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ECADEMY

BASIC HYDRAULICS AND PUMP PERFORMANCE

# CAVITATION AND ITS EFFECTS ON PUMPS

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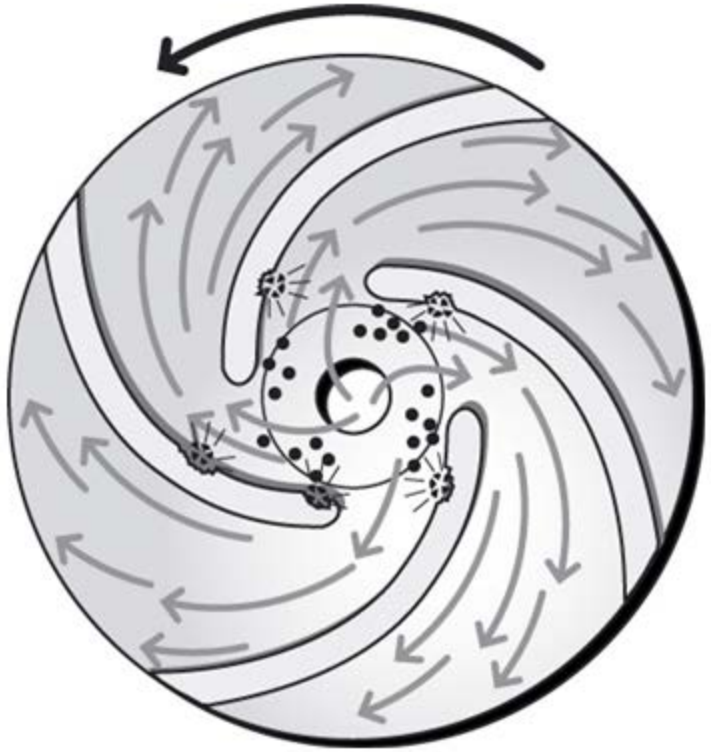
# Cavitation: Definition

Cavitation is the rapid formation and collapse of air bubbles in water as the water moves through the pump.

Cavitation is a phenomenon caused by boiling water. The water may boil locally because the pressure is dropping locally.

Cavitation is an important issue that must be addressed when working with pumps. It can be devastating for the pumps.



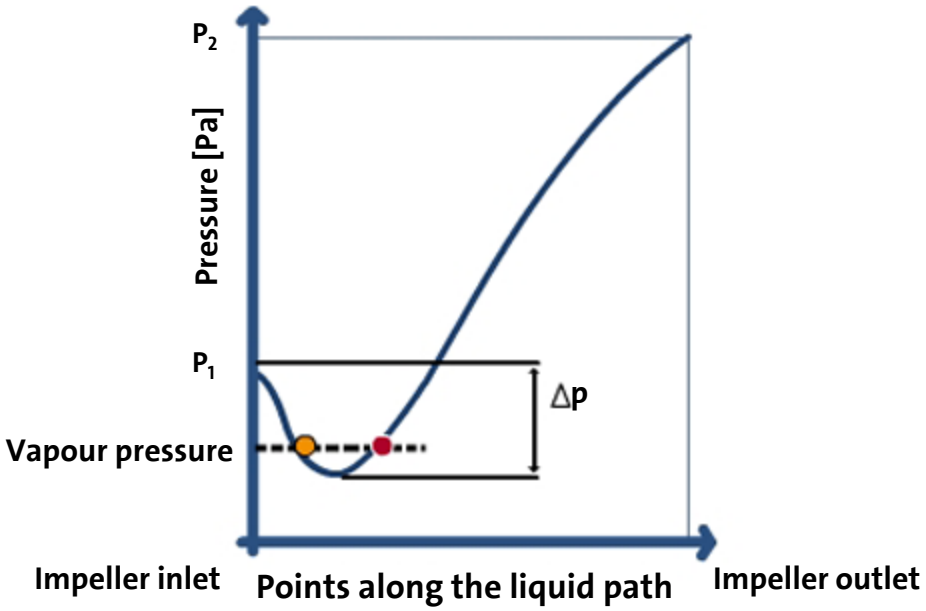
# Causes of cavitation

Locally, the water may boil as a result of drop in local pressure. This pressure drop is linked to the design of the pump impeller.

Cavitation occurs when water changes its state from vapour to water.

Water boils at 100°C at normal atmospheric pressure.

If the pressure drops to 0.1 bar, water starts to boil at 45°C.

