CONDUITPRO · NEC ELECTRICAL EXAM

The Ultimate Conduit Bending & Voltage Drop Cheat Sheet

Tape this to the inside of your van door.

1 Offset bends

Both marks come off one number. Multiply the depth of the offset by the multiplier for the angle you are bending.

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Distance between bends = Offset depth × Multiplier
Shrink = Offset depth × Shrink rate (add it to the overall length)
```

BEND ANGLE	MULTIPLIER	SHRINK PER INCH OF OFFSET
10°	6.0	1/16"
22.5°	2.6	3/16"
30°	2.0	1/4"
45°	1.4	3/8"
60°	1.2	1/2"

> **A 3" offset at 30° puts the marks 6" apart and costs 3/4" of length.**

2 Three-point saddle

Standard saddle: 45° at the centre, 22.5° either side.

```
Centre mark to each outer mark = Obstacle depth × 2.5
Shrink = Obstacle depth × 3/16"
```

Mark the centre of the obstacle first, then measure out both ways. A four-bend saddle is just two offsets back to back.

3 Voltage drop and Ohm's law

K is the resistance of a mil-foot of the conductor: 12.9 for copper, 21.2 for aluminium. CM is the circular mils of one conductor.

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Single phase: VD = 2 × K × I × L ÷ CM
Three phase: VD = 1.732 × K × I × L ÷ CM
Ohm's law: V = I × R   Power: P = V × I
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CIRCUIT	RECOMMENDED LIMIT
Branch circuit	**3% of the supply voltage**
Feeder plus branch circuit	**5% of the supply voltage**

The 3% and 5% figures are the NEC informational-note recommendation, not a hard code rule. Your local amendment may make them enforceable.

4 Three-phase power and conduit fill

The three-phase formulas assume a balanced load. Power factor is 1.0 unless the nameplate says otherwise.

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Three-phase kVA = V × I × 1.732 ÷ 1000
Three-phase kW = V × I × 1.732 × PF ÷ 1000
Single-phase kVA = V × I ÷ 1000
Motor kW to hp = kW ÷ 0.746
```

CONDUCTORS IN THE RACEWAY	MAXIMUM FILL
1 conductor	**53% of the internal area**
2 conductors	**31% of the internal area**
3 or more conductors	**40% of the internal area**

Fill percentages are NEC Chapter 9, Table 1. Take the conductor and raceway areas from the Chapter 9 tables in your own code book.

Doing this by hand on site?

- Offset, saddle, voltage drop, conduit fill and motor circuit calculators that show every step
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A study and field aid. Check every figure against the code adopted where you work, its local amendments and the manufacturer's data before you rely on it.