

Cistern



Cisterns can provide storage capabilities for water running off of a roof. The captured water may then be used for irrigation and watering purposes. This results in the “recycling” of water, which equates to drastically reduced water bills.

Cisterns are designed entirely for water quantity control, and they provide no improvements to water quality.

It is important to note that rain barrels can function like a small scale cistern, providing less storage at a reduced cost. Rain barrels are often available from local garden or hardware stores.

AT-A-GLANCE SUMMARY

Benefit

Major ●

Secondary ◐

Minor/None ○

Costs ◐

Maintenance ○

Advantages

- Reduction in water bill
- May be installed above or below ground.

Disadvantages

- If installed above ground, a cistern can be a less aesthetically pleasing BMP option
- Provides no pollutant removal

Maintenance

- Clean roof surfaces and gutters of animal droppings and leaves
- Check the cistern at least once a year for possible leaks
- Remove deposits from the bottom of the tank as periodically necessary

Costs

Commercial cisterns may be purchased from numerous vendors, and they can range in price from \$160 to \$10,000. Below is a chart of sample costs.

Material	COST, Small System	COST, Large system
galvanized steel	\$225 for 200 gallons	\$950 for 2000 gallons
polyethylene	\$160 for 165 gallons	\$1100 for 1800 gallons
fiberglass	\$660 for 350 gallons	\$10,000 for 10,000 gallons
ferro-cement	Price variable upon location	Price variable upon location
fiberglass/steel composite	\$300 for 300 gallons	\$10,000 for 5000 gallons
aluminum	Cost prohibitive for water use	Cost prohibitive for water use

Source: *Low Impact Development Center*

Design Specifications

Cistern volume is a function of roof area, precipitation required to fill the cistern, and water loss due to evaporation. A simple equation for calculating cistern volume is:

$V = A2 \times R \times 0.90 \times 7.5$ gallons/ft.3,
where

V = volume of cistern (gallons)

A2 = surface area of roof (square feet)

R = rainfall (inches)

0.90 = losses to system (no units)

7.5 = conversion factor (gallons per cubic foot)

- Cistern walls should be at least 6 inches thick
- Concrete, cast-in-place cisterns are recommended

Source: Virginia Water Resources Research Center

Suggested Resources

Additional information on cisterns can be found at the following suggested sources:

Low Impact Development Center, Inc.
Beltsville, MD
http://www.lid-stormwater.net/raincist/raincist_sizing.htm

U.S. Department of Energy
Energy Efficiency and Renewable Energy
<http://www.eere.energy.gov/femp/techassist/pdf/29267-6.7.pdf>

International Rainwater Catchment Systems Association
<http://www.eng.warwick.ac.uk/ircsa/2nd.html>