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| NOGRR Number | [256](https://www.ercot.com/mktrules/issues/NOGRR256) | NOGRR Title | Related to NPRR1191, Registration, Interconnection, and Operation of Customers with Large Loads; Information Required of Customers with Loads 25 MW or Greater |
| Date Posted | | August 1, 2023 | |
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| Requested Resolution | | Normal | |
| Nodal Operating Guide Sections Requiring Revision | | 2.11, Voltage Ride-Through Requirements for Large Loads (new)  4.5.3.1, General Procedures Prior to EEA Operations  4.5.3.4, Qualified Scheduling Entity Registered Curtailable Load Shed Obligation (new)  4.5.3.4, Load Shed Obligation | |
| Related Documents Requiring Revision/Related Revision Requests | | Nodal Protocol Revision Request (NPRR) 1191, Registration, Interconnection, and Operation of Customers with Large Loads; Information Required of Customers with Loads 25 MW or Greater  Planning Guide Revision Request (PGRR) 111, Related to NPRR1191, Registration, Interconnection, and Operation of Customers with Large Loads; Information Required of Customers with Loads 25 MW or Greater  Resource Registration Glossary Revision Request (RRGRR) 036, Related to NPRR1191, Registration, Interconnection, and Operation of Customers with Large Loads; Information Required of Customers with Loads 25 MW or Greater | |
| Revision Description | | This Nodal Operating Guide Revision Request (NOGRR) establishes voltage ride-through requirements for Large Loads and Load-shedding processes for Large Loads that are registered as Registered Curtailable Loads. | |
| Reason for Revision | | Addresses current operational issues.  Meets Strategic goals (tied to the [ERCOT Strategic Plan](https://www.ercot.com/files/docs/2018/12/13/ERCOT_Strategic_Plan_2019-2023.pdf) or directed by the ERCOT Board).  Market efficiencies or enhancements  Administrative  Regulatory requirements  Other: (explain)  *(please select all that apply)* | |
| Business Case | | The voltage-ride through requirements in this NOGRR are necessary to ensure Large Loads do not present a reliability risk to the system by tripping when voltage excursions within a specified range occur. ERCOT has identified nine events since June 2021 that included at least 400 MW of Load loss during a voltage excursion. The largest such event was in December 2022 when ~1,560 MW of Load dropped, which resulted in frequency spiking to 60.235 Hz. As Large Loads increase on the ERCOT System, similar events would be expected to increase in magnitude and frequency, leading to frequency instability and other reliability problems absent voltage ride-through requirements. | |

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| Sponsor | |
| Name | Bill Blevins |
| E-mail Address | [Bill.Blevins@ercot.com](mailto:Bill.Blevins@ercot.com) |
| Company | ERCOT |
| Phone Number | 512-248-6691 |
| Cell Number |  |
| Market Segment | Not applicable |

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| --- | --- |
| **Market Rules Staff Contact** | |
| **Name** | Cory Phillips |
| **E-Mail Address** | [cory.phillips@ercot.com](mailto:cory.phillips@ercot.com) |
| **Phone Number** | 512-248-6464 |
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| **Market Rules Notes** | |

Please note that the following NOGRR(s) also propose revisions to the following section(s):

* NOGRR252, Related to NPRR1176, Update to EEA Trigger Levels
  + Section 4.5.3.1

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| Proposed Guide Language Revision |

**2.11 Voltage Ride-Through Requirements for Large Loads**

(1) A Large Load that interconnects to the ERCOT Transmission Grid shall ride through the root-mean-square voltage conditions in Table A, below, and the instantaneous phase voltage conditions in Table B, below, as measured at the Large Load’s Service Delivery Point, or if co-located with a Generation Resource or Energy Storage Resource, the Point of Interconnection Bus (POIB) of that Resource:

**Table A**

|  |  |
| --- | --- |
| Root-Mean-Square Voltage  (p.u. of nominal) | Minimum Ride-Through Time  (seconds) |
| V > 1.20 | May ride-through or trip |
| 1.10 < V ≤ 1.20 | 0.5 |
| 0.90 ≤ V ≤ 1.10 | Continuous |
| 0.80 ≤ V < 0.90 | 2.0 |
| 0.70 ≤ V < 0.80 | 0.50 |
| 0.50 ≤ V < 0.70 | 0.20 |
| V < 0.50 | 0.15 |

In the event of multiple excursions, the minimum ride-through time in Table A is a cumulative time over a ten-second time window.

