

# **ELECTRICAL BULLETIN**

## **2011-01**

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Pg 1 of 6

Date: January 5, 2011 ( **Revision 1, April 2011** )

Subject: Emergency Power Requirements  
Section 46 of the 2009 Canadian Electrical Code Part 1 (CEC )  
**Rules 46-108 & 46-206**

This bulletin only applies to new stand alone installations, except as noted, where an emergency power supply is mandated by the National Building Code (NBC) to feed emergency loads ( life safety systems as defined per the CEC ). Non life safety systems may be connected to the common emergency power supply provided that all applicable requirements described within this bulletin and section 46 of the CEC are met. ( Refer to general statements and requirements notes 1 & 4 )

A stand alone installation is one with its own supply service and emergency power and is not fed from or shared with another buildings supply service or emergency power supply.

The revisions to Section 46 are intended to ensure that emergency loads as mandated by the NBC are designed and installed to provide a high level of reliability to assist in the safety of the public during fire and emergency situations.

In regard to the changes in section 46 they have a large impact on the electrical design of the building and the following is required for any design where section 46 of the CEC applies.

### **Rule 46-108** **Separation of conductors**

Subrule 46-108(5) does not permit conductors feeding life safety systems to share the same raceway or the same distribution equipment with conductors feeding other electrical equipment not defined as life safety systems that are fed from the emergency power supply.

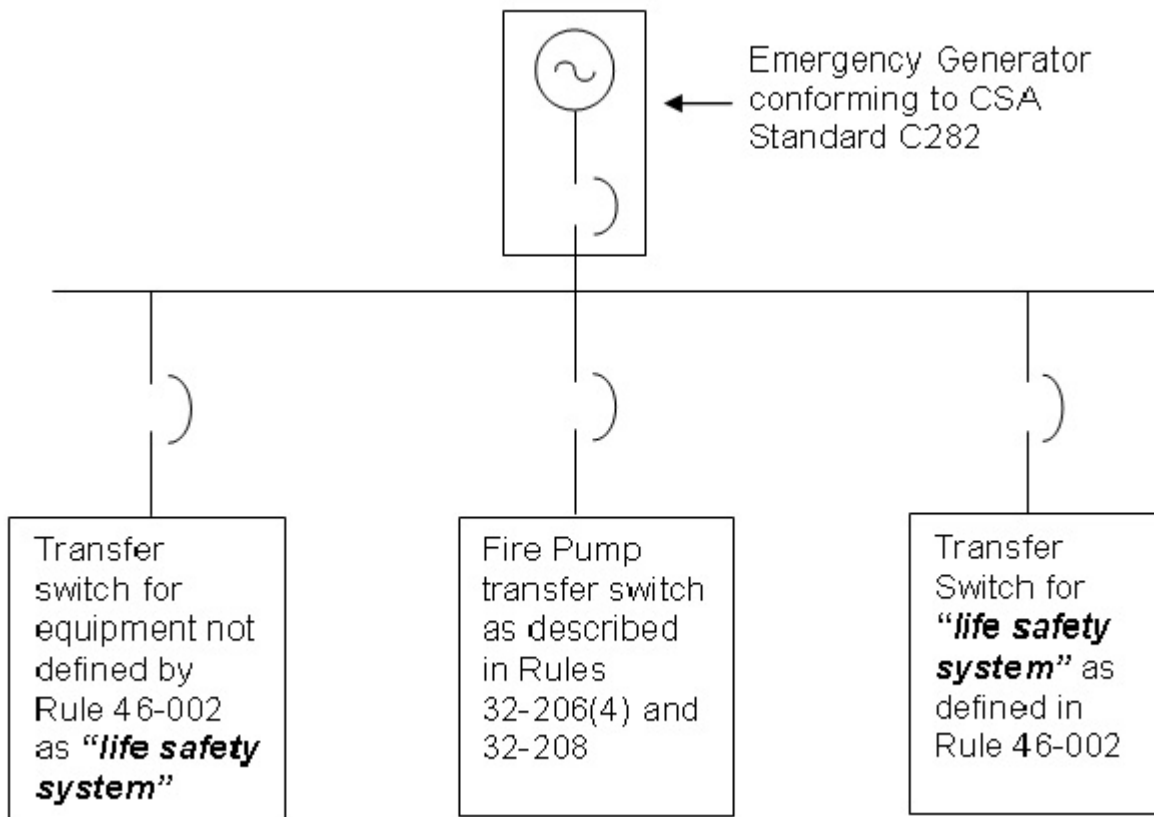
Conductors for life safety systems are to be separated from all other non life safety conductors .

The only exception that the rule permits is for connection to a common emergency power supply i.e. the common emergency generator. Transfer switches are not included in this exception.

