Bulletin 84-1-20

Interconnection of electric power production sources
Rules 2-010, 2-024, 64-078, 64-110, 84-004, 84-008, 84-018, 84-022 and 84-030

Issued October 2026
Supersedes Bulletin 84-1-19

Scope

1) Requirements for power production sources
2) Single-phase inverters connected to three-phase system
3) Neutral conductor requirements for connection to a supply authority
4) Requirements for connection to a supply authority
5) Inverters approval

1) Requirements for power production sources

This bulletin applies to power production sources that are subject to inspection in accordance with the Ontario Electrical Safety Code (OESC). It is intended to provide additional information and clarification to the requirements of Section 84, “Interconnection of electric power production sources”.

Additional information can also be found in:
1) CSA standard C22.2 No. 257 Interconnecting inverter-based micro-distributed resource to distribution systems;
2) CSA standard C22.3 No. 9 Interconnection of distributed resources and electricity supply systems; and
3) ESA Bulletin 64-1-* “Connection of interactive inverters on the load side of service disconnecting means.”

General
Rule 84-002 requires that a supply authority be consulted as part of planning an interconnected power production source.

Protection and Control
Protection and control of power production sources is required in accordance with Section 84.

For electrical power production source installations utilizing inverter technology and directly connected to the supply authority, an inverter that is approved and marked “INTERACTIVE INVERTER” is acceptable as meeting the protection and control requirements of Section 84.

Where inverters are connected to the supply authority system through a customer-owned isolation transformer, the designer/installer shall provide proof to the area electrical inspector that the inverter will shut down upon loss of any one phase on the supply authority side of the isolation transformer - see Rules 84-008 and 64-078. The secondary of the isolation transformer often continues to deliver similar operating

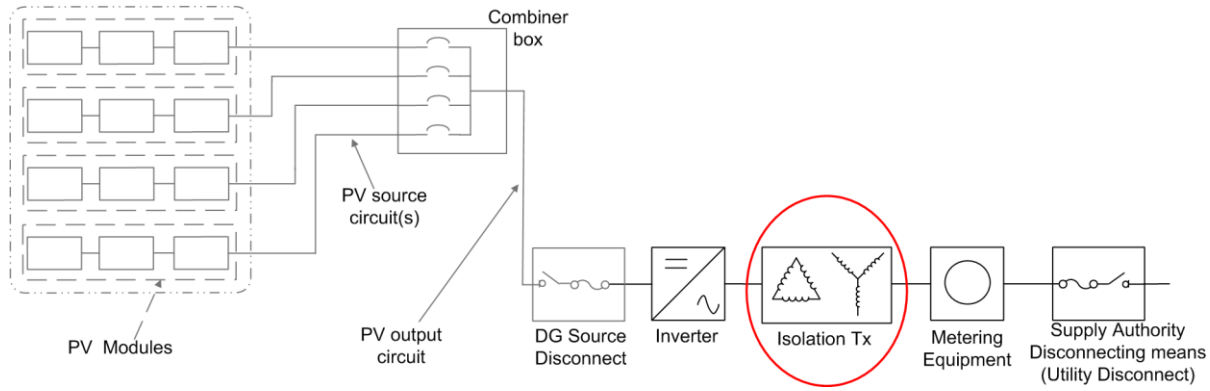
voltage in an open delta configuration. An example of one of the configurations where the inverter may not shut down upon loss of any one phase on the supply authority side is WYE-DELTA, with the delta facing the inverter, as shown in Diagram B1 (may not be limited to only that configuration).

Location for supply authority disconnecting means: Rule 84-022 requires disconnecting means to be provided to disconnect simultaneously all electrical power production sources from the supply authority system. As per Rule 84-024, the disconnecting means is required to be **readily accessible** *for the supply authority's quick operation* for all types of interconnected power production sources in all buildings (residential, commercial, industrial, etc.). *Therefore,* the location of the supply authority disconnecting means is *to meet the requirements of the supply authority (see note 1).*

Note 1: The designer/installer should consult with the supply authority in advance to determine their preferred disconnecting means location as they may accept isolation of the power production source as the main service box.

Visible isolation may be required for some installations as per the supply authority. Installers are required to comply with the supply authority requirements for disconnecting means.

Diagram B1 – Solar PV system connected to a supply authority via an isolation transformer



The Electrical Safety Authority (ESA) strongly recommends designers of interconnected power production sources utilizing an isolation transformer consult with a transformer manufacturer and review the supply authority and customer configurations/requirements prior to specifying the transformer for a project.

For systems based on non-inverter technology or utilizing an approved stand-alone inverter, the protection and control required by Section 84 shall be coordinated with, and acceptable to, the supply authority prior to connection authorization from ESA. The owner or owner's agent shall provide verification to ESA that the installed protection and control is acceptable to the supply authority.

For this reason, the supply authority must be involved with customer-owned, electric power production installations.

Temporary connections may be authorized to permit calibration and coordination prior to generation.

Plan Review
Electrical work on any electrical installation shall not commence until plans have been submitted and examined by the ESA. Refer to bulletin 2-11-* for further information on this requirement.

2) Single-phase inverters connected to three-phase system

Question 1
Are one or two single-phase inverters marked as “INTERACTIVE INVERTER” permitted to be connected to a three-phase supply authority system?

