



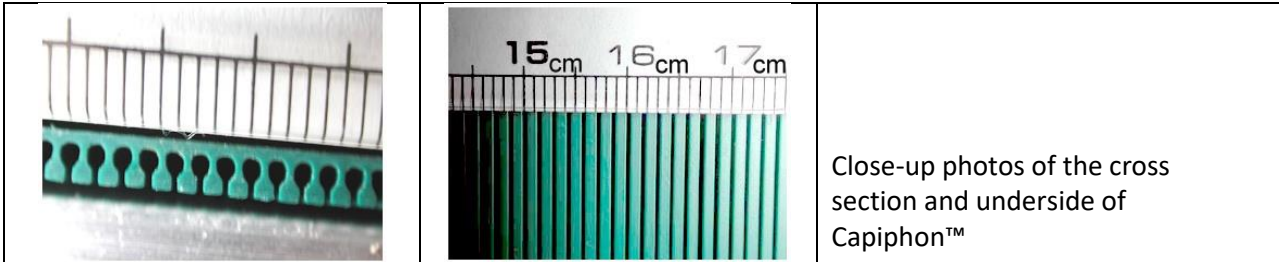
CAPIPHON
Drainage Solutions
ACN 129 296 957

CAPIPHON™ TECHNICAL SPECIFICATIONS

Product

Capiphon™ is a drainage material made from a special formulation of PVC that remains flexible and is long lasting.

Capiphon™ has a series of grooves running down its length. The grooves are omega shaped with an internal diameter of one millimetre. The opening to the grooves is approximately 0.3 mm.



Capiphon comes as

- rolls of flat belt,
- Capiphon Pipe, that is, lengths of PVC pipe (DWV) with belt wrapped around them,
- Capiphon Intercept Pipe, that is, lengths of PVC pipe (DWV) with short lengths belt inserted at intervals.

The Capiphon belt is most often sold as 10 metre rolls of 100mm belt. Other lengths and widths may be available to fit PVC of varying lengths and diameters, either assembled or ready for assembly as Capiphon Pipe

The Capiphon belt may also be sold as offcuts from the belt sold for wrapping around the PVC pipe.



A PVC collector/connector may be sold to join lengths of Capiphon Pipe

Handling & Storage

- There are no special requirements for handling Capiphon belt except for 100m rolls of 200mm belt which at 36kg when packed requires caution when lifting.
- Capiphon Pipe and Capiphon Intercept pipes may be purchased in 3m or 6m lengths, if available, and require similar storage and handling to that for the parent DWV PVC pipe.
- Both the Capiphon Pipe and the Capiphon Intercept Pipe may be fabricated on site.

SAFETY SHEET

There are no special requirements for handling Capiphon belt except for weight considerations in lifting 100m rolls of 200mm belt (36kg).

See http://www.caphon.com.au/literature_197078/Caphon_Safety_Data_Sheet

Technical Specifications

Material	PVC compound
Width	100 or 200mm ± 5% 175mm wide Capiphon Belt (6m rolls for 50mm DWV pipe) 135mm wide Capiphon Belt (6m rolls for 40mm DWV pipe) 105mm wide Capiphon Belt (6m rolls for 25mm DWV pipe) 95mm Capiphon Belt offcut (6m rolls) 65mm Capiphon Belt offcut (6m rolls) 25mm Capiphon Belt offcut (6m rolls) Other lengths and widths available on request.
Thickness	2mm ±15%
Sale unit: roll	100m, 10m, 6m
Weight (Excludes packaging)	1.7kg per m2.
Compressive strength (40%)	>3 N/mm2
Tensile strength (Longitudinal/Transversal)	> 6.0/2.0 N/mm2
Shearing strength (Longitudinal/Transversal)	> 30/15 N/mm
Acid resistance	Excellent
Alkali resistance	Excellent
Root invasion resistance	Excellent
Algal/fungal resistance	Excellent
Effective water inlet opening ratio (Slot area per metre)	>20%. Equivalent to 20,000mm2 per m2. (The minimum requirement for the Australian Standard AS2439.1 is 1,500mm2 per m2)

