Cable Tray Fill Calculator

Fill of a cable tray from the number and diameter of cables and the tray width and depth, against an allowed fill, with the most cables that fit.

Method: Geometric fill ratio (sum of cable cross-sections / tray cross-section)

Input parameters

Unit system: SI

Parameter	Value	Unit
Number of cables	40.000	
Overall diameter of each cable	18.000	mm
Tray width (inside)	300.00	mm
Usable depth of the tray	75.000	mm
Allowed fill Your project specification or wiring code sets this.	40.000	%

Calculated results

Parameter	Value	Unit
Total cross-section of the cables	101.79	cm²
Cross-section of the tray	225.00	cm²
Fill	45.239	%
Most cables within the allowed fill	35.000	
Smallest tray width for these cables at the allowed fill	339.29	mm

Notes for this case

- The fill is above the allowed value.

Formula and method

$$f = \frac{n\,\pi d^2/4}{WH}, \quad n_{max} = \left\lfloor \frac{f_{max}\,WH}{\pi d^2/4} \right\rfloor$$

Variables

n	Number of cables	-
d	Overall diameter of each cable	m
W	Tray width (inside)	m
H	Usable depth of the tray	m
f_{max}	Allowed fill	-
A_c	Total cross-section of the cables	m²
A_t	Cross-section of the tray	m²
f	Fill	-
n_{max}	Most cables within the allowed fill	-
W_{min}	Smallest tray width for these cables at the allowed fill	m

Method and standards

Area ratio.

Assumptions and limits

- Cables of one size.
- A pure area ratio: it ignores how round cables pack and the single-layer or diameter-sum rules that wiring codes apply to large power cables, so n_max may not be attainable in practice.

References

- Geometric fill ratio (sum of cable cross-sections / tray cross-section)

Report details

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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/electrical/cables/cable-tray-fill

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.