**Table B**

|  |  |
| --- | --- |
| Instantaneous Phase-to-Phase or Phase-to-Ground Voltage  (p.u. of nominal) | Minimum Ride-Through Time  (milliseconds) |
| V > 1.80 | May ride-through or trip |
| 1.70 < V ≤ 1.80 | 0.2 |
| 1.60 < V ≤ 1.70 | 1.0 |
| 1.40 < V ≤ 1.60 | 3.0 |
| 1.20 < V ≤ 1.40 | 15.0 |

The instantaneous voltages in Table B are the residual voltages with surge arrestors, if applied. If required by equipment limitations, the Large Load may operate in current-blocking mode when instantaneous voltage exceeds 1.20 p.u. at the Service Delivery Point or POIB. If the Large Load operates in current-blocking mode, it shall restart current exchange in less than or equal to five cycles following instantaneous voltage falling below, and remaining below, 1.20 p.u. at the Service Delivery Point or POIB. In the event of multiple excursions, the minimum ride-through time in Table B is a cumulative time over a one-minute time window.

(2) Nothing in paragraph (1) above shall be interpreted to require a Large Load to trip for voltage conditions beyond those for which ride-through is required.

(3) If installed and activated to trip the Large Load, all protection systems (including, but not limited to protection for over-/under-voltage) shall enable the Large Load to ride through voltage conditions beyond those defined in paragraph (1) above to the maximum extent possible.

(4) If a Large Load was consuming electric current at the time of the voltage condition, the Large Load shall continue to consume electric current during all periods requiring ride-through. When the POIB voltage is outside the continuous operating voltage range, a Large Load shall continue to consume pre-disturbance active and reactive current during voltage conditions for which ride-through is required.

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

(6) A Large Load that interconnects to the ERCOT Transmission Grid and that consists of primarily power electronic equipment and/or variable speed drives must use constant current control and may not use constant power level control.

**4.5.3.1 General Procedures Prior to EEA Operations**

(1) Prior to declaring EEA Level 1 detailed in Section 4.5.3.3, EEA Levels, ERCOT may perform the following operations consistent with Good Utility Practice:

(a) Provide Dispatch Instructions to QSEs for specific Resources to operate at an Emergency Base Point to maximize Resource deployment so as to increase Responsive Reserve (RRS) levels on other Resources;

(b) Commit specific available Resources as necessary that can respond in the timeframe of the emergency. Such commitments will be settled using the Hourly Reliability Unit Commitment (HRUC) process;

(c) Start Reliability Must-Run (RMR) Units available in the time frame of the emergency. RMR Units should be loaded to full capability;

(d) Utilize available Resources providing RRS, ERCOT Contingency Reserve Service (ECRS), and Non-Spinning Reserve (Non-Spin) services as required;

(e) Instruct TSPs and Distribution Service Providers (DSPs) or their agents to reduce Customer Load by using existing, in-service distribution voltage reduction measures if ERCOT determines that the implementation of these measures could help avoid entering into EEA and ERCOT does not expect to need to use these measures to reduce the amount of Load shedding that may be needed in EEA Level 3. A TSP, DSP, or their agent shall implement these instructions if distribution voltage reduction measures are available and already installed. If the TSP, DSP, or their agent determines in their sole discretion that the distribution voltage reduction would adversely affect reliability, the voltage reduction measure may be reduced, modified, or otherwise changed from maximum performance to a level of exercise that has no negative impact to reliability; and

(f) ERCOT shall use the PRC and system frequency to determine the appropriate Emergency Notice and EEA levels.

