

Section 84 — Interconnection of electric power production sources

84-000 Scope (see Appendix B)

This Section supplements or amends the general sections of this Code and applies to the installation of electric power production sources interconnected with a supply authority system.

84-002 General requirement (see Appendix B)

The interconnection arrangements shall be in accordance with the requirements of the supply authority.

84-004 Interconnection

The outputs of interconnected electric power production sources shall provide protection against back-feed into a supply authority system fault.

84-006 Synchronization

Electric power production sources shall be equipped with the necessary means to establish and maintain a synchronous condition without adverse effect on the interconnected system.

84-008 Loss of supply authority voltage (see Appendix B)

- (1) Unless an alternative procedure is followed in accordance with the requirements of the supply authority, electric power production sources shall, upon loss of voltage in one or more phases of the supply authority system,
 - (a) be automatically disconnected from all ungrounded conductors of the supply authority system that the electric power production source feeds; and
 - (b) not be reconnected until the normal voltage of the supply authority system is restored.
- (2) An inverter suitable for interconnection with electric power production sources and designed to serve as a disconnection device shall be permitted to be used to meet the requirement of Subrule (1) if approved by the supply authority.

84-010 Overcurrent protection

Equipment and conductors that are energized from both directions shall be provided with overcurrent protection from each source of supply.

84-012 Transformer overcurrent protection

Overcurrent protection for a transformer that is energized from both directions shall be provided in accordance with Section 26 by considering first one side of the transformer, then the other side of the transformer, as the primary.

84-014 System protection devices

Each interconnected electric power production source installation shall be provided with such additional devices as are necessary for system stability and equipment protection.

84-016 Ground fault protection

Ground fault protection shall be provided in accordance with Rule 14-102.

84-018 Loss of electric power production source voltage

An electric power production source shall, upon loss of voltage in one or more of its phases, automatically disconnect all phases from the interconnected system.

84-020 Disconnecting means — Electric power production source

Disconnecting means shall be provided to disconnect simultaneously all ungrounded conductors of any electric power production source of an interconnected system from all circuits supplied by the electric power production source equipment.

84-022 Disconnecting means — Supply authority system (see Appendix B)

Disconnecting means shall be provided to disconnect simultaneously all the electric power production sources from the supply authority system.

84-024 Disconnecting means — General (see Appendix B)

- (1) Disconnecting means shall
 - (a) be capable of being energized from both sides;
 - (b) plainly indicate whether in the open or closed position;
 - (c) have contact operation verifiable by direct visible means if required by the supply authority;

- (d) have provision for being locked in the open position;
 - (e) conform to Sections 14, 28, and 36 of this Code if it includes an overcurrent device;
 - (f) be capable of being opened at rated load;
 - (g) be capable of being closed with safety to the operator with a fault on the system;
 - (h) disconnect all ungrounded conductors of the circuit simultaneously;
 - (i) bear a warning to the effect that inside parts can be energized when the disconnecting means is open; and
 - (j) be readily accessible.
- (2) Where a main fusible disconnecting means is used, an isolating switch shall be provided to allow the fuses to be dead during handling.

84-026 Isolating means

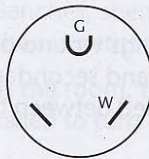
Means shall be provided to isolate equipment that is energized from both directions from all ungrounded conductors of each source of supply.

84-028 Grounding (see Appendix B)

- (1) The grounding means at the service entrance shall be permitted to serve as the grounding means for the electric power production source, and the grounding shall be in accordance with Sections 10 and 36.
- (2) Notwithstanding Subrule (1), a direct-current power source connected through a solid-state inverter shall not be grounded unless the inverter AC power is separated from the supply authority system by means of an isolating transformer.

84-030 Warning notice and diagram (see Appendix B)

- (1) A warning notice of an interconnected system shall be installed in a conspicuous place at the supply authority disconnecting means of Rule 84-022 and the supply authority meter location.
- (2) A single-line, permanent, legible diagram of the interconnected system shall be installed in a conspicuous place at the supply authority disconnecting means.



The 5-15R and 14-50R receptacle configurations referred to in Subrules (1)(a) and (1)(c) are shown in Diagram 1.

Section 74

Δ Rule 74-004(4)

Because there are many variables in the structural design of airport runways and aprons depending on the required design strength of the surface material and in order to ensure that the installation of a conduit within the surface material will not result in damage to the runway or apron, this Rule intends that such an installation be designed by a civil engineer in accordance with good engineering practice and that the design be acceptable to the airport authorities.

