


# FortisAlberta DER EMT Modeling, Quality Testing, Conformity & Validation Requirements

DER-02F

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# DER EMT Modeling, Quality Testing, Conformity & Validation Requirements

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# DER EMT Modeling, Quality Testing, Conformity & Validation Requirements

## Revision History

Version	Date	Revision Details
1.0	May 2026	Draft Standard Issued. Release for comment by proponents. Proponents are encouraged to use this standard and provide feedback to FortisAlberta before being issued as a normative standard.

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## PURPOSE

This document prescribes technical requirements, submission content, mandatory tests, and validation deliverables for EMT models submitted under DER-02.

### 1.0 Resources

The following documents should be understood for the purposes of preparing and reviewing EMT model submissions under DER-02F.

- IEEE 1547-2018 - IEEE Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces
- IEEE 1547.1-2020 - IEEE Standard Conformance Test Procedures for Equipment Interconnecting Distributed Energy Resources with Electric Power Systems and Associated Interfaces
- DER-02D - FortisAlberta ICAP Technical Requirements
- DER-02E - FortisAlberta ICAP Process Requirements
- EPRI: EMT Model Requirements - Verification, Model Quality Testing, Conformity Assessment, and Validation (Technical Update 3002034018)
- Alberta Electric System Operator (AESO). Facility Modelling Data and List of Electrical and Physical Parameters for Transmission System Model. Information Document ID #2010-001R. Posting Date: 2024-04-19. Appendix 3: Electromagnetic Transients (EMT) Modelling Requirements; Appendix 4: EMT Model Verification, Validation and Quality Testing Requirements. Available at: <https://www.aeso.ca/assets/Information-Documents/2010-001R-Facility-Modelling-Data-2024-04-19.pdf>
- Alberta Electric System Operator (AESO). Model Validation and Reactive Power Reporting Guidance. Information Document ID #2017-013R. Posting Date: 2024-04-19. Available at: <https://www.aeso.ca/assets/Information-Documents/2017-013R-Model-Validation-and-Reactive-Power-Report-Guidance-2024-04-19.pdf>
- Alberta Electric System Operator (AESO). EMT Model Submission Checklist (PSCAD Model Submission Checklist). Posted: March 13, 2024. Available at: <https://www.aeso.ca/assets/Uploads/PSCAD-Model-Submission-Checklist.docx>
- Electric Power Research Institute (EPRI). EMT Model Requirements — Verification, Model Quality Testing, Conformity Assessment, and Validation. Technical Update 3002034018. EPRI, Palo Alto, CA.

- Alberta Electric System Operator (AESO). ISO Rules Section 503.20: Baseline and Model Validation Testing. Authoritative document under the Electric Utilities Act. Available at: [www.aeso.ca](http://www.aeso.ca).

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## 2.0 Glossary

**conformity assessment:** Pre-commissioning testing confirming functional compliance of the EMT model against interconnection performance requirements, as defined in Annex B Section 2.

**electromagnetic transient (EMT) model:** A time-domain simulation model representing power system components and controls at sub-millisecond resolution, used to study fast transient phenomena including fault response, inverter control interactions, and grid support function behaviour.

**model quality testing (MQT):** A set of pre-commissioning simulation tests used to confirm basic model stability, initialization, and response behaviour prior to conformity assessment, as defined in Annex B Section 1.

**momentary cessation:** The temporary suspension of active current injection by an inverter-based DER during a voltage or frequency disturbance, in accordance with IEEE 1547-2018.

**open loop response time (OLRT):** The time for a DER to achieve 90% of a commanded reactive power change following a voltage step, measured under open loop conditions with no feedback from the grid.

**plant-level EMT model:** An EMT model representing the complete DER facility including aggregated inverters, plant power controller, collector system, transformers, and filters, validated against field or commissioning measurements.

**point of common coupling (PCC):** The point where the DER electrical system connects to the FortisAlberta distribution network, at which interconnection performance requirements are evaluated.

**plant power controller (PPC):** A supervisory control system that coordinates the output of one or more inverters within a DER facility to meet plant-level active power, reactive power, voltage, or power factor setpoints.

**revalidation:** Re-submission of an EMT model and associated testing required following a material change to inverter or plant controller firmware, protection or ride-through settings, control functions, or plant configuration, as defined in Section 8.0.

**short circuit ratio (SCR):** The ratio of the short circuit apparent power at the PCC to the DER nameplate apparent power rating. A lower SCR indicates a weaker grid connection.

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**unit-level EMT model:** An OEM-supplied EMT model representing a single inverter unit or an aggregated equivalent, provided in lieu of a full plant-level validated model for smaller DER facilities as defined in DER-02.

**validation:** Post-commissioning comparison of EMT simulation results against field or commissioning measurements, used to confirm that the model accurately represents as-built facility behavior, as defined in Annex B Section 3.

