Green Dome® Odour Filters

Eliminate sewage odours from pump stations, air release valves, sewers & tanks

armatec ENVIRONMENTAL

Solve odour problems in pump stations with Green Domes®

Hydrogen sulphide odours from pump stations and the sewerage network are a common problem throughout our communities. Large issues are effectively dealt with by existing extract-and-treat technologies such as biological scrubbers, carbon adsorption beds, or soil bed filters.

But for smaller applications such as pump stations and air release valves, these options can be restrictively expensive to install and operate, require power and ongoing operator involvement in often remote areas, and have high maintenance costs. How do you economically resolve odour complaints from small, infrequent odour releases in all parts of the landscape without impacting the often public setting? Enter the Green Dome® Odour Filter.

Green Dome® Odour Filters are a simple low cost way to solve odour problems from sewage pump stations and the sewerage network and a key component of the no-odour sewerage network. They are purpose designed carbon bed absorbers perfect for removing odours and volatile gases (VOCs) such as hydrogen sulphide (H_2S) from air vented pump stations, air release valves, sewers and tanks.

Green Dome® Odour Filters

- Proven performance
- Proven activated carbon technology
- No fan, no noise, no power, no water, no moving parts. No smell.
- No operator input
- No regular maintenance
- Low visual impact & footprint
- Robust and corrosion resistant fibreglass construction

1

2

1: A Green Dome® Odour Filter eliminated "the smell of death" on this forest walk used by tourists and locals alike. Armatec's Managing Director Ken Holyoake received positive feedback. **2:** A Green Dome® Odour Filter installed on main pump station at Mangawhai.

Proven performance and happy communities

Business is better now for the Mangawhai Village thanks to the Green Domes®.

The Mangawhai wastewater sewer network is a combination of pressure sewers and a gravity network. The main pump station at Mangawhai Village is located just 10 metres from a gift shop. There were odour complaints from this pump station as soon as it started operation.

"The odour was bad. Customers noticed it immediately," the shop owners said. *"But now there hasn't been even a whiff since you installed it. You wouldn't even know the pump station was there."* The engineer for the Mangawhai wastewater scheme is very pleased with the result. *"The Green Domes® are working well,"* he stated.

"The odour was gone as soon as it was installed. It is just fantastic." -

Gift Shop Attendant, Mangawhai Village

Redwood Forest a more enjoyable destination

Long Mile Road in Rotorua leads to the popular Redwood Forests, a mountain biking and walking recreation area for locals and tourists alike. A roadside sewer air release valve caused a 'stink' detracting from the nature experience. In 2011, a Green Dome® Odour Filter was installed. Instantly the H_2S sewage odour was gone. Dennis, a local who walks his dog along this road every day, and was the first to congratulate Armatec for eliminating the odour immediately after installation.

"The Green Domes work. Before it was installed, we had complaints about the smell of death at this location" says Riaan Rossouw, principal engineer for Hydrus Engineering Consultants – who bikes this road frequently in the Rotorua Redwood Forest.

After Green Domes® were installed, Rotorua District Council received unsolicited phone calls of congratulations for taking care of sewage odours. This is a welcome change from the normal phone calls which are usually complaints when things go wrong.

Following the first two successful Green Domes® at Mangawhai in 2010, more than 30 installations have been done throughout New Zealand and Australia to eliminate odour releases from pump stations, air release valves and manholes.

We welcome feedback: feedback@armatec.co.nz

3

4

3: Rotorua: Dennis walks the road every day with his dog, and was the first to offer congratulations on eliminating the odour.
4: Rotorua: More locals give the Green Dome® the thumbs up. "Well done", they said. "Give yourself a raise".

Elegant & masterfully engineered

Where did the Green Dome® come from?

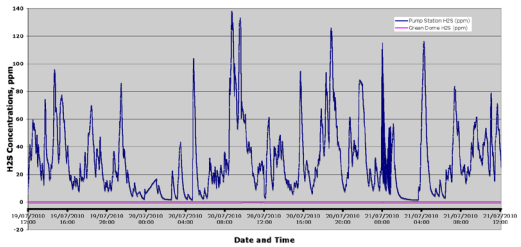
We developed Green Domes® as a simple low cost way to solve odour problems from sewage pump stations. Neighbours complained of ongoing H_2S sewage odours from two pump stations. Other technologies had not been effective, or were complex, costly and difficult to run. As soon as the Green Dome® design was offered, it was immediately ordered. Once installed, all odours ceased and the operator continues to reports ongoing total satisfaction. Since this we have helped many others using this same unique approach and the Green Domes were born.

Activated Carbon for Trusted Odour Removal

Green Dome® Odour Filters use proven carbon adsorption technology. Pellets of activated carbon capture molecules of odours and volatile gases, effectively removing them from the air passing through. No fan is required; the air is displaced through the Green Dome® as the sewage level in the pump station rises. Two types of carbon are used within the bed; one type to target H_2S and the other VOCs.