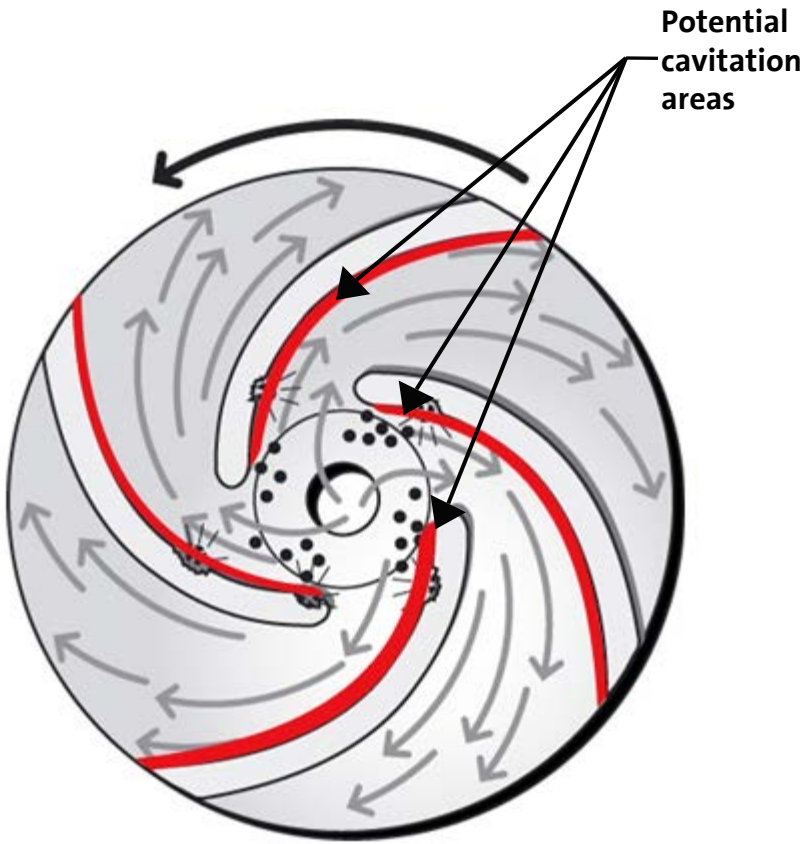


# Effects of cavitation on pumps

Cavitation can be heard as loud noise and vibration.

The vapour bubbles in the water implode causing the noise. This is followed by a heavy mechanical impact.

Cavitation causes pitting of the impeller and pump housing.



# Avoiding cavitation

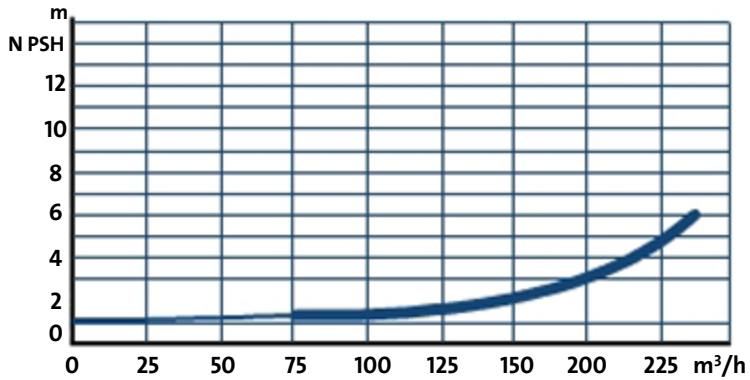
To avoid cavitation, you must first understand Net Positive Suction Head (NPSH).

The NPSH value must be added to the suction lift and friction loss in the suction pipe. Let us look at an example:

At 30°C, vapour pressure is only 0.43 m.

Assuming that friction loss is 1 m, by pumping 200 $m^3/h$ with the pump curve placed at the right, the NPSH is 3 m. Therefore, the minimum inlet pressure to avoid cavitation should be:

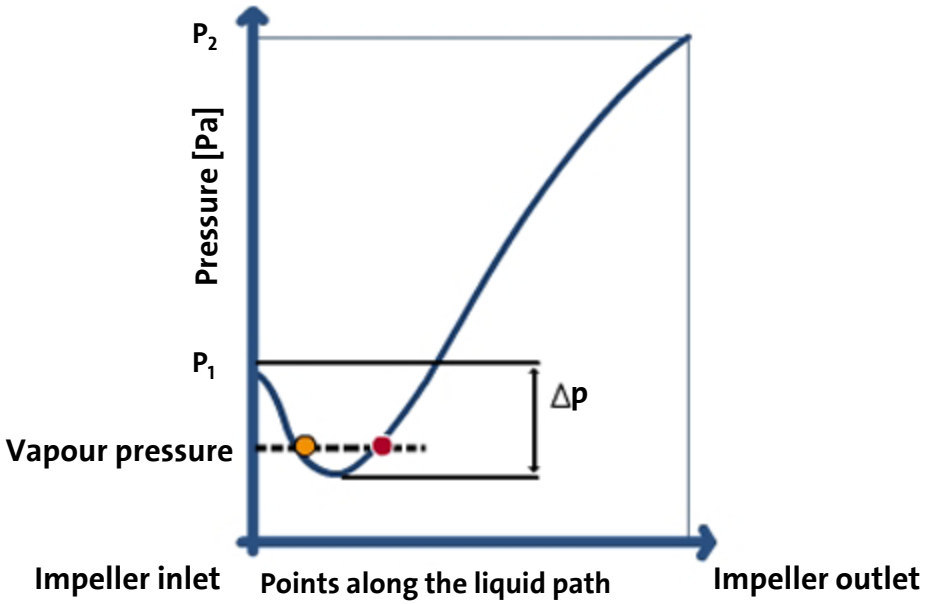
3 + 1 + 0.43 = 4.43 m.



# Avoiding cavitation (continued)

The practical approaches to avoid cavitation are as follows:

- Lower the pump inlet and increase the inlet pressure.
- Reduce friction loss in the suction pipe.
- Reduce the flow of the pump.
- Increase the elevation of the suction water level.
- If cavitation still occurs, choose another pump.



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