

RainVault® harvesting system Installation guide



Purpose of this guide

This guide outlines the construction procedures and requirements for the installation of the RainVault® harvesting system. This document should be reviewed by supervisory personnel prior to commencing any RainVault® system installation.

The following information is of a general nature only and is not intended to be exhaustive or impose or imply any particular requirements and should be read in conjunction with project-specific documents including the contract, project specifications and project drawings. This guide is not a substitute for the project documentation.

For typical installation requirements please refer to the Humes general assembly standard drawings or Humes project-specific drawings. These are system assembly drawings only and do not constitute and should not be construed as a site layout; the site layout should be specified in project documents provided by the consulting engineer who has been engaged by the asset owner.

Where the contents of this guide differ from project specifications and drawings, supervisory personnel should consult with a Humes engineer. In the event of any conflict between the information in this guide and local legislative requirements, the legislative requirements will take precedence.

It is the responsibility of the site owner and its contractors and consulting engineers to determine the site's suitability for construction, including access for plant, equipment and other issues.

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Installation

Top:
Suitable H2
type bedding

Bottom:
String lines and
set out points

As with the installation of any large precast concrete system, detailed preparation is the key to its success. The RainVault® system is installed in the following six stages:

- Stage 1 – Prepare the site
- Stage 2 – Take delivery of the system
- Stage 3 – Inspect and prepare the modules
- Stage 4 – Place the modules
- Stage 5 – Test for watertightness
- Stage 6 – Backfill the system

Stage 1 – Prepare the site

A) Ensure there is sufficient access:

- for trucks to deliver the modules
- for inspection, preparation and storage of modules
- for cranae.

B) Place the bedding **(Critical step)**

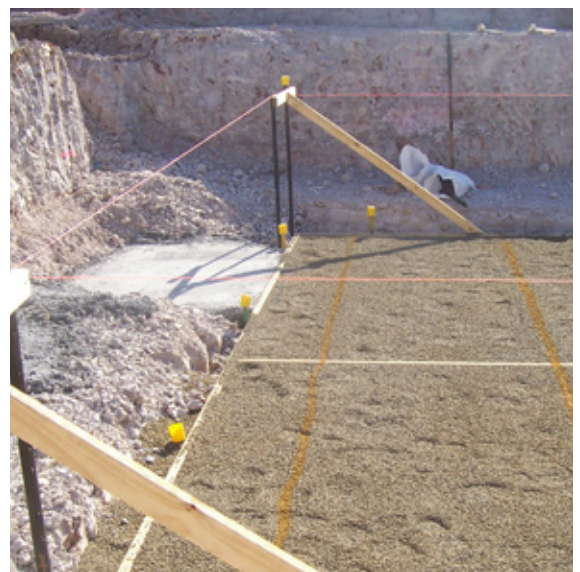
The required bedding type will be stated on the drawings provided by Humes, which will be referenced to AS NZS 3725-2007: Design for installation of buried concrete pipes. Bedding types may be different for each RainVault® system installation as they are specific to the site's ground condition, and potential applied loads on the completed system.

C) Set up string lines and set out points.

While not mandatory, string lines are very helpful to ensure accurate alignment of the modules. Set out points help ensure the first modules are placed accurately to ensure the rest of the sections align more easily.

Stage 2 – Take delivery of the system

A delivery schedule will be negotiated with the installation contractor prior to the installation date, at which time the number of modules delivered and their timing will be discussed in relation to the available storage area and proposed timeline of the installation.



Stage 3 – Inspect and prepare the modules

A) Inspect the modules

Before modules are lifted off the truck, inspect the modules to ensure there are no obvious signs of damage. Do not remove any modules that display cracks, large chips or bug holes on the module jointing areas (i.e. spigot or socket); request that they are returned and a replacement is provided. Conduct a further detailed inspection once the modules have been unloaded.

