

Interconnection Requirements

Closed Transition Transfer for Standby Generators

(For Parallel Operation ≤ 100 ms)

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1. Purpose

This document, including any updates, amendments, and/or bulletins, as published by Nova Scotia Power Inc. (NSPI), provides minimum technical requirements for the interconnection of Standby Distributed Energy Resources (DERs) to the Distribution System (DS) to transfer load between the DS and DER via Closed Transition Transfer (CTT) techniques and technologies.

For proposed CTT Standby DER projects to be authorized for interconnection with NSPI's DS, **any parallel with NSPI's DS shall only be maintained for six cycles (100 ms) or less during a source transfer.**

This iteration of the document **does not apply** to Extended Close Transition Transfer Requirements for application such as Shore Power.

For DER projects that seek extended duration (>100 ms) parallel connections with NSPI's DS, such as for load displacement projects, or for grid-export projects, please refer to the latest version of NSPI's Distribution Generator Interconnection Procedures (DGIP) and Interconnection Requirements for Generating Facilities (Connected to Distribution Systems Rated $\leq 26,400$ V), available on NSPI's website.

1.1. Limitations

This document is not intended or provided as a design specification or as an instruction manual for the Interconnection Customer (IC) or their agents. Persons using information included in the document do so at their own risk and at no risk to NSPI, and they rely solely upon themselves to ensure that their use of all or part of this document is appropriate in the particular circumstances and compliant with all applicable laws, codes, and standards. NSPI assumes no responsibility or liability for its use or for any conclusions drawn from it.

This document is not a substitute for electrical codes, any applicable laws and regulations, or other relevant standards.

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2. Definitions

Automatic Transfer Switch (ATS): Self-acting transfer switch used for transferring a load from one power source to another.

Canadian Electric Code (CE Code): A safety standard for all electrical work and electrical equipment operating at all voltages in electrical installations.

Closed Transition Transfer (CTT): An automatic transfer of load through a transfer switch in a make-before-break fashion between normal and alternative power sources that are (actively or passively) synchronized at the time of transfer.

Canadian Standards Association (CSA): A Canadian standards organization that publishes standards in a variety of areas.

Distributed Energy Resource (DER): The Interconnection Customer's device(s) for the production of electricity identified in the application submitted by the Interconnection Customer.

Distribution System (DS): Part of the NSPI system that operates at 26,400 V or less.

Interconnection Customer (IC): Any entity that proposes to interconnect is DER to NSPI's system.

Interconnection Request (IR): A formal request for interconnection of a DER to NSPI's system

Parallel Operation: The simultaneous energization of the facility by NSPI and a DER.

Point of Connection: The first physical point where the DER interconnects with other loads or generator units within the DER facility.

Point of Interconnection (POI): The physical boundary point where the change of ownership between NSPI and the IC takes place. It is also referred to as the Point of Common Coupling (PCC).

Professional Engineer (P.Eng.): An electrical engineer registered, in good standing, with Engineers Nova Scotia (EngNS).

Supervisory Control And Data Acquisition (SCADA): Systems and devices used to gather real-time data from various sensors and devices, as well as providing control functionality over said systems and devices.

Single Line Diagram (SLD): An electrical schematic representation of the existing DER facility and the proposed interconnection clearly identifying the important electrical elements of the system.

3. Interconnection Requirements

3.1. General

- Per CE Code Part I, Section 84, the IC may only operate a DER in parallel with the NSPI DS with written approval by NSPI. This requirement applies to all DERs, including those running parallel via CTT ATS(s) or schemes.
- All DER(s) and CTT-related equipment interconnected with NSPI shall comply with the latest of applicable CSA standards, including, but not limited to: CSA C22.3 No. 9 and CSA C22.2 No. 178 series.
- The DER facility shall be an NSPI load customer.
- The DER shall not, under any circumstances, energize and de-energize portion of the NSPI DS. The protection device shall provide all required protection functions, which shall be functional in automatic and manual modes of operation. If the utility source is lost, the ATS must default to open-transition mode.
- The DER parallel operation with the NSPI DS shall be for a short period (≤ 100 ms) for a seamless transfer of the customer load from the NSPI DS to the DER and vice versa.
- DER(s) capable of CTT shall not export power to the NSPI DS.

3.2. Main Disconnect Device(s)

The Main Disconnect device(s) of a DER facility shall be accessible, lockable, provide a means for gang-operated load breaking, and provide a visible confirmation of the break.

Please refer to CE Code part I (clauses 84-020 to 84-024) and/or NSPI Regional Engineering for further details on Main Disconnect device(s) requirements.

Certified Momentary CTT ATS is an automatic transfer switch capable of operating in CTT mode that:

- Parallels the DER with NSPI's DS for up to 100 ms (6 cycles);
- Is factory built and shipped as a single piece of equipment; and
- Is certified to CSA C22.2 No. 178

Since the duration of the CTT is very short, the ATS(s) that are factory built and certified CSA C22.2 No. 178 and installed at the site without modifications from the factory; interconnection requirements for Certified Momentary CTT ATS(s) are less stringent than for other CTT ATS(s) or schemes.