Customers Love Green Domes®

Customers are attracted to the ability of Green Domes® to totally eliminate sewage odours at low overall cost. They handle high H_2S loads, there is no fan or other moving parts to service, the units have low profile so can be positioned in streets alongside footpaths, and require minimal monitoring. The units can be installed slightly away from the odour source so that they do not get in the way of service crews, are away from traffic and are low profile for minimal visual impact. Carbon consumption is monitored with a simple dipstick.

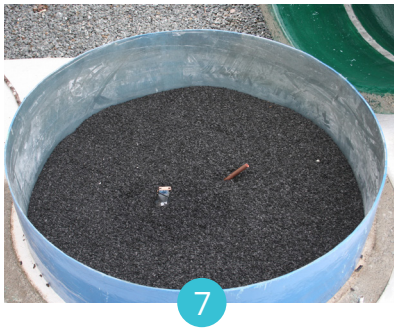


Independently Proven

The Odalog plot above confirms a Green Dome® is working as designed. The H_2S concentration in the Green Dome® outlet is the straight red line at 0.0 ppm, compared with the H2S concentration in the pump station which is the jagged blue line up to 130 ppm.

Specifically designed for the Sewerage Network

Green Dome® Odour Filters are an ideal choice when you want to eliminate odours being released from small pump stations, air release valves, manholes, and storage tanks, with simple technology that requires minimal ongoing cost and servicing.



5: The first Green Dome® at Mangawhai in 2010 solved problem odour problems for neighbours, a gift shop just 10 metres away. **6:** Green Dome® positioned alongside footpath but away from pump station to keep street clear for pedestrians. **7:** Pellets of activated carbon adsorb and eliminate sewage odours such as H_2S.

Specifying the right Green Dome

Armatec can assist with any specification and sizing requirements.

Green Domes® deliver the greatest benefit in situations where there are inconsistent air flows with varying H_2S loads present. The recommended maximum air flow rate is generally selected to match the maximum possible filling rate in the pump station or tank, or the rate of air released.

For pump stations when the filling rate is not known, choose 50% of the pumping rate as the airflow rate. Then balance the size decided on airflow per the table on the right, with the key parameters below.

Size of H_2S Load

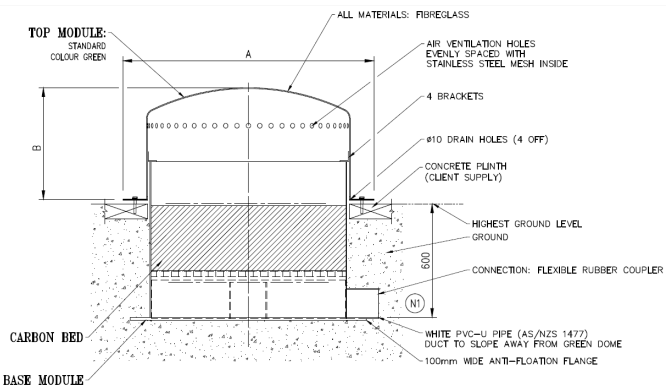
The larger the Green Dome®, the more carbon installed, the more H_2S can be adsorbed, the longer the time between carbon changes. H_2S loads are typically higher with long sewer residence times.

Sealing Of Pump Station

Sealing manhole lids increases the maximum allowable flow in Green Domes® - see table on right. Sealing lids on pump stations are needed to guarantee no odours. Green Dome® Odour Filters have a very low air velocity to minimise pressure drop, and force the air discharged to exit via the Green Dome.

Carbon Change-Out Time

Choose one size larger if you want to increase the time between carbon changeouts.



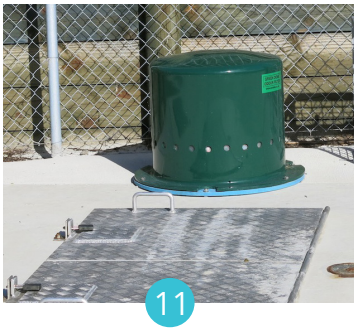
Model Number	Nom. Dia (mm)	Max Airflow (Unsealed) (l/sec)	Max Airflow (Sealed Lid) (l/sec)	Min Duct Size (mm)	Standard Carbon Load (kg)	Elimination Capacity (kg H_2S)
GDOF Mini	300	3	6	50	7	2
GDOF 12	300	3	6	50	11	3
GDOF 16	400	6	12	50	19	5
GDOF 20	500	10	20	75	30	8
GDOF 24	610	15	30	75	50	12
GDOF 30	760	30	60	100	70	18
GDOF 36	910	40	80	100	100	25
GDOF 42	1070	70	140	150	150	37
GDOF 48	1200	90	180	150	200	50
GDOF 60	1480	140	280	200	300	75
GDOF 72	1830	200	400	200	525	133

Green Domes® can be sized to suit any situation and application - or choose from our standard range of models


8


9


10


11

8: Sealing pump station lids are needed to guarantee no odours. **9:** Large Green Dome® GDOF-72 for air released from long rising main. **10:** Larger Green Dome® positioned away from pump station out of way of service crews. **11:** Smaller Green Dome® positioned on top of pump station.

