

#### EXPANSION VOLUME

Water used in a hydronic heating system expands when heated, occupying greater volume. Water, being an incompressible fluid, will require a compressible volume to expand into. In a hydronic system, we use air as this compressible volume. The air is contained in either a compression tank or expansion tank.

Compression tanks are mounted in the ceiling, do not have a membrane, and air vents into the tank. Expansion tanks on the other hand are either hanging or floor mounted with an integral bladder or membrane, air from the system is bled to the room through a vent. For the purposes of this guide, both styles will be henceforth referred to as expansion tanks.

To size the expansion tank, refer to the charts, tables or software provided by the tank manufacturer. At a minimum, the temperature change from a cold start and total water volume of the hydronic system will be required.

The expansion tank becomes the point of no pressure change in the hydronic loop. As the pumps are energized, and the heating loop warms up, the pressure as recorded at the expansion tank location will remain relatively unchanged. This assumes the expansion tank is appropriately sized and properly pressure pre-charged at commissioning.

A pump or circulator is a mechanical device that generates a differential pressure, and if a path allows, flow. Since the expansion tank pressure does not change, the pumps shall be located as to pump away from the expansion tank, in other words, the expansion tank must be mounted on the suction side of the pump.

The reason for this is to keep the system properly pressurized to prevent potentially damaging situations such as the ingress of air, cavitation of the pumps, and localized boiling in the boiler heat exchanger. Figure 1 details the proper installation location, Figure 2 shows an unacceptable installation where the system is pulled into a vacuum.

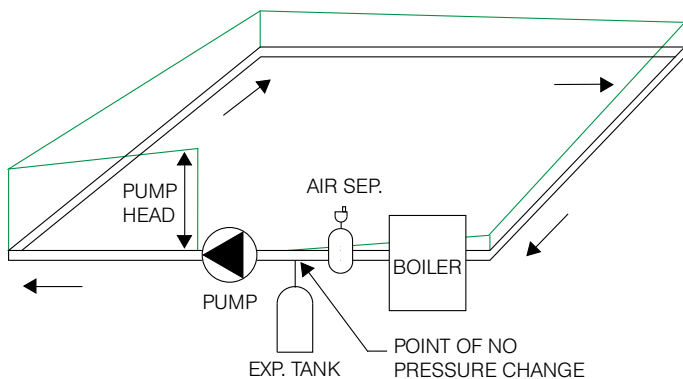


Figure 1 - Acceptable Installation

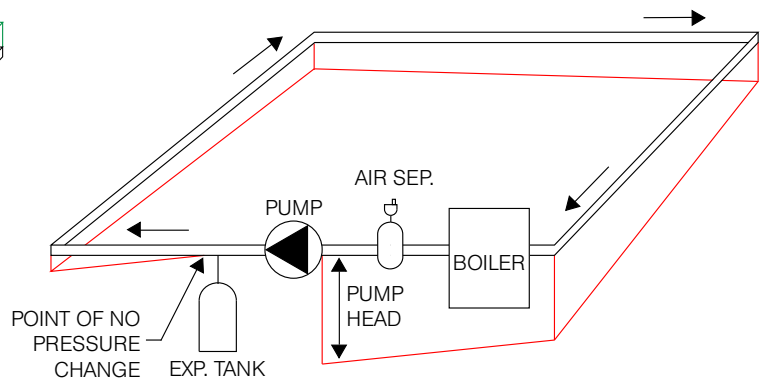


Figure 2 - Unacceptable Installation

#### AIR SEPARATION

Air separators are devices which use low velocity, centrifugal action and/or coalescence to remove air and dirt from the hydronic system. Air causes system corrosion, noise, insulates the boiler heat exchanger causing metal hot spots, and reduces pump head pressure. To ensure entrained air can get to the air separator for removal, verify pipe velocities are at least 2 ft/sec (0.61 m/sec).

Install the main system air separator at the point of lowest solubility: the lowest pressure, highest temperature point in the loop. This is typically located downstream of the boilers on the supply piping, and on the suction side of the pumps. Generally, the air separator will be at approximately the same location as the expansion tank. It may be necessary to install additional air vents at various points throughout the system.