HydroOttawa		TITLE: Standard DER Commissioning Guide		
RECOMMENDED:	**Sarfraz Mansuri** **Raed Abdullah**	NO:	**1**	REV:
APPROVED:	**Robert Harrington**	**ECG0024**	OF	**0**
REV. DATE:	**2025-05-29**		**16**	

1. Introduction

The purpose of this document is to provide the Applicant with guidance on developing a Commissioning Plan for verifying that a Customer-owned DER project does not have an adverse effect on the Grid. The Applicant's Commissioning Plan may require additional testing to confirm that the DER meets the Customer's design requirements

2. Reference

The following documents are referred to in this guideline:

CSA	C22.2 No. 107.1	*Power conversion equipment*
CSA	C22.3 No. 9	*Interconnection of Distributed Resources and Electricity Supply Systems*
Electricity Safety Authority (ESA)		*Ontario Electrical Safety Code (OESC)*
Government of Canada		*Electricity and Gas Inspection Act (R.S.C., 1985, c E-4)*
Hydro Ottawa	ECG0006	*Distributed Energy Resource Technical Requirements*
IEEE	1547	*IEEE Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces*
UL	1741 SA & SB	*Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources*

3. Definitions.

Applicant means a person who approaches a distributor and requests information for the purpose of connecting, or requests to connect a DER to the distributor's system.

Commissioning Plan means a written plan of Commissioning activities as described herein.

Commissioning Report means a written report that provides a summary of Commissioning activities that were undertaken and the results.

Customer is defined in Hydro Ottawa's *Conditions of Service*.

Dead-Zone Testing (DZT) means validation of the protection and communication systems before Hydro Ottawa permits the DER to generate.

Grid is defined in Hydro Ottawa's *Conditions of Service*.

Live-Zone Testing (LZT) means testing that requires the DER to generate for testing purposes.

Commissioning means the process of verifying an installed system or component meets the design requirements.

SLD means a single line diagram.

4. Process Requirements

The Commissioning must follow these process requirements:

a. Before installing equipment, the Applicant must:

   i. Receive a completed Connection Impact Assessment report from Hydro Ottawa;
   ii. Receive confirmation of the assigned Hydro Ottawa Project Manager;
   iii. Receive confirmation that the engineered single line diagram has been reviewed and approved by Hydro Ottawa;
   iv. Complete a site visit with Hydro Ottawa Project Manager;
   v. Sign the Offer to Connect (OtC) agreement; AND
   vi. Pay the requisite fee(s).

b. Before commencing testing of the DER facility, the Applicant must:

i. Complete a Commissioning Plan as outlined in *Section 8 - Commissioning Plan* herein;
ii. Submit a Commissioning Plan stamped by a P.Eng. for approval by HOL;
iii. Book an appointment with HOL for Commissioning;
iv. Obtain an ESA connection authorization for all work related to the DER installation;
v. Confirm all the conditions in the CIA and the OtC are met; AND
vi. Also confirm the following items, if they are required:
- Distribution or Transmission system expansion complete
- The EOMA is signed by the appropriate parties;
- New metering equipment is installed
- MCB or Transfer Trip has been installed.

c. Commissioning Plan Review and Witnessing Requirements:
The Applicant shall submit a detailed Commissioning Plan (the "Plan") to HOL at least six (6) weeks prior to the scheduled Commissioning. This is to allow adequate time for Plan review and coordination. HOL will review the submitted plan and generally respond within 10 business days. To ensure a timely review, the Applicant should respond promptly to any questions or requests for clarification. HOL reserves the right to witness any part or all of the DER Commissioning. Commissioning activities shall not commence until HOL has reviewed and deemed the Plan acceptable.

d. The Commissioning Report shall be submitted to HOL for acceptance before the operation of the DER facility.

e. Summary of testing results and certificates must be kept on file by the Customer for the service life of the DER

f. It is the Applicant's accountability to ensure that all requirements are met. Additional requirements may be necessary to address unique situations, and HOL will advise the Applicant of any additional requirements at the appropriate assessment stage

g. Additional HOL visits due to non-compliance may incur a fee, as outlined on the HOL website

h. If site modifications occur during or after Commissioning that may result in either:
    1. deviation from HOL standards,
    2. changes to the DER devices and settings, OR
    3. changes to protection system settings,

    then the Customer shall notify HOL to discuss the next steps.

5. Commissioning Plan

The Applicant must submit a Commissioning Plan to HOL for approval. The Commissioning Plan must include the following:

a. The following project information:

Project and Site Details	
HOL Project Number	
Project Address	
Project Name	
Nameplate Rated Capacity (kW/kVA/PF)	
Aggregate Exported Rated Capacity (kW/kVA/kVAR)	
Planned In-service Date	
Normal Connecting Station and Feeder	
Supporting Document Names and Version Numbers	
Electrical Single Line Diagram	
Equipment Layout Drawing	
Protection Schema	
Inverter or Generator Manufacturer, Model Number, Quantity, and Hardware Certification (Add More Cells if Required)	
1.	5.
2.	6.
3.	7.
4.	8.
Contact Information	
Design Engineer	
Name	

License Number	
Commissioning Agent*	**P.Eng. or Licensed Electrical Contractor*
License Number	
Commissioning Agent Name	
Title	
Date	
Phone	
Email	

b. Planned Commissioning date(s)

c. Milestone description:

The Applicant is to include milestone descriptions using the format below. One of the milestones shall be the obtaining of an ESA connection authorization to delimit between the DZT and LZT.