(2) When PRC falls below 3,100 MW and is not projected to be recovered above 3,100 MW within 30 minutes following the deployment of Non-Spin, ERCOT may deploy some or all Registered Curtailable Loads (RCL) in 100 MW blocks allocated to QSEs, as described in Section 4.5.3.4, Qualified Scheduling Entity Registered Curtailable Load Shed Obligation, in order to maintain or restore 3,100 MW of PRC to the greatest extent possible.

(a) RCLs may be deployed in any number of 100 MW blocks and at any time in a Settlement Interval at the discretion of ERCOT Operators.

(b) Upon deployment of any amount of RCLs, ERCOT shall notify all Market Participants via an operations message that such deployment has been made and shall specify the MW capacity of RCL deployed.

(c) ERCOT shall notify QSEs of the RCLs deployment via an Extensible Markup (XML) message followed by VDI to the QSE Hotline. The VDI shall represent the official notice of the Registered Curtailable Load deployment and the RCL ramp period shall begin at the completion of the VDI.

(d) Upon deployment, QSEs shall instruct their RCLs to cease consumption within 30 minutes from the start of RCL ramp period and the deployed RCLs shall comply with those instructions. A RCL that is also a Large Load shall comply with the ramp rate limitations specified in Protocol Section 6.5.7.12, Large Load Ramp Rate Limitations, when responding to these deployments.

(e) QSEs shall promptly notify the ERCOT operator of any RCLs that are unable to comply with a deployment instruction, including the reason for the failure to comply. ERCOT may instruct the applicable TSP or QSE to disconnect a RCL that fails to comply with a deployment instruction.

(f) ERCOT shall notify QSEs of the termination of the RCL deployment via an XML message followed by VDI to the QSE Hotline. The VDI shall represent the official notice of the Registered Curtailable Load recall.

(g) Upon termination of the RCL deployment, any RCL that is also a Large Load shall not increase consumption at a rate exceeding the requirement established in Protocol Section 6.5.7.12.

(h) Upon termination of RCL deployment, ERCOT shall notify all Market Participants via an operations message that such deployment has been terminated and shall specify the MW capacity of RCL recalled.

(3) When PRC falls below 3,000 MW and is not projected to be recovered above 3,000 MW within 30 minutes following the deployment of Non-Spin, ERCOT may deploy available contracted Emergency Response Service (ERS)-10 and ERS-30 via an Extensible Markup Language (XML) message followed by a Verbal Dispatch Instruction (VDI) to the QSE Hotline. The ERS-10 and ERS-30 ramp periods shall begin at the completion of the VDI.

(a) ERS-10 and ERS-30 may be deployed at any time in a Settlement Interval. ERS-10 and ERS-30 may be deployed either simultaneously or separately, and in any order, at the discretion of ERCOT operators.

(b) Upon deployment, QSEs shall instruct their ERS Resources in ERS-10 and ERS-30 to perform at contracted levels consistent with the criteria described in Section 8.1.3.1.4, Event Performance Criteria for Emergency Response Service Resources, until either ERCOT releases the ERS-10 and ERS-30 deployment or the ERS-10 and ERS-30 Resources have reached their maximum deployment time.

(c) ERCOT shall notify QSEs of the release of ERS-10 and ERS-30 via an XML message followed by VDI to the QSE Hotline. The VDI shall represent the official notice of ERS-10 and ERS-30 release.

(d) Upon release, an ERS Resource shall return to a condition such that it is capable of meeting its ERS performance requirements as soon as practical, but no later than ten hours following the release.

**4.5.3.4 Qualified Scheduling Entity Registered Curtailable Load Shed Obligation**

(1) Each QSE representing one or more RCLs shall take and direct actions to ensure that ERCOT RCL shed instructions are effectuated. Each RCL shall comply with any reasonable instruction given by its QSE to effectuate Load shed obligations.