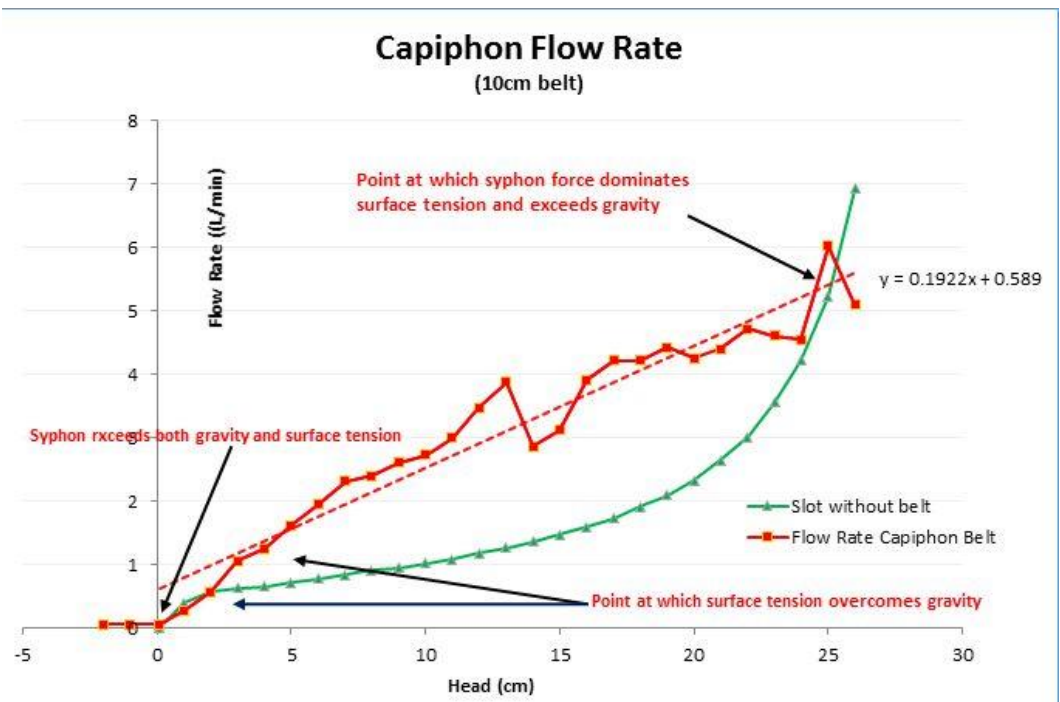
Drainflo™ (Marley) or Draincoil™ (Vinidex)				Capiphon	
Nominal Size (mm)	160	110	65	Pipe 50mm	100mm Belt
Mean outside diameter (mm)	159.5	110.2	68.4	56.4 (circum.=175)	**
Mean inside diameter (mm)	139.0	94.0	55.5	56.0	** (56.0 DWV collector)
Average weight/metre (kg/m)	0.882	0.500	0.231	0.16	0.17
Slot area/metre (mm2/m)	9,180	7,668	5,560	35,000	20,000
Slot dimensions (mm)	15 x 1.7	12 x 1.5	8 x 1.5	0.3	0.3

** Direct comparison of some features is not possible:

- Capiphon Pipe consists of 175mm of Capiphon Belt wrapped around 50mm DWV or 200mm Capiphon Belt wrapped around 65mm DWV.
- Capiphon Belt is usually inserted into 50mm or 65mm DWV.