**model verification:** A pre-simulation check confirming that the EMT model structure, parameters, settings, and files accurately represent the physical equipment and plant design before MQT or conformity assessment begins. Verification is a distinct stage from MQT, conformity assessment, and validation.

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## 3.0 Applicability and Thresholds

EMT model applicability thresholds and required models (plant-level validated vs unit-level) are defined in DER-02. This standard defines the required testing, documentation, and acceptance process for those EMT models. Where DER-02 requires a validated plant-level EMT model, Pre-Commissioning EMT and Post-Commissioning EMT submissions are required unless otherwise specified by FortisAlberta.

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## 4.0 Required Model Formats and Package

EMT models required under DER-02 Section 4.2 shall be provided in both EMTP-RV and PSCAD/EMTDC formats. Each format shall represent the same control behaviour, protection functions, parameters, and firmware/software version(s). Model packages shall include all required libraries, DLLs, and compilers as applicable, and include a Readme with run instructions, recommended timestep, and description of key signals used for acceptance testing. For unit-level OEM models, the package shall also include a sample test case with basic expected output results to allow the user to confirm model functionality prior to site-specific configuration.

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## 5.0 Pre-Commissioning EMT Submission Requirements

The pre-commissioning EMT package shall be submitted as outlined in DER-02 and shall include:

- EMT models (PSCAD/EMTDC and EMTP-RV) with dependencies and run instructions.
- Completed EMT submission form (Annex A).
- MQT results per Annex B (Section 1).
- Conformity results per Annex B (Section 2).

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## 6.0 Post-Commissioning EMT Submission Requirements

The post-commissioning EMT package shall be submitted as outlined in DER-02 and shall include:

- Updated as-built EMT models reflecting installed firmware/software and commissioned settings.
- Validation report (Annex C) demonstrating EMT-to-field/commissioning correlation using the procedures and metrics in Annex B (Section 3).
- Model verification confirmation demonstrating that the updated as-built model parameters, settings, and files reflect the installed firmware/software and commissioned plant configuration. Where material changes have occurred (e.g., firmware/software updates, protection or ride-through setting changes, control function modifications, or plant reconfiguration), the submission shall also include updated MQT and conformity assessment results. Where changes are limited to minor settings adjustments within previously reviewed allowable ranges, model verification and validation alone may be sufficient, subject to FortisAlberta review.

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## 7.0 Acceptance Criteria

Pre-commissioning EMT submission acceptance shall be based on successful completion of model verification, MQT and Conformity testing for plant-level EMT submissions. For unit-level OEM model submissions, acceptance shall additionally require evidence of model verification, MQT, and OEM conformity or validation testing for the installed inverter make, model, and firmware version as defined in Annex B.

Post-commissioning EMT submission acceptance shall be based on validation against field/commissioning data using the acceptance metrics in Annex B (Section 3) and the report format in Annex C.

Default numeric tolerances are defined in Annex B and are expressed as percent of a plant apparent power rating  $S$ . For reference,  $\pm 7.5\%$   $S$  corresponds to 0.075 per unit on plant  $S$  base, and  $\pm 5\%$  corresponds to 0.05 per unit on a plant rating base.

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## 8.0 Change Management (Revalidation)

Any change to DER unit or plant controller firmware/software, protection or ride-through settings, control functions, or plant configuration that materially affects EMT behavior requires re-submission under DER-02F (Revalidation), consistent with DER-02.

## 9.0 Synchronous Machine Modeling Requirements

This section applies to DERs that include one or more synchronous generators.

The DER owner shall submit complete synchronous machine modeling data (RMS and EMT as applicable), including rated MVA/kV, reactances and time constants, saturation data where available, excitation/AVR model type and parameters, governor model type and parameters, and protection functions/settings influencing dynamic response.

Validated inverter-style plant EMT model validation is not required for synchronous machines under this standard. Synchronous machine model acceptance is based on completeness and plausibility of OEM parameters, internal consistency checks, and commissioning verification evidence where applicable.

FortisAlberta may request additional EMT study information or verification for synchronous machines where system conditions warrant.

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# DER EMT Modeling, Quality Testing, Conformity & Validation Requirements

## DER-02F — Annex A: EMT Submission Form

### FortisAlberta — EMT Model Submission Form (Pre and Post Commissioning)

Instructions: Complete all sections and attach required files. Use one form per facility.

