

# Cable Tray Specification Formula Table

## Article Overview

Cable tray sizing is calculated using the cross-sectional area of cables relative to the tray area, applying fill ratios per NEC or IEC standards.

### Cable Tray Fill Calculation Formula

- o Calculate the area of a single cable:  $A_{\text{cable}} = \pi(D/2)^2$  where D is the cable outer diameter including insulation and jacket .
- o Calculate the total cable area:  $A_{\text{total}} = A_{\text{cable}} \times N$  where N is the number of cables.
- o Calculate the tray cross-sectional area:  $A_{\text{tray}} = W \times H$  where W is tray width and H is tray depth .
- o Determine the fill ratio:  $\text{Fill Ratio (\%)} = \frac{A_{\text{total}}}{A_{\text{tray}}} \times 100$  Apply a 20% void factor for air gaps between round cables if stacked .
- o Adjust for NEC/IEC limits:
- o Power cables: 40% of tray cross-section
- o Control/signal cables: 50% of tray cross-section
  
- o Number of cables formula (for a desired fill ratio F% ):  $N = \frac{F \times 100 \times A_{\text{tray}}}{A_{\text{cable}}}$  Round down to the nearest whole cable .

## Practical Considerations

- o Single-layer vs stacked cables: Apply derating factors for multiple layers to account for reduced heat dissipation .
- o Cable grouping: Segregate power, control, and communication cables to prevent interference and overheating .
- o Support spacing: Ensure tray supports are spaced appropriately (commonly 5 ft / 1.5 m) to handle cable load .
- o Future expansion: Leave extra space for additional cables without exceeding thermal limits .

### Quick Reference Table (Example for 100mm Depth, 40% Fill)

| Tray Width (mm) | Max Cable Area (mm <sup>2</sup> ) | Approx. # of 10mm OD Cables |
|-----------------|-----------------------------------|-----------------------------|
| 100             | 4,000                             | 4                           |
| 150             | 6,000                             | 6                           |
| 200             | 8,000                             | 8                           |
| 250             | 10,000                            | 10                          |
| 300             | 12,000                            | 12                          |
| 350             | 14,000                            | 14                          |
| 400             | 16,000                            | 16                          |
| 450             | 18,000                            | 18                          |
| 500             | 20,000                            | 20                          |

Note: Values are indicative; exact sizing should use cable OD and quantity for precise calculation .

## Tools and Calculators

Several online calculators can automate these calculations:

- o Shelden Cable Tray Fill Calculator: NEC & IEC compliant, allows custom cable schedules .

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- o ECalPro Cable Tray Calculator: Includes derating for stacked cables and single/multi-layer fill limits .
- o Calculator Academy Cable Tray Capacity Calculator: Solves for tray width, height, or cable diameter based on known values . Using these formulas and reference tables ensures safe cable installation, proper heat dissipation, and compliance with NEC 392 and IEC 61537 standards.

The Wire Mesh / Cable Tray Fill table in below section shows the number of cables and the load in lbf/lineal foot

In accordance with its continuous impro-vement policy, Legrand reserves the right to change the specifications and illus-trations

As an industry leader in cable tray, Eaton offers one of the widest ranges of cable management solutions available in the market

CONCENTRATED STATIC LOADS: Some applications may require the cable tray to support the weight of a single, dead object in

The Benefits of Cable Tray Cable tray wiring systems offer significant advantages over conduit pipe and other wiring systems. Cable

Cable tray size calculation is important for ensuring safe cable installation, proper heat dissipation, and enough spare

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IEC Standard for Cable Tray: Complete Technical Guide The International Electrotechnical

The NEC rule requires that the cable cross-sectional areas together may not exceed 50% of the tray area (width x depth = fill).

The cable tray calculator determines the required tray width and type based on the number and size of cables to be

The the following sections of this page tables and formulas are provided to help determine how many cables can be

Learn how to calculate the size of a perforated cable tray with real examples and clear



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These documents: ANSI/NEMA VE-1, Metal Cable Tray Systems; NEMA VE-2, Cable Tray Installation Guidelines; and NEMA FG-1,

The document provides information on cable tray sizing including cable types and weights, tray sizes and weights, bending moment

NEMA VE 1-2017 Specifies requirements for metal cable trays and associated fittings designed for use in accordance with the rules

Conductors used in cable tray must be specified in Table 19 of the CEC and, except where permitted under paragraphs [12-2202(2)]

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