Compressor Free Air Delivery by Pump-Up Test

Actual free air delivery of a compressor on site from the time it takes to pump a receiver of known volume between two pressures, compared with its rating.

Method: Receiver pump-up (filling) method; ideal gas

Input parameters

Unit system: SI

Parameter	Value	Unit
Receiver and pipe volume (isolated from users)	5.0000	m³
Pressure at the start of the timing	4.0000	bar g
Pressure at the end of the timing	7.0000	bar g
Time taken	105.00	s
Atmospheric pressure (absolute)	101.33	kPa
Compressor inlet air temperature	30.000	°C
Air temperature in the receiver	40.000	°C
Rated free air delivery	10.000	m³/min

Calculated results

Parameter	Value	Unit
Actual free air delivery	8.1892	m³/min
Share of the rated delivery	81.892	%

Formula and method

$$\dot{V}_a = \frac{V(p_2 - p_1)}{p_a\, t}\,\frac{T_a}{T_r} \qquad \frac{\dot{V}_a}{\dot{V}_r}$$

Variables

V	receiver and pipe volume	m³
p_1	start pressure	Pa
p_2	end pressure	Pa
t	time	s
p_a	atmospheric pressure	Pa
T_a	inlet temperature	K
T_r	receiver air temperature	K
$\dot{V}_r$	rated FAD	m³/s
$\dot{V}_a$	actual FAD	m³/s
$\dot{V}_a/\dot{V}_r$	share of rating	–

Method and standards

Mass balance on the receiver with the ideal-gas law; a site check, not the ISO 1217 acceptance test.

Assumptions and limits

- Ideal gas; uniform receiver temperature; no leaks.

References

- Receiver pump-up (filling) method
- ideal gas

Report details

Report reference	FCC-DRJH-VK4E (the same inputs always give the same reference)
Generated	17 November 2026, 19:46 UTC
Calculator	Compressor Free Air Delivery by Pump-Up Test
Method last reviewed	12 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/mechanical/compressors/free-air-delivery-pump-up-test

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.