

**Bulletin 10-17-6**  
**Installation of grounding conductors and grounding electrodes**  
**Rule 10-102**

**Issued May 2020**  
Supersedes Bulletin 10-17-5

**Scope**

- (1) Grounding conductor entry in to the branch section of a combination panelboard
- (2) 12/2 NMSC Service grounding conductor
- (3) Installation of ground electrodes at less than the required depth
- (4) Metallic water pipe as in-situ grounding electrode

**(1) Grounding conductor entry in to the branch section of a combination panelboard**

We have been asked if the system grounding conductor may enter the panel through the branch circuit section of a combination panel.

Traditionally the system grounding conductor has been required to enter service equipment as close as practicable to the point of connection within the equipment. It was not permitted to route the system grounding conductor through the branch circuit compartment of a combination panel to the main breaker compartment.

There is no Rule in the Ontario Electrical Safety Code prohibiting this practice.

**Direction**

It is permissible to route the system grounding conductor through the branch circuit compartment of a service entrance rated combination panel as long as no alteration of the main breaker compartment barrier is required.

System grounding conductors may also be installed in the same raceway as the consumer's service conductors subject to the provisions of Rule 10-116 5) and provided that they do not interfere with the installation of the service conductors by a Supply Authority.

In all cases the system grounding conductor shall terminate at the main neutral bar in the main breaker compartment of the panel board.

**(2) 12/2 NMSC service grounding conductor**

Many older services have a 12/2 NMSC installed as the service grounding conductor and the question is often asked, is it required to be replaced with a conductor meeting Rule 10-114?

To ensure consistency the following shall apply:

- (1) When upgrading service equipment panels to increase ampacity, it is mandatory the existing 12/2 NMSC service grounding conductor be replaced to meet the minimum requirements of Rule 10-114.
- (2) When changing service equipment panels from fuses to breakers, but not increasing ampacity, the existing 12/2 NMSC service grounding conductor shall be permitted to remain.
- (3) When replacing load centre panel boards, with no alteration to the service box, the existing 12/2 NMSC service grounding conductor shall be permitted to remain.

**Note**

When an existing 12/2 service grounding conductor is utilized, the termination point on the ground electrode shall be inspected to ensure an approved ground clamp is installed and there is no corrosion at the connection point.

**Rationale**

12/2 NMSC has an ampacity equal to a # 8 copper conductor, which was permitted by Table 17 as a grounding conductor for 100 A rated service conductors, prior to the 2012 Code.

This practice was accepted for many years by the Inspection Authority of the day.

### **(3) Installation of ground electrodes at less than the required depth**

Rule 10-102 5) states that where a local condition such as rock or permafrost prevents a rod or plate electrode from being installed at the required burial depth, a lesser acceptable depth shall be permitted.

#### **Question 1**

What lesser acceptable depth shall be permitted?

#### **Answer 1**

For a plate electrode, where a local condition such as rock or permafrost prevents compliance with the 600 mm burial depth, a lesser depth is permitted provided 450 mm granular material or 100 mm concrete is used to provide a cover for the grounding plate.

For a rod electrode, where rock bottom is encountered at a depth of 1.2 m or more, each rod shall be driven to rock bottom and the remainder buried at least 600 mm below finished grade level in a horizontal trench; or where rock bottom is encountered at a depth of less than 1.2 m, each rod shall be buried at least 600 mm below finished grade level in a horizontal trench.

### **(4) Metallic water pipe as in-situ grounding electrode**

A metallic water pipe, conductively in contact with earth, is recognized as an in-situ grounding electrode. Based on the Appendix B note to Rule 10-102, in-situ grounding electrode is required to have a surface area contact with earth equivalent to that provided by manufactured electrode. A metallic water pipe system located at least 600 mm below finished grade and extending 3 m has traditionally been recognized as an acceptable in-situ grounding electrode.

There is no prescriptive Code requirements where the grounding conductor should be attached to a metallic water pipe. If a grounding conductor is connected to the consumer side of the water-meter and there are insulating joins or sections, such as plastic water meter, a bonding jumper shall be installed so that there are no insulating sections between the point of attachment and the point at which the electrode makes contact with earth.

Some municipalities have requirements that do not allow the municipal water system to be used as an in-situ grounding electrode. In these circumstances, an alternative electrode means for grounding in accordance with Rule 10-102 should be employed. Furthermore, a provision for electrically isolating the municipal water system from the building water system (e.g., an insulating section at the point of entrance of the water service to the building) should be in place before bonding the building metallic water pipe system in accordance with Rule 10-700 a).