B) Unload the modules

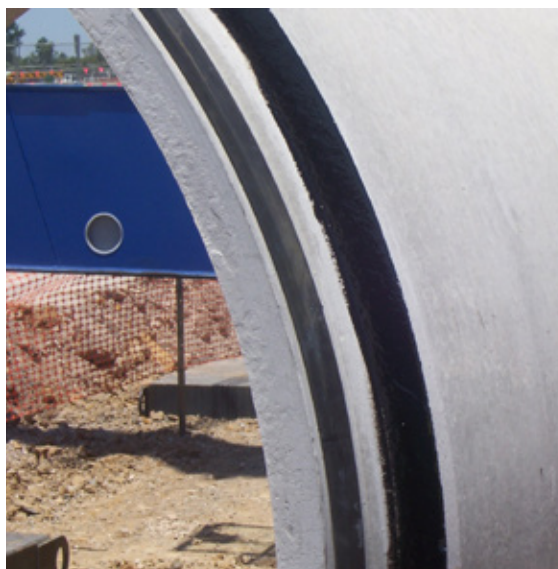
There are four lifting anchors on the top of each module; Humes uses Reid Swiftlift® anchors as standard. The drawing set provided for the system will identify the size and number of lifters; for example, “4 No. 5T lifters” means a contractor will require four 5 tonne lifting clutches capable of fitting onto Reid lifting anchors. Some of the larger diameter RainVault® systems will use 10T lifters so it is imperative that the contractor refers to the drawing set for the correct number and size.

Not all lifting clutches will fit correctly onto the Reid lifting anchors and can therefore damage or become jammed onto the anchor. It is important to check that the lifting clutch correctly fits the anchor before attempting to lift the module from the truck.

Note: Modules up to and including DN2100 will be delivered as a pipe in the horizontal orientation, while modules DN2400 and above will be delivered as a shaft and require rotation by the customer on site.

C) Install the rubber rings onto the modules

Ensure the ring (supplied by Humes) is stretched on the spigot and located correctly on the key, and that the ring does not have any twists in it. It is very important that the



Left:
Rubber ring applied
to module

ring is uniformly tensioned on the spigot by stretching and releasing the ring (in a flicking action) several times at different locations. Alternatively, this can also be accomplished by locating a screwdriver between the ring and the spigot, and then sliding the screwdriver around the circumference of the spigot at least twice. Either of these methods will evenly distribute the tension on the ring all the way around the spigot. Uneven tension on the ring can cause it to roll off the spigot during installation. Note further that failure to de-tension the ring correctly will create undue pressure on the joint surfaces which may result in a cracked socket.

Tip: Sitting the rings in the sun to soften, or even placing the bag of rings on the engine compartment of a nearby excavator, will make them easier to install, de-tension, and then pull the modules together.

D) Mastic preparation

Use a paint brush to apply the mastic primer (supplied) to both the spigot and socket of each module. Apply a bead of mastic to the outer mating faces at the spigot and socket ends of each module.

Stage 4 – Place the modules

Top:
First end module in
correct position

Bottom:
Lubrication of
second module's
spigot ring and
the bead of mastic
applied to the
outer mating face

When a multiple barrel RainVault® system is being installed it is important to install both barrels at the same time to ensure there is sufficient working room for the entire installation.

A) Place the first module

1. It is critical to install the first module accurately as alignment of the remaining modules is dependent on this. Pay detailed attention to the alignment and ensure it is installed vertically as the access risers (to the surface) will be out of alignment if this is not correct at the start. It is not possible to adjust the alignment once the second module is installed. Only a check of the vertical alignment should be necessary as the lifting locations are designed such that the module is lifted and placed in the correct vertical position.
2. Use a small piece of corflute (or similar) at the invert of each of the joints to stop bedding material from being dragged into the joint area. Note that it is necessary to dig out a small amount of bedding under the corflute otherwise the corflute will pinch between the joints.
3. Once the first module is installed correctly pack sandbags around the base to minimise any further movement, especially while installing the second module.

