Compressed Air Demand and Leakage — Report

DOCUMENT

Plant / project	**Example Plant**
Equipment tag / system	**CA-01**
Calculation / document no.	**CALC-39E**
Revision	**0**
Prepared by	**Your name**
Checked by	**—**
Date	**07-Nov-2026**
Calculation basis	Leakage: Load/unload timing test · Receiver sizing: Stored-air event · Free air at the stated reference conditions, corrected to the site · Isothermal pipe flow
Status	**✓ Inputs OK · ℹ️ 10 default value(s) in use: delivered capacity on load, reference pressure of the free air delivery, reference temperature of the free air delivery, ambient pressure at the site, pressure at the leaks, hours per year the system is pressurised, effectiveness of the pressure-ratio law, pipe roughness, fittings and valves, flow through the pipe**

KEY INPUTS

Input	Unit	Value used
Rated free air delivery of the compressor(s) on test	m³/min	18.00
Delivered capacity on load	%	100.0
Site altitude above sea level	m	150
Ambient air temperature at the compressor intake	°C	30.0
Compressor discharge pressure (average, gauge)	bar g	7.50
Pressure required at the point of use (gauge)	bar g	6.00
Pressure drop across dryer and filters	bar	0.50
Unregulated share of the demand without leaks	%	15.0
Average on-load time in normal production	s	55.0
Average unloaded time in normal production	s	35.0
Leak test: average on-load time	s	10.0
Leak test: average unloaded time	s	50.0
Specific power input at full load	kW/(m³/min)	6.10
Hours per year the system is pressurised	h/yr	8,000
Electricity price	per kWh	0.100
Proposed discharge pressure (gauge)	bar g	6.90
Event demand added to the normal demand	m³/min	12.00
Allowable pressure drop in the receiver during the event	bar	0.50
Pipe inside diameter	mm	80.0

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RESULTS — CAPACITY, LEAKAGE AND COST

Result	Unit	Value
Delivered capacity on load (free air)	m³/min	17.33
Average air demand in production	m³/min	10.59
Leak flow	m³/min	2.89
Leakage as share of capacity	%	16.7
Leakage as share of average demand	%	27.3
Energy lost to leaks per year	MWh/yr	146
Cost of leaks per year	USD/yr	14,640

RESULTS — PRESSURE AND PRESSURE REDUCTION

Result	Unit	Value
Discharge pressure required	bar g	6.70
Excess discharge pressure	bar	0.80
Artificial demand from excess pressure	m³/min	0.40
Energy saved per year	MWh/yr	35.4
Saving per year	USD/yr	3,542

RESULTS — RECEIVER AND PIPE

Result	Unit	Value
Receiver volume required	m³	3.69
Pressure drop with the existing receiver	bar	0.46
Pressure drop in the pipe	bar	0.199
Pipe drop as share of the discharge pressure	%	2.7

FINDINGS AND RECOMMENDATIONS

⚠️ Correct soon

Leakage of 16.7 % of the capacity is above the 10 % of a well-managed system: it costs 14,640 USD per year.

◆ Opportunity

The discharge pressure is 0.80 bar above what the end use needs: 0.4 m³/min of artificial demand. Lowering the set point to 6.9 bar g saves about 35 MWh and 3,542 USD per year.

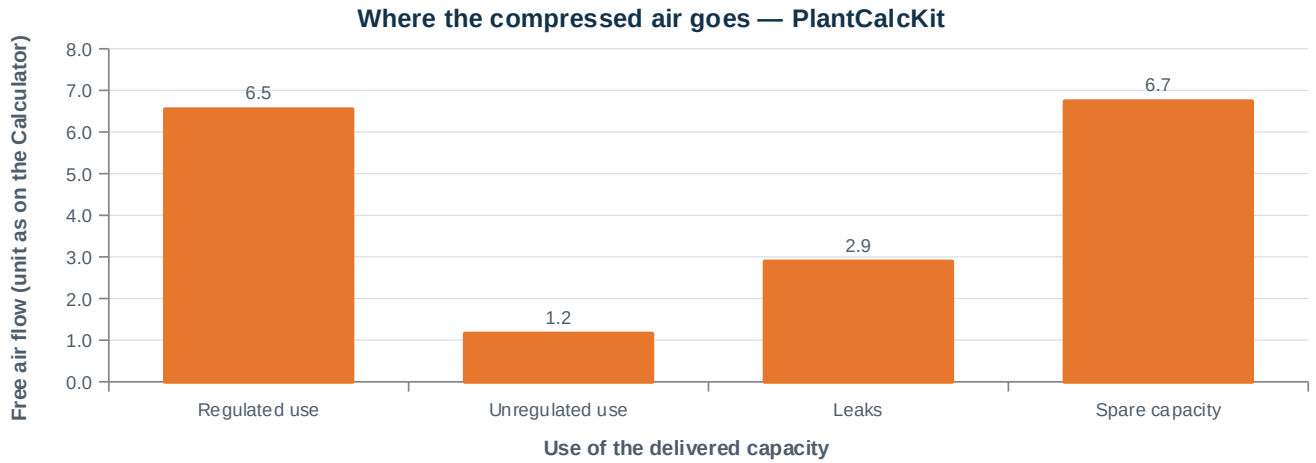
ℹ️ Note

At the site conditions the compressor delivers 3.7 % less free air (referred to the reference conditions) than its rating: size and compare machines on the corrected value.