#### Section A — Project Information

Project / CRM #: \_\_\_\_\_

Facility Name / Substation: \_\_\_\_\_

Location: \_\_\_\_\_ POI Feeder: \_\_\_\_\_

Submission Type:  Pre-commissioning  Post-commissioning Validation  Revalidation

Technology:  PV  BESS  Wind  Hybrid  Other: \_\_\_\_\_ Nameplate: \_\_\_\_\_ kVA

Inverter OEM/Model: \_\_\_\_\_ Firmware: \_\_\_\_\_

PPC OEM/Model: \_\_\_\_\_ Firmware: \_\_\_\_\_

#### Section B — Files & Versioning (Complies? / Comments)

PSCAD model provided; model version visible in .pscx/.pslx; all DLLs/objs included - Comments:

\_\_\_\_\_

EMTP-RV package included - Comments:

\_\_\_\_\_

Readme with run instructions, timestep guidance, trip/operation signal descriptions - Comments:

\_\_\_\_\_

#### Section C — Model Content (Complies? / Comments)

Dual converter bridge (detailed switching + averaged) with consistent protections - Comments:

\_\_\_\_\_

Full inner control: PLL, current control; real-code if applicable - Comments:

\_\_\_\_\_

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Protections and grid-support functions implemented (Volt-VAR, Volt-Watt, Freq-Watt, RT/MC) - Comments: \_\_\_\_\_

PPC modeled with delays/latency; inverter-PPC coordination - Comments: \_\_\_\_\_

Electrical detail: transformer (vector, Z%, X/R), filters, cables; DC-side dynamics - Comments: \_\_\_\_\_

Time-step stability at 10  $\mu$ s to 50  $\mu$ s; supports snapshots/batch; multiple instances; no hidden layers - Comments: \_\_\_\_\_

User-accessible parameters identified and range-checked against hardware specifications; model and applicable equipment parameters cross-checked against site-specific settings and design documents to confirm correct site-specific parameterization - Comments: \_\_\_\_\_

## Section D — Diagrams & Parameters

Single-Line Diagram attached     Aggregation methodology (if used)     Parameter tables (controls/protections/transformers/cables)

## Section E — MQT Results (attach plots)

MQT-1 Flat Start     MQT-2 P-Steps     MQT-3 Q-Steps     MQT-4 Small Voltage     MQT-5 Small Frequency     MQT-6 Large Voltage     MQT-7 Large Frequency

## Section F — Conformity Results (attach plots & pass/fail table)

Volt-VAR     Constant PF     Constant Q     Freq-Watt     LVRT (bal/unbal)     HVRT     Frequency RT     Phase-Angle Jump RT

## Section G — Validation (Post commissioning only)

As-built parameters confirmed     Field/commissioning traces attached     EMT vs Field deltas within  $\pm 5\%$  (V/I/P/Q) and  $\pm 20$  ms for continuous inverter control responses or  $\pm 50$  ms for discrete protection events

## Section H — Attestations

Proponent Declaration: The submitted parameters match final commissioning settings; any future changes shall be re-submitted. Signature/Date: \_\_\_\_\_

# DER EMT Modeling, Quality Testing, Conformity & Validation Requirements

## DER-02F - Annex B: EMT Test Procedures

Purpose: Define the mandatory test procedures and pass criteria used by Fortis for EMT model intake and acceptance. This annex is applied with DER-02F.

Where the site short-circuit ratio (SCR) at the point of common coupling (PCC) is less than 3.0, standard acceptance tolerances may not be achievable due to inherent weak-grid sensitivity of inverter controls. In such cases, the following provisions apply:

- The applicant shall document the site SCR used in all EMT simulations and confirm it is consistent with FortisAlberta-provided network data or a FortisAlberta-approved power flow case.
- Where a tolerance in this Annex cannot be met solely due to low SCR conditions, the applicant shall provide a written technical rationale explaining the deviation, identify the specific control interactions or instability mechanisms responsible, and propose corrective actions or model adjustments where feasible.
- FortisAlberta will evaluate deviations on a case-by-case basis and may accept the model with conditions, require control parameter adjustments, or require additional EMT study work as part of the interconnection assessment.
- A site SCR below 1.5 shall be flagged to FortisAlberta prior to model submission for early alignment on study approach and tolerance expectations.

## 1. Model Quality Testing (MQT) - Pre-commissioning EMT submission

Reference step-change and disturbance waveforms for active power, reactive power, voltage, and frequency tests are defined in Annex B (this section) to ensure standardized inputs and consistent reporting across submissions.

Setup: Use a Single-Machine Infinite-Bus (SMIB) system with realistic SCR at the PCC (default SCR = 10, X/R = 3 when the site value is unknown). Initialize the inverter/DER at 1.0 pu active power unless otherwise stated. Record instantaneous and RMS voltage and current, frequency, active power (P), reactive power (Q), and any trip/operation flags.