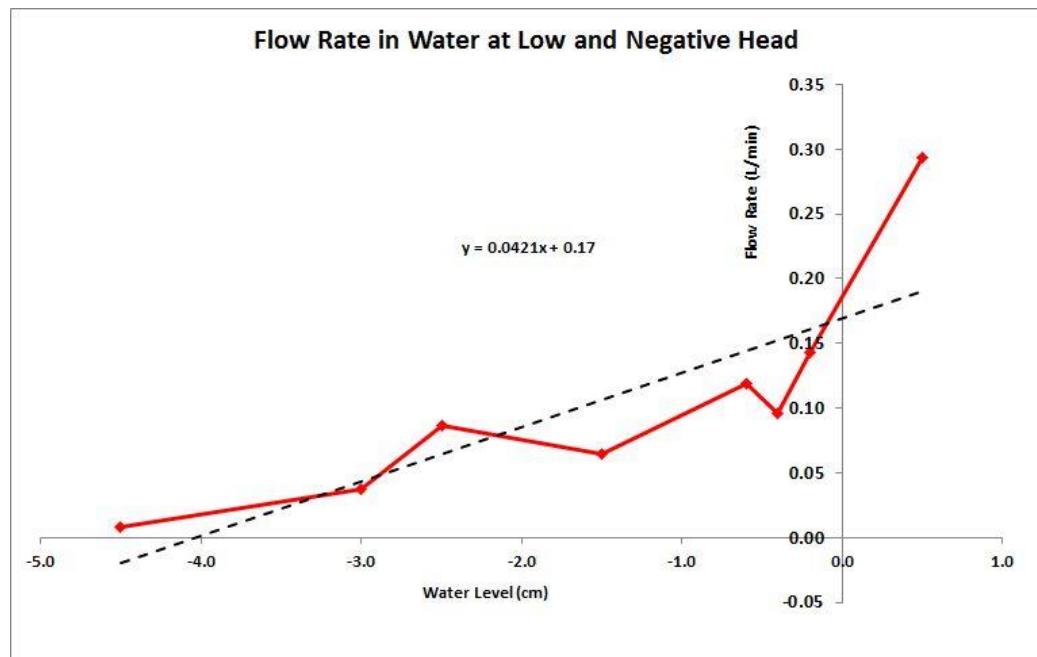
Flow rate in water:
5 to 25cm head

~200ml/min/cm head



Flow Rate in water:
5 to -4.5cm

3ml/min/cm head reflecting syphon and capillary forces overcoming surface tension.



<p>Flow rate in soil:</p> <p>a. 185cm to 10cm</p> <p>b. 5cm to -4.5cm head)</p>	<p>a. 3.2ml/min/cm head reflecting the permeability of the soil,</p> <p>b. 0.5ml/min in the range 5cm to -4.5cm head as the syphon and capillary effect dominates the surface tension in the soil.</p> <div style="text-align: center;"> </div>																															
<p>Flow Rate In Intercept Drains with Coarse Sand Back-fill</p>	<p>In many situations, Capiphon is installed as lengths (25cm 0.5m of 10cm wide belt) inserted vertically at, say, 0.5m intervals into a smooth PVC discharge pipe laid in a narrow trench and back-filled with coarse sand. In these situations, the flow rate into the discharge pipe is dependent on the area of the strips of belt, and the permeability of the sand.</p> <p>The same applies with longer lengths (up to 10m) used behind retaining walls.</p>																															
<p>Measured Flow Rates in Water, Fine Sand and Soil (Decreasing Head)</p>	<p>Capiphon Belt</p> <table border="1" data-bbox="483 1301 1358 1671"> <thead> <tr> <th>Medium</th> <th>Head (cm)</th> <th>Flow Rate (Litre per Hour)</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Water</td> <td>25 to 5</td> <td>130 to 10</td> </tr> <tr> <td>5 to -5</td> <td>10 to 0</td> </tr> <tr> <td rowspan="2">Fine Sand</td> <td>55 to 5</td> <td>96 to 24</td> </tr> <tr> <td>5 to -5</td> <td>20 to 0</td> </tr> <tr> <td rowspan="2">Soil</td> <td>185 to 10</td> <td>2.4 to 0.3</td> </tr> <tr> <td>5 to -5</td> <td>0.3 to 0</td> </tr> </tbody> </table> <p>Ag Pipe with Sock</p> <table border="1" data-bbox="483 1749 1358 1957"> <thead> <tr> <th>Medium</th> <th>Head</th> <th>Flow Rate</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Water</td> <td>35 to 2.5</td> <td>330 to 26</td> </tr> <tr> <td><2.5</td> <td>No Flow</td> </tr> <tr> <td rowspan="2">Soil</td> <td>1855 to 2.5</td> <td>2.2 to 0.28</td> </tr> <tr> <td><2.5</td> <td>No Flow</td> </tr> </tbody> </table>	Medium	Head (cm)	Flow Rate (Litre per Hour)	Water	25 to 5	130 to 10	5 to -5	10 to 0	Fine Sand	55 to 5	96 to 24	5 to -5	20 to 0	Soil	185 to 10	2.4 to 0.3	5 to -5	0.3 to 0	Medium	Head	Flow Rate	Water	35 to 2.5	330 to 26	<2.5	No Flow	Soil	1855 to 2.5	2.2 to 0.28	<2.5	No Flow
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Design and Installation Information

Capiphon™ uses capillary action and is, therefore, in dynamic equilibrium with the moisture in the soil.

