Reciprocating Compressor Displacement and Refrigerant Flow

Swept volume of a reciprocating compressor from bore, stroke, cylinders and speed, the refrigerant mass flow for a volumetric efficiency, and the capacity.

Method: Swept volume (π/4)D²S z N; ṁ = η_v V̇_d / v₁

Input parameters

Unit system: SI

Parameter	Value	Unit
Bore	70.000	mm
Stroke	60.000	mm
Number of cylinders	4.0000	
Speed	1,450.0	rpm
Volumetric efficiency	80.000	%
Suction specific volume From refrigerant tables at the suction state.	0.050000	m³/kg
Refrigerating effect h₁ − h₄	150.00	kJ/kg

Calculated results

Parameter	Value	Unit
Swept volume	80.356	m³/h
Actual suction volume	64.285	m³/h
Refrigerant mass flow	1,285.7	kg/h
Refrigerating capacity	15.232	TR

Formula and method

$$\dot{V}_d = \frac{\pi D^2}{4} S z N, \quad \dot{m} = \frac{\eta_v \dot{V}_d}{v_1}$$

Variables

D	Bore	m
S	Stroke	m
z	Number of cylinders	-
N	Speed	1/s
η_v	Volumetric efficiency	-
v_1	Suction specific volume	m³/kg
q_e	Refrigerating effect h₁ − h₄	J/kg
$\dot{V}_d$	Swept volume	m³/s
$\dot{V}_a$	Actual suction volume	m³/s
$\dot{m}$	Refrigerant mass flow	kg/s
$\dot{Q}_e$	Refrigerating capacity	W

Method and standards

Geometry and continuity.

Assumptions and limits

- Single-acting cylinders.

References

- Swept volume $(\pi/4)D^2S\ z\ N$; $\dot{m} = \eta_v \dot{V}_d / v_1$

Report details

Report reference	FCC-ZBBW-XKZH (the same inputs always give the same reference)
Generated	17 November 2026, 19:45 UTC
Calculator	Reciprocating Compressor Displacement and Refrigerant Flow
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/hvac/refrigeration/compressor-displacement

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.