Baffle or Sparge Pipe? Which one do you need?

Now that you've sized the buffer tank for your application, you might be wondering about the inner workings of your tank.

Your system's functionality is affected by the tank's internal design. The best buffer tanks will direct the flow to thoroughly mix the water.

This "directing" can be done using baffles or sparge pipes, but sometimes neither is needed.

So, are you in need of a baffle, or a sparge pipe? Or is your tank ok on its own?

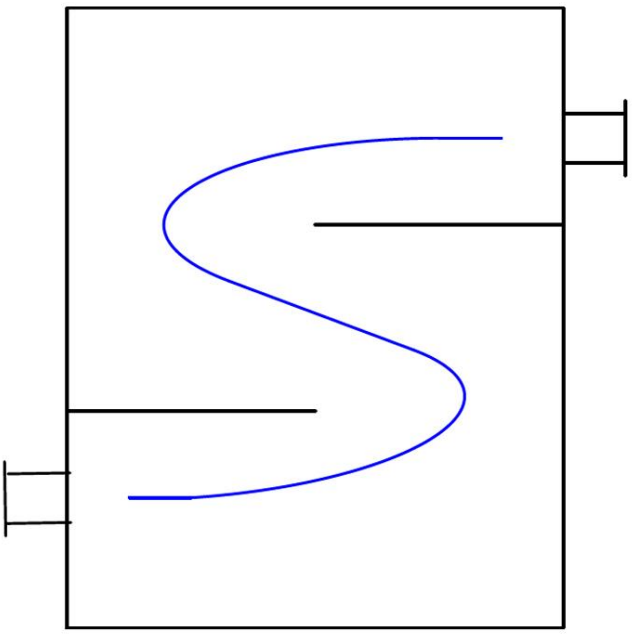
What's a baffle?

In the world of tanks, a "baffle" is simply a plate of steel welded to the inside of the tank.

Its purpose is to alter the natural flow of water coming into the tank (see Figure 1).

A baffle will ensure serpentine flow within the tank and eliminate 'dead spots' within.

Figure 1:



When do you need a baffle?

If the application of your buffer tank is to add to the total volume of the system, you need to make sure all of that extra volume is usable. The usable volume in your system is known as the effective volume.

Dead spots are areas that are under-utilised, or not utilised at all.

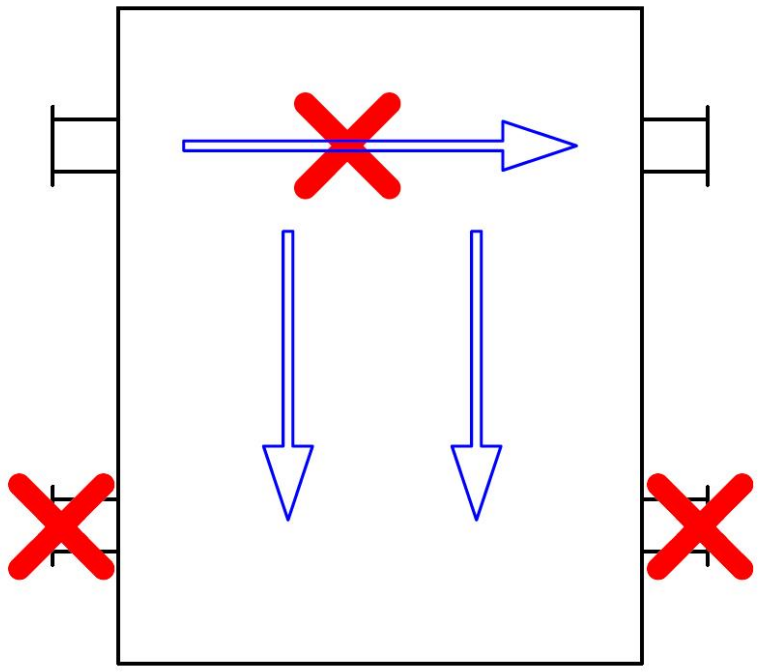
A dead spot will consist of water that is at a temperature variance from the rest of the tank. Dead spots reduce the efficiency of your system because they reduce the effective volume of the tank.

For instance, consider a flow rate of reasonable velocity coming into the tank near the top.

If the pipework has determined that the tank's outlet is also at a high level and directly opposite the inlet, you'll get a large amount of water flowing in a straight line directly toward the outlet as soon as it enters the tank (see Figure 2).

This is commonly known as "streaming".

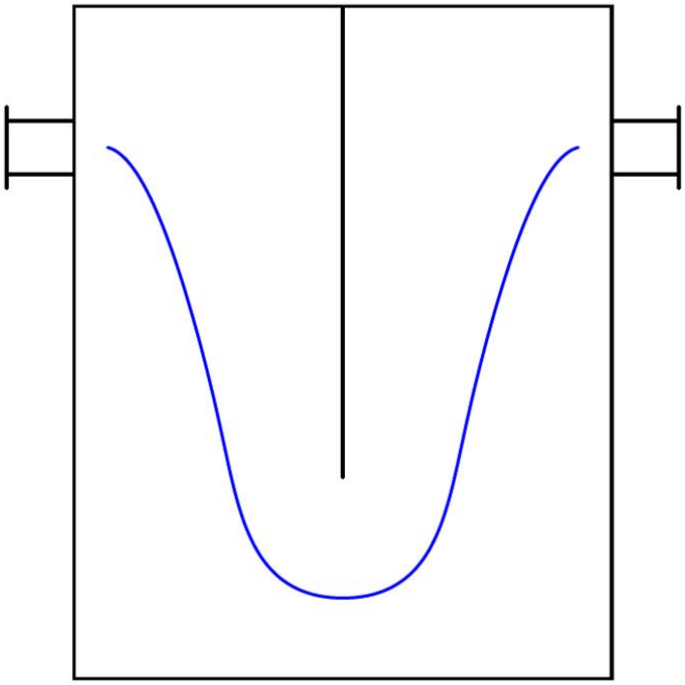
Figure 2:



In this case, the majority of the tank is rendered useless, with the water that does travel downward moving at a different temperature and velocity to the water in the rest of the system, reducing efficiency.

