Rainwater Harvesting with HP Storm & N-12® Pipe Cisterns & RMS Systems

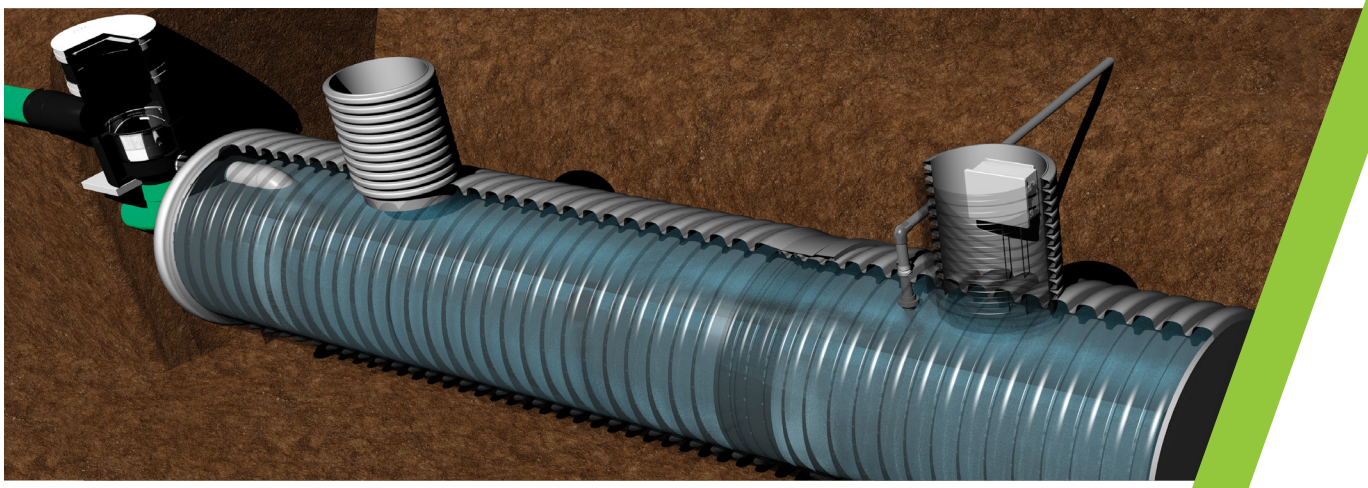
Advanced Drainage Systems (ADS) and Rainwater Management Solutions (RMS) work together to provide turn-key water harvesting solutions for commercial, industrial, and residential applications that utilize subsurface pipe cisterns designed for non potable applications.

The ADS/RMS rainwater harvesting systems use polypropylene and high-density polyethylene underground cisterns designed for non-potable water reuse applications. ADS HP (High Performance) & N-12 pipe cisterns are robust and cost-effective solutions for water harvesting and runoff control. Combine reliable pipe storage with RMS engineered systems that include filtration, pumps and post-tank treatment for any site-specific reuse needs.

Every region and every job can benefit from water harvesting solutions for both economic and environmental benefits. ADS and RMS bring the expertise to make the process simple. Contact ADS for cistern and equipment sizing based on collection area, location and end use demand.

Benefits

- Flexible & Scalable Designs
- Solution for any Water Reuse Application
- Meet Regulatory Guidelines & Sustainability Goals
- Resources from Concept to Installation and Maintenance
- Best-in-Class Water Quality & Filtration



RMS RAINWATER MANAGEMENT SOLUTIONS

ADS

Pipe Storage Specifications

Scope

This specification describes 36” (900mm), 48” (1200mm), & 60” (1500mm) HP & N-12 Rainwater Harvesting Cisterns for use in gravity-flow (non-pressure) rainwater harvesting applications.

Pipe Cistern Requirements

Polypropylene compound for pipe and fitting production shall be an impact modified copolymer meeting the material requirements of ASTM F2764.

Polyethylene pipe material meeting the requirements of ASTM F2306 and AASHTO M294.

36” (900 mm), 48” (1200 mm), & 60” (1500 mm) HP polypropylene Rainwater Harvesting Cisterns shall be fabricated from pipe meeting the requirements of ASTM F2764 for triple wall polypropylene pipe and ASTM F2881 for dual wall polypropylene pipe. N-12 HDPE Rainwater Harvesting Cisterns shall be fabricated from pipe meeting the requirements of ASTM F2306 and AASHTO M294. The inlet and bypass outlet stubs shall be 4”-12” (100-300 mm) diameter made from same plastic polymer as the cistern pipe. For water equalization between multiple cisterns, or for installing tap connections below the water storage level, the installer may use a commercially available threaded bulk head tank fitting at the bottom invert of the cistern. The cistern shall have at least one 30” (750 mm) diameter riser for maintenance purposes. Cisterns are available in configurations beginning at 20’ (6 m) length and can be customized to achieve various lengths as specified.

Joint Performance

Pipe joints shall be watertight gasketed integral bell & spigot connections meeting the requirements of ASTM D3212. Spigot shall have two gaskets meeting the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable, protective wrap to ensure the gaskets are free from debris. A joint lubricant available from the manufacturer shall be used on the gasket and bell during assembly.