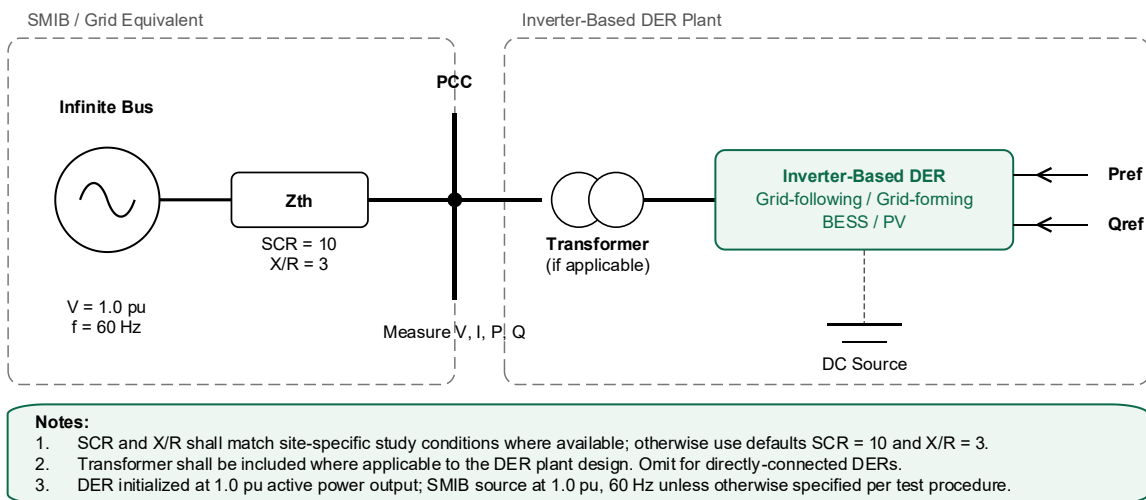


Figure B-1: Test system for EMT model quality testing and conformity assessment.

### MQT-1 Flat Start

Procedure: Start at 1.0 pu voltage, 60 Hz, unity power factor; run for at least 20 seconds. Acceptance: Reach steady state in < 5 s;  $|\Delta P|$  and  $|\Delta Q| \leq \pm 7.5\%$  of nameplate apparent power S; no unintended trips; responses well-damped.

## MQT-2 Active-Power Steps

Procedure: Apply active-power reference steps (BESS) or DC-available steps (PV). Prescribed step profile (per EPRI 3002034018 Figure 5): apply instantaneous active power reference steps from 1.0 pu downward in 0.2 pu decrements to 0.2 pu, holding each level for a minimum of 5 s or until steady-state is confirmed, then return to 1.0 pu. For BESS, steps are applied via Pref; for PV, via DC available power. Acceptance: Track steps with steady-state error  $\leq \pm 7.5\%$  S; responses well-damped; no unintended trips.

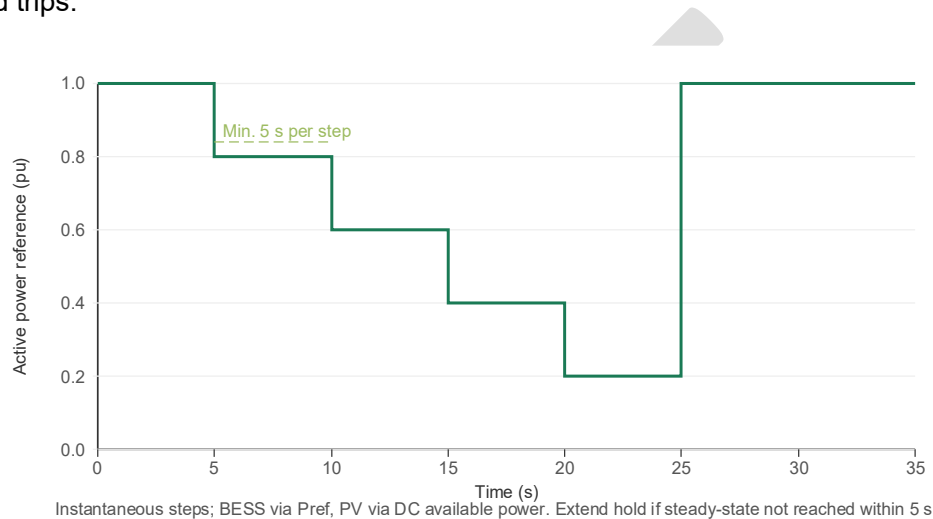
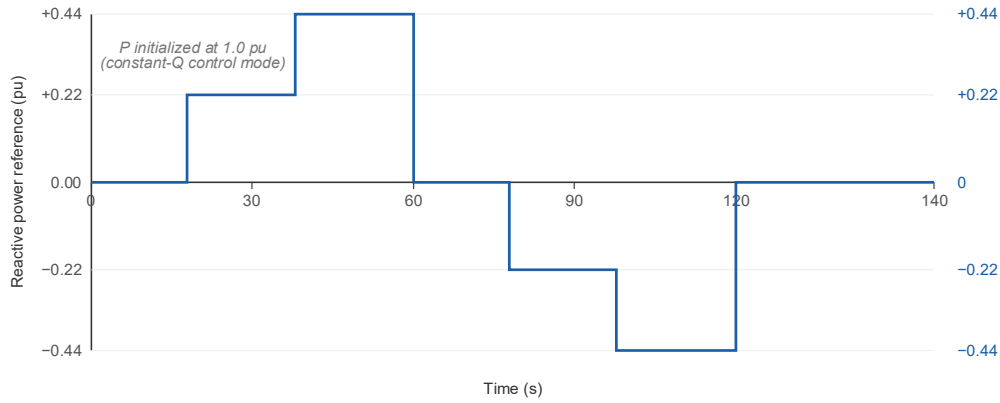


Figure B2: MQT-2 Active power reference step profile.

