

# Buffer Tank Sizing - Calculating Capacity

The Heat-Flo buffer tanks are a simple, cost effective way to improve overall system operating efficiency by reducing unnecessary equipment short cycling. The recommended capacity or volume of a buffer tank is based on four variables.

1. The duration of the heating or cooling source "on time". (minutes)

The desired length of "on time" for each run cycle depends on the type of equipment used. Heat pump and chiller manufacturers typically recommend a minimum of 5 to 10 minutes on time, and boiler manufacturers may recommend a minimum of 10 minutes "on time". Check with your equipment manufacturer. Generally, the longer the on time, the higher the overall operating efficiency.

2. The minimum rate of heat input. (BTU/HR)

This is based on the heat pump or chiller output, or the boiler output at the minimum firing rate if the boiler has a variable input system that ramps input down as the demand decreases.

3. The minimum system load (BTU/HR)

This is the demand placed on the system with the smallest zone calling for heat.

4. The allowable tank temperature rise. (deg. F)

This varies depending on the type of heating or cooling system used, and on the design of the distribution system. Chillers may require a tight, (6 deg. F), differential to assure good dehumidification and prevent freezing, heat pumps may require a 10 deg. F differential to maintain a high COP, and boilers with hydronic heating distribution systems may require a differential anywhere between 10 to 40 deg. F depending on the application.

The following formula determines the tank volume:

$$V = \frac{T \times (Q \text{ heat input} - Q \text{ min. heat load})}{\text{Tank temp. rise} \times 500}$$

V = Buffer tank volume (gallons)

T = desired heat source "on cycle" (min.)

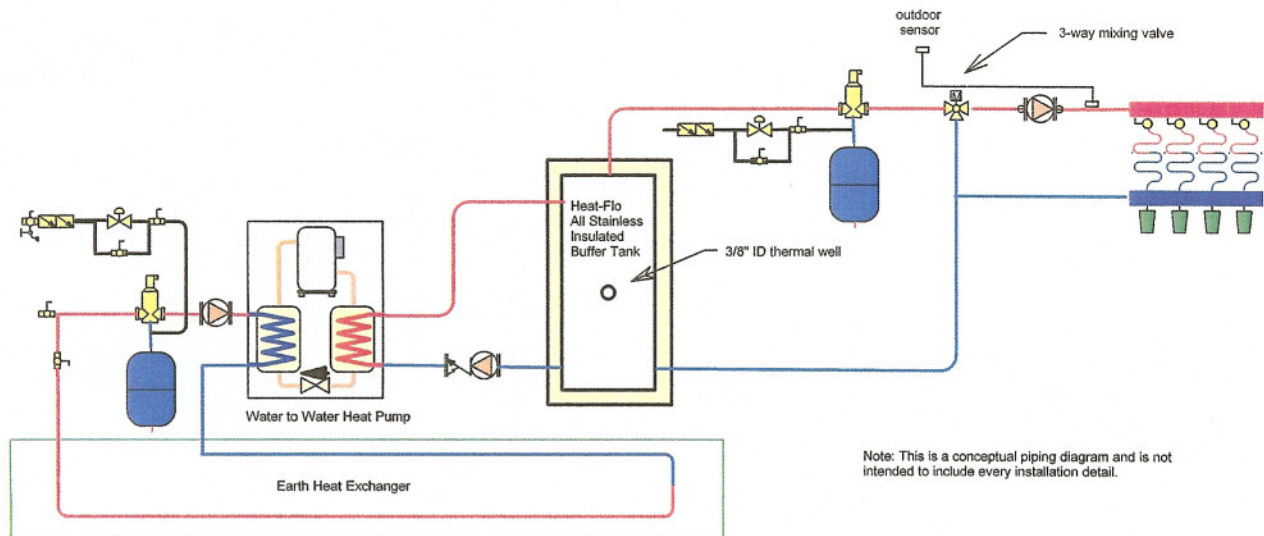
Q heat source = heat source output (BTU/HR)

Q min. heat load = heat output to minimum load

Tank temp rise (deg.F)

Water to Water Heat Pump Example: Town and Country Mechanical wants a minimum heat pump on time of 10 minutes. The heat pump output is 46,500 BTU/HR. The smallest zone is a 7,000 BTU/HR bathroom. The allowable temperature differential is 90 to 100 deg. F for the radiant heating zones.

$$V = \frac{10 \times (46,500 - 7,000)}{(100-90) \times 500} = 79.0 \text{ Gallons minimum volume. Choose the HF-80BT buffer tank.}$$



Note: This is a conceptual piping diagram and is not intended to include every installation detail.

Hydronic Buffer Tank applied to Water source heat pump application