Pipe bell shall have a fused and reinforced polymer composite band installed by the manufacturer.

Quality

Cisterns shall be pressure or vacuum tested by the manufacturer prior to shipment to ensure weld quality. Testing report may be available by request prior to order.

Performance Testing

In lieu of an engineer’s written specification, the joint integrity of the HP & N-12 Rainwater Harvesting Cistern may be tested in accordance with ASTM F2487, with the exception that the cistern may not be filled past the invert of the bypass outlet pipe. A maximum leakage allowance of 0.12 gallons/ft-dia/ft-pipe/24-hour may be applied to the HP cistern in lieu of written specification. Performance not meeting the requirements of this or the engineer’s written specifications shall be remedied by the installer or other party. Appropriate safety precautions must be used when field testing any pipe material.

Installation

Installation shall be in accordance with ASTM D2321 and ADS recommended installation guidelines, utilizing a class 1 or 2 (ASTM D2321) structural backfill materials. Minimum cover in traffic areas shall be 2 ft (0.6 m) as measured from top of pipe to top of rigid pavement or to bottom of flexible pavement. Maximum fill heights shall not exceed 8 ft (2.4 m).

Connection pipes, valve boxes, pumps and accessories shall be as specified on the plans and supplied by Rainwater Management Solutions (RMS).

Water harvesting system component information

Pre-tank filtration

A pre-tank water harvesting filter has one inlet, a filtered water outlet and a debris/overflow outlet. These low maintenance filters prevent unfiltered water from entering the storage system. Pre-filtration devices reduce the amount of debris entering the tank, promote a healthy tank environment, and reduce system maintenance. Pre-tank filters do not allow debris larger than 400 micron to enter the tank under any circumstances. The polyethylene constructions allows for direct burial. Load rated lids are available. Above grade installation is possible with available mounting brackets. Pressure rated stainless steel units also available. 4” (100 mm) 280-micron filtration from up to 2,100 ft^2 (195 m^2), 6” (150 mm) 280-micron filtration from up to 5,500 ft^2 (511 m^2), 12” (100mm) 380-micron filtration from up to 33,000 ft^2 (3,065 m^2).

RMS High Volume (HV) Filters are designed to filter high volumes of water from roof areas up to 200,000 square feet. Sizes range from 6” to 24” (150 - 600 mm) with bottom and side filtered water outlets available.

Smoothing inlet

Gently introduces water into the tank, helping prevent unnecessary turbulence. The inflow of water also oxygenates the tank. These functions ensure optimal water quality. 4” (100 mm) inlet & 8” (200 mm) inlet

Floating intake

Floating intake devices draw water from the tank to be sent for treatment. The intake device floats just below the surface of the water where the water is the cleanest. This ensures optimal water quality being sent to treatment. These devices come in multiple sizes and filtration intensities. 1” (2 mm) inlet, 1 ¼” (31 mm) inlet, 2” (50 mm) inlet, 1,200-micron filtration, 300-micron filtration.

Overflow device

Overflow devices skim and remove floating particles from the water’s surface, helping protect water quality inside the tank. They are designed with vermin prevention and back-flow prevention capabilities. They also prevent storm odors from entering the tank. 4” (100 mm) inlet 8” (200 mm) inlet.

Pumping systems

RMS has pumps to meet a wide variety of horsepower and voltage demands for your project requirements. RMS builds custom, manufacturer approved cooling jackets to house large pumps and motors.

RMS can provide booster pump skids when desired flow or pressure needs increased. Booster pump skids are also ideal for flooded-suction applications. RMS has partnered with industry leaders to develop a Variable Frequency Drive (VFD) for water harvesting to reduce energy spikes by powering the motor at adjustable rates. A VFD reduces wear on the pump motor and provides more consistent pressure/flow output.

Modular Treatment Skids

Standard skids are available starting at 25 gpm to 200 gpm in 25 gpm increments and can be tailored to the clients specific needs
UL/CA certified treatment systems to address the following:

- Self-Cleaning/Back-Flushing Screen Filters to remove large particulate matter.
- Cartridge/Bag Housings for secondary sediment filtration to level of 5 microns.
- Carbon filtration reduces discoloration, odor, and volatile organic compounds.
- Ultraviolet Lights to sterilize pathogens.
- Integrated Backup Water Supply to provided uninterrupted water to the end use if rainwater is depleted.
- Flow meters for both rainwater and domestic sources.
- Pressure Differential Transmitters to signal required servicing.
- Single Point Power Source connects to building power and provides a single point connection and a step-down transformer to power 120V secondary and low voltage control wiring. Units are U.L./CA listed.
- RMS 200 Controller is touch screen PLC with graphical interface to display system health and control certain components. BAS interference provided through MODBUS or BACnet.
- All equipment is mounted on an RMS skid made of powder coated carbon steel. The standard color is safety blue, but additional options available. Piping materials include copper, schedule 80 PVC, stainless steel, CPVC, and PEX.