ℹ️ Note

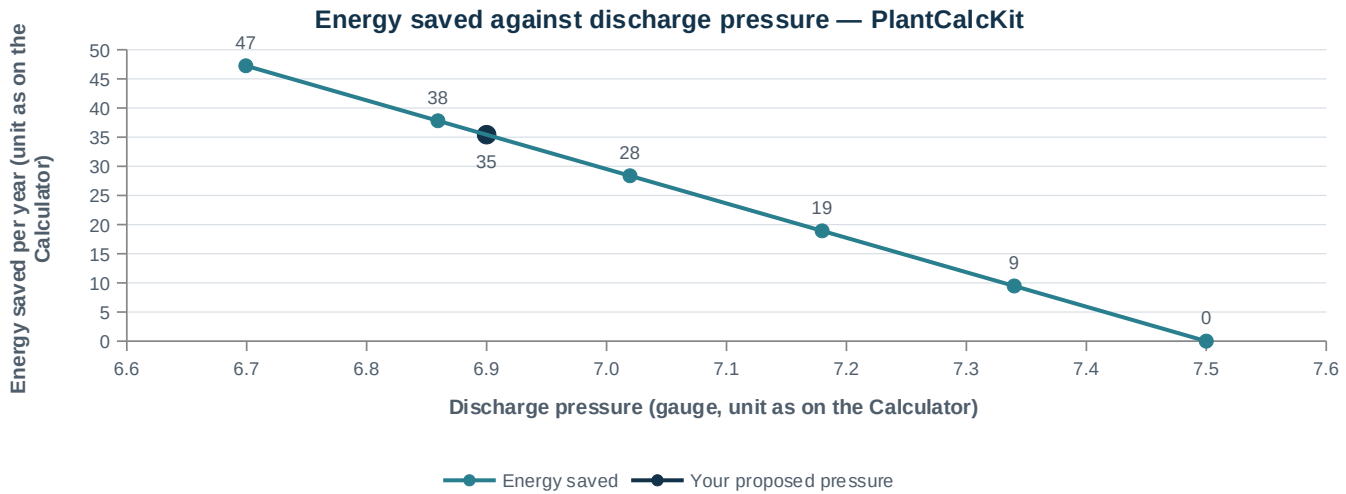
The load/unload test is valid only with every production air use off and with the same pressure band as in production. Repeat it after repairs to measure the result.

CHARTS



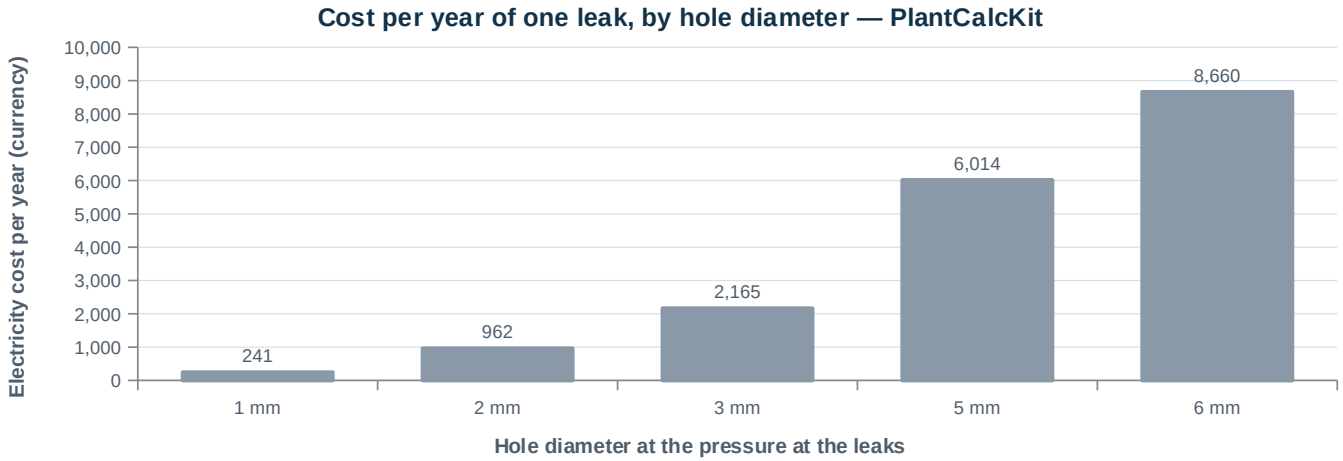
Observations — where the air goes

[Write your observations here]



Observations — pressure reduction

[Write your observations here]



Observations — cost of one leak

[Write your observations here]

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