Milestone #:

Goal:

Commissioning Dates:

Tasks:

Prerequisites:

Required equipment:

People (skill sets) required:

Roles and responsibilities:

Steps to accomplish task:

Expected results:

d. A Professional Engineer's seal to indicate approval of the plan.

Name:

Date:

Signature:

See section 4 for HOL timelines for reviewing the Commissioning Plan.

6. Checklist of Pre-Commissioning Tasks

The Commissioning agent (P.Eng. or Licensed Electrical Contractor) is to carry out the following checks prior to Commissioning:

	Results (Y/N)	Initials	Comments
Submit Correct As-Built SLD to HOL			
Label All switches & devices designated by HOL with HOL Nomenclature for proper identification			
Confirm Inverter/Generator meets industry standards specified by HOL (per CIA and ECG0006)			
Confirm the Grid support settings are as per the CIA (if applicable)			
Confirm the Protection settings are as per the CIA			
Confirm the interconnection system paralleling-device is capable of withstanding 220% of the interconnection system rated voltage			
Confirm a letter sealed by a Professional Engineer in good standing indicating that all protections have been applied and tested per the protection schema that was previously reviewed and accepted by HOL			

7. Commissioning Tasks

The following Commissioning Tasks will need to be successfully completed:

7.1. Interconnection

The Point of Common Coupling (PCC) and Point of DER Connection (PoC) shall be identified in the design and on the SLD. The equipment on the Customer's side of the PCC shall be approved in accordance with Rule 2-024 of the Ontario Electrical Safety Code (OESC)

7.1.1. Isolation at the Point of Common Coupling - Disconnecting Means

Test Name	Test Description	Reference	Acceptance Criteria
Disconnecting Means	Verify that the disconnecting means meets LDC requirements	ECG0006 Section 5.1 OESC Rule 84-024	• Can be opened, locked and tagged by the utility. • Meets the requirements of OESC Rule 84-024. • Shall be service entrance rated, if the DER connects to the Grid side of the Customer's main disconnect. • Provides a visible point of disconnect either through a viewing window or by opening the front cover

7.1.2. Grounding

Test Name	Test Description	Reference	Acceptance Criteria
Grounding	Verify that interconnected systems are grounded	ECG0006 Section 5.2 OESC	• DER and their associated interconnection systems must be grounded according to the manufacturer's recommendations and meet requirements set out by the OESC. • Interconnection of three-phase transformers, and transformer grounding on a three-phase Grid is installed per design.

7.2. Power Quality

The DER shall not significantly impact the power quality at the PCC and shall meet all the requirements set out in CSA C22.3 No. 9 regarding power quality

7.2.1. **Harmonics**

Test Name	Test Description	Reference	Acceptance Criteria
Harmonics	Verify the harmonic distortion limits in CSA C22.3 No. 9 are not exceeded	ECG0006 Section 6.1 CSA C22.3 No. 9	• Harmonics are at or below the allowable harmonic distortion limits set forth in CSA-C22.3 No.9.

7.2.2. **Steady State Voltage**

Test Name	Test Description	Reference	Acceptance Criteria
Steady State Voltage	Operate within the allowable deviation from nominal	ECG0006 Section 6.3.2 ECG0008 CSA C235	• DER operates within the CSA CAN3-C235 voltage limits.

Test Name	Test Description	Reference	Acceptance Criteria

7.2.3. Voltage Fluctuation

Test Name	Test Description	Reference	Acceptance Criteria
Voltage Fluctuation	Adequate voltage regulation shall be maintained under a variety of operating conditions	ECG0006 Section 6.3.3 ECG0008 CSA C22.3 No. 9	• Complies with CSA C22.3 No. 9 • Complies with UL 1741 SA & SB

7.2.4. Voltage Unbalance

Test Name	Test Description	Reference	Acceptance Criteria
Voltage Unbalance	DER not cause voltage unbalances	ECG0006 Section 6.3.4 ECG0008 CSA C22.3 No. 9	• Complies with CSA C22.3 No. 9

7.2.5. Power Factor

Test Name	Test Description	Reference	Acceptance Criteria
Power Factor	DER not significantly influence system voltages	ECG0006 Section 6.4	• The DER operates at the PF range specified by the design at the output of the Inverter/Generator

7.2.6. DC Injection

Test Name	Test Description	Reference	Acceptance Criteria
Limitation of DC Injection	DER DC current injection is limited	ECG0006 Section 6.5 IEEE 1547	• DER does not inject a DC current greater than 0.5% of the unit rated output current.