Specialty Treatment Solutions

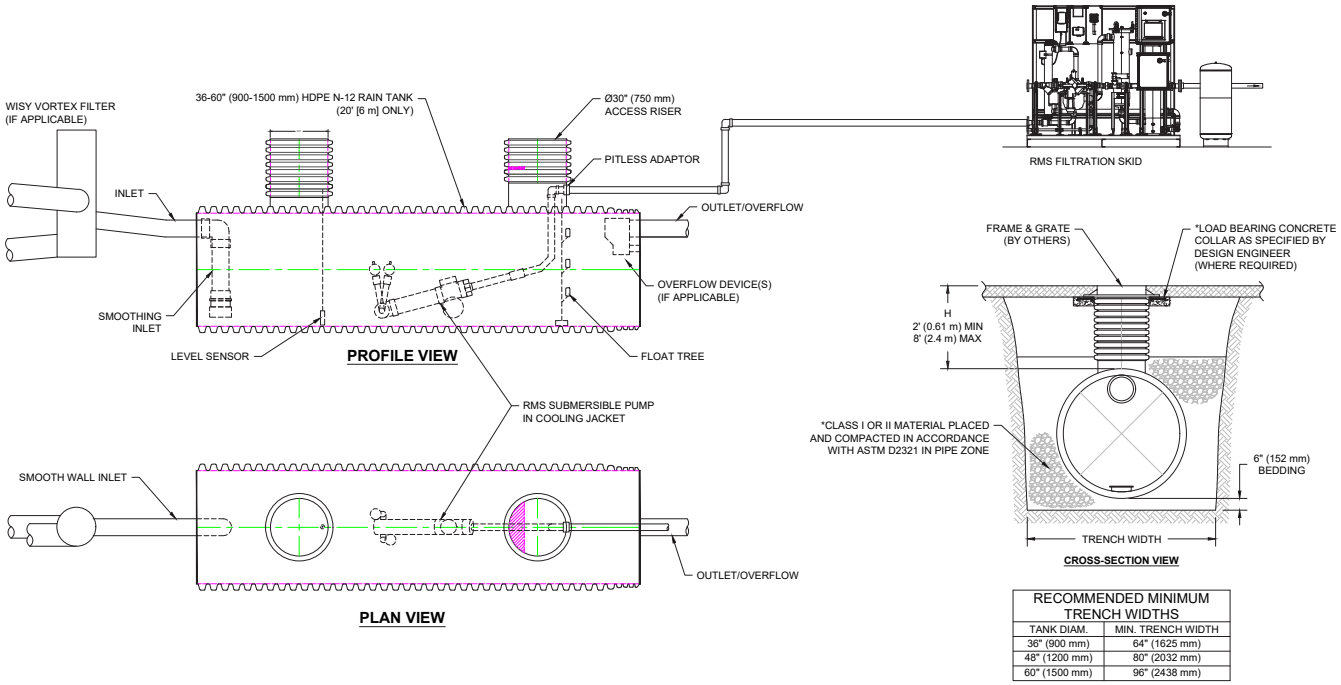
RMS Provides additional treatment solutions including ultrafiltration, reverse osmosis, ozone, and chemical injection.

Controls

RMS produced touch-screen Programmable Logic Controllers that are constructed, programmed, and testing in its UL508A Panel Shop for the rainwater harvesting industry. RMS can directly assist with any controller operation needs, no third party is necessary. The RMS controls team provides guidance throughout design design construction, operation, and maintenance.

- RMS Series 200 Controller: 10.4” (260 mm) Screen
- RMS Series 200 Mini Controller: 5.7” (142.5 mm) Screen
- Run light boxes are also available.

System Schematic Submersible Pump to Filtration Skid



RECOMMENDED MINIMUM TRENCH WIDTHS	
TANK DIAM.	MIN. TRENCH WIDTH
36" (900 mm)	64" (1625 mm)
48" (1200 mm)	80" (2032 mm)
60" (1500 mm)	96" (2438 mm)

Approximate Tank Storage Capacity

Approximate volume per linear feet of pipe for each configuration are shown in the table. This table assumes volume up to the invert of the outlet connection with no overflow device. Volumes shown may increase depending on overflow device selection. For additional information, please contact ADS.

Unit Diameter in (mm)	Connection Diameter in (mm)	Storage per Linear Foot Single Connection* gallons (liters)	Storage per Linear Foot Double Connection* gallons (liters)
36 (900)	4 (100)	49.00 (185.48)	44.58 (168.77)
36 (900)	6 (150)	46.30 (175.28)	40.32 (152.63)
36 (900)	8 (200)	43.31 (163.95)	35.16 (133.09)
48 (1200)	4 (100)	88.72 (335.84)	84.16 (318.56)
48 (1200)	6 (150)	85.58 (323.94)	79.67 (301.57)
48 (1200)	8 (200)	81.99 (310.35)	74.43 (281.75)
60 (1500)	4 (100)	139.44 (527.83)	134.65 (509.70)
60 (1500)	6 (150)	135.85 (514.23)	129.79 (491.30)
60 (1500)	8 (200)	131.73 (498.66)	124.25 (470.34)
60 (1500)	10 (250)	127.24 (481.67)	117.97 (446.56)
60 (1500)	12 (300)	122.31 (462.98)	-

* Volume to invert of outlet pipe.