



## ELECTRICAL INSPECTION BULLETIN

(Effective 2000-03-01)



Rule 28-900

### Standby Generator Installations

Due to the increasing number of standby generator installations being established to maintain continuity of service to essential loads, should the normal supply fail or need to be removed from operation, the code requirements for transferring between the normal and standby generator supply and for grounding and bonding standby generators require some emphasis and clarification, as provided in this bulletin.

The Nova Scotia Electrical Installation and Inspection Act and its Regulations requires that the installation of a standby generator system that is to be interconnected with a permanent electrical system, shall be performed under a wiring permit, by an electrical contractor, and shall be inspected.

The requirement for a wiring permit and inspection shall not apply in those cases where an approved cord connected appliance is directly connected to the generator outlet.

All equipment installed as part of a standby generator system shall be rated for its intended use and be approved by a recognized certification agency. For a list of certification agencies which are recognized in Nova Scotia, see the Office Of The Fire Marshal Electrical Bulletin # 98-02 entitled, "Approval Of Electrical Equipment" or NSPI Electrical Inspection Bulletin B-2-024.1

Standby generator supply conductors shall *not* be installed in the same raceway with other service, feeder or branch circuit conductors as required by Rule 12-904(2).

Standby generators shall be equipped with a disconnecting means as required by Rule 28-900.

### Transfer Switch Requirements :

Where a standby generator is interconnected to a service entrance, a feeder or a branch circuit, an approved transfer switch must be installed in such a manner that no operation of the transfer switch will result in an inadvertent interconnection of normal and standby sources of supply which would allow the standby power to feed back into the utility system normal supply, as required by Rules 14-612 and 6-106.

Where a transfer switch is to be connected to a main service or feeder or branch circuit, it shall be connected to the load side of the main service, feeder or branch circuit overcurrent device.

A supply side connection will only be permitted when the transfer switch is marked as service entrance approved.

The transfer switch shall be rated to meet load requirements. This rating shall be equivalent to the rating of the main service, feeder or branch circuit overcurrent device, or the standby generator amperes, whichever is greater.

## **Wiring Methods :**

*Portable* generator installations shall be equipped with a recessed male receptacle. The wiring between the transfer switch and this receptacle shall conform to the applicable CE Code requirements for fixed wiring methods. Flexible cord is not permitted between the transfer switch and recessed male receptacle. The receptacle may be located adjacent to the transfer switch or located outside on the building wall. When installed outdoors the receptacle shall be installed in a weatherproof outlet box complete with a weatherproof cover. Transfer switches having a factory installed recessed receptacle are acceptable.

For connection of the portable generator to the recessed male receptacle, an outdoor flexible cord of the hard usage type will be required, which will be equipped with one female plug for the transfer switch receptacle or the outdoor receptacle connection, and one male plug for the portable generator connection. Acceptable flexible cord specifications may be obtained from Table 11 of the CE Code, Part 1.

### Note :

*Anderson Plug* devices are not CSA certified for standby generator connection applications. Such plugs are a potentially hazardous device, and will not be acceptable for use as a means of connecting a standby generator to a farm or premise wiring system within the NS Power Electrical Inspection area.

*Permanently* installed standby generator systems shall be wired so as to conform with the applicable CE Code Rules for fixed equipment.

## **Grounding and Bonding Requirements :**

### Fixed Standby Generator Neutral Grounding (Fig. 3)

A standby generator neutral is to be grounded as required by the CE Code Rules 10-106, 10-206 and 10-210(a)(b).

The CE Code requires that the grounded conductor (neutral) shall be *grounded at only one point*. Therefore, care must be exercised to ensure that this requirement is met for normal and for standby power supply operating conditions.

The standby generator neutral shall be grounded at the *supply* side of the service disconnecting means, as required by Rule 10-204(1)(b). Furthermore, Rule 10-204(1)(d) requires that the grounded circuit conductor (neutral) is *not* to be connected to the service ground electrode on the *load side* of the service disconnecting means.

The grounding of the standby generator neutral is accomplished by one of two possible methods. The method to be used will depend on whether or not the generator neutral is connected to the generator frame or case by the manufacturer. The status of this connection should be provided by the manufacturer, as required by CSA Standard C22.2 No 100-95, and should be indicated on the generator itself or in its documentation.

### Method 1: Generator Neutral Floating or Isolated from Frame (Fig. 2)

The objective in this situation is to prevent the generator neutral from becoming isolated from the system ground electrode resulting in the standby power supply operating as an ungrounded system thereby violating Rule 10-106.

For this case, to ensure the generator neutral is grounded to the main service ground electrode, the generator neutral shall be solidly connected to the normal supply neutral at the transfer switch. The neutral conductor shall not be switched at the transfer switch.

This type of transfer switch will normally require a two pole design for a single phase system and a three pole design for a three phase system.

Method 2: Generator Neutral Bonded to Frame (Fig. 1)

The objective in this situation is to avoid installing a parallel circuit, including the neutral conductor and the bonding path, which would allow a portion of the normal load current to continuously flow through the equipment bonding path including the exposed non-current carrying metal enclosures.