- Water moves into the belt as soon as the soil reaches saturation, much earlier than when relying on gravity alone.
- The water in the grooves will flow if there is a 10mm head, or the belt is on a 2% slope. Syphonic action then pulls the water from the soil.
- Capiphon can lift pure water approximately 3.5mm.
- The syphonic lift is greater in soil and is a function of the “capillary straw” in the soil, lifting the water table some 7mm in a sandy loam, and up to 10mm in a clay loam.
- As a result, Capiphon™ removes 3-4 times more water than conventional drainage.

Capiphon Drainage™ can be used in place of any subsurface drainage system

Capiphon must be installed in accordance with installation guidelines published at

<http://www.capiphon.com.au/capiphon-installation-guides>

Building and Road Regulations and A/ANZ Standards

- Capiphon conforms to all Australian and New Zealand Standards, particularly AS/NZS 3500.3:2015 Plumbing and drainage - Stormwater drainage.
- AS/NZS As 2439.1-1981: Perforated Drainage Pipe and Associated Fittings applies to the manufacture of PVC pipe, and is not relevant..
- Capiphon also complies with [Specification for pipe subsoil drain construction specification TNZ F/2](#)

Question:

Is the installation design for Capiphon different to Ag Pipe i.e. is it a simple substitution or is there education for installers to deliver outcome?

- The simple answer is that one can use Capiphon wherever one uses Ag pipe – no additional education or training required.
- A better answer is that, in some instances, it can be a simple substitution but with performance and cost benefits if some practices are modified. These benefits will require installers to change their ways but only slightly. For example
 - Trenches need not be as wide as usual with slotted pipe.
 - Nor, in most instances, as deep.
 - There is no need for gravel/aggregate.
 - Nor geotextile sock or covering fabric which is also subject to blocking with sand and silt
 - A 25-50mm layer (horizontal or vertical) of washed coarse sand is an adequate barrier against silt and clay particles.
 - All of which applies to basement and retaining walls,
- In some other instances, Capiphon can be used where Ag Pipe cannot
 - Narrow spaces on boundaries or under existing buildings.
 - With high value assets where rapid and complete drainage is necessary.
- Most importantly, architects, landscape designers, and other specifiers, need to re-think the way that water behaves in soils and buildings etc.
 - For instance, specifying a 25mm layer of coarse sand with Capiphon under a concrete slab for a basement instead of the usual drainage layer of 300mm of gravel.
 - Using Capiphon pipe inserted under footings, or into cut faces of excavated sites.

Technical Literature (see <http://www.caphon.com.au/caphon-brochures>)

Fenn, G.R. (2012b), 'Drainage Characteristics of Capiphon™ Belt and Capiphon™ Pipe - Some comparisons with slotted pipe with sock', International Commission on Drainage & Irrigation. 63rd IEC/ 7th Asian Regional Conference, June 2012, Adelaide

Sileshi, R., R. Pitt, and S. Clark. (2010a) "Enhanced biofilter treatment of urban stormwater by optimizing the hydraulic residence time in the media." ASCE/EWRI, Watershed: Innovations in Watershed Management under Land Use and Climate Change. Madison, WI, Aug 23-27, 2010. Conference CD (peer reviewed).

Sileshi, R., R. Pitt, and S. Clark. 2010(b) "Examining the Clogging Potential of Underdrain Material for Stormwater Biofilter" ASCE/EWRI, Watershed: Innovations in Watershed Management under Land Use and Climate Change. Madison, WI, Aug 23-27, 2010. Conference CD

Yates, D, Merrick< N, Bedrossian, S, Leslie, D, and Fenn, G. (2005), 'Investigating the effectiveness of a new soil drainage and irrigation technology (Capiphon™ Drainage Belt), Part 1, Installation', New Zealand Hydrological Society, IAHR, Australian Chapter New Zealand Society of Soil Science, Auckland, New Zealand, pp. 1-10.