

HumeFilter[®] UPT Installation guide



Purpose of this guide

This guide outlines the construction procedures and requirements for the installation of the HumeFilter® UPT. This document should be reviewed by supervisory personnel prior to commencing any HumeFilter® 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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Safety advice

The HumeFilter® UPT must be installed in accordance with all relevant health and safety requirements, including the use of PPE.

- Fall protection may be required.
- Prior to the fit out of the filters and insert, the HumeFilter® chamber is very deep and as such care must be taken when standing or walking around the structure.
- If the top slab, covers or hatches have not yet been installed, or are removed for any reason, great care must be taken to not drop anything onto the HumeFilter® insert or filters. The HumeFilter® insert and filters create a watertight seal that may be damaged under high impact loads. This type of activity voids all warranties.

Confined space entry

Entry into the HumeFilter® requires confined space entry. All equipment and training must comply to SHE regulations. It is the responsibility of the contractor or person/s entering the HumeFilter® unit to proceed safely at all times.

Personal safety equipment

The contractor is responsible for the provision of appropriate personal protection equipment including, but not limited to safety boots, hard hat, reflective vest, protective eyewear, gloves and fall protection equipment. Make sure all equipment is used by trained and certified personnel, and is checked for proper operation and safety features prior to use.



Installation

Installing the HumeFilter® UPT precast structure is in many ways the same as installing a manhole structure like a precast pump station, and should conform in general to state highway, provincial or local specifications.

Stage 1 – Prepare the site

a) Excavate

Site excavation, shoring and general site preparation for the installation of the HumeFilter® system is the responsibility of the contractor and should conform to local specifications and EH&S regulations.

- Verify the soil bearing capacity is adequate for the required load.
- Stockpile any topsoil removed during the excavation into designated areas, and do not mix this with subsoil or other materials.
- The HumeFilter® should not be installed on frozen ground.
- Excavate a minimum of 300 mm from the precast concrete surfaces, plus an allowance for shoring and bracing where required.
- If the bottom of the excavation provides an unsuitable foundation additional excavation may be required. In areas with a high water table, continuous dewatering may be required to ensure that the excavation is stable and free of water.

b) Prepare the base

Compact undisturbed sub-grade materials to 95% of maximum density at +/-2% of optimum moisture content prior to placement of crushed rock. Place granular sub-base and compact to State/Provincial and local standards as per the Engineers requirements to a depth of 300 mm. Unsuitable material below sub-grade shall be replaced per site engineer's approval. Level the sub-grade to the proper elevation. Verify the elevation against the HumeFilter® precast structure dimensions, the invert elevations, and the site plans. Adjust the base aggregate, if necessary.

Stage 2 – Take delivery of the HumeFilter®

a) Select a suitable crane

The contractor is responsible to provide a safe work site, including the appropriate selection of equipment to safely rig, lift, unload and set the HumeFilter® in place. Humes will provide the contractor with the maximum lift weight of the heaviest precast component. The lifting clutches required will be advised on the Humes manufacture drawings, which will be supplied by the contractor or crane company.

Safety considerations for crane size, placement, ground support, stability, and distance to excavation, swing and lifting radius, overhead conflicts, permits, or traffic control and other items must be carefully addressed but are outside Humes' responsibility. We encourage professional planning procedures be followed at every step.

b) Off-load and inspect HumeFilter® componentry

The contractor is responsible to safely rig and unload the HumeFilter® structure and associated components. Handle all HumeFilter® components with care. Special lift gear and rigging may be necessary to unload and handle any precast components. Do not damage the parts in handling or unloading, and if parts are damaged prior to off-loading, please call Humes immediately.

In all cases, the complete HumeFilter® has been preassembled at the factory before shipment, so when it arrives on site you can be assured that it will fit together correctly on your site. Prior to offloading, the contractor should confirm the quality and condition of the HumeFilter® components, and if there is any reason for concern, contact Humes immediately.