B) Lubricate the second module

- Lubricant is supplied with the RainVault® modules and is applied to the sockets and spigot rings.
 - The lubricant should be applied just before installation of a module as dirt will stick to the lubricant if left on for any length of time. There is no need to apply lubricant to the first module being installed. This is because it can be applied immediately prior to the installation of the second module, and it is likely that there will be some amount of time before the second module is ready to be placed.
- When the second module is ready to be installed, brush the spigot or socket clean (this will depend on the direction of installation) and apply the lubricant. On the second module, only the side to be joined should be lubricated and the other side should be left until the next module is ready to be installed. Note that this is for safety. The second module being installed will remain suspended by the crane, so it is important to ensure that the lubricant is applied before the module is lifted so no one is working under a suspended load.



C) Place the second module

1. Crane the second module into position; the crane should continue to hold the weight of the module while it is being joined to the first module to reduce the drag from the ground while pulling the modules together.

Each module will have two additional lifting anchors (one centered on each side) that are used to join the modules together. An additional four lifting clutches will also be required along with two chain blocks (otherwise known as “come alongs”). The chain blocks must be rated to the same size as the lifters e.g. 5T, although larger chain blocks can be used. The chains on the come along will not likely be long enough to make the connection between the modules when pulling them together, and as such appropriately sized slings or chains will be required to cover the shortfall in length. Typically a total effective length of 6 meters will be required for each come along.

2. Using lifting clutches attach a chain block between the additional lifting anchors on both sides of the first and second modules.
3. Pull both chain blocks together at the same pace on both sides. Call out the gap distance to each other continually so that one can stop to allow the other to catch up should the gap not be the same.
4. Appoint a spotter in front of the RainVault® module to make sure the alignment is correct. Communication is key to ensure this important step is completed correctly.
5. Pull the modules together until either the joint gap on the external side is 10 mm, or the internal gap is closed completely. As the gap closes on the outside of the modules the mastic will squeeze out of the joint – this is normal.
6. Check the internal gap widths and the alignment of the module externally before releasing the weight from the crane. The internal gap should be consistent all the way around the module’s joint, and the string line will show the alignment – this can be measured. There are three elements to the seal; the rubber ring (which is rated to provide a 90kPa seal), the mastic (externally), and an internal seal around the joint.



Top:
First and second modules being joined by chain block

Bottom:
Completed external joint less than 10mm wide. Note the mastic being squeezed out.



Top:
Sealing internal joint with Sikaflex 11FC

Bottom:
Placing additional modules

D) Seal internal joints

Once two modules have been connected seal the internal joint with Sikaflex 11FC - a fast curing one-component polyurethane sealant/adhesive with permanent elasticity. A specification sheet is supplied with the product that details the procedure for applying the product.



E) Place additional modules

Once the second module has been joined, its other side (spigot or socket) can be cleaned and lubricated ready for the joining of the next module.

Continue to install modules as per module two however when installing a third module (or more) onto the system, it is important to always pull one module onto two modules. By pulling a single module onto two modules there is no possibility of pulling apart a previous join. Combined with the crane holding the weight of the single module being pulled onto two modules the previous join will remain secure.

Repeat the addition of modules until the entire system is completely installed.



Stage 5 – Test for watertightness

Once the Sikaflex 11FC sealant has cured sufficiently (as per Sikaflex guidelines) a vacuum test should be carried out in accordance with AS3500 (Compendium) National Plumbing and Drainage Code - this method is most suitable for rounded tank walls. The system should be sealed and tested by a NATA approved contractor to -30kPa pressure and held for 10 minutes without loss.

Stage 6 – Backfill the system

Once the system has demonstrated watertightness, it needs to be backfilled as defined in AS NZS 3725-2007: Design for installation of buried concrete pipes.

Appendix

Equipment required

The following equipment is required to successfully install the RainVault® system:

- 8 lifting clutches – see drawings for correct size
- 2 chain blocks or “come alongs” the same size as the lifters (e.g. 5T chain blocks for 5T lifters)
- additional slings/chains as required
- ladders (for removing clutches after unloading and positioning)
- large screwdrivers
- large spirit level
- spade
- caulking gun.

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