Therefore, it is only permitted to have one common bus to connect to the common main overcurrent device of the generator described under Rule 46-206 ( refer to Figure B1).

An alternate acceptable installation is indicated in Figure B2, with or without ground fault protection (GFP ) installed.

Power from the emergency power supply is required to be separated at the first point of distribution to feed the different categories of the emergency loads and a separate disconnecting means and overcurrent device shall be provided to supply power to each transfer switch.( refer to Figure B1 ) .



**FIGURE B1**

Emergency generator common bus connection with overcurrent protection requirements indicated ( busway, splitter or distribution panel/switchboard )

Separate transfer switches are required to feed each of the three loads indicated in Figure B1.

Life safety and non life safety systems can not be fed from one common transfer switch except as indicated in this bulletin under Note 1 for rule 46-108.

Any renovations to existing emergency branch circuits or any addition of new emergency branch circuits to an existing emergency distribution system ( pre CEC 2009 ) shall be permitted, provided there is the capacity to do so, without requiring the upgrade of the emergency distribution system to comply with Subrule 46-108(5). ( refer to Rule 46-108 note 3 ) ( **Revision 1, April 2011** )

When designing the emergency distribution for a hospital or a facility within the scope of Section 24 of the CEC , it is permitted to include the vital branch and delayed vital branch essential electrical systems, as specified in the CSA Z32 standard “ Electrical Safety and Essential Electrical Systems in Health Care Facilities” with the life safety systems as defined under Rule 46-002 of the CEC.

The conditional branch systems **shall not** be included with the life safety systems, even where considered essential by the design engineer or the Health Care Facilitator.

**Rule 46-108 Notes:**

1. Where the number of mandated life safety systems are limited to **only** loads such as the fire alarm, emergency lighting and exit signs the emergency power supply may be provided by means of acceptable battery backup.

Where battery backup is used to supply emergency power to the above equipment and **all** the requirements of the NBC and the CEC are met ,then the requirements of 46-108(5) do not apply and the requirement for separate transfer switches and panel boards is not required.

All other applicable rules of section 46 still apply.

Where a battery backup design also incorporates an emergency generator that picks up the entire building load, the design shall be such that the battery supplied mandated life safety systems go off battery when the emergency generator comes on and are continually being charged while the generator is operating. ( Refer to general statements and requirements note 1 )

The battery supplied mandated life safety systems will be required to operate for the mandated time per the NBC in the event of the generator failing and the normal power not returning.

Designers should consider future additions or alterations to their design which may require mandated emergency power because a design indicated in this note may limit the ability to accommodate future emergency power requirements that would be required to comply with section 46.

2. When a fire pump is required by the NBC, a separate fire pump transfer switch is always required and the fire pump and associated accessories shall be installed in accordance with section 32 of the CEC and per the NBC.

3. A new generator may be installed, where no generator existed before, or to replace an existing generator for a building or site built prior to 2009 and the requirements for separate transfer switches is not required and the existing wiring may remain as is. Any life safety equipment with battery back up shall remain installed “ as is “ . ( **Revision 1, April 2011**)

### **Rule 46-206**

#### **Selective operation of overcurrent devices**

Given the critical role of emergency systems, it is essential to maintain emergency power to as many of the life safety systems as possible and ensure the emergency power supply continues to operate. ( Refer to general statements and requirements note 4 )

Subrule 46-206(1) requires that the common main overcurrent device for an emergency power supply be coordinated with the overcurrent devices of feeders supplying life safety systems and other electrical equipment connected to the emergency power supply except for an installation as shown in Figure B2 of this bulletin.

Per Figure B2, where a fire pump is required and installed as indicated ,there are no coordination issues with the fire pump breaker and common main overcurrent device of the emergency generator.

Selective tripping shall be provided to ensure that a fault in any circuit downstream of the emergency generator common bus connection shall not result in a loss of generator power to the main emergency bus.

Also, any fault in any circuit downstream from the main overcurrent device for the life safety distribution shall not result in tripping that overcurrent device.

Operation of any overcurrent device on the load side of any transfer switch shall not effect any of the upstream feeder overcurrent devices.

The common main overcurrent device for the emergency power supply shall not be part of a series rated combination as defined by Rule 14-014 and series rated breakers can not be used beyond the branch circuit panel level.

In addition to the above requirements, it is recommended that all branch circuit overcurrent devices for life safety systems be selectively coordinated with upstream overcurrent devices to ensure the continuity of the emergency power supply to life safety systems.

