|  |  |  |  |
| --- | --- | --- | --- |
| NOGRR Number | [282](https://www.ercot.com/mktrules/issues/NOGRR282) | NOGRR Title | Board Priority - Large Electronic Load Ride-Through Requirements |

|  |  |
| --- | --- |
| Date | January 30, 2026 |

|  |  |
| --- | --- |
| Submitter’s Information | |
| Name | Patrick Gravois |
| E-mail Address | [Patrick.Gravois@ercot.com](mailto:Patrick.Gravois@ercot.com) |
| Company | ERCOT |
| Phone Number |  |
| Cell Number | 512-413-7489 |
| Market Segment | Not applicable |

|  |
| --- |
| Comments |

ERCOT submits these comments regarding Nodal Operating Guide Revision Request (NOGRR) 282 to address the following items:

1. Renumber Section 2.14, Voltage Ride-Through Requirements for Large Electronic Loads, to Section 2.15 since Section 2.14 is now used for advanced grid support requirements for inverter-based Energy Storage Resources (ESRs), implemented in NOGRR272, Advanced Grid Support Requirements for Inverter-Based ESRs;
2. Revise frequency and voltage ride-through requirement exemption language in paragraph (1) of Section 2.6.4, Frequency Ride-Through Requirements for Large Electronic Loads), and Section 2.15;
3. Respond to Tesla comments submitted on December 18, 2025; and
4. Revise the active power recovery time for post-disturbance Large Electronic Load (LEL) consumption from one second to two seconds.

**Need for revised exemption language in paragraph (1) of Section 2.6.4 and Section 2.15:**

After discussions with Transmission and/or Distribution Service Providers (TDSPs) and from comments in the Large Load Working Group (LLWG) meetings, ERCOT recognizes that the exemption language needs to be revised to address operational LELs, the effective date of PGRR115, Related to NPRR1234, Interconnection Requirements for Large Loads and Modeling Standards for Loads 25 MW or Greater, and LELs that were not required to go through the interim Large Load interconnection process. ERCOT also added language denying ride-through requirement exemptions to LELs that add additional Demand at the facility above a certain threshold.

* ERCOT added language in paragraph (1)(a) of Sections 2.6.4 and 2.15 to exempt LELs that were operational and consuming power before the NOGRR282 submittal date of November 14, 2025. LELs that received approval to energize on or before November 14, 2025, are also exempt. ERCOT revised language to state that the approval to energize notification must be in written format.
* ERCOT revised language in paragraph (1)(b) of Sections 2.6.4 and 2.15 and added subsequent paragraphs to define which additional LELs are exempt. Since PGRR115 was still grey-boxed at the time of NOGRR282 submittal on November 14, 2025, it is not pertinent to refer to this language for exemption criteria. Therefore, ERCOT revised language to state the specific requirements in Planning Guide Section 9.5, Interconnection Agreements and Responsibilities, that are required for exemptions and refer to ERCOT approvals through the interim Large Load interconnection process. In addition, some LELs were not required to go through the interim Large Load interconnection process since they were not attempting to energize within a two-year period and will be expecting approval to energize in 2026. ERCOT agrees that some of these LELs should also be exempt from the ride-through requirements but is limiting this exemption to LELs expecting to energize in 2026.
* ERCOT added paragraph (2) to Sections 2.6.4 and 2.15 to deny ride-through exemptions for existing LELs that add additional Demand at the facility that meets the criteria in Planning Guide Section 9.2.1, Applicability of the Large Load Interconnection Study Process.

**ERCOT Response to Tesla comments submitted on December 18, 2025:**

ERCOT agrees with Tesla’s assessment that NOGRR282 ride-through requirements should be focused and assessed on the LEL performance as seen from the LEL’s Service Delivery Point or Point of Interconnection Bus (POIB), and this is the intent of the NOGRR282 requirements as written by ERCOT. ERCOT also agrees that load transfer to other behind the meter technologies such as BESS are an acceptable solution to ride-through issues in which the computational load (and sometimes cooling load) transfers off the utility to UPS, or the Load trips. Therefore, ERCOT is amenable to add explicit language to this effect.

ERCOT has provided some suggested language changes to Tesla’s original edits, which do not change the overall intent. The suggested ERCOT edits are meant to help coordinate the load transfer language with the existing requirements without being overly prescriptive.