Answer 1
Yes, if permitted by the supply authority and meet the conditions of Rule 64-110.

3) Neutral conductor requirements for connection to a supply authority

Question 2
For an electrical power production source (generator) connected to a supply authority incorporating a neutral (grounded circuit conductor), does the OESC require a neutral output from the generating system to be connected to the supply authority system neutral?

Answer 2
No, unless:

- The generator used requires a neutral reference from the supply authority (Rule 2-034); or
- The supply authority specifies a neutral output (Rule 84-002).

Question 3
Where a transformer is used to change the voltage of the electrical power production source to match that of the supply authority, does the OESC require transformer output to have a neutral point for connection to the supply authority system neutral? (i.e.: 208 V solar inverter system connected to 347/600 V supply authority.)

Answer 3
No, unless the supply authority requires a neutral output.

Rationale
Although the supply authority connected electrical power production source may also feed neutral connected loads within the facility, or load share, and a neutral connection

to the revenue meter may also be required by the supply authority for metering purposes, the OESC does not mandate a neutral output.
Some supply authorities specify a neutral output from the interconnected electrical power production source which would require compliance based on Rule 84-002.

Some grid tie inverters require a neutral reference from the supply authority; this would require compliance based on Rule 2-034.

Some grid tie inverters can be configured to operate with or without a neutral output, (i.e. L1 and L2 only). Others, such as three-phase grid tie inverters, may require a neutral reference.

Supply authorities may also require a neutral output from the interconnected electrical power production source for metering purposes or for voltage stability.

4) Requirements for connection to a supply authority

Some products can operate in parallel with the supply authority and can be programmable whether or not to ***export to*** the supply authority. The applicable requirements for supply authority interconnection are required as per CSA standard C22.2 No. 107.1 and ***C22.3 No. 9.*** The interconnection requirements may be included in the certification of energy storage systems.

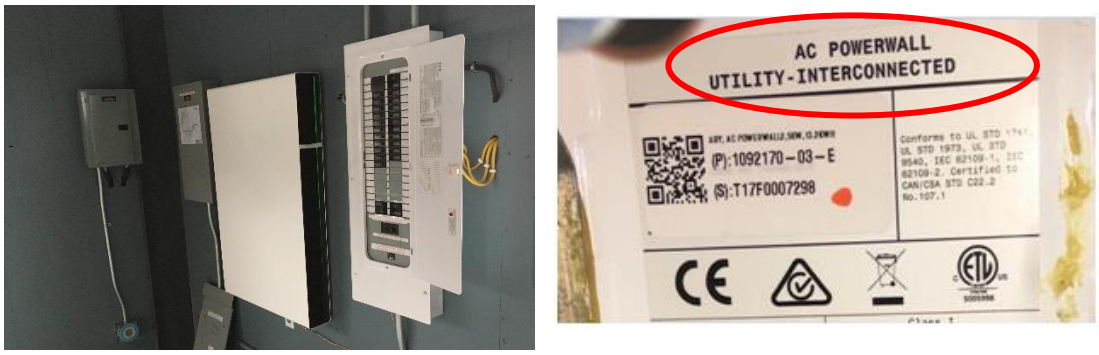
These products may not be, or ***may*** not include “transfer devices” that electrically isolate the system from the supply authority. Devices that operate in parallel with the supply authority are required to meet the applicable standards’ requirements for supply authority interconnection and be marked as “INTERACTIVE INVERTER” or equivalent.

Rule 84-002 requires the interconnection of electrical power production sources, with or without energy storage (such as batteries), to be in accordance with supply authority. As part of the business process at ESA, inspectors are required to send a connection authorization to the supply authority indicating interconnected electrical power production sources regardless of if it is programed not to ***export***.

Examples of systems that may operate in parallel with the supply authority:

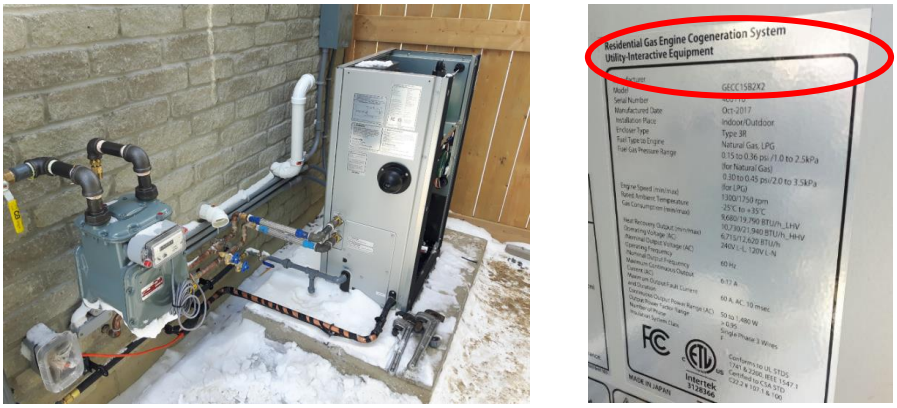
1) Self-contained energy storage systems, see Photos B1

Photo B1 - Example of self-contained energy storage system and nameplate



2) Residential co-generation systems, see Photos B2

Photo B2 - Example of residential co-generation system and nameplate label



5) Inverters approval

Inverters are required to be approved for use in Canada and marked as interactive when operating in parallel with the supply authority.