** (averaged over ≥ 0.1 s, excluding the fault).
Over-voltage / V-per-Hz	NOG 2.9.1.1(6): OV / OC protection must use filtered quantities and time delays; AC instantaneous OV window ≥ 1 cycle. No identical numeric V/Hz carve-out.	**R1, fourth exception:** an explicit numeric V/Hz exception: the unit may trip when MPT-high-side V/Hz exceeds **1.1 pu for > 45 s or 1.18 pu for > 2 s.**

PRC-029-2 R1 · THE FOUR LISTED EXCEPTIONS

PRC-029 R1 lists four exceptions to ride-through in the must-ride-through zone: **(a)** electrically disconnecting to clear a fault; **(b)** MPT high-side voltage went outside an accepted hardware limitation (per R4); **(c)** an instantaneous positive-sequence phase-angle change > 25 degrees at the MPT high-side from a non-fault switching event; or **(d)** V/Hz at the MPT high-side above 1.1 pu for > 45 s or 1.18 pu for > 2 s. Outside these exceptions and the Attachment 1 conditions (cumulative durations, more than four excursions in 10 seconds, and the Item 12 relief new in PRC-029-2 for a VSC-HVDC connected IBR whose AC or DC chopper reaches its designed thermal energy absorption limit, subject to Item 12's design, coordination and documentation conditions), a trip inside the must ride-through zone is a ride-through failure. ERCOT publishes **no equivalent closed list**; it instead constrains how protection may be set inside the profile, which is why an ERCOT-tuned protection scheme has to be re-checked against this exact list for PRC-029.

4 Five structural reasons one regime cannot stand in for the other

1. **Different legal authority.** A FERC-approved NERC standard under FPA § 215 vs. PUCT-approved ERCOT operating-guide text. ERCOT IBRs that meet the PRC-029-2 applicability criteria and whose owners are NERC-registered are bound by both at once.
2. **Different applicability triggers.** ERCOT keys off SGIA date and resource type; PRC-029 keys off GO registration and BES / non-BES MVA & kV thresholds. Different plants are captured, against different curves.
3. **Different evidence channels.** RIOO / IVRTCR / IFRTCR and ERCOT-approved models vs. the NERC CMEP (retained evidence, audits by Texas RE). ERCOT-accepted documentation is not automatically PRC-029 audit evidence.
4. **Different enforcement.** ERCOT monitors and can refer violations to the PUCT Reliability Monitor, with PUCT penalties possible; Texas RE enforces PRC-029-2 under the NERC CMEP, with penalties approved by NERC and filed with FERC.
5. **Different off-ramps.** The exemption and extension paths are run by different bodies on different grounds, and neither carries over (see § 5).

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5 Exemptions and extensions: separate, and not the same shape

Both regimes have an "I cannot fully comply" path, but they are **not the same kind of relief**, and neither carries over to the other. The common misread is that PRC-029 R4 and the ERCOT process are both "hardware exemptions." They are not. **ERCOT's relief is broader in grounds but conditioned on system risk: extensions are dated, and an exemption runs for any period ERCOT sets or until a qualifying modification; PRC-029's is narrow and lasts until the limiting hardware is replaced.**

	NOGRR 245 (NOG 2.11 / 2.12 / 2.13)	PRC-029-2 (R4)
What it forgives	A **technical limitation that remains** after the Resource Entity has made all available software, settings, firmware and parameterization changes; not limited to hardware. Exemption requests required a notice of intent by April 1, 2025. PUCT Substantive Rule 25.517 (effective July 10, 2025) took the place of the planned follow-on NOGRR: ERCOT grants an exemption, grants it with conditions, or denies it, depending on whether it would create a threshold reliability risk.	A **documented hardware limitation only**, for an IBR in service (in the U.S., the date the GO reasonably expects it to be ready to back feed power, PRC-029-2 fn. 10) by the PRC-029-1 effective date (Oct 1, 2026), or in service later with an interconnection agreement executed by that date and an equipment procurement contract for the limiting hardware executed before Sep 1, 2025: technical documentation must show the hardware would need to be physically replaced and that **software updates or setting changes cannot remedy it.** The exemption covers only the specific ride-through criteria the IBR cannot meet.
Is it a "buy time" path?	**Yes, conditionally.** ERCOT will grant dated extensions, in its sole and reasonable discretion, when all NOG 2.12.1(3) conditions exist; requests were due April 1, 2025 unless ERCOT approves otherwise.	**No within the standard.** R4 is not a deadline; it lasts until the limiting hardware is replaced. Separately, the ERO Enterprise's enforcement discretion covers the design elements of R1-R3 until October 1, 2028 (BES) or January 1, 2029 (non-BES) for entities that sought but could not secure resources and notified their Regional Entity.
Duration / when it ends	Extensions capped at Dec 31, 2027 (SGIA before Aug 1, 2024) or Dec 31, 2028 (SGIA after); IEEE 2800 extensions also end no later than 24 months after COD, if earlier. Exemptions run for any period ERCOT sets and end when a modification removes the need or a modification synchronized after Jan 1, 2028 is implemented.	Ends when the limiting hardware is replaced; tied to the physical equipment, not to any date.
Documentation & to whom	IVRTCR / IFRTCR capability reports via RIOO by Apr 1, 2025 (ERCOT accepted filings to Apr 15, 2025); for exemptions, complete reports, models and an Exemption Request Form by Sep 15, 2025 under PUCT Rule 25.517; models reflecting the limitation.	Provided to the PC / TP / TOP / RC and the CEA (Texas RE) per the PRC-029-2 implementation plan: by Oct 1, 2027 (12 months after the PRC-029-1 effective date) if the IBR was in service, and already subject to the GO's compliance obligations, by that effective date; otherwise by the later of 90 calendar days after the GO is required to comply for the IBR or the PRC-029-2 effective date. **CEA acceptance confirms the documentation is complete.**
Effect on the other regime	**None.** An ERCOT extension or exemption does not relieve any PRC-029-2 obligation.	**None.** A PRC-029 R4 exemption does not relieve any ERCOT obligation.