3.3. Protection Requirements

Please see Table 1 below for the protection functions required for the interconnection of a Momentary CTT ATS to NSPI's DS:

PROTECTION FUNCTION (ANSI/IEEE #)	ELEMENT FUNCTION AND SETTINGS
Synchronism-Check (25)	During the enter service period, an intentional time delay of 300 s should be added to ensure synchronizing voltage and frequency steadiness. Refer to Section 6.5 of the NSPI Distribution System Interconnection Requirements (Generating Facilities >100 kW) for further Synchronism details.
Under-voltage (27P)	Each phase shall be monitored to ensure that the Standby DER cannot energize any de-energized portion of the DS. All phases must exceed 88% of nominal system voltage. Upon detecting under-voltage conditions on any phase, the breaker shall trip.
Reverse Power (32R)	Monitoring power direction towards NSPI's DS. The relay shall operate to isolate the Standby DER from NSPI's DS. The maximum allowable time delay is 1s.
Maximum Parallel Operating Time (62)	The timer shall allow no more than 500ms. Exceeding this time shall result in aborting the CTT and initiating a local alarm to inform the DER facility operator.

Table 1 Protection Requirements for Momentary CTT Interconnections

The following additional protective elements are permitted for protection of the CTT Standby DER Interconnection: Phase-Sequence (47), Overvoltage (59), Over/Under Frequency (81O/U).

If the closed-transition utility inter-tie circuit breaker does not open within the pre-set time, there shall be a local alarm to inform the IC, who shall immediately contact the NSPI Control Centre. Where a SCADA system exists, a remote alarm to NSPI's SCADA system shall meet this requirement.

3.4. SCADA

All CTT applications greater than 5 MW shall be equipped with real time communications facilities to enable connection NS Power's SCADA system for telemetering of the generator real and reactive power output, indication of device status, and real time device control. All Generating Facilities with a Generating Facility Capacity greater than or equal to 1 MW and less than 5 MW shall be reviewed by NSPI to determine if similar remote-control functionality is required.

At NSPI's sole discretion, event logging may be required for CTT projects and event logs shall be provided to, or made accessible to, NSPI personnel, upon request and within 3 business days of the request.

3.5. Application Requirements

To apply for the interconnection of a CTT DER, an IC must submit the following. Failure to provide any one of the following will result in delays to the processing and review of the proposed interconnection.

- Completed Application Form – the form is to be completed in full, and shall be signed and sealed by a Professional Engineer
- A Narrative Description: Description of the CTT system operating modes (normal, auto, manual and/or test mode) should include utility protection, normal and maximum closed transition transfer time limits and to lesser level of detail, a description of the facility power scheme and generator(s) operation
- A Single Line Diagram – the SLD shall be signed and sealed by a Professional Engineer licensed to practice engineering in Nova Scotia and who is in good standing with Engineers Nova Scotia, and must contain the following elements at a minimum:
 - Service entrance
 - Ampere rating
 - Transformer(s)
 - All types, including service, interconnection, interface
 - Winding configuration for each transformer
 - Voltage levels
 - Impedance
 - NSPI revenue metering
 - Including instrument transformers
 - Point of Interconnection
 - Major power distribution equipment
 - Disconnect devices
 - All onsite generators
 - CTT switches/ATS(s)
 - IEEE Device #s as per Table 1
- Facility Site Plan(s) – Plan should show the location of service entrance and major electrical equipment (including incoming vaults, generators, switchgear, CTT switches)

NSPI reserves the right to study projects in more depth, which may include, but not limited to, Short Circuit or Protection Co-ordination studies. The IC shall provide all requested or required documentation in the event NSPI decides to exercise this right.

3.6. Commissioning

The IC has full responsibility for the inspection, testing and calibration of its equipment, up to the POI. Commissioning shall be performed by competent personnel, and a commissioning report shall be produced. The commissioning report shall be verified and sealed by a Professional Engineer licensed to practice engineering in Nova Scotia and who is in good standing with Engineers Nova Scotia. NSPI shall be advised 15 business days in advance of testing and may send a representative to witness tests.

Commissioning tests confirm the safe and effective operation of all equipment in the IC's facility under normal and abnormal conditions. NSPI reserves the right to inspect, test, and verify the intertie protection functionality at any time, with or without notice. All efforts will be made to provide the IC with advance notice, however, circumstances may arise where such notice is not practicable for the safe operation of NSPI's DS.

3.7. Maintenance

The IC has full responsibility for the maintenance of its equipment, up to POI. Maintenance must be performed by competent personnel and properly documented.

Equipment used to control, generate, and protect shall be maintained such that the reliability of NS Power's system is not affected. NSP reserves the right to inspect and test the equipment given a reasonable notice. The IC must perform necessary maintenance requested by NSP within a reasonable period.

Devices such as protective relays and circuit breakers shall be calibrated and tested in intervals no greater than 2 years.