

A Guide to Domestic Hot Water (DHW) Flow Rates & Pressure.

When sizing a Plate Heat Exchanger it is necessary to calculate the total demand of Domestic Hot Water required by counting all the outlets and adding all the combined flow rates together and applying any diversity factor you may consider necessary.

It will also be necessary to know the total flow rate and the overall pressure drop across the system to Select the pumps required.

Primary (Boiler or similar) KW Power Required

When the required flow rate is known it will be necessary to make sure you have the necessary KW Power available to heat the water instantaneously.

EXAMPLE:

$$\begin{array}{rcccccc} 1 \text{ l/s} & \times & 4.2 & \times & 50 & = & 210 \text{ KW} \\ \text{Flow rate} & \times & \text{Specific Heat of Water} & \times & \text{Temperature Rise } ^\circ\text{C} & = & \text{KW required.} \end{array}$$

Low Pressure Installations

A typical gravity or low Pressure Installation in a standard two storey house would have a cold feed water tank in a loft serving a hot water cylinder on the first floor.

The bathroom taps would have approximately 0.2 bar of pressure.

A shower head would have approximately 0.1 bar of pressure.

Taps on the ground floor would have approximately 0.4 - 0.5 bar of pressure.

A kitchen sink cold water tap would usually be supplied from the incoming mains water supply and anything over 1 bar would be considered high pressure.

Approximate Guide to Flow Rates for Taps and Showers

Standard basic basin taps 1/2" = 0.166 l/s

Standard basic bath tap 3/4" = 0.25 l/s

Standard basic bath mixer 3/4" tap = 1.2 l/s

Monobloc basin mixer with 10-12mm connections = 0.066 l/s to 0.083 l/s

Standard basic 1/2" kitchen sink tap = 1.2 l/s

Monobloc sink mixer = 0.13 l/s

A gravity shower on the ground floor with 0.5bar pressure could provide approximately 0.16 l/s to 0.2 l/s so always best to check with the manufacturer.

Mains Fed Systems

Mains fed systems normally operate at 2.5 to 3 bar pressure and give good flow rates in excess of 0.25 l/s to 0.416 l/s but this can depend on the size of the mains water supply pipe coming into the property.

Static and Dynamic Pressures

Static pressure is the pressure when all the taps are turned off and no water flow is occurring.

Dynamic pressure is when taps are turned on and the pressure becomes increasingly lower as more taps are opened. As the demand for water increase across the system the resistance increases because every length of pipe, valve and fitting creates more and more “frictional” resistance to the flow.

Lower resistance means less dynamic pressure reduction and greater flow and greater resistance means less flow.

Showers

Gravity showers will only be just adequate so if you want a good shower on a gravity system it will need to be pumped at a pressure of 1 bar or above for a single headed shower but if you are using body jets as well then you would need a 2.4 to 3 bar pump.

When using a pump in a shower system you must consider the size of your existing hot and cold water tanks.

An average shower time is approximately 8 to 12 minutes.

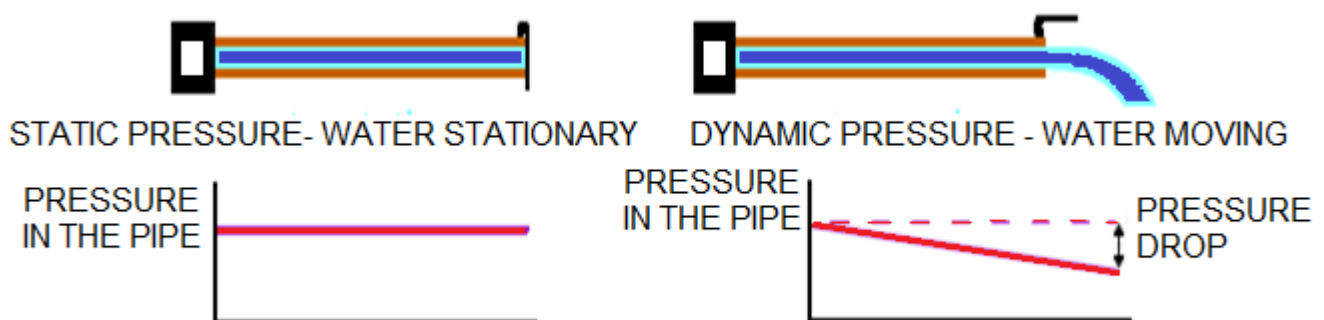
A twelve minute shower with a flow rate of 0.25 l/s and would use 180 litres of water.

With a split of 60% of hot to 40% of cold water a shower could use about 108 litres of hot water. An average domestic hot water cylinder in a 3 bedroomed house would have an approximate capacity of 117 litres so your 12 minute shower will have used approximately 92% of your hot water capacity.

Water Pressure and Water Flow

Good pressure does not mean you will get good flow and good flow does not mean you will have good pressure.

A standard dripping tap can have good pressure but very poor flow rate whereas for example a stream can have very good flow rate but very low pressure.



Note; All of the above is a guide only and actual pressure losses and flow rates should be verified with the manufacturers.