

**COMMONWEALTH of VIRGINIA**

DEPARTMENT OF TRANSPORTATION
1401 EAST BROAD STREET
RICHMOND, 23219-2000
July 27, 2001

CHARLES D. NOTTINGHAM
COMMISSIONER

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STATE TRAFFIC ENGINEER

*Equipment Grounding Conductors For
Grounding Raceway and Equipment*

MEMORANDUM

TO – District Traffic Engineers

The intent of this memorandum is to provide the latest information concerning equipment grounding conductors for grounding raceways and equipment and replaces all such information previously indicated in Mr. J. L. Butner's memorandum dated April 21, 1992. *It should be noted that in the previous memorandum that the terminology "system bond wire" was used; however, to be consistent with the terminology used in the National Electrical Code (NEC), the terminology "equipment grounding conductors" will be used in this memorandum.*

Since 1992, the equipment grounding conductor sizes have been determined by the plan designers and shown on the plans. This prevented the Department from relying on the Contractor to assure the correct equipment grounding conductor size was selected and allowed the field personnel responsible for inspections to know the exact size requirements at each location. We still believe this to be the best method and have no plans to change that at this time. However, based on the NEC, we have determined that *we need to change the calculation method for sizing of the equipment grounding conductors used for lighting applications and other applications where the power conductor size has been adjusted to compensate for voltage drop. This change in the calculation method will cause an increase in the size of the equipment grounding conductor in most installations. While the NEC provides the calculation method concerning this, it has been determined by working through multiple examples of typical installations that the equipment grounding conductor will be increased to be the same size as the power conductor. Therefore, to eliminate the expense of accomplishing the calculations, it has been decided to require the equipment grounding conductor to be the same size as the power conductor for lighting applications and other applications where the power conductor size has been adjusted to compensate for voltage drop.*

In order for everyone to know what is required, we have attached a sheet entitled Equipment Grounding Conductor Sizes for Grounding Raceways and Equipment. This attachment will provide the direction to the plan designers so they will know what is required on the plans along with the proper equipment grounding conductor size.


District Traffic Engineers
July 27, 2001
Page 2

As it has been in the past, the cost of the equipment grounding conductor is included in the cost of the conduit, therefore no pay item will be needed. The only exception to this would be if you are installing equipment grounding conductors in existing conduits; in those instances, you will need to have a separate pay item for the equipment grounding conductor or you will need to indicate that the cost is included in other appropriate pay items.

This revised method shall be used on all projects that bids have not been received provided you can obtain approval to make the changes from Construction Division for those already advertised. This method will in most instances increase the equipment grounding conductor size so it will also be necessary to verify that the conduit size is capable of handling this increase.

In existing installations, the equipment grounding conductor should be adjusted to conform to these requirements for those conduits where conductor cables are being replaced or additional cables are being installed within such conduits. As indicated before, you will need to ensure that the conduit size is capable of handling the increase. When not, replacement of the conduit will be required.

If there are any questions, please contact Mr. Mansour Mahanoozadeh at (804) 786-7983 or via email at mahban_me@vdot.state.va.us.


I. O. Kastenhofer
State Traffic Engineer

DCF/df
Attachment

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EQUIPMENT GROUNDING CONDUCTOR SIZES FOR GROUNDING RACEWAYS AND EQUIPMENT

BACKGROUND

The method of determining the equipment grounding conductor size for grounding raceways and equipment as shown herein will provide a size of equipment grounding conductor that equals or exceeds Article 250 of the NEC.

WHEN ARE EQUIPMENT GROUNDING CONDUCTORS REQUIRED

Equipment grounding conductors are only required in non-metallic conduits in accordance with Article 250 of the NEC. The NEC **does not require** that equipment grounding conductors be installed in non-metallic conduits when the line voltage of conductors is less than fifty (50) volts. (See latest version of the NEC for details)

Conductors such as loop lead-ins, pedestrian push button cable, DC interconnect cable, video detection coaxial cable, TMS communication cable, etc. have a line voltage of all conductors of less than fifty volts and therefore will not require a equipment grounding conductor.

EQUIPMENT GROUNDING CONDUCTOR SIZE

Determination of the equipment grounding conductor size shall be in accordance with the following:

- Traffic Signals – All traffic signals will require 1#8 AWG conductor in non-metallic conduits for grounding raceways and equipment.
- Lighting Systems (Or Other Systems Where The Power Conductor Size Has Been Adjusted To Compensate For Voltage Drop) – Equipment grounding conductor shall be the same size as the largest power conductor within the non-metallic conduit.

EXAMPLE PLAN NOTE

Since the contractor normally has the option of providing metal conduits where we do not specifically state non-metallic conduits, the following note is recommended for installation on the plans:

Equipment grounding conductor shown on plans is required only if the conduit is non-metallic.

EXAMPLE PLAN LABELING FOR CONDUITS

- Traffic Signals
 - 2" Conduit
 - 4-7c
 - 2-2c(s)
 - 1#8 AWG Equipment Grounding Conductor
- Lighting Systems
 - 2"-3#2 & 1#2 Equipment Grounding Conductor