



Irrigation Siphons

– Size does matter!

Siphon Diameter

A two inch siphon is NOT the same as a 50mm siphon!

Siphon pipe diameter has a significant influence on flowrate. It is therefore important to know the exact type of siphon you are using as metric and imperial siphons specify diameter differently. Imperial siphon diameter size refers to the internal diameter (ID) whilst metric siphons refer to the outer diameter (OD) as displayed in Figure 1A and 1B.

This means that the internal diameter (the dimension that affects flow) of a metric siphon is always smaller than the specified measurement, and is always smaller than an equivalently specified imperial siphon. Because metric siphons are specified according to external diameter, the internal diameter for a given nominal siphon size varies between manufacturers due to differences in pipe wall thickness. The difference in siphon internal diameter for a range of imperial and metric siphons from

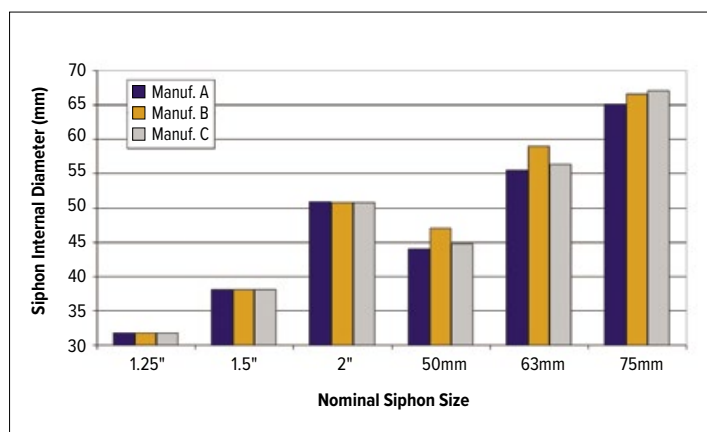


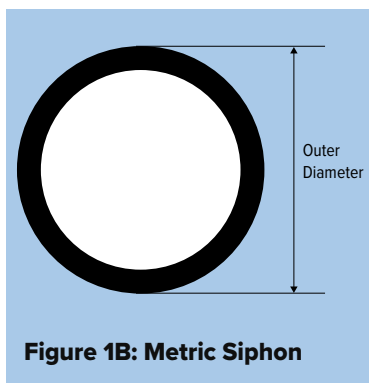
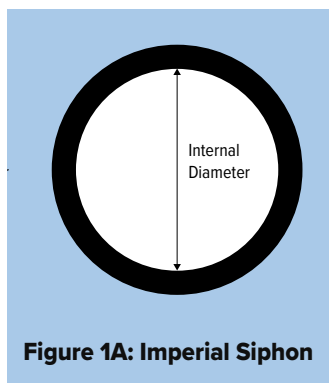
Figure 2: Difference in siphon internal diameter for three Australian manufacturers.

three different Australian siphon manufacturers is illustrated in Figure 2.

If you were to order a 50mm metric siphon (close to 2inch) you could get siphons with an internal diameter of 44mm or 47mm depending on manufacturer!

But what does this variation in internal diameter mean?

Assume that you are purchasing additional siphons to replace a portion of your existing imperial two inch siphons. However the siphons that you order are 50 mm metric siphons which actually have an internal diameter of 44mm, compared to 50.8 mm for your existing two inch siphons. If both the existing siphons and the new siphons have a length of 3.6 metres, and the operating head is 300 mm, the difference in



flow rate is 2.74 l/s (imperial two inch) compared to 1.98 l/s (metric 50 mm) – almost 30% difference! Over an 8 hour irrigation, irrigating every furrow of a 600m long field, the difference in total flow is an additional 0.37 ML/ha through the two inch siphons (Table 1).

If the two types of siphon are used together, the result will be an irrigation event with the potential for considerable differences in the time it takes furrows to come through, due to the substantial difference in siphon flow rate. Similarly, if the different sized siphons are allowed to run for the same length of time, there will be significant differences in the total volume of water applied to individual furrows. For longer fields or longer run times the difference in the total volume of water applied gets even larger!

Table 1: Comparison on flow rates for different siphon sizes.

NOMINAL SIPHON SIZE	TWO INCH	50 MM
Internal Diameter (mm)	50.8	44
Flow @ 300 mm head (l/s)	2.74	1.98
Total Flow over 8 hours (l)	78,912	57,024
Volume applied to 600m long field (ML/ha)	1.32	0.95

Because imperially sized siphons are specified according to ID, no matter which ones you get, a two inch should be a two inch. However two siphons of the same metric specification may have a different flow rate, due to differences in wall thickness between manufacturers.

Siphon Length

Length will also affect flow rates. The variation in flow rate due to siphon length increases as the flow increases. So the difference in flow rate between a 3.6 metre siphon and a 4.0 metre siphon ranges from as little as 1.6% for a 1.25 inch siphon at 100mm head up to 10.9% for a 75mm siphon operating at 400mm head. So if you have different siphon lengths, this may also impact upon the uniformity of irrigation if you are mixing the lengths together.



Siphon Charts

Siphon charts are available in [WATERpak](#). There are charts for three different siphon lengths with varying internal diameters and operating head levels. The chart provides a theoretical flowrate for each combination so irrigators can estimate the volume of water delivered to a field.

Finally, if you know the variation in flow between different siphons, you can use this to your advantage to account for existing variability. For example if your wheel tracks come through faster than the rest of your field, you could use a slightly smaller diameter siphon to make them more even.

This factsheet has been adapted from Irrigation Siphons: Size Does Matter, David Wigginton, NSW Department of Primary Industries.