7.3. Protection

7.3.1. Protective Functions Internal to an Inverter

A letter sealed by a Professional Engineer in good standing indicating that all protections have been applied and tested per the protection schema provided to and accepted by HOL shall be provided. Anti-islanding protection shall be verified.

Test Name	Test Description	Reference	Acceptance Criteria
Anti-Islanding	DER anti-islanding	ECG0006 Section 7.4 CSA C22.3 No.9	• The Customer shall not island without permission from the LDC

7.3.2. Protective Functions That Use Current Transformers

Test Name	Test Description	Reference	Acceptance Criteria
Protection Tests	Demonstrate protection functionality	ECG0006 Section 7 CIA for the project	Verify all of the protective functions required by ECG0006 and the CIA for the project

7.4. Cease to Energize

HOL makes use of automatic reclosers to maintain the reliability of the Grid - the Customer must ensure that their DER disconnects from the Grid prior to automatic re-close of the Grid's breakers or line reclosers.

7.4.1. Reconnection Delay

Test Name	Test Description	Reference	Acceptance Criteria
Reconnection Delay	Verify the DER reconnection is delayed after disconnection to allow the Grid to return to normal.	ECG0006 Section 8 Connection agreement for the project.	The DER reconnection shall be delayed by an amount of time prescribed by HOL in the connection agreement.

7.5. Monitoring and Control

HOL requires time to perform Commissioning of the following tasks on the monitoring and control systems. Contact HOL for the required time to allot.

Test Name	Test Description	Reference	Acceptance Criteria
DER Monitoring	If applicable, verify monitoring and control box (MCB) or transfer trip monitoring functionality.	ECG0006 Section 9.0 OESC Rule 2-004	• Output voltage (per phase), current (per phase), MVA, MVAR, MW power factor, and any other measurements specified in the CIA is received at HOL's SCADA system
MCB Control	If applicable, verify MCB control functionality.	ECG0006 Section 9.0 OESC Rule 2-004	• The status of the controlled circuit breaker or contactor is received at HOL's SCADA system. • The controlled circuit breaker or contactor can be opened from HOL's SCADA system. • Closing of the controlled circuit breaker or contactor can be blocked through HOL's SCADA system. • Test other MCB control logic.
Transfer Trip Control	If applicable, verify transfer trip control functionality.	ECG0006 Section 9.0 OESC Rule 2-004	• The status of the controlled circuit breaker or contactor is received at HOL's SCADA

Test Name	Test Description	Reference	Acceptance Criteria
			system. ● The controlled circuit breaker or contactor can be opened remotely through HOL's SCADA system. ● Closing of the controlled circuit breaker or contactor can be blocked through HOL's SCADA system. ● Transfer Trip Isolates DER from the Grid when signal is received. ● Confirmat DER disconnection is received at the HOL substation no more than one second after the trip signal is sent. ● Test other transfer trip control logic.

7.6. Revenue Metering

The Applicant shall schedule one day for HOL revenue meter installation and testing to occur during Live-Zone Testing, near the end of the Commissioning schedule. There may also be a need for a DER meter for other settlement purposes.

7.7. Additional Requirements

7.7.1. **Synchronizing Facilities**

Test Name	Test Description	Reference	Acceptance Criteria
Synchronizing Facilities	Adequate synchronizing facilities	ECG0006 Section 13.2	Verify the DER synchronizes and connects to the grid using the methods

Test Name	Test Description	Reference	Acceptance Criteria
			described in ECG0006.

7.7.2. Remotely Operated DER Disconnecting Device Requirements

Test Name	Test Description	Reference	Acceptance Criteria
Remotely Operated DER Disconnecting Device	Circuit breakers or contractors for remotely disconnecting the DER	ECG0006 Section 13.3	If a circuit breaker is equipped with manual breaker operating control (example: pushbuttons on the front of the breaker), the manual “Close” function will be physically disabled or removed

8. Deficiency and Resolution

Include the table below in the Commissioning Report to document which of the Milestones or Tasks the facility doesn’t meet per HOL requirements. Any operating or design deficiencies shall be corrected before re-Commissioning and before submitting the required Commissioning Report to HOL.

Milestone / Task	Deficiency	Resolution

9. Required Supplementary Document

Please provide the following document(s) for review with the Commissioning Report.

Document	Notes
As built drawings	
Derating of the inverter (Provide a letter from a manufacturer or a picture of nameplates with serial number) (if applicable)	
Third party Commissioning Reports (if applicable)	
Completed Commissioning Plan	

10. Commissioning Report

This section outlines the required items to be included in a completed Commissioning Report.

a. A summary of Commissioning results.
b. The table from *Section 8 - Deficiency and Resolution*
c. The required supplementary document(s)
d. Commissioning Report signatures

11. Commissioning Report Signatures

The Applicant and Commissioning agent shall sign and date the Commissioning Report to acknowledge that all required Commissioning milestones and tasks specified in this guide have been completed.

12. Submission Checklist

Ensure the following table is completed and included in the submission to HOL with your Commissioning Report. The Applicant will not proceed to the next connection step if any of these items is omitted or incomplete.

Item	Document	Initials
1.	The signed Commissioning Report	
2.	Required supplementary document	