

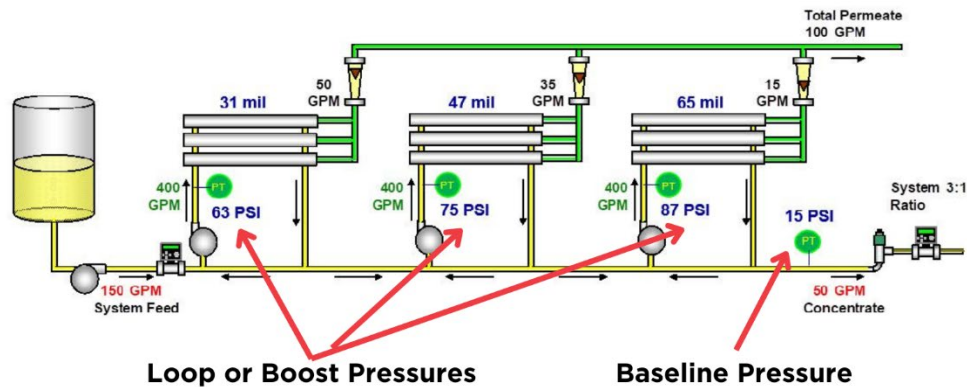
Membrane System Cross-Flow

Are you aware of how to determine if a spiral-wound membrane filtration system has proper flow for effective clean-in-place (CIP) cleaning?

Proper CIP steps, chemical amounts, and attaining the proper pH measurements are only part of the equation when evaluating the CIP of a membrane filtration system. Stated simply, without proper flow, a membrane filtration system will not effectively clean during CIP - even with the best chemicals and wash procedure!

So how do you determine whether or not each stage or loop of the membrane system is achieving proper flow when there are typically no flow meters on the individual loop pumps? The proper flow is determined by looking at the difference between the loop or boost pressure and the baseline pressure.

Note the illustration of a typical membrane system below:



Baseline Pressure: the pressure in the pipe or line that feeds all of the individual loop or stage pumps

Stage/Loop/Boost Pressure: the pressure at the discharge of each individual loop or stage pump

For each stage or loop, calculate the ΔP (delta P) per membrane element using the formula:

$$\Delta P = (\text{Stage/Loop Pressure} - \text{Baseline Pressure}) \div \# \text{ of membranes per vessel}$$

As a **general rule**, the value obtained when plugging numbers into the above formula should be 10 - 15 psi per membrane element. If the value obtained is between 10 -15 psi per membrane element, then the system should have sufficient flow for effective CIP. Do this calculation for each stage or loop in the system during an active CIP wash step. Please note, that the desired ΔP values can vary somewhat, depending on the type of membrane and the flow spacer size (31mil, 45 mil, 65 mil, 80 mil). The larger the flow spacer, the larger the ΔP value may be.

Are You Aware...?

In the illustration above, assume each membrane vessel contains 5 membrane elements. For stage/loop 2 above, the calculation would be: $(75 - 15) \div 5 = 12$ psi per membrane element. ΔP is in the desired range!

If you find ΔP values that are out of line, make a note of it and contact a RITE Team Membrane Specialist. A value outside of the norm, low or high, COULD indicate a flow issue, but it should be verified by a membrane specialist.

Reach out to the RITE team for more information on proper flow for membrane systems.