## MQT-3 Reactive-Power Steps

Procedure: Use constant-Q mode at 1.0 per unit P; apply Q reference steps per Figure B3: steps from 0 pu to +0.22 pu to +0.44 pu, then 0 pu to -0.22 pu to -0.44 pu, returning to 0 pu; hold each level for a minimum of 20 s or until steady-state is confirmed. Acceptance: Track steps within  $\pm 7.5\%$  S; responses well-damped; no unintended trips.

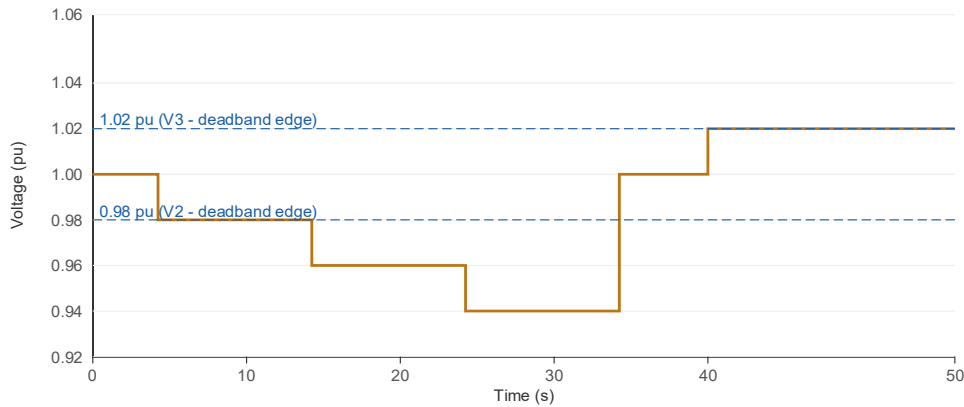


Constant-Q control mode; P = 1.0 pu. Hold each level  $\geq 20$  s or until steady-state confirmed. Extend if needed

**Figure B3: MQT-3 Reactive power reference step profile.**

### MQT-4 Small Voltage Disturbances

Procedure: Enable Volt-VAR, initialize at 0.5 per unit P; apply small voltage steps per Figure B4: steps from 1.00 pu down to 0.94 pu (in 0.02 pu decrements), then up to 1.02 pu; hold each level for a minimum of 10 s ( $\geq 2 \times$  Cat II Volt-VAR OLRT of 5 s) or until steady-state is confirmed. Acceptance: Q follows the Volt-VAR curve; responses well-damped; no unintended trips.

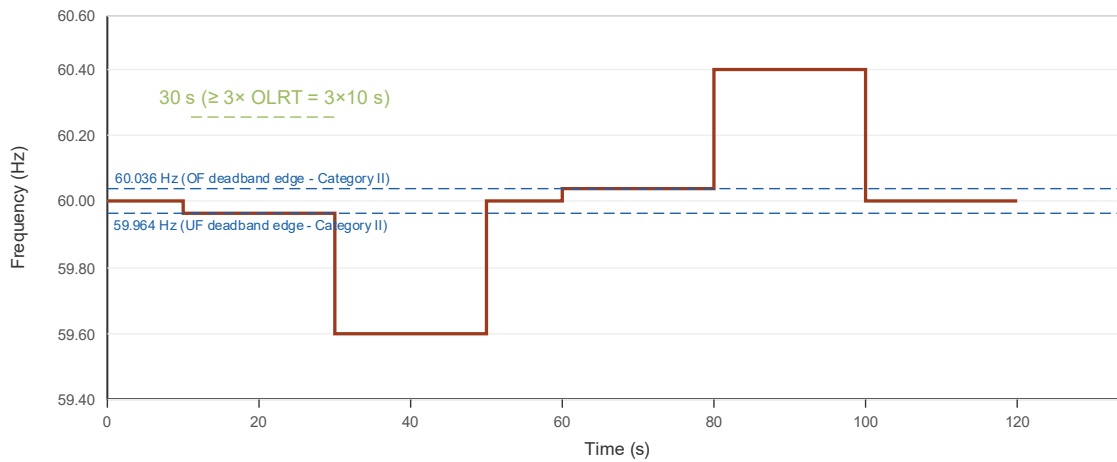


Volt-VAR enabled; P = 0.5 pu, Hold  $\geq 10$  s per step ( $\geq 2 \times$  OLRT). Dashed lines show IEEE 1547-2018 Cat B deadband edges.