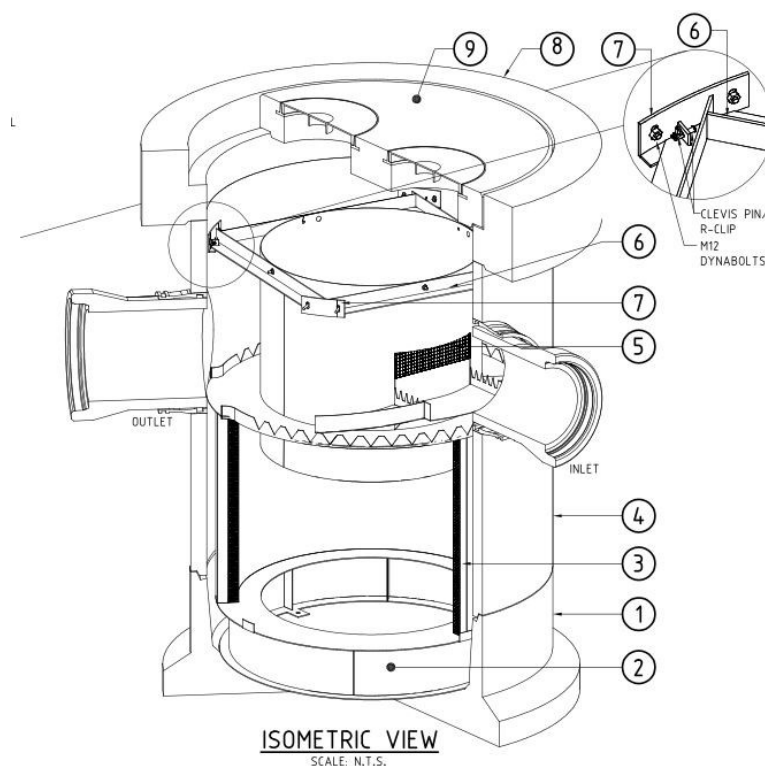
The contractor and/or site engineer are responsible for the inspection of all HumeFilter® unit components shipped at time of delivery. Any non-conformance to approved drawings or damage to any part of the system shall be documented on the shipping ticket, and Humes should be contacted immediately. Damage to the unit during and after unloading shall be corrected at the expense of the contractor. Any necessary repairs shall be approved by the site engineer/inspector.

HumeFilter® filter components list

HumeFilter® components will be documented on the approved drawings, and typically include:

1. Precast concrete base unit
2. Stainless steel plinth already fitted into the precast base unit
3. Inner and outer filters that will require lowering into position after the Precast concrete shaft is fitted
4. Precast concrete shaft – note, there may also be an additional make up shaft to achieve the correct depth to invert level
5. Stainless steel insert that sits inside the precast concrete shaft and on top of the inner and outer filters
6. Stainless steel insert support bracket
7. Support frame mounting brackets (pre-fitted to the shaft in the factory)
8. Precast concrete surround
9. Precast concrete lid

Figure 1 – HumeFilter® components



Materials to be supplied by the contractor:

- All personal safety equipment
- Crane, and structure lifting and rigging gear for off-loading and setting
- Grout — Non-shrink grout to connect the inlet/outlet pipe
- Grout — Non-shrink grout to fill all entry and exit points and any holes for lift points
- Inlet and outlet pipe plugs

Stage 3 – Install the HumeFilter® UPT

1. Obtain a copy of the final approved shop drawing and site plan to orient and verify all components and their correct placement. Ensure the inlet(s) and outlets are oriented per the plans.
2. Set the base section of the HumeFilter® on solid sub-grade.
3. Add a watertight seal (either mastic and primer or rubber ring and lubricant, or megapoxy) to each of the precast sections.
4. Verify the level and elevation of the base section before adding any additional precast shaft sections. Manhole floor shall slope 6 mm maximum across the “width”, and slope downstream 25 mm per 3.7 m of “length” (“length” is defined by a line running from the invert of the outlet through the centre of the manhole and “width” is the perpendicular to the “length”).
5. Set shaft section(s) on top of the base section. This section will contain the filters and stainless steel inserts.
6. Verify the outlet pipe invert elevation.
Note: All HumeFilter® elevations are based on the outlet pipe invert elevation (assuming the outlet pipe is centred in the hole provided). The HumeFilter® was designed and fabricated around the outlet elevation, unless otherwise stated in brackets.
7. Once the first shaft section has been installed, add the mastic, megapoxy or rubber ring and lubricant. Place the next shaft section (if required), ensuring the steps (if required) are correctly aligned.
Note: Precast sections should assemble relatively easily and should not be forced.
8. Set the surround on top of the shaft. Note the top surround’s orientation. The surround can be manufactured to accommodate a sloping site and therefore the orientation of the surround relative to the sites grade is important. The lid finish grade shall match the surrounding finish grade surface per the engineer’s plans and the Humes approved shop drawings unless otherwise directed by the site engineer.



Above: Base, shaft, and surround installed

9. Install the inlet and outlet pipes ensuring that the non-shrink grout sealing the pipes is flush with the inside walls of the precast shaft. It is important that the grout doesn’t protrude inside the shaft as it will interfere with fitting the stainless steel insert.
10. Once the watertight connection is established carefully backfill around them, compacting in “lifts” that will not deflect, disturb or damage the pipes in accordance with the site plans and specifications.
11. Contractor is responsible for sealing and making all joints, line entry and exit points watertight, and for sealing any holes used for lift points.