For this case, to ensure the neutral is connected to the ground electrode at only one point at any given time, the neutral connections shall be switched at the transfer switch.

The transfer switch is to be of the type where the normal and standby neutral connections are to be switched.

This type of transfer switch will normally require a three pole design for a single phase system and a four pole design for a three phase system..

Equipment Bonding Requirements

As required by Rules 10-400 and 10-408, an equipment bonding conductor shall be installed with the circuit conductors to bond all non-current carrying metal parts of the installation, including the standby generator frame, the transfer switch enclosure and the main service panel.

For the case of the *portable* generator with its neutral bonded to frame, it should be noted that the *bonding conductor* in the flexible cord or cable shall be permitted to perform the function of the *grounding conductor*. The basic reason for this is that it is not practical to install a separate permanent grounding conductor in compliance with Rules 10-806 and 10-812 to a portable generator. Also it is not realistic to rely on the user to properly connect a separate grounding conductor at the generator.

Although not technically in compliance with the Code, the intent of the Code is met by ensuring the portable generator's neutral is connected to a ground electrode.

The circuit bonding conductor will be the same size as, or one trade size smaller than the circuit conductors and will be adequate.

The *fixed* standby generator shall be permanently bonded and grounded in compliance with the Code at the time of installation.

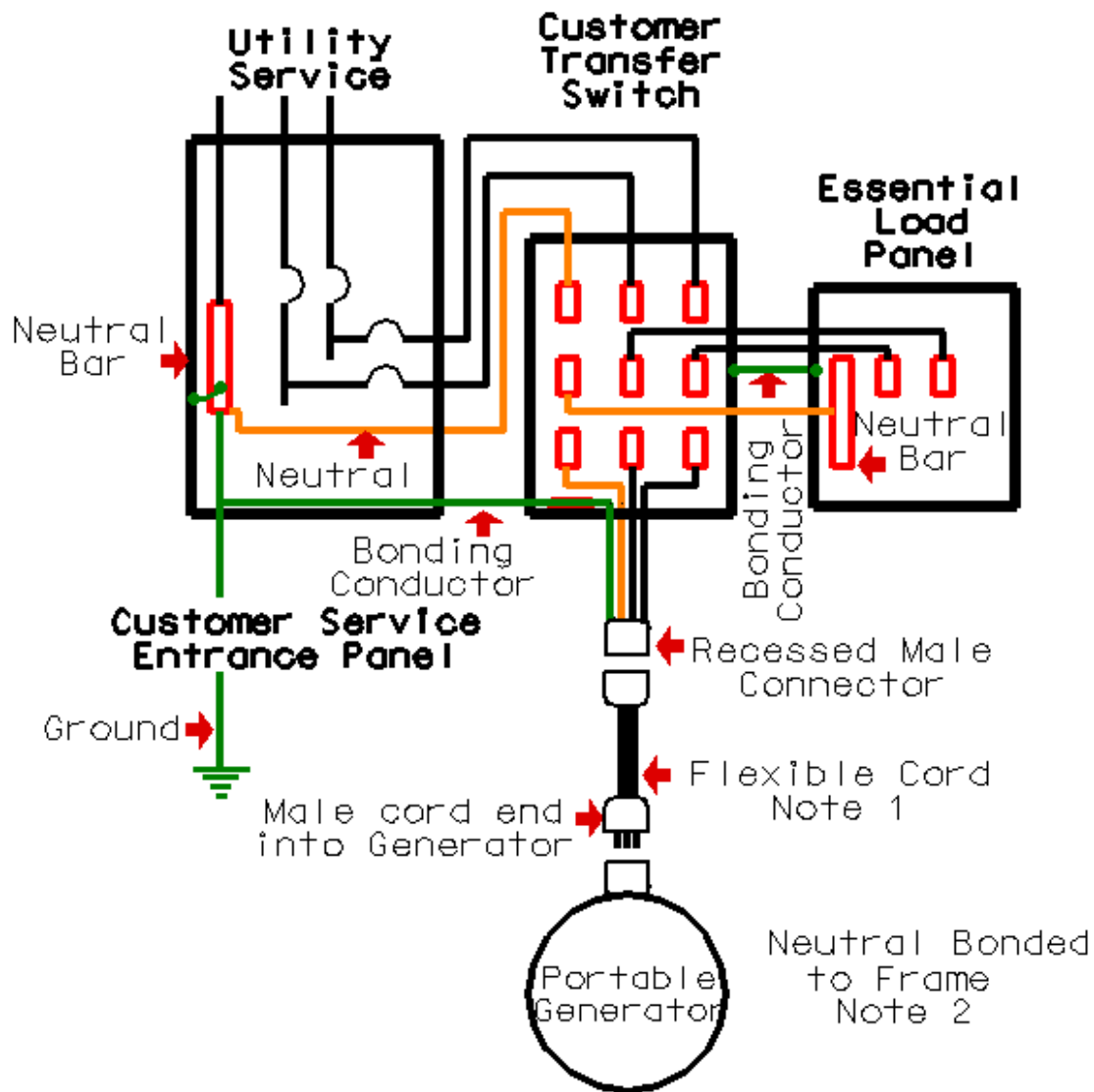
See the figures provided in this bulletin showing the required bonding conductor connections for portable and fixed standby generator cases, where the generator neutral is bonded to the frame.

