

Pump System: Pipe Size Mismatch (Leaks, Flooding, or Low Flow)

Abstract

We had two opposite problems: leaks/flooding with loose, oversized joints and weak flow with narrow pipe and many fittings. We fixed this by computing total dynamic head (TDH), right-sizing pipe, and picking a pump whose curve meets our system curve at the target flow (Pumps & Systems, 2024; Hydraulic Institute, 2025; SimScale, 2025).

Introduction

Pipe diameter and fittings decide how much head is lost to friction and where the operating point lands.

Body

- Friction grows with velocity: Head loss from straight pipe and elbows roughly follows the square of velocity; small pipe pushes velocity up, so loss rises sharply (Pumps & Systems, 2024).
- System curve: We add static lift and friction losses at various flows to plot the system curve, then check where it intersects the pump curve (Hydraulic Institute, 2025).
- What we changed: We increased pipe one size on long runs, reduced sharp elbows, and selected a pump whose best-efficiency point sits near our target flow at the computed TDH (SimScale, 2025).

Conclusion

Sizing pump and pipe together stopped leaks and restored steady flow. The TDH check is quick and prevents repeat rebuilds.

References

Hydraulic Institute (2025) *Pump system curves (data tool)*. Available at: <https://datatool.pumps.org/pump-fundamentals/sys-curves> (Accessed 25 October 2025).

Pumps & Systems (2024) 'Calculating frictional head loss in pump systems'. Available at: <https://www.pumpsandsystems.com/calculating-frictional-head-loss-pump-systems> (Accessed 25 October 2025).

SimScale (2025) 'How to calculate major head loss in pipes and ducts'. Available at: <https://www.simscale.com/blog/how-to-calculate-major-head-loss-in-pipes-and-ducts/> (Accessed 25 October 2025).