CEC Rule 32-212 does not permit ground fault protection to be installed on the fire pump feeder circuit from the emergency power supply

If ground fault protection is required by Rule 14-102 at the common main overcurrent device of the emergency generator then an installation as shown in Figure B2 is acceptable.( Figure B2 is also acceptable where GFP is not required)

As an alternative to Figure B2 ,GFP can be provided as indicated in Figure B3.

Figure B2  
Acceptable Installation

A maximum of two overcurrent devices, which are typically supplied with the emergency generator, are permitted to be directly connected on the load side of an emergency generator as shown in this figure. ( ie the common main overcurrent device and the overcurrent device to feed the fire pump)

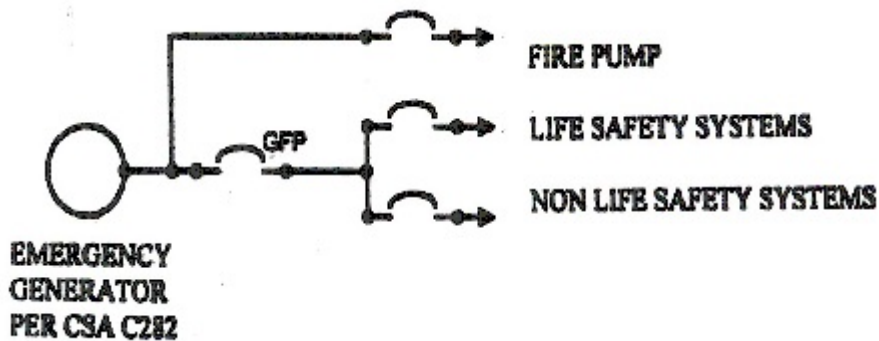
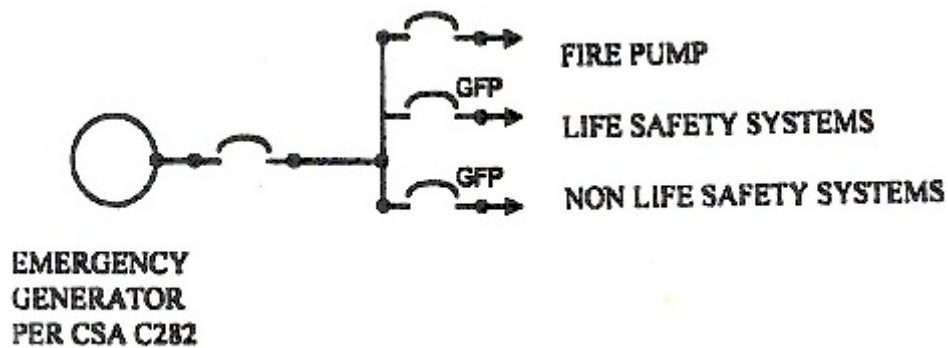


Figure B3  
Acceptable Installation



**Rule 46-206 Notes:**

- 1.The overcurrent devices for life safety systems shall be accessible only to authorized personnel in order to minimize the possibility of inadvertent disconnection, as required by Subrule 46-206(2).
- 2.Selective operation of overcurrent devices is one of many factors that must be considered in the design of a safe and reliable emergency power system.

Other factors such as arc flash, fire and risk hazards, equipment damage (ie 30 cycle withstand fault ratings ), downtime before restoration of power, redundancy and maintenance should be considered so as not to diminish the reliability and safety of the overall emergency power system.

**General statements and requirements :**

- 1.Any design other than indicated in this bulletin shall be reviewed on an individual basis and shall be required to obtain approval to proceed with the proposed design prior to tender of the project.

**Designs that vary from this bulletin, if not approved prior to tender, may not be accepted at a later date and may result in the project being delayed or not being permitted to be energized.**

- 2.Applications for a variation from this bulletin may not always be accepted.
- 3.The design engineer should review the requirements of the latest edition of CSA Z32 where applicable.
- 4.The design engineer is responsible to ensure compliance with ,as a minimum, this bulletin, the CEC and the NBC for any installation they design that falls within the scope of section 46 of the CEC and they shall provide any documentation that may be requested by the inspection department or Provincial Chief Electrical Inspector to substantiate such compliance.

The design engineer is responsible to ensure the emergency power supply system and the associated design for the life safety system provides a safe and reliable system.

5. The design engineer should be aware that the NBC 2010,when adopted and in force, -Rule 3.2.4.6 requires the commissioning of life safety and fire protection systems as a whole to ensure the proper operation and inter-relationship between the systems.

\*The Provincial Chief Electrical Inspector may amend , revise or delete any of the above requirements or interpretations at any time in the future.

\*\*Any deviations or questions concerning this Bulletin may be forwarded to the:  
Provincial Chief Electrical Inspector - David MacLeod, C.E.I., P.Eng at 902-424-8018  
or by email - macleodd@gov.ns.ca