Number of Tubes for a Heat Transfer Area

Number of tubes in a shell-and-tube exchanger for a required area from tube outside diameter, length and passes, rounded up to a whole number per pass.

Method: A = N π d_o L

Input parameters

Unit system: SI

Parameter	Value	Unit
Heat transfer area needed	85.000	m²
Tube outside diameter	19.050	mm
Effective tube length	4.8800	m
Tube passes	2.0000	

Calculated results

Parameter	Value	Unit
Tubes for the area (exact)	291.04	
Tubes, rounded up to a multiple of the passes	292.00	
Tubes per pass	146.00	
Area provided	85.280	m²

Notes for this case

- Shell size follows from the tube count, pitch and layout tables of your design method.

Formula and method

$$N = \frac{A}{\pi d_o L}$$

Variables

A	Heat transfer area needed	m²
d_o	Tube outside diameter	m
L	Effective tube length	m
n_p	Tube passes	-
N_0	Tubes for the area (exact)	-
N	Tubes, rounded up to a multiple of the passes	-
N/n_p	Tubes per pass	-
A_{act}	Area provided	m²

Method and standards

Geometry.

Assumptions and limits

- Straight tubes.

References

- A = N π d_o L

Report details

Report reference	FCC-RWJR-MC2T (the same inputs always give the same reference)
Generated	17 November 2026, 19:36 UTC
Calculator	Number of Tubes for a Heat Transfer Area
Method last reviewed	12 November 2026
Software release	FireCAD Calc, release of 17 November 2026
Release checks	2 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/chemical/process-heat-exchangers/tube-count-from-area

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.