(2) ERCOT shall update the QSE RCL Load-shedding allocation percentage table each calendar quarter. The allocation percentages may be revised as otherwise appropriate to reflect any new or changed QSE designation, ERS awards, and RCL Load amount as reflected in the RIOO system. ERCOT shall maintain and post on the ERCOT website a QSE RCL Load Shed Table that reflects each QSE’s total RCL Load shed obligation.

(3) Following ERCOT’s quarterly RCL review or ERCOT’s receipt of any new or changed QSE designation, ERCOT shall post any anticipated revisions to the QSE RCL Load Shed Table on the ERCOT website. ERCOT shall issue a Market Notice announcing the posting of the revisions at least ten days prior to the effective date of the revisions or as soon as practicable if ERCOT determines there is a need to correct the Market Notice less than ten days before the effective date.

4.5.3.5 Transmission Operator Load Shed Obligation

(1) Each TO shall take and direct actions to ensure that ERCOT Load shed instructions are effectuated. Each DSP shall comply with any reasonable instruction given by its TO to effectuate Load shed obligations.

(2) Load shed obligation percentages for ERCOT EEA Level 3 Load shedding will be determined by calculating each TO’s Load as a percentage of the ERCOT System summer and winter peak 15-minute Demand interval. For the purposes of this paragraph, TO Load will be the amount of Load being served by all of the TDSPs that the TO represents, excluding RCLs. The calculations for summer and winter Load shed obligation percentage are as follows:

(a) The calculated Load shed obligation percentage for the summer Season will be based on the single highest coincident ERCOT System peak 15-minute Demand interval for the summer months of June through September as reflected in the 4-Coincident Peak (4-CP) data submitted by ERCOT to the Public Utility Commission of Texas (PUCT) for that year. Anticipated revisions to the summer Load shed table shall be posted as described in paragraph (4) below no later than March 31st of each year based on data from the previous calendar year.

(b) The calculated Load shed obligation percentage for the winter Season will be based on the single highest coincident ERCOT System peak 15-minute Demand interval for the winter months of December through February as reflected at the time that ERCOT extracts the Load data for the winter Season from its settlement system. Anticipated revisions to the winter Load shed table shall be posted as described in paragraph (4) below no later than August 31st of each year based on data from December of the previous calendar year and January through February of the current year.

(3) The summer Load shed table will be used during a hot weather Load shed event and the winter Load shed table will be used during a cold weather Load shed event. ERCOT will determine, in its sole discretion, whether an EEA event will be treated as a hot weather or cold weather Load shed event based on the weather conditions. The summer and winter Load shed time periods will be published annually with the updated obligation tables in paragraph (2) above. In addition, if ERCOT issues an Operating Condition Notice (OCN), it will notify Market Participants which Load shed table would apply to the potential Load shed event. When ERCOT directs TOs to shed Load, it will specify which Load shed table applies for the Load shed event. ERCOT shall use the same Load shed table for the duration of a Load shed event.

(4) ERCOT shall maintain the Seasonal Load shed tables reflecting each TO’s total Load shed obligation on the ERCOT website. The Load shed obligation percentages will be reviewed by ERCOT and revised as described above, or as otherwise deemed appropriate by ERCOT, to reflect any new or changed TO designation by a DSP. Adjustments to the Load shed obligations due to changes in TO designations will be performed using the same Load data upon which the table was based. Following ERCOT’s Seasonal peak Load reviews or ERCOT’s receipt of any new or changed TO designation, ERCOT shall post any anticipated revisions to the Load shed tables on the ERCOT website. ERCOT shall issue a Market Notice announcing the posting of the revisions at least ten days prior to the effective date of the revisions or as soon as practicable if ERCOT determines there is a need to correct the Market Notice less than ten days before the effective date.