Reciprocating Pump Acceleration Head (NPSH)

Acceleration head of the suction line of a reciprocating pump from line length, velocity, speed, pump type and liquid factor, to add to friction in the NPSH check.

Method: Ganapathy; Steam Plant Calculations Manual; ...

Input parameters

Unit system: SI

Parameter	Value	Unit
Suction line length	2.4384	m
Average flow	8.1765	m³/h
Suction line inner diameter	77.927	mm
Pump speed	360.00	rpm
Pump type	Triplex (0.066)	
Liquid factor	Deaerated water (1.4)	

Calculated results

Parameter	Value	Unit
Mean velocity in the suction line	0.47621	m/s
Acceleration head	2.0096	m

Notes for this case

- Add the acceleration head to friction losses when checking NPSH available; a suction pulsation dampener can cut L to almost nothing.

Formula and method

$$H_a = \frac{LVNC}{Kg}$$

Variables

L	Suction line length	m
Q	Average flow	m³/s
d	Suction line inner diameter	m
N	Pump speed	1/s
C	Pump type	-
K	Liquid factor	-
V	Mean velocity in the suction line	m/s
H_a	Acceleration head	m

Method and standards

Ganapathy's Q5.17 (N in rpm; any consistent length units).

Assumptions and limits

- Rigid suction line; sum segments of different size.

References

- Ganapathy
- Steam Plant Calculations Manual
- 2nd ed. (Marcel Dekker, 1993)
- Q5.17 (acceleration head; constants C and K)

Report details

Report reference	FCC-A0VH-C0A6 (the same inputs always give the same reference)
Generated	17 November 2026, 19:45 UTC
Calculator	Reciprocating Pump Acceleration Head (NPSH)
Method last reviewed	13 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/mechanical/pumps/reciprocating-pump-acceleration-head

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.