**Figure B4: MQT-4 Small voltage disturbance profile.**

## MQT-5 Small Frequency Disturbances

Procedure: Enable Frequency-Watt; initialize at ~0.5 per unit P; apply small frequency steps per Figure B5: steps from 60.00 Hz down through 59.964 Hz (deadband edge) to 59.60 Hz, then up through 60.036 Hz (deadband edge) to 60.40 Hz, returning to 60.00 Hz; hold each level for a minimum of 30 s ( $\geq 3 \times$  Cat II Freq-Watt OLRT of 10 s) or until steady-state is confirmed. Acceptance: P follows deadband and droop behavior; responses well-damped; no unintended trips.



Freq-Watt enabled; P = 0.5 pu. Cat II OLRT = 10 s; hold  $\geq 30$  s per step. Dashed lines show Cat II deadband edges ( $\pm 0.036$  Hz).

**Figure B5: MQT-5 Small frequency disturbance profile (IEEE 1547-2018 Category II).**

Where the site SCR is less than 3.0, the DER shall additionally demonstrate stable operation at the site SCR using the same MQT test suite. If oscillatory or marginally stable behavior is observed, the applicant shall document the nature of the instability, the SCR threshold at which it occurs, and any proposed control modifications. FortisAlberta may require additional sensitivity runs at SCR values between the site SCR and SCR = 3.0.

## MQT-6 Large Voltage Disturbance

Procedure: With the DER initialized at 1.0 pu active power output, apply (a) balanced three-phase voltage sag events and (b) balanced three-phase voltage swell events at the infinite bus per Figure B-6. Observe active power, reactive power, and output current responses. Acceptance: (a) no cessation or trip during the 0.7 pu sag (mandatory operation region); momentary cessation within 83 ms and restoration of active current to  $\geq 80\%$  of pre-disturbance level within 0.4 s following the 0.3 pu sag. (b) Momentary cessation within 83 ms following the 1.15 pu swell; trip when cumulative instantaneous voltage exceeds 1.3 pu for  $> 16$  ms. Responses shall be well-damped; no unintended trips outside the above criteria.

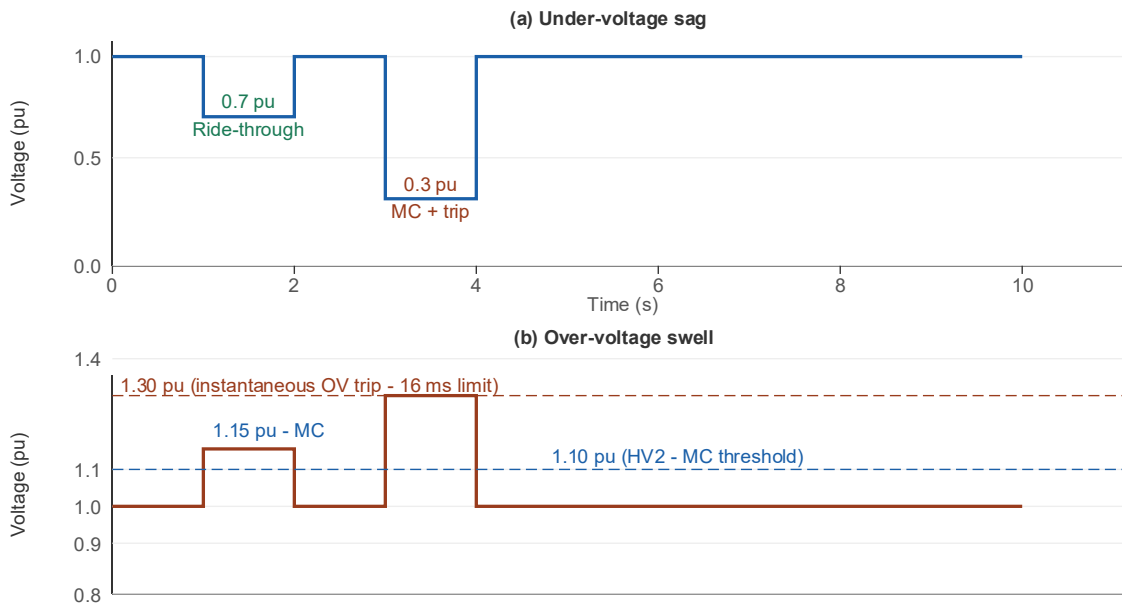


Figure B6: MQT-6 Large voltage disturbance: under-voltage sag (a) and over-voltage swell (b).

