Rainwater Harvesting in the Caribbean

RWH Technical Fact Sheet 2A: *First Flush Diverters*

Minimizing contamination from the catchment

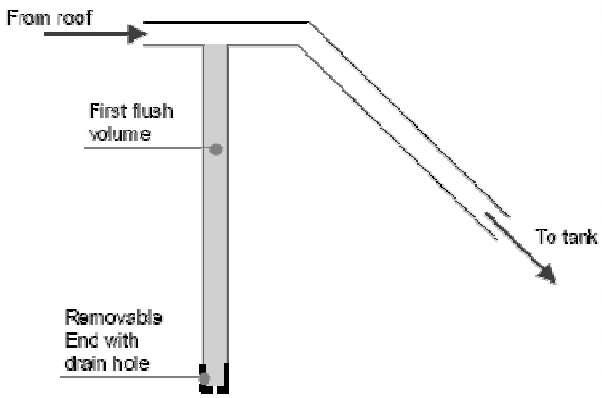
A **first-flush diverter** is a simple installation that is part of the downpipe, designed to remove the initial wash or "first-flush" that is sometimes laden with dirt, soot, animal droppings (when it first starts raining after a dry period) off the roof so that this contaminated water does not enter the tank.

The first flush diverter works by channelling the first flow down the downpipe to its base where it encounters a cap with a small drain hole (the drain hole will allow for gradually drainage else, the system will need to be drained manually). This permits the first flow of water containing the roof debris to settle at the bottom of the downpipe, with the cleaner 'later' water settling on top permitting relatively clean water to enter the tank.

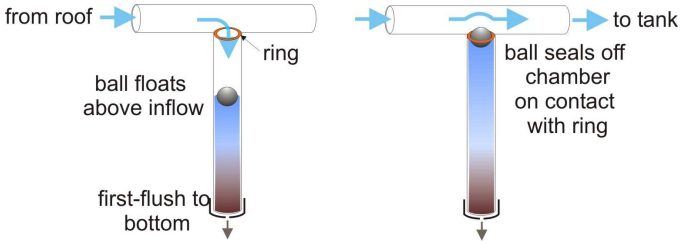
Here are three different designs.

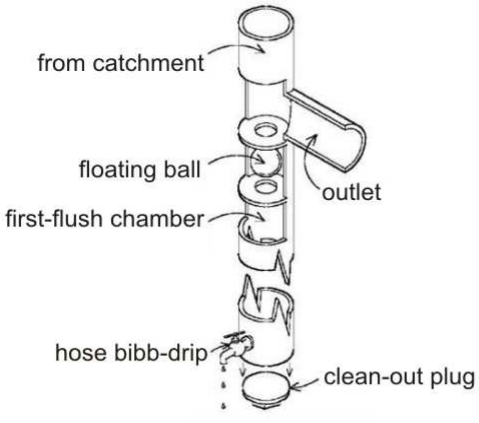
1. Simple first-flush diverter

(example in St. Lucia)



2. Float-ball mechanism first-flush systems





Source: Texas Manual on Rainwater Harvesting. On-line at http://www.texashuntfish.com/app/generic-pages/24585/Texas-Manual-on-Rainwater-Harvesting

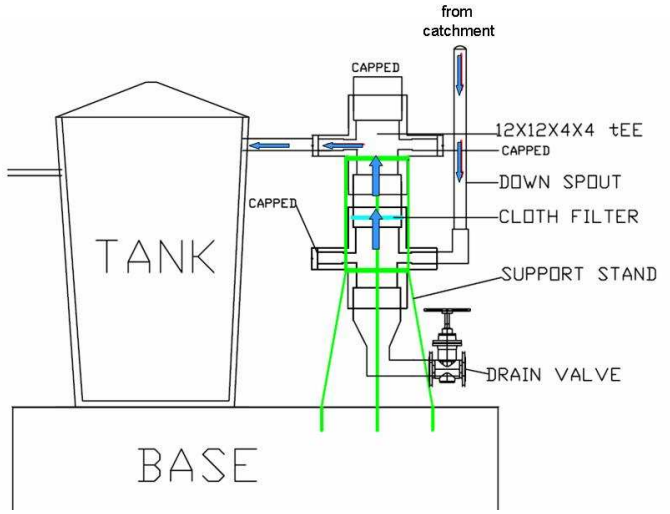
Collaborative production between the Caribbean Environmental Health Institute and the United Nations Environment Programme

For more information contact:
Caribbean Environmental Health Institute
P.O. Box 1111, The Morne, Castries, St. Lucia
Tel: 758 452-2501; Fax: 758 453-2721
E-mail: cehi@candw.lc; Web: www.cehi.org.lc

Rainwater Harvesting in the Caribbean

RWH Technical Fact Sheet 2B: *First Flush Diverters*

3. Upflow first-flush filter design. *Used in UNEP-funded, CEHI implemented RWH initiative in Antigua and Barbuda. (Design by Hastin Barnes, Antigua and Barbuda Public Utilities Authority)*



Upflow first-flush filter systems in Antigua

How to calculate the volume of water you need to divert using a first flush system

It is generally assumed that a depth of rainfall on the roof equivalent to 0.5 mm is required to wash off the accumulated contaminants. You first need to determine the area of the roof and multiply by 0.5mm (see CEHI RWH Technical Fact Sheet 1). Secondly, to determine the length of first-flush down-pipe diversion, divide the required volume of water to be diverted, by the cross-sectional area of the pipe (πr^2), where π = 3.14 and r is the radius or ½ the diameter.

(a) Volume of diverted water (litres) = roof length (m) x roof width (m) x 0.5 (mm)
(multiply answer by 0.22 to convert the value to imperial gallons)

(b1) Pipe length (m) = Volume of diverted water (l) ÷ [3.14 x pipe radius² (mm) x 0.001]

(b2) Pipe length (feet) = Volume of diverted water (gal) x 22.57 ÷ (3.14 x pipe radius² (inch)

A worked example:

Roof length = 8 metres
Roof width = 5 metres
Pipe diameter = 150 mm (6 inches), therefore radius = 75 mm (3 inches)

(a) Volume of diverted water (litres): 8 x 5 x 0.5 = 20 litres (or 4.4 imp. gallons)

(b1) Pipe length (m)= 20 ÷ [3.14 x 75² x 0.001] = 1.13 m

(b2) Pipe length (ft) = 4.4 x 22.57 ÷ (3.14 x 3²) = 3.51 ft

Source: South Pacific Applied Geoscience Commission (2004)

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E-mail: cehi@candw.lc; Web: www.cehi.org.lc

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