Pump NPSH and Cavitation — Report

DOCUMENT

Plant / project	**Example Plant**
Equipment tag / system	**P-201A**
Calculation / document no.	**CALC-NPSH-001**
Revision	**0**
Prepared by	**Your name**
Checked by	**—**
Date	**28-Oct-2026**
Calculation basis	NPSHa from suction system (design or check) · Open tank (atmosphere at site altitude) · loss: calculate from the suction line · Liquid: Water · NPSHR: vendor NPSH3 curve (quadratic fit) at 2,950 rpm · Recommended: ratio ≥ 1.30, margin ≥ 0.9 m (General service / water)
Status	**✓ Inputs OK · ℹ️ 7 default value(s) in use: site altitude above sea level, sum of fitting coefficients σk, pipe roughness, pump speed, recommended npsha / npshr ratio, minimum npsh margin, suction line velocity limit**

RESULTS BY CASE

Result	Unit	Rated	Maximum flow	Hot (max. temperature)	Low level
Flow	m³/h	120.0	150.0		
Liquid temperature	°C	80.0		95.0	
Liquid level above the pump centreline	m	3.000			1.000
Liquid density	kg/m³	971.8	971.8	961.9	971.8
Vapour pressure (absolute)	kPa a	47.41	47.41	84.58	47.41
Vessel surface pressure (absolute)	kPa a	101.33	101.33	101.33	101.33
Pressure head above vapour pressure	m	5.66	5.66	1.78	5.66
Static head (liquid level)	m	3.00	3.00	3.00	1.00
Suction line velocity	m/s	1.89	2.36	1.89	1.89
Suction line loss	m	0.482	0.745	0.478	0.482
NPSH available (NPSHa)	m	8.18	7.91	4.30	6.18
NPSH required (NPSHR, NPSH3)	m	4.47	5.85	4.47	4.47
Margin NPSHa − NPSHR	m	+3.71	+2.06	-0.17	+1.71
Ratio NPSHa / NPSHR	—	1.83	1.35	0.96	1.38
Recommended NPSHa	m	5.81	7.60	5.81	5.81
Verdict	—	✓ OK	✓ OK	⛔ Cavitates	✓ OK

FINDINGS AND RECOMMENDATIONS

⛔ Act now

Hot (max. temperature): NPSHa 4.30 m is below NPSHR 4.47 m at 120 m³/h — the pump cavitates (noise, vibration, impeller pitting, loss of head and flow). Raise the level or pressure, cool the liquid, cut the suction losses, reduce the flow or speed, or choose a pump with lower NPSHR (larger eye, inducer, double suction, vertical can pump).

The suction line velocity exceeds 1.5 m/s: a larger suction line lowers the losses and gives more NPSH margin, especially at maximum flow.

◆ Opportunity

Suction specific speed 8,808 is above the conservative 8,500 guide: avoid long running at low flow.

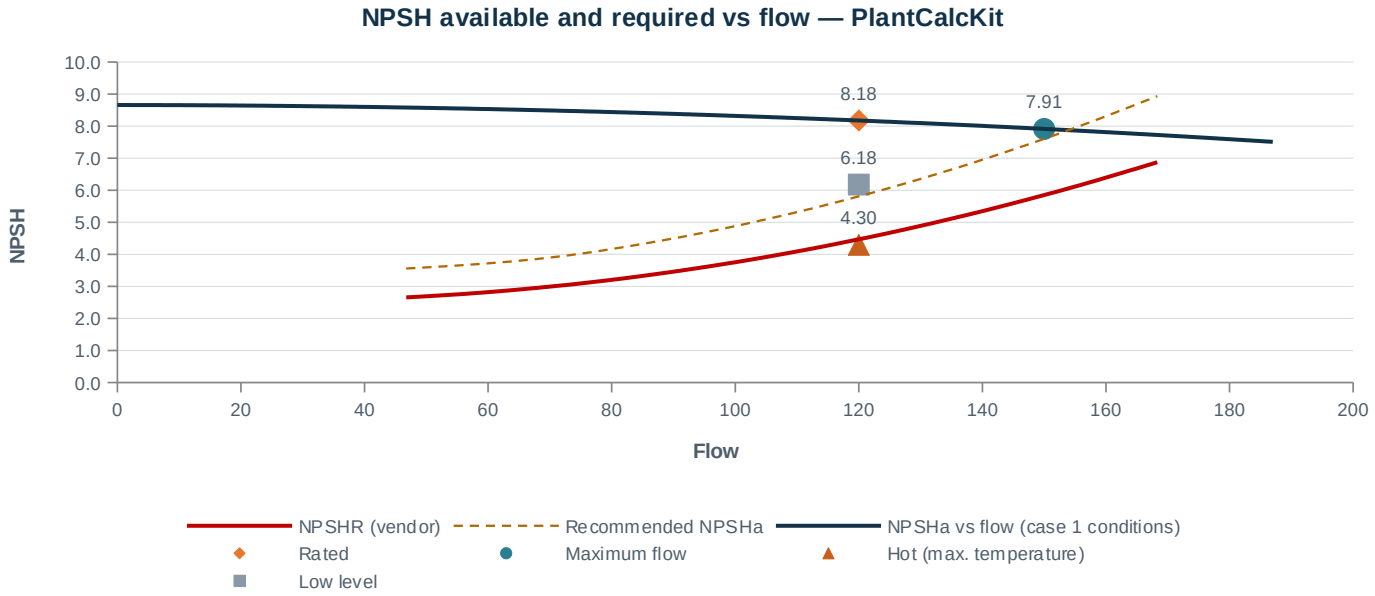
ℹ️ Note

Lowest ratio: Hot (max. temperature) (0.96) · Suction specific speed Nss = 8,808 (US, per eye), NPSHR at BEP 4.89 m

Blank input cells in cases 2–4 of the case table take the case 1 value.

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CHART (NPSH in the unit chosen for NPSHa; flow in the unit of the case flows)



Observations — NPSH

[Write your observations here]

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