## MQT-7 Large Frequency Disturbance

Procedure: With the DER operating at 0.5 pu active power output, apply (a) under-frequency and (b) over-frequency excursions at the infinite bus per Figure B-7 with a rate-of-change-of-frequency (ROCOF) of 3 Hz/s. Observe active power response and output current. Acceptance: (a) no cessation or trip at 57 Hz (mandatory operation region); trip within required clearing time at 56.5 Hz. (b) No trip at 61.5 Hz (mandatory operation region); trip within required clearing time at 62 Hz. Responses shall be well-damped; no unintended trips outside the above criteria.

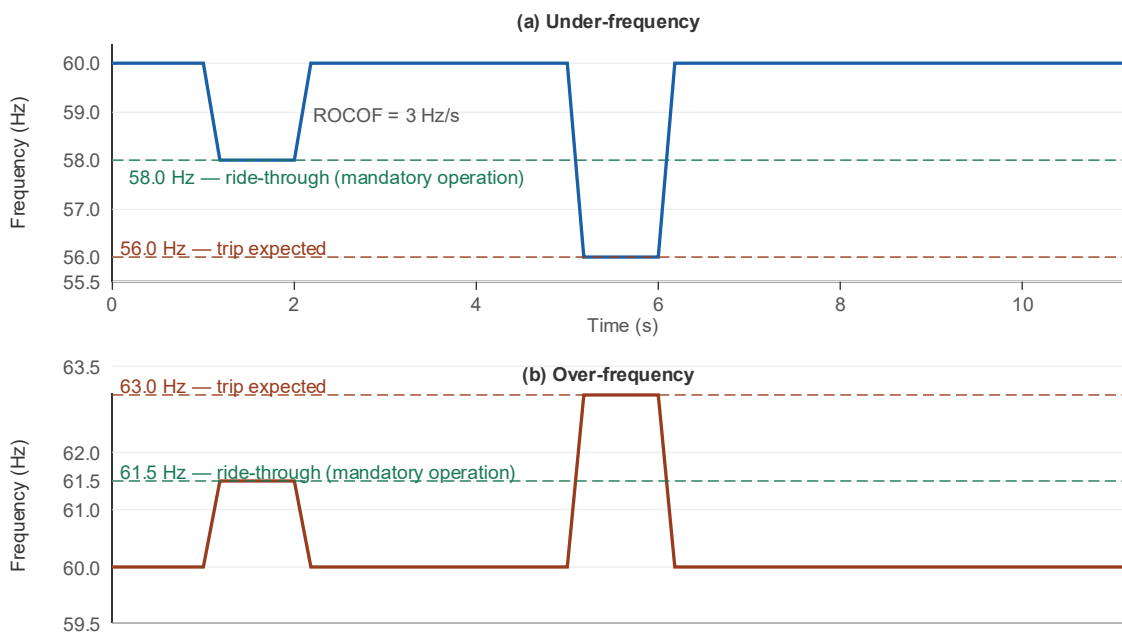


Figure B7: MQT-7 Large frequency disturbance — under-frequency (a) and over-frequency (b). Cat II. ROCOF = 3 Hz/s.

## 2. Conformity Assessment - Pre-commissioning EMT submission

Confirm functional compliance against interconnection performance expectations before Fortis EMT impact studies. Use site specific settings where available; otherwise IEEE defaults for function settings and trip thresholds. Conformity testing shall use the prescribed reference step-change and disturbance waveforms defined in this section to ensure standardized inputs and consistent reporting across developers and OEMs.

### Volt-VAR

Open-loop voltage steps; evaluate both OLRT and steady-state Q. Acceptance: Q follows the Volt VAR curve within the specified band; 90% of the expected reactive power change is achieved within

the Open Loop Response Time (OLRT)  $\pm 1.5$  seconds, or  $\pm 1.5\%$  of the commanded OLRT value, whichever is greater.

## Constant Power Factor

Active-power steps while maintaining the commanded PF at the PCC. Acceptance: Q stays within  $\pm 5\%$  S of the target reactive power corresponding to the commanded power factor at the PCC, evaluated at steady state following each active power step. Note: the  $\pm 5\%$  S tolerance for Constant PF control is intentionally tighter than the  $\pm 7.5\%$  S applied to Constant Q, reflecting the more direct measurement traceability of power factor at the PCC per IEEE 1547.1-2020.

## Constant Q

Q-reference steps from 0 to capability limits. Acceptance: steady-state  $|\Delta Q| \leq \pm 7.5\%$  S; 90% response within 10 s.

## Frequency-Watt

Frequency steps both inside and outside the deadband. Acceptance: deadband respected; droop response achieved;  $|\Delta P| \leq \pm 5\%$  S; meets OLRT.

## LVRT (balanced & unbalanced)

Voltage sags (e.g., 0.7 per unit and 0.3 per unit profiles). Acceptance: no trip at 0.7 per unit; momentary cessation and restoration timing at 0.3 per unit as per profiles; reactive current injection magnitude within  $\pm 5\%$  S of the expected response during the fault period.