**Revision of active power recovery time for post-disturbance LEL consumption from one second to two seconds:**

Recent ERCOT study results revealed that system frequency performance was slightly improved when the active power recovery time of post-disturbance LEL consumption was two seconds as compared to the previous proposed requirement of one second. In addition, LEL developers have expressed concerns in stakeholder meetings that the one second recovery time may be difficult to achieve. Therefore, ERCOT is revising the requirement to allow for a two second recovery time.

|  |
| --- |
| Revised Cover Page Language |

|  |  |
| --- | --- |
| Nodal Operating Guide Sections Requiring Revision | 2.6.4, Frequency Ride-Through Requirements for Large Electronic Loads (new)  2.15, Voltage Ride-Through Requirements for Large Electronic Loads (new) |

|  |
| --- |
| Revised Proposed Guide Language |

**2.6.4** **Frequency Ride-Through Requirements for Large Electronic Loads**

(1) A Customer that proposes to interconnect or maintains an interconnection of a Large Electronic Load (LEL) with the ERCOT System shall ensure the LEL complies with the frequency ride-through requirements of this section, unless the Customer can demonstrate that:

(a) The LEL was operational and consuming power from the ERCOT System or received written approval to energize from ERCOT on or before November 14, 2025; or

(b) If the LEL is not co-located with a Generation Resource Facility, all required interconnection agreements or equivalent service extension agreements between the Interconnecting Large Load Entity (ILLE) and the applicable TDSP were executed on or before November 14, 2025; or

(c) If the LEL is co-located with a Generation Resource Facility, all required interconnection agreements and/or equivalent service extension or other agreements with the Resource Entity, Interconnecting Entity, and ILLE were executed on or before November 14, 2025.

(d) For an LEL meeting the conditions in paragraph (b) or (c) above, the interconnecting TSP received notice to proceed with the construction of all required interconnection Facilities and the interconnecting TSP and, if applicable, directly affected TSP(s) have received the financial security, applicable payments, and/or other agreements required to fund all required interconnection Facilities, and either of the following additional criteria below were met;

(i) Its Large Load Interconnection Study (LLIS), as part of the interim Large Load Interconnection process, has been completed and approved by ERCOT on or before November 14, 2025; or

(ii) Both of the following conditions have been met:

(A) ERCOT received a written attestation from the Authorized Representative of the interconnecting TDSP before December 31, 2026, stating that the LEL was not required to be in the interim Large Load Interconnection process and that the LEL is expected to be energized between November 14, 2025, and December 31, 2026, and ERCOT provided written approval of the exemption; and

(B) The LEL achieved Initial Energization by December 31, 2026.

(2) An LEL that meets the exemption criteria of paragraph (1) above but makes a modification after November 14, 2025, that meets the criteria in paragraph (1)(b) of Planning Guide Section 9.2.1, Applicability of the Large Load Interconnection Study Process, shall not be exempt from the frequency ride-through requirements.

(3) An LEL shall ride through frequency disturbances of the magnitude and duration specified in Table A below, as measured at the LEL’s Service Delivery Point, or if the LEL is co-located with a Generation Resource or Energy Storage Resource, at the Point of Interconnection Bus (POIB) of that Resource. An LEL is not required to ride-through if it is either performing in accordance with its interconnecting TDSP’s Under-Frequency Load Shed (UFLS) program or providing an Ancillary Service that would require the LEL to trip or reduce consumption due to a frequency disturbance.

**Table A**

|  |  |
| --- | --- |
| Frequency (f) in (Hz) | Minimum Ride-Through Time  (seconds) |
| f > 61.8 | May ride-through or trip |
| 61.2 < f ≤ 61.8 | 299 |
| 58.8 ≤ f ≤ 61.2 | continuous |
| 57.0 ≤ f < 58.8 | 299 |
| f < 57.0 | May ride-through or trip |

(4) Nothing in paragraph (3) above shall be interpreted to require an LEL to trip or transfer load to backup generation for frequency conditions beyond those for which ride-through is required.

(5) If an LEL is consuming electric current from the grid at the time of the frequency disturbance, the LEL shall continue to consume electric current from the grid during frequency deviations requiring ride-through. In addition, an LEL should continue to consume active power within 10% of the pre-disturbance level during frequency deviations requiring ride-through.

(6) For frequency deviations outside the continuous operating range specified in Table A of paragraph (3) above, an LEL may implement an internal load-transfer or control-stabilization scheme such that the LEL facility returns to at least 90% of its pre-disturbance consumption level within two seconds, as measured from the LEL’s Service Delivery Point or POIB.

(a) For LELs composed of multiple internal devices, one load-transfer or control action per disturbance event per individual device shall be permitted.

(7) If protection systems are installed and activated to trip the LEL, they shall enable the LEL to ride-through frequency conditions beyond those defined in paragraph (3) above to the maximum level the equipment allows, unless the protection systems are set to respond to an UFLS event or Ancillary Service obligation.

(8) If frequency protection schemes are installed and activated to trip an LEL, they shall use filtered quantities or add sufficient time delays to prevent misoperations while providing the desired equipment protection. Protection schemes shall not trip an LEL based on an instantaneous frequency measurement.