SO WHY IS PRC-029 "NARROWER"?

Three reasons, not just "hardware." First, **grounds:** ERCOT considers any technical limitation left after software, settings and firmware changes, but under PUCT Rule 25.517 must deny an exemption that would create a threshold reliability risk; PRC-029 accepts **only** a genuine hardware limit that software or settings cannot fix. Second, **time:** ERCOT extensions are dated; PRC-029-2 has **no extension in the standard**, though the ERO's enforcement discretion covers the design elements to Oct 1, 2028 (BES) or Jan 1, 2029 (non-BES) for qualifying entities. Third, **process:** ERCOT decides extensions under NOG 2.12 and exemptions under PUCT Rule 25.517, both reviewable by the PUCT under P.U.C. Proc. R. 22.251; a PRC-029-2 R4 limitation is documented to the PC, TP, TOP, RC and the CEA (Texas RE in ERCOT), whose **acceptance confirms the R4.1 information is complete**. A valid ERCOT extension can coexist with a live PRC-029 violation, and vice versa.

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6 Applicability and dates side by side

	NOGRR 245	PRC-029-2
Captured resources	Transmission-connected IBRs, Type 1 and Type 2 WGRs (Type 3 for parts of 2.9.1); distribution DGR / DESR sub-tables.	IBRs owned by a NERC-registered Generator Owner.
Size / voltage threshold	Transmission-connected (POIB on the ERCOT Transmission Grid); tiered by SGIA date.	BES IBR: > 75 MVA gross nameplate at ≥ 100 kV. Non-BES IBR: ≥ 20 MVA at ≥ 60 kV.
Tiering	"Preferred" (SGIA ≥ Aug 1, 2024, IEEE 2800 §§ 5/7/9) vs. "Legacy" (SGIA < Aug 1, 2024).	Same R1 through R3 for all; R4 for IBRs in service by the PRC-029-1 effective date, or later with a qualifying interconnection agreement and procurement contract (§ 5); design compliance dates differ BES vs. non-BES.
Key dates	PUCT-effective Oct 1, 2024 · IVRTCR / IFRTCR by Apr 1, 2025 · "maximize capability" by Dec 31, 2025.	FERC letter order (Sep 30, 2026) · effective Oct 1, 2026 · design elements Oct 1, 2026 (BES), Jan 1, 2027 (non-BES) · R4 hardware-limitation documentation by Oct 1, 2027 for IBRs in service, and already subject to the GO's compliance obligations, by Oct 1, 2026; other IBRs per § 5.
Status (October 2026)	**In force.**	**Effective October 1, 2026.** BES IBR design obligations, and R4 for all applicable IBRs, apply now; non-BES design from January 1, 2027; operation elements phase in with PRC-028-1 monitoring.

The timing differs too: NOGRR 245 took effect October 1, 2024, and PRC-029-2 on October 1, 2026 (PRC-029-1 was retired immediately prior), with non-BES design and operation elements phasing in later. PRC-029-2 imposes its own, separately audited obligations against the curves and clauses laid out above.

> **WHAT IT MEANS IN PRACTICE**
>
> Treat the curves (§ 2) and the requirement clauses (§ 3) as **two overlapping but distinct specifications**, then confirm which plants each one captures (§ 6) and what relief, if any, is available (§ 5). The overlap is real, so a single engineering program (shared models, capability data, relay settings) can serve both. The gaps are also real: the two assessments are **separate, and very different, simulations**, scored at different reference buses (POIB vs. MPT high-side, so the per-unit voltages are physically different quantities) against different bands, fault types, and exit conditions. Reuse the data; re-run the analysis. **Demonstrating one does not discharge the other; you must demonstrate both, separately.**

GROUNDING AND SOURCES

This comparison summarizes, and was checked against, the published PRC-029-2 standard and implementation plan and ERCOT Nodal Operating Guide Section 2 (§§ 2.6, 2.9, 2.11-2.13); the Attachment 1 and Attachment 2 numeric curves are GridStrong's reviewed encoding of those attachments, whose values are the same in PRC-029-1 and PRC-029-2.

Regulatory record. FERC Order No. 909 (issued July 24, 2025) approving PRC-029-1. FERC letter order of September 30, 2026 (Docket RD26-10-000) approving PRC-029-2, its implementation plan, and the retirement of PRC-029-1; PRC-029-2 is effective Oct 1, 2026. Non-BES IBRs comply with the design elements by the later of Jan 1, 2027 or the PRC-029-1 effective date. PUCT approval of NOGRR 245 effective October 1, 2024, with ERCOT milestones (IVRTCR / IFRTCR by Apr 1, 2025; "maximize capability" by Dec 31, 2025). PUCT Substantive Rule 25.517 (effective July 10, 2025) governs NOGRR 245 exemption requests. Texas RE's NSRF presentation "PRC-029-1 & NOGRR245 Comparison" (Feb 20, 2025) compares PRC-029-1 and NOGRR 245 side by side. Applicability thresholds come from PRC-029-2 Section 4.2 and Inclusion I4 of the NERC BES definition.

Caveat. For a legally precise, curve-by-curve and clause-by-clause delta, confirm against the published NERC PRC-029-2 PDF (Attachments 1 and 2) and the current ERCOT Nodal Operating Guides § 2.6 / § 2.9. The published standards govern.

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