Tube Bundle Diameter from Tube Count and Pitch

Diameter of a circular tube bundle for a number of tubes at a triangular or square pitch, with clearance to the shell, and how many tubes fit in a given shell.

Method: Ganapathy; Industrial Boilers and Heat Recovery Steam Generators (Marcel Dekker, 2003); ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Number of tubes	500.00	
Tube pitch	76.200	mm
Layout	Triangular pitch	
Clearance added to the diameter	0	mm
Available shell inside diameter (for tube count)	1,800.0	mm

Calculated results

Parameter	Value	Unit
Bundle diameter	1,789.2	mm
Diameter with clearance	1,789.2	mm
Tubes that fit in the given shell	506.00	

Notes for this case

- Area-based estimate (Ganapathy): actual counts depend on pass partitions, tie rods and the outer tube limit; check with a tube-sheet layout.

Formula and method

$$D_b = 1.05\,p_t\sqrt{N}\ \text{(triangular)}, \quad D_b = 1.128\,p_t\sqrt{N}\ \text{(square)}$$

Variables

N	Number of tubes	-
p_t	Tube pitch	m
layout	Layout	-
C	Clearance added to the diameter	m
D_s	Available shell inside diameter (for tube count)	m
D_b	Bundle diameter	m
$D_b + c$	Diameter with clearance	m
N_{max}	Tubes that fit in the given shell	-

Method and standards

Area-equivalence.

Assumptions and limits

- Uniform pitch over the whole circle.
- The area-equivalent diameter is that of the tube field to the pitch-cell boundary, not the outer tube limit; the tube outside diameter is not an input, so allow for it in the shell clearance and check with a tube layout.

References

- Ganapathy
- Industrial Boilers and Heat Recovery Steam Generators (Marcel Dekker, 2003)
- Q8.50 (bundle diameter: D = 1.05p√N triangular, 1.128p√N square)

Report details

Report reference	FCC-SY3T-1KBM (the same inputs always give the same reference)
Generated	17 November 2026, 19:46 UTC
Calculator	Tube Bundle Diameter from Tube Count and Pitch
Method last reviewed	13 November 2026
Software release	FireCAD Calc, release of 17 November 2026
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/chemical/process-heat-exchangers/tube-bundle-diameter

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.