A vertical baffle (see Figure 3) would help maximise the extra capacity the tank offers by directing the flow of water to eliminate dead spots.

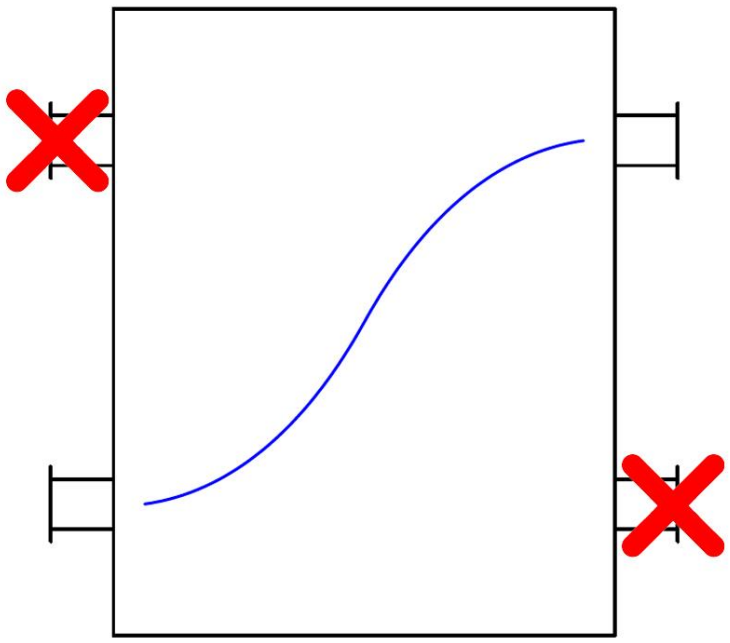
Figure 3:



When you don’t need a baffle:

If the incoming water velocity is low and you are utilizing diagonal connections, e.g. top inlet and bottom outlet diagonally opposite, the fluid path will naturally cover the whole tank, leaving minimal dead spots (see Figure 4).

Figure 4:



Another application where baffles aren't recommended is when you're using a buffer tank for storage. Here you would use a sparge pipe.

What's a sparge pipe?

A sparge pipe is used in storage tanks to reduce the velocity of water entering the tank.

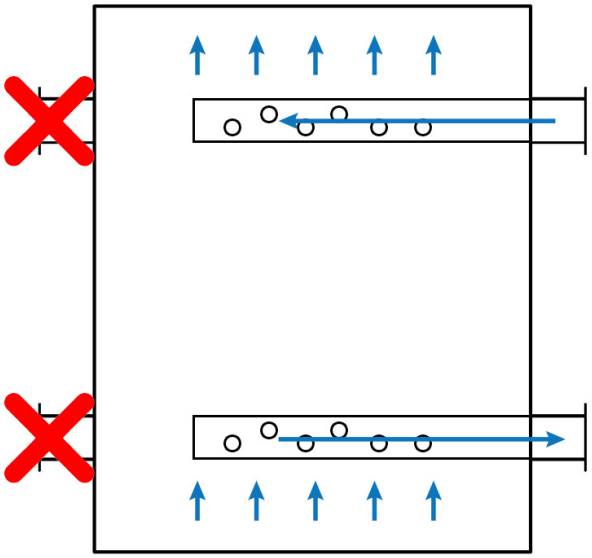
A metal pipe with holes is attached to the inlet of the tank, controlling the speed at which the water enters (see Figure 5).

The purpose of this is to slow down the change of temperature that occurs within the tank, which is called stratification.

In its simplest form, a sparge is a cylindrical pipe connected to the tank connection and protrudes across the diameter of the tank in a straight line.

More sophisticated designs are used for the larger volume chilled water storage tanks, which may be Octagonal or H shape for more effective reduction of velocity, which aids the stratification.

Figure 5:



What is stratification?

Typically, stratification is implemented when a buffer tank acts as a storage tank.

Stratification is when you have uniform cold water below the thermocline and warm water above the thermocline.

Stratification is used in situations when a power outage occurs.

A tank can continue to discharge enough low-temperature water to the equipment during the several minutes it takes to implement the temporary power from the generator.

We've embarked on a series of computer modelling and field testing to ascertain which designs work best.

These designs consider incoming water velocity, tank size and temperature gradients to achieve the desired outcome.

Read more about stratification **here**.

When do you need a sparge pipe?

When you want to slow down the temperature change inside a buffer tank, we strongly recommend going with a sparge pipe rather than a baffle.

This allows you to maximize the amount of cold water that can be used by the fan coil units in the system. Without diffusers, there will be a lot of mixing when water enters

the tank and the water leaves the tank, resulting in all your cold water mixing with the warm water.

Always clearly describe your system so the correct sparge pipe or baffle can be included.

When making an enquiry with your tank supplier, it's necessary to advise the desired function of the tank.

The function of the tank determines whether a baffle or a sparge is needed.

Failure to allow for these could result in unexpected additional costs or inferior performance if they are overlooked at the ordering stage.

To find out more about the different types of buffer tank applications, check out our article "**3 Main Functions of a Buffer Tank**".

Got more questions?

We'd love to talk! Give us a ring at 02 9748 2022 or leave us a message **here**.