

Pump Starvation—Cause, Effect and Cure

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What is meant by “pump starvation”?

When the intake of liquid to a pump is less than the capacity of the pump to discharge, this condition is frequently referred to as “pump starvation.”

What is the cause of pump starvation?

It is caused by any of a number of conditions which restrict the flow of liquid to the pump, such as an inadequate size of the inlet piping, or an insufficient head pressure to force the liquid through the inlet piping, and its necessary fittings, to the pump.

Would not pump suction be effective in drawing liquid in sufficient quantity to fill the pump capacity regardless of some restriction in the inlet line?

Pump suction is effective to a degree in pumping water or oil, but this does not work out with such liquids as butane or propane, which are being handled at their boiling points. Even a slight reduction of pressure in the suction line to less than the vapor pressure established in the supply tank, will cause the liquid to boil or to “open up into gas,” as we say. Such suction pressure reduction in the intake line results in what is sometimes called a “foaming intake.”

What effect does this have on the pump capacity?

Every bubble of gas at the pump intake naturally displaces a like volume of liquid. If the intake were half gas in volume, we would discharge approximately half as much liquid as we would if the intake were solid liquid.

What is the best way to avoid this capacity reduction?

In the first place, since it is often impossible to avoid a considerable resistance to fluid flow in the intake line, it is most important to provide as much height of the tank liquid level above the pump intake as may be practicable.

It is difficult to see why the addition of a few feet of height of the liquid level above the pump would help

much when the liquid is already under a vapor pressure of 50 to 150 lbs. in the tank. Doesn't this tank pressure help to force the liquid into the pump?

Suppose you are handling 100% propane at a tank temperature of say 80° Fahrenheit, your tank gage will register 128 lbs. This figure you can find on your temperature-pressure charts, and this is the pressure at which the liquid will stop

boiling at that particular temperature. If, under these conditions you were to draw off a little gas, enough even to drop the pressure just 1 lb., or to 127 lbs. on your tank gage, the liquid in the tank would at once start to boil and to give off additional gas or vapor so as to bring the pressure on your gage right back to the 128 lbs.

This, of course, is assuming that the temperature remained constant.



