

2025 Electrical License Renewal Part III

Calculations Based on 2020 NFPA -70

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Find the minimum galvanized rigid steel (GRS) conduit size for 3-#10 (THHN). To calculate the minimum conduit size, we add up the cross-sectional areas of the conductors from Table 7. We are dealing with THHN conductors, therefore: $(3) * 0.0211 \text{ in}^2 = 0.0633 \text{ in}^2$

Since we have three conductors, we can use up to 40% of the conduit fill, as shown in Table 1. We could either look at the 40% fill column in Table 4 for the smallest value greater than 0.0633 in^2 , or calculate the 100% fill value by dividing 0.0633 in^2 by 40%, such as: $0.0633 \text{ in}^2 / 0.4 = 0.15825 \text{ in}^2$, which is the minimum 100% conduit fill value. Using 0.15825 in^2 , we look at Table 4 in the 100% column and see that we could use a $\frac{1}{2}$ " conduit. Many construction specifications, however, limit the smallest conduit size to $\frac{3}{4}$ ". If that were the case, we would have to choose $\frac{3}{4}$ " conduit to match the construction specification, even though $\frac{1}{2}$ " meets the NEC requirement for conduit fill.

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Find the minimum Schedule 80 PVC conduit size for 3-500 KCMIL, 1/0 AWG Gnd, all conductors XHHW. Looking at Table 7 for XHHW conductors, we have: $(3) * 0.6984 \text{ in}^2 = 2.0952 \text{ in}^2$ $(1) * 0.1825 \text{ in}^2 = 0.1825 \text{ in}^2$ Adding together: 2.2777 in^2 Looking at the 40% column of Table 6 for Schedule 80 PVC, we find that we need a minimum conduit size of 3".

Table 5 – Cross-Sectional Area of Individual Conductors 14 AWG RHH Cu With Outer Covering = $.0293 * 4 = .1172$ 12 AWG RHH Cu Without Outer Covering = $.0260 * 6 = .1560$ Total Square Inches for Conductors = $.2732$ Table 4 – 40% fill column for “Over 2 wires”. $.2732 \text{ Sq.In.}$ Requires a 1 inch IMC Conduit 40% fill for 1 inch IMC = $.384 \text{ Sq. In.}$ Answer = 1 Inch IMC

Table 5 – Cross-Sectional Area of Individual Conductors 2/0 AWG THW Cu = $.2624 \times 3 = .7872$ 4/0 AWG THHN Cu = $.3237 \times 4 = 1.2984$ Total Square Inches for Conductors = 2.0820
Table 4 – 40% fill column for “Over 2 wires”. 2.0820 Sq.In. Requires a 2 ½ inch EMT Conduit
40% fill for 2 ½ inch EMT = 2.343 Sq. In. Answer = 2 ½ Inch EMT

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What size GRS nipple would be required for 6-4/0 AWG XHHW, 2-6 AWG THHN Gnd? $(6) * 0.3197 \text{ in}^2 = 1.9182 \text{ in}^2$ [XHHW] $(2) * 0.0507 \text{ in}^2 = 0.1014 \text{ in}^2$ [THHN] Adding together: 2.0196 in² Looking at the 60% column of Table 4 for Rigid Metal Conduit (RMC), we find that we need a minimum conduit size of 2”. Since the conductors are different diameters, there is no need to consider using Note 7.

Now on to Chapter 4,5,6,7,8 and 9
2020 changes!!!!!!!!!!