Bulletin 10-22-3
Requirements for converting a delta service to a grounded wye service
Rules 10-204, 10-624, 10-812, 4-024, 4-028, 4-030, 14-012 and 14-102

Issued October 2016
Supersedes Bulletin 10-22-2

Scope

(1) Background
(2) Prior to conversion
(3) Requirements when converting from a delta ungrounded supply to a wye grounded supply
  (a) Specific requirements where the neutral is used for metering purposes only
  (b) Specific requirements where phase-to-neutral loads are served

(1) Background

Utilities may decide to convert from a delta ungrounded supply (3 phase, 3 wire) to a wye grounded supply (3 phase, 4 wire). Generally, the customer has no immediate need for supply from a grounded system and they do not need to increase their capacity.

Rule 10-204 requires that the new 3 phase, 4 wire system be connected to a grounding conductor at each individual service. In most cases, *with a delta ungrounded supply* there will be no system grounded conductor (neutral) run to each consumer's service, as no neutral conductor is installed as part of the existing delta connected consumer's service.

The utility and the customer both generally wish to use the existing installation with as little change as possible. Questions arise about installing the neutral, grounding and overcurrent protection. The following information has been developed as a guide for implementing such conversions. Please note that some of the requirements where the metering is changed and neutral loads are to be installed differ from those where the neutral is used for metering purposes only.

(2) Prior to conversion

- *Inspect the electrical system being converted, paying particular attention to the status of the Ground Fault Indication Lights (GFI) and make sure that the GFIs are functioning properly.*
- *If the GFI indicates a fault (indicators of different brightness could be a sign of partial faults) further tests should be conducted to find the source of the fault. The fault may be further inside the building, outside the building or in another building on the same system.*
- *ALL FAULTS MUST BE CLEARED BEFORE THE CONVERSION IS ATTEMPTED.*

(3) Requirements when converting from a delta ungrounded supply to a wye grounded supply

General requirements:

- Where the utility and customer are agreeable, conversions should be preceded by a general inspection to check the condition of equipment, grounding and overcurrent protection. In particular, any pre-existing phase to ground faults shall be rectified.
- *A new grounded (neutral) conductor must be installed and brought to the building, whether or not the customer has an immediate or perceived need for a neutral. This connection is essential for clearing faults on the system.*
  - *The grounded conductor shall not be smaller than that permitted by Rule 10-204(2), which means sized per Table 16A or 16B, and comply with Rule 4-024.*
  - *Adequate provisions shall be made to ensure that the service box enclosure is bonded to the grounded conductor, as per Rule 10-624.*
- All ground fault indicators are to be removed and all openings filled.

- The overcurrent protection must be adequate for the available fault current it must withstand. HRC fuses are to be used where the available fault current of the system is not known, as per Rule 14-012.
- Where the existing service equipment grounding conductor meets the requirements of Rule 10-812 for a system grounding conductor, it can be re-used and shall be terminated so as to ground the new system grounded conductor, as per Rule 10-204(1)(b).
- Ground Fault Protection shall be provided as required by Rule 14-102, for solidly grounded system as follows:
  - Services rated more than 150 V to ground, less than 750 V phase-to-phase and 1000 A or more; OR
  - Services rated 150 V or less to ground and 2000 A or more.

  Converting a Delta service to Wye without the inclusion of ground fault or similar protection exposes the service equipment to significant risk if a failure occurs.
- Where Delta-Wye conversions are completed on facilities that had external buildings/ structures fed with no continuous bonding back to the main service distribution, Code compliant bonding is required to be installed to ensure that overcurrent protection operates as required (with phases now referenced to ground and no fault return path, a fire hazard could be present where fault current tries to find an alternate path i.e. metallic gas, communication cable etc.).

(a) Specific requirements where the neutral is used for metering purposes only

Where the metering is changed and the neutral is used for metering purposes only, the following additional requirements apply in addition to "General requirements":

- Service equipment is to be marked in a permanent and conspicuous manner to indicate that no phase to neutral loads are permitted.
- Notwithstanding the requirements of Rules 12-106 and 12-904, the grounded conductor (neutral) is permitted to be installed external to the raceway containing the ungrounded conductors and may terminate on the outside of the main service box, provided the grounded conductor;
  (a) is as close as practical to the raceway containing the ungrounded conductors;
  (b) is an aluminum sheathed cable, armoured cable with a non ferrous sheath, MI cable or is an insulated or bare conductor in a non metallic raceway; and
  (c) is installed in compliance with other applicable rules of the code.
- Neutral conductors installed for metering purposes only shall be permanently identified in the service box, as per Rule 4-030, and shall not extend to any distribution equipment.

(b) Specific requirements where phase-to-neutral loads will be served

Where the metering is changed to a four wire system and phase-to-neutral loads (other than the metering) are to be connected, the following additional requirements apply in addition to "General requirements":

- There must be space and provision in the service box (main disconnect switch) for the termination and grounding of the neutral conductor (Rules 4-028, 10-204 and 10-624), as per Diagram B1.
- A new bonding jumper shall be installed to bond the service box enclosure to the new grounding block installed inside the service box, as per Rule 10-624(2).
- *The grounded conductor shall be installed in the same manner as the ungrounded service conductors.* A grounded conductor installed external to the service raceway is not permitted where phase to neutral loads, other than the metering, are installed. The service neutral conductor shall be installed in the same manner as the ungrounded service conductors.

Diagram B1 – Termination of the grounded conductor