(9) If ERCOT determines that an LEL has failed to ride through a frequency disturbance in accordance with any requirement in Section 2.6.4:

(a) The interconnecting TDSP shall provide available information to ERCOT to assist with ERCOT’s event analysis;

(b) The Customer representing the LEL shall:

(i) Investigate and determine the root cause of the frequency ride-through failure and report the results of the investigation to ERCOT within 90 days of ERCOT’s request;

(ii) Develop a plan to ensure the LEL can meet the applicable ride-through performance requirements and submit the plan to ERCOT within 90 days of completion of (i) above; and

(iii) Implement the plan upon ERCOT approval within 180 days of (ii) above unless ERCOT approves a longer timeline.

(c) Notwithstanding the requirements of paragraph (b) above, if ERCOT determines that the operation of an LEL following a failure to comply with the requirements of Section 2.6.4 poses an imminent risk to local or system reliability, ERCOT may require the LEL to disconnect from the ERCOT System and remain disconnected until the Customer representing the LEL has demonstrated to ERCOT’s satisfaction that the LEL can comply with the ride-through performance requirements of this Section.

**2.15 Voltage Ride-Through Requirements for Large Electronic Loads**

(1) A Customer that proposes to interconnect or maintains an interconnection of a Large Electronic Load (LEL) with the ERCOT System shall ensure the LEL complies with the voltage ride-through requirements of this section, unless the Customer can demonstrate that:

(a) The LEL was operational and consuming power from the ERCOT System or received written approval to energize from ERCOT on or before November 14, 2025; or

(b) If the LEL is not co-located with a Generation Resource Facility, all required interconnection agreements or equivalent service extension agreements between the Interconnecting Large Load Entity (ILLE) and the applicable TDSP were executed on or before November 14, 2025.

(c) If the LEL is co-located with a Generation Resource Facility, all required interconnection agreements and/or equivalent service extension or other agreements with the Resource Entity, Interconnecting Entity, and ILLE were executed on or before November 14, 2025.

(d) For an LEL meeting the conditions in paragraph (b) or (c), the interconnecting TSP received notice to proceed with the construction of all required interconnection Facilities and the interconnecting TSP and, if applicable, directly affected TSP(s) have received the financial security, applicable payments, and/or other agreements required to fund all required interconnection Facilities, and either of the following additional criteria below were met;

(i) Its Large Load Interconnection Study, as part of the interim Large Load Interconnection process, has been completed and approved by ERCOT on or before November 14, 2025; or

(ii) Both of the following conditions have been met:

1. ERCOT received a written attestation from the Authorized Representative of the interconnecting TDSP before December 31, 2026, stating that the LEL was not required to be in the interim Large Load Interconnection process and the LEL is expected to be energized between November 14, 2025, and December 31, 2026, and ERCOT provided written approval of the exemption; and

(B) The LEL achieved Initial Energization by December 31, 2026.

(2) An LEL that meets the exemption criteria in paragraph (1) above but makes a modification after November 14, 2025, that meets the criteria in Planning Guide Section 9.2.1 paragraph (1)(b), shall not be exempt from the voltage ride-through requirements.

(3) An LEL interconnecting with the ERCOT System shall ride through the root-mean-square positive sequence voltage conditions of the magnitude and duration specified in Table A below, as measured at the LEL’s Service Delivery Point, or if the LEL is co-located with a Generation Resource or Energy Storage Resource, at the Point of Interconnection Bus (POIB) of that Resource. An LEL shall remain connected to the Transmission Grid during voltage conditions requiring ride-through. Additional LEL performance requirements for voltage conditions requiring ride-through are listed below.

**Table A**

|  |  |
| --- | --- |
| Root-Mean-Square Positive Sequence Voltage  (p.u. of nominal) | Minimum Ride-Through Time  (seconds) |
| V > 1.20 | May ride-through or trip |
| 1.10 < V ≤ 1.20 | 2.0 |
| 0.90 ≤ V ≤ 1.10 | Continuous |
| 0.80 ≤ V < 0.90 | 2.0 |
| 0.50 ≤ V < 0.80 | 0.5 |
| 0.20 ≤ V < 0.50 | 0.25 |
| V < 0.20 | 0.15 |

(a) When voltage at the Service Delivery Point or, if the LEL co-located with a Generation Resource or Energy Storage Resource, at the POIB, remains within the continuous operating range in Table A during a disturbance or exceeds 1.1 per unit and remains below 1.2 per unit for less than 2 seconds for an overvoltage condition, the LEL shall continue consuming active power from the grid at the pre-disturbance level during the disturbance.

