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Select Junction Boxes According to Box Fill Requirements in the *NEC®*

Program: Electrician Technician

Course: EL140 – Residential Applications

Objectives: Under the supervision of your instructor, you should be able to do the following:

- Size outlet boxes and select the proper type for different wiring methods
- Select the proper type and size outlet box needed for a given set of wiring conditions

Lab Equipment:

- Raceway system layout including conductor number, sizes, and notes

Required Tools:

- Pencil and paper
- Calculator
- *National Electrical Code®* book

Materials:

- N/A

Safety (PPE):

- Safety Glasses
- Hard Hats if using bays

Resources- Instructor Notes:

- *National Electrical Code®* book

Time Required: 120 Minutes

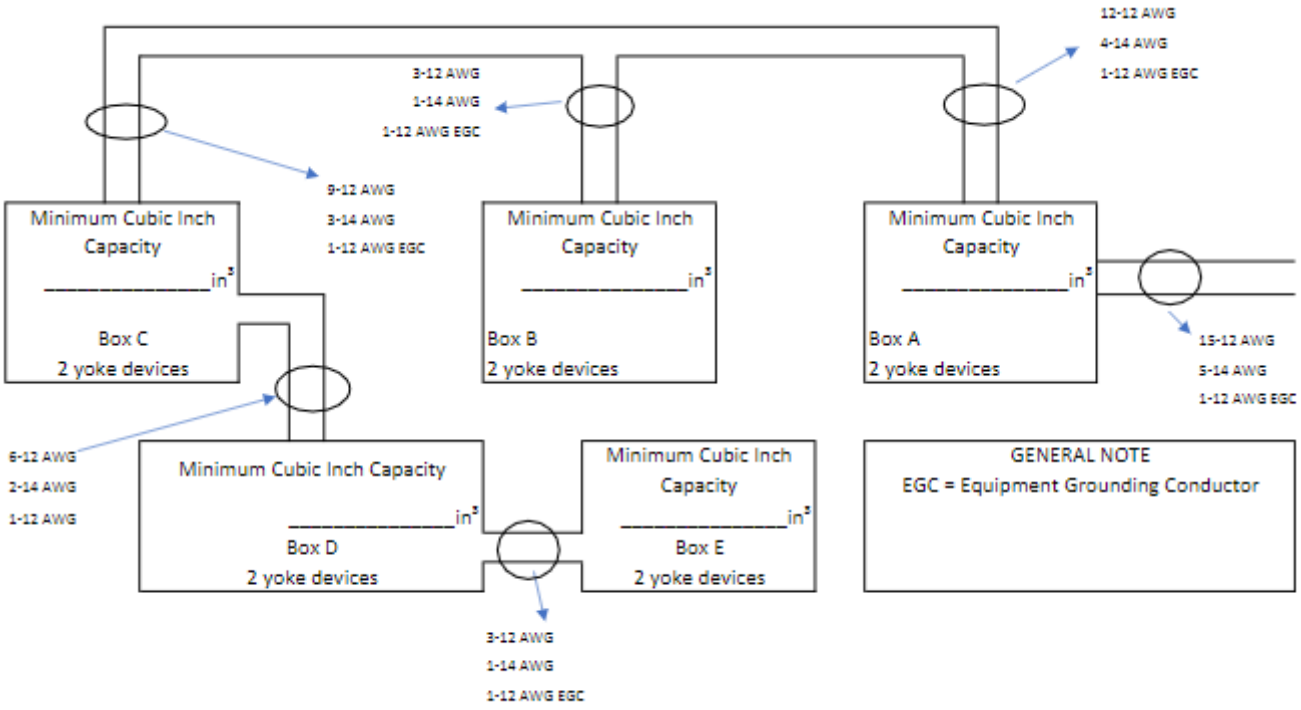
Shop Maintenance:

- All work will cease 20 minutes prior to the end of class.
- All work areas must be cleaned.
- Tools and equipment must be cleaned and returned to the designated areas (cage, tool room, cabinets etc.)
- Any broken or missing tools must be reported immediately.
- Tools and equipment are student's responsibility

Procedures:

This performance project requires you to determine the minimum box sizes based on the size and number of conductors, and other factors that regulate box fill requirements.

1. Review ***NEC Section 314.16 and Tables 314.16(A) and (B)***.
2. Review the raceway layout in *Figure 1* and note the size and number of conductors entering and leaving each box.
3. Review the Notes on *Figure 1*.
4. Refer to Module 26111-11 Section 12.0.0, ***NEC Section 314.16***, and ***NEC Table 314.16(B)*** for box fill calculations and volume allowance required per conductor.
5. Calculate the total cubic inch requirements for each box based on the number of conductors entering and leaving the boxes, and the box fill allowances listed in the ***NEC Sections 314.16(B)(1) through (5)***.
6. Enter the minimum box sizes on the spaces provided in each box of *Figure 1*.
7. Have your instructor check your work.



SOLUTION

Box A:		
27 – 12 AWG (coming in and leaving)	2.25 in^3 x 27	= 60.75
9 – 14 AWG (coming in and leaving)	2.00 in^3 x 9	= 18.00
1 – 12 EGC	2.25 in^3 x 1	= 2.25
4 – 12 AWG (two yokes)	2.25 in^3 x 4	= 9.00
Total minimum cubic inch capacity for Box A:		= 90.00 in^3
Box B:		
3 – 12 AWG (coming in)	2.25 in^3 x 3	= 6.75
1 – 14 AWG (coming in)	2.00 in^3 x 1	= 2.00
1 – 12 EGC	2.25 in^3 x 1	= 2.25
4 – 12 AWG (two yokes)	2.25 in^3 x 4	= 9.00
Total minimum cubic inch capacity for Box B:		= 20.00 in^3
Box C:		
15 – 12 AWG (coming in and leaving)	2.25 in^3 x 15	= 33.75
5 – 14 AWG (coming in and leaving)	2.00 in^3 x 5	= 10.00
1 – 12 AWG EGC	2.25 in^3 x 1	= 2.25
4 – 12 AWG (two yokes)	2.25 in^3 x 4	= 9.00
Total minimum cubic inch capacity for Box C:		= 55.00 in^3
Box D:		
9 – 12 AWG (coming in and leaving)	2.25 in^3 x 9	= 20.25
3 – 14 AWG (coming in and leaving)	2.00 in^3 x 3	= 6.00
1 – 12 AWG EGC	2.25 in^3 x 1	= 2.25
2 – 12 AWG (one yoke)	2.25 in^3 x 2	= 4.50
Total minimum cubic inch capacity for Box D:		= 33.00 in^3
Box E:		
3 – 12 AWG (coming in)	2.25 in^3 x 3	= 6.75
1 – 14 AWG (coming in)	2.00 in^3 x 1	= 2.00
1 – 12 AWG EGC	2.25 in^3 x 1	= 2.25
2 – 12 AWG (one yoke)	2.25 in^3 x 2	= 4.50
Total minimum cubic inch capacity for Box E:		= 15.50 in^3