## HVRT

Voltage swell including instantaneous over-voltage  $> 1.3$  per unit case. Acceptance: cessation near 1.15 per unit; trip if cumulative instantaneous overvoltage exceeds 1.3 per unit for  $> 16$  ms; active power cessation magnitude and recovery within  $\pm 5\%$  S of the expected response.

## Frequency Ride-Through

Under-/ over-frequency ramps or steps. Acceptance: no trip within the mandatory ride-through region (IEEE 1547-2018 Category II:  $\geq 57.0$  Hz under-frequency,  $\leq 61.5$  Hz over-frequency).

## Phase-Angle Jump Ride-Through

Specified phase-angle jumps; hold 1 s; return. Acceptance: ride-through with positively-damped oscillations; brief momentary cessation  $\leq 0.5$  s allowed.

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### 3. Validation - Post commissioning EMT submission

Compare EMT simulations to commissioning/field measurements for identical tests where practical. Import measured instantaneous waveforms into the EMT environment to harmonize RMS and power calculations.

Acceptance tolerances:  $|\Delta V|$ ,  $|\Delta I|$ ,  $|\Delta P|$ ,  $|\Delta Q| \leq \pm 5\%$  of rated magnitude; Timing tolerances shall be applied on a two-tier basis:

- Continuous inverter control responses: including LVRT reactive current injection onset and recovery, HVRT active power cessation and restoration, and frequency-watt droop response initiation — shall match field measurements within  $\pm 20$  ms.
- Discrete protection events: including trip signal assertion, reconnect initiation, and momentary cessation onset and recovery where these are protection-driven rather than control-driven — shall match field measurements within  $\pm 50$  ms.

Where it is unclear whether a response is control-driven or protection-driven, the  $\pm 20$  ms tolerance applies unless the applicant provides written justification accepted by FortisAlberta that the  $\pm 50$  ms tolerance is appropriate.

Where low SCR conditions prevent exact matching between EMT simulation and field measurements, the DER shall:

- Confirm the SCR used in the validation simulation matches the as-built network conditions at the time of commissioning measurements, using FortisAlberta-provided impedance data where available.
- Document any observed discrepancies exceeding  $\pm 5\%$  and provide a technical explanation attributing the deviation to specific low SCR interaction mechanisms rather than model error.
- Demonstrate that the model's behavior is conservative relative to field measurements (i.e., the model does not underestimate oscillatory behavior or overestimate damping).
- Propose and implement control parameter adjustments where FortisAlberta determines that model-field discrepancies represent a material risk to study accuracy.

Where deviations are accepted by FortisAlberta under low SCR provisions, the Validation Report (Annex C) shall include a dedicated section summarizing all accepted deviations, their technical basis, and any conditions or limitations placed on model use.

## DER-02F — Annex C: EMT Validation Report Required Elements

### C.1 Executive Summary

- Facility overview and interconnection summary
- Submission type: EP20 (Post-commissioning Validation) or Revalidation
- EMT model versions (PSCAD/EMTDC and EMTP-RV), firmware/software versions, and dates
- Summary of validation events and overall outcome

### C.2 As-Built Configuration

- Confirm as-built inverter firmware versions and plant controller firmware/software versions
- Confirm protection and ride-through settings used for validation
- Confirm control modes enabled/disabled during validation

### C.3 Measurement Sources and Data Quality

- Measurement locations (PCC/POI, unit terminals, relay points)
- Sensors/recorders used, sample rates, timestamps, and synchronization method
- Data processing applied (filtering, resampling, power calculation method)
- Known data limitations

### C.4 Validation Events and Results (repeat for each event)

For each event include:

- Operating point (P, Q, V, control mode state)
- Event description and time window
- Plots: measured vs simulated overlays (minimum: V, I, P, Q, frequency, trip/reconnect flags)
- Quantitative checks:  $\Delta V$ ,  $\Delta I$ ,  $\Delta P$ ,  $\Delta Q$  within  $\pm 5\%$  of rated magnitude (steady-state).
- Timing tolerances as per Annex B ( $\pm 20$  ms for continuous inverter control responses;  $\pm 50$  ms for discrete protection events)
- Discussion of differences and rationale (including low-SCR effects where applicable)

## C.5 Conclusions

- Validation status: Accepted / Accepted with Conditions / Revise & Resubmit
- Model limitations and conditions for use (if any)
- Corrective actions and revalidation triggers (if any)

## C.6 Low SCR Deviations (Where applicable)

- SCR used in validation simulation vs. as-built network SCR at time of commissioning measurements
- Summary of each deviation accepted by FortisAlberta under low SCR provisions
- Technical basis for each accepted deviation
- Conditions or limitations placed on model use as a result of accepted deviations
- Corrective actions or revalidation triggers associated with low SCR conditions

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