(b) When voltage at the Service Delivery Point or POIB falls below 0.9 per unit but remains above 0.8 per unit and then returns to above 0.9 per unit within 2 seconds, the LEL shall continue consuming active power from the grid during the low voltage condition. In such cases, the LEL may reduce its active power consumption proportional to the voltage drop but shall return to 90% of its pre-disturbance consumption level from the grid within two seconds of voltage at the Service Delivery Point or POIB returning to above 0.9 per unit.

(c) For any voltage condition at the Service Delivery Point or POIB that an LEL is required to ride-through and involves a voltage condition below 0.8 per unit, the LEL may decrease active power consumption from the grid but shall return to at least 90% of its pre-disturbance consumption level from the grid within two seconds of voltage at the Service Delivery Point or POIB returning to above 0.90 per unit. Additional performance requirements for the allowable reduction of consumption in active power when voltage drops below 0.8 per unit are defined as follows:

(i) For any LEL that satisfies the requirements in Planning Guide Section 9.5, Interconnection Agreements and Responsibilities, after November 14, 2025 but on or before January 1, 2028, if the LEL needs to temporarily reduce active power consumption from the grid to allow the facility to ride through the voltage disturbance in accordance with the performance requirements defined in paragraph (c) above, that reduction in active power shall be proportional to the voltage drop for any voltage between 0.8 and 0.5 per unit at the Service Delivery Point or POIB, if capable. The LEL may reduce active power consumption as much as needed for voltage drops below 0.5 per unit. If the LEL equipment is not capable of the performance described above, then the LEL may reduce active power consumption as much as necessary to remain connected to the grid but shall return to pre-disturbance consumption as defined in paragraph (c) above.

(ii) For any LEL that satisfies the requirements in Planning Guide Section 9.5 after January 1, 2028, the LEL shall continue consuming active power from the grid when the voltage at the Service Delivery Point or POIB is between 0.8 and 0.5 per unit but may temporarily reduce active power consumption from the grid proportional to the voltage drop. When the voltage at the Service Delivery Point or POIB is below 0.5 per unit, the LEL may reduce active power consumption as needed to allow the facility to ride through the voltage disturbance in accordance with the performance requirements defined in paragraph (c) above.

(d) When a voltage disturbance causes the voltage at the Service Delivery Point or POIB to drop outside the continuous operating range in Table A of paragraph (3) above, an LEL shall not consume electric current during the disturbance at a level that exceeds 125% of its maximum electric current consumption during normal operations.

(e) For voltage deviations outside the continuous operating range specified in Table A of paragraph (3) above, an LEL may implement load-transfer or control stabilization scheme such that the LEL facility returns to at least 90% of its pre-disturbance consumption level within two seconds, as measured from the LEL’s Service Delivery Point or POIB.

(i) For LELs composed of multiple internal devices, one load-transfer or control action per disturbance event per individual device shall be permitted.

(4) Nothing in paragraph (3) above shall be interpreted to require an LEL to trip or transfer load to backup generation for voltage conditions beyond those for which ride-through is required.

(5) If installed and activated to trip or transfer the LEL, all protection systems (including but not limited to protection for over-/under-voltage) shall enable the LEL to ride-through voltage conditions beyond those defined in paragraph (3) above to the maximum level the equipment allows.

(6) If instantaneous over-current or over-voltage protection systems are installed and activated to trip or transfer the LEL, they shall use filtered quantities or time delays to prevent misoperation while providing the desired equipment protection. Any alternating current instantaneous over-voltage protection that could disrupt the LEL power consumption shall use a measurement window of at least one cycle of fundamental frequency.

(7) An LEL shall not implement a load trip or transfer scheme that disconnects or transfers load to backup generation due solely to a certain number of voltage sags or swells within a certain period of time if the LEL is required under paragraph (3) above to ride through each such condition.

(8) If ERCOT determines that an LEL has failed to ride through a voltage disturbance in accordance with any requirement in Section 2.15:

(a) The interconnecting TDSP shall provide available information to ERCOT to assist with ERCOT’s event analysis;

(b) The Customer representing the LEL shall:

(i) Investigate and determine the root cause of the voltage ride-through failure and report the results of the investigation to ERCOT within 90 days of ERCOT’s request;

(ii) Develop a plan to ensure the LEL can meet the applicable ride-through performance requirements and submit the plan to ERCOT within 90 days of completion of (i) above; and

(iii) Implement the plan upon ERCOT approval within 180 days of (ii) above unless ERCOT approves a longer timeline.

(c) Notwithstanding the requirements of paragraph (b) above, if ERCOT determines that the operation of an LEL following a failure to comply with the requirements of Section 2.15 poses an imminent risk to local or system reliability, ERCOT may require the LEL to disconnect from the ERCOT System and remain disconnected until the Customer representing the LEL has demonstrated to ERCOT’s satisfaction that the LEL can comply with the ride-through performance requirements of this Section.