Section 78

Rule 78-108

To minimize deterioration due to marine environmental conditions, the following materials have been found to be generally acceptable:

- (a) copper-free aluminum with aluminum or stainless steel hardware;
- (b) fibreglass with stainless steel hardware;
- (c) epoxy-coated rigid steel threaded conduit;
- (d) PVC-coated rigid steel threaded conduit;
- (e) 19 mm plywood, either penta-treated or painted with two coats of marine grade paint and used with galvanized or stainless steel hardware;
- (f) rigid PVC boxes and enclosures with stainless steel hardware; or
- (g) hot-dipped galvanized structural steel.

Section 80

Rule 80-000

NACE International Standards are recommended as guides to the design, materials specifications, installation, and operation of cathodic protection systems.

Rule 80-000

This Section has the following objectives:

- (a) to recognize that cathodic protection systems have to be installed using wiring methods that may not be consistent with those of other sections of the Code;
- (b) to address the electrical safety of the cathodic protection systems and not their efficacy.

Rule 80-006

Care should be taken to select clamps that maintain a secure electrical connection and that will be anodic to the material being protected when in the presence of an electrolyte, so that the clamp will not itself corrode the material if the connection becomes wet.

When welding to oil or gas piping, reference should be made to CAN/CSA-Z662.

Section 84

Δ Rule 84-000

Where power generating equipment such as photovoltaic arrays, fuel cells, micro-turbines, etc., supply power through an approved inverter, the output of the inverter is considered to be the "electric power production source".

Δ **Rule 84-002**

The consumer electric power generator owner should consult with the supply authority before planning the interconnection.

The interconnection arrangements should not adversely affect the safety of the supply authority system.

The output of the electric power production source, when interconnected with a supply authority electric system, should not adversely affect the voltage, frequency, or wave shape of the system to which it is connected.

Δ **Rule 84-008**

Where the utility loses one phase of a 3-phase system, some transformer configurations allow a voltage to continue to be present on all phases, and the voltage drop is often not high enough to cause the electric power production source to shut down. Because the electric power production source continues to detect a voltage within tolerance on all phases, it is not expected that the electric power production source shut down.

The words “disconnected” and “disconnection” in the context of this Rule do not necessarily mean “disconnecting means” as used elsewhere in the Code.

Δ **Rule 84-022**

The supply authority disconnecting means is intended to allow the supply authority a single point of access to simultaneously isolate one or more electric power production sources on a premise. The main service box, or the equivalent, is normally used to provide this function.

Δ **Rule 84-024**

In some circumstances, the supply authority may use provisions of Rule 84-002 to require the disconnecting means to have “contact operation verifiable by direct visible means”. This is a common worker safety feature used by supply authority workers to provide added assurance that the circuit is open before work is initiated.

Where inverters approved for interconnection are used, the anti-islanding feature automatically isolates the generation equipment from the supply authority upon loss of supply authority voltage so that having “contact operation verifiable by visible means” may not be required. CSA C22.2 No. 107.1-01 Section 15 applies to utility-interconnected inverters and requires the inverter to automatically cease to deliver ac power to the utility in accordance with an anti-islanding test — within the time in Table 3.1 and after the output V and frequency of the utility source are adjusted to each condition in Table 3.1. Utility abandonment of the interface disconnect switch would require the utility to rely 100% on the inverter to be fail-safe under normal operation and component fault mode re-energizing a dead utility bus. A small generator can magnetize a 1-phase distribution transformer when the transformer is disconnected from the primary conductor.

Δ **Rule 84-028**

The isolating transformer referred to in Subrule (2) can be remote from or integral to the inverter.

Δ **Rule 84-030**

The single line diagram should identify related components of the interconnected system including switching arrangements, interlocks, isolation points, and their relative locations. See Diagram (2) in the Appendix B Note to Rule 50-002 for diagrams of an interconnected photovoltaic system.

Section 86

Rule 86-102

Installation of electric vehicle charging equipment is not intended to be considered a hazardous location unless the location is specified as hazardous in accordance with Section 18 or 20, or where ventilation is required and not provided.

Rule 86-400

It is the intent of this Rule to provide ventilation with electric vehicle charging equipment unless the equipment is marked for use with electric vehicles not requiring ventilation, or where the manufacturer’s installation instructions specify that ventilation is not required. When designing ventilation for indoor charging sites where vented storage batteries are used, both supply and mechanical exhaust equipment should be installed and located to intake from, and vent directly to, the outdoors.