Note:

It should be noted that standby generators *not* equipped with a 120/240 volt, 4-wire bonding receptacle, are not intended for use as a standby generator for connection to a premises wiring system. It is not permitted to use the ground position of a generator 240 volt, 3-wire bonding receptacle as a combined neutral and bonding connection point.

Figure 1

**PORTABLE GENERATOR  
"NEUTRAL BONDED TO FRAME"**

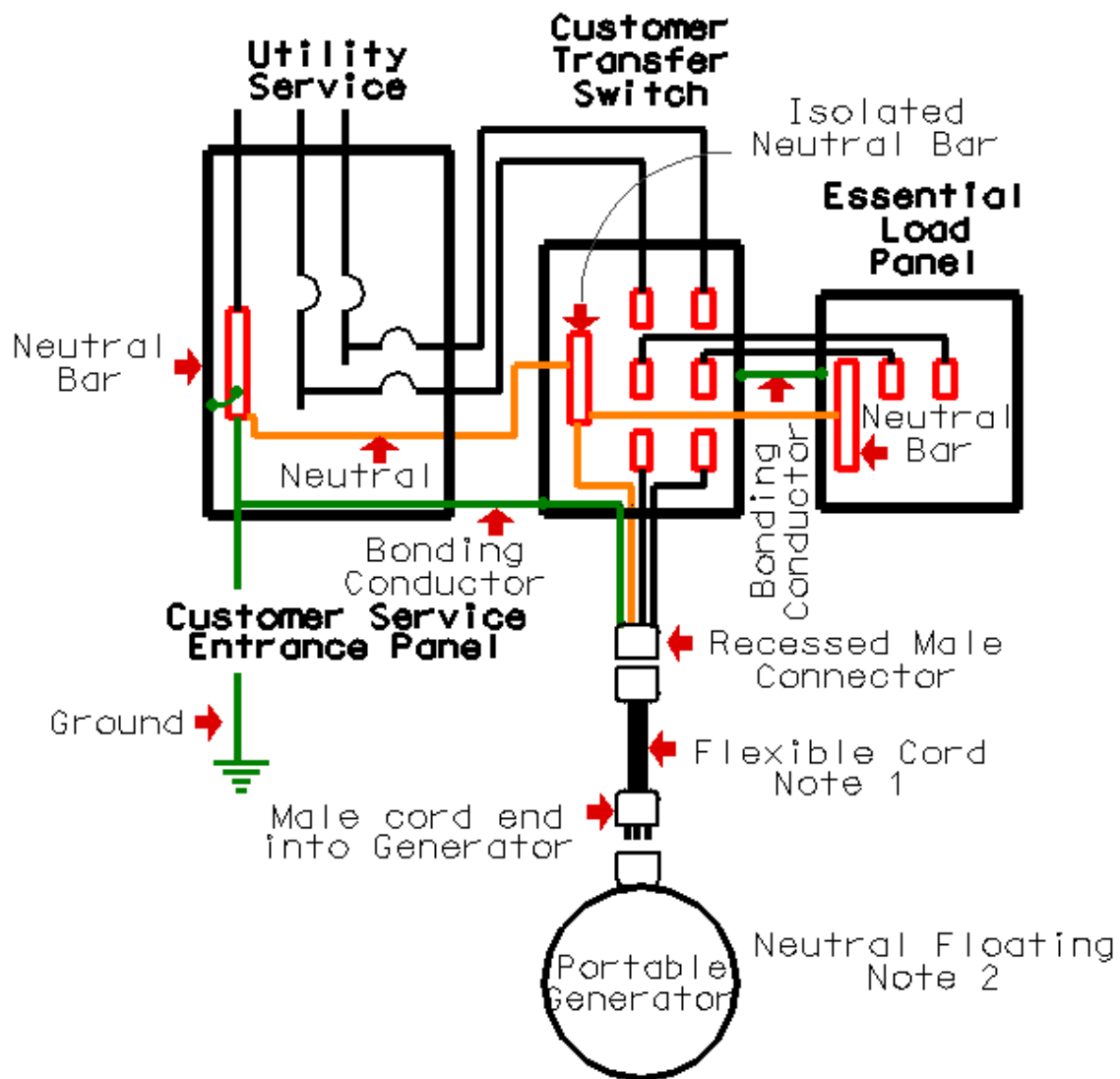


**NOTES:**

1. Flexible cord conductors sized to match generator output.
2. Three-pole transfer switch shall be used with neutral bonded to frame generator.

Figure 2

# **PORTABLE GENERATOR "NEUTRAL FLOATING"**



## **NOTES:**

1. Flexible cord conductors sized to match generator output.
2. Two-pole transfer switch shall be used with neutral floating generator.

### Fixed Standby Generator

Figure 3: Bonding and Grounding for a *Fixed* Standby Generator, with the generator neutral bonded to the frame