12. After the shaft sections and surround is installed, the outer filter is lowered onto the stainless steel plinth. There are 4 vertical tabs on the plinth to locate this filter. Next the inner filter is lowered inside the outer filter – see top image.

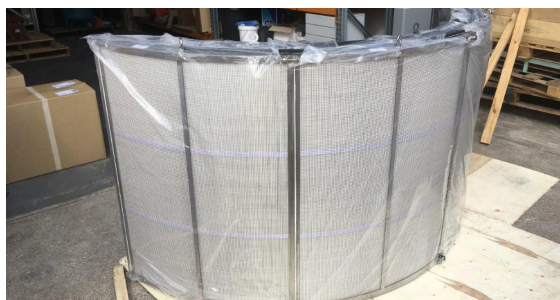
- **Note:** The UPT1200 filters and UPT1800 filters will arrive as fully circular filter elements and no assembly will be required prior to lowering them into position.
- The UPT2400, UPT3000, and UPT3600 filters will arrive on site as arced panels and require some assembly prior to lowering into position.
- Each panel will slide into the next and a bolt at the top and the bottom of each will need to be tightened. All the panels when bolted together will form a fully circular filter ready to be lowered into position. See images below.



Top:
Filters lowered into position

Middle:
Pleated cartridge panel for a UPT2400 filter

Bottom:
Multiple panels bolted together for a UPT2400 filter and bolting detail close-up



Top:
Stainless steel
insert fitted into
the shaft

Middle:
Pinned support
frame

Bottom:
Site works
completed



13. The filters are lowered into position; the stainless steel insert is lowered into the shaft and onto the top of the filters.

- **Note:** The bolts for the brackets on the wall are loose to allow for adjustment on site. The intention is for some weight (sand bags or similar) to be placed on top of the support frame, to ensure that the watertight seals are compressed correctly.
- Once the weight has been added, the brackets can be raised such that the hole on the vertical plate is above the support frame and the clevis pin/r-clip can be inserted.
- Once inserted the bracket can be lowered under its own weight so its weight is supported by the pin, and the bolts on the wall can be tightened.
- When the weight is removed from the support frame the tension of the filter seals will apply tension on the pins and lock the insert into the correct position. A Humes representative will be on site to provide guidance if required.

14. After the insert has been fitted the lid can be fitted and the site works completed

Stage 4 – Manage construction run-off

The HumeFilter® is a Post-Construction Best Management Practice for stormwater treatment, and was selected by the Engineer for post-construction stormwater quality treatment. It is the responsibility of the contractor to ensure appropriate erosion and sediment control (ESC) measures and construction BMPs are in place to protect the HumeFilter® from construction runoff, sediment and other debris until the site is fully stabilized post-construction. Methods to assist in maintaining cleanliness of the HumeFilter® during construction include:

1. Plug the inlet and outlet of an upstream flow splitter or bypass structure and downstream junction manhole to prevent construction run-off from reaching the HumeFilter®, or,
2. It is also possible to refrain from installing the filters until the unit has been fully cleaned, post-construction and the site stabilized.

The method ultimately selected shall be at the contractor's discretion and risk, knowing the HumeFilter® shall be clean and free of sediment and debris prior to filter installation.

Stage 5 – Activate the system

Once construction is complete and the site has been fully stabilized (i.e. landscaping is in place, grass growing and top course of pavement laid), the HumeFilter® system can be activated. The contractor is responsible for ensuring the HumeFilter® system is kept clean and free of debris and sediment prior to filter installation. The site shall be stabilized (non-erodible soil surfaces) and unit been confirmed to be clean and free of debris prior to filter installation and being placed in service for proper operation and performance. This delay avoids the potential of a large rainfall/runoff event that could load (and/or overload) the filters prematurely and shorten the service life for the owner.

Even so, care should be taken in project site-maintenance of erosion control practices and barriers to prevent an influx of sediment that would require vacuum truck maintenance costs prior to commissioning a new system. Even with care, some jobsite debris can enter the HumeFilter® system. All debris MUST be cleaned from the HumeFilter® PRIOR to filter installation. Keeping the system clean is the contractor's responsibility.

Depending on the methods used to protect the HumeFilter® from construction runoff, the contractor should:

1. Inspect the system to ensure maintenance is not required
2. Remove all upstream and downstream pipe plugs that were used to prevent construction runoff from reaching the structure. Standing water should be pumped out - the contractor must conform with all confined space requirements prior to entering any underground structure.

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