Stress-free operation

No Servicing Required

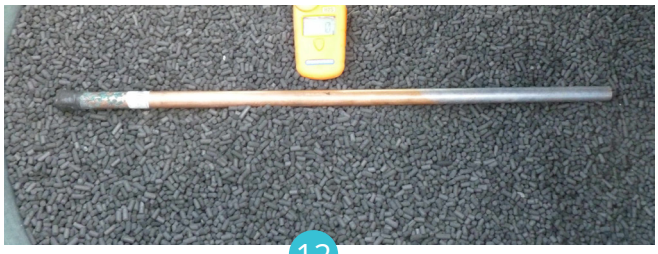
There is no fan, no moving parts and no servicing required. Green Domes® are made from robust corrosion resistant fibreglass.

Easy monitoring

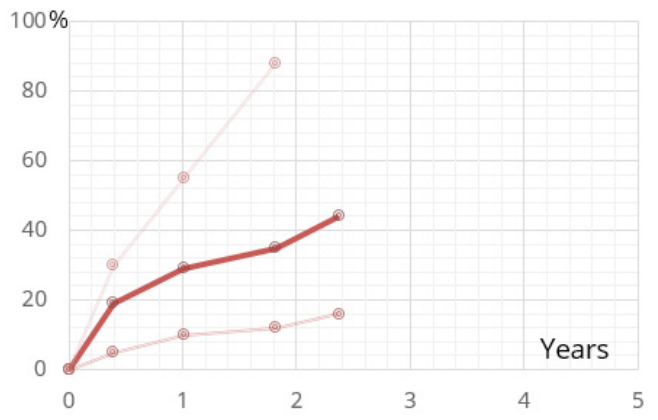
A dipstick is included in every Green Dome® to monitor carbon usage. The dipstick discolours black on exposure to H_2S. Every 6 to 12 months remove the dipstick and measure the relative length of the embedded dipstick that has discoloured, i.e. on the angle along the dipstick. For example on an embedded dipstick length of 320 mm and a blackened length of 85 mm, the depth of carbon bed saturated with H_2S is 27% (85/320). Monitoring this with time enables you can predict when the carbon will be saturated or 'used up'. We recommend you plan to replace the carbon before 90% is saturated with H_2S.

Troubleshooting Subsequent Odours

If there are still odours after the Green Dome® is operational, check the dipstick in the Green Dome®; if it has blackened from the top, this confirms that H_2S is entering the top of the Green Dome® from other sources (see Photo 12). Check all cable ducts, access ways, and other openings are sealed.



12



12: Monitoring, recording and extrapolating the rate of blackening on the dipstick estimates carbon usage rates and expected replacement dates.

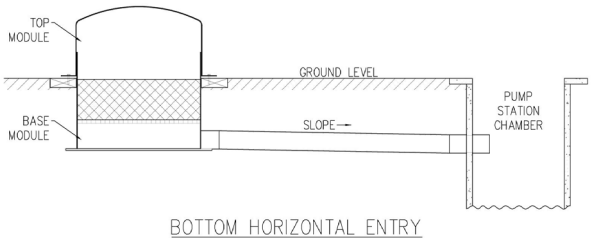
Green Domes® Odour Filters are simple and easy to install in any new or existing pumping station.

Bottom Vertical Entry Option

Bottom vertical entry may better suit the topography and preferred site of some installations. Small units can be mounted directly on top of a pump station, provided they are not in the way of pump station service crews.

Bottom Horizontal Entry Standard

All condensation drains away from the Green Dome® back to the pump station. The top of base module must be above any possible local water level so that the Green Dome® cannot flood.



BOTTOM HORIZONTAL ENTRY

Increased H_2S in vessel must be handled

As the Green Dome® is a passive breather, H_2S concentrations in the pump station or vessel may increase compared to a vented system. Check there is no resulting corrosion. Solve this by using corrosion-resistant fibreglass pump stations and vessels or apply resistant coatings to existing concrete pump stations. Both are available from Armatec.

Parts and supplies are inexpensive and simple to source

Replacement carbon and dipsticks are available direct from Armatec. We purchase carbon in bulk, then supply the precise quantity of carbon you need.

Maximum Duct Length

For all installations, Armatec recommends a maximum duct length of 10 metres in order to minimise pressure drops.

Simple & easy installation

1. Confirm the position and layout with installation contractor.
2. Unpack the pallet and store the carbon and other fittings in a safe dry place.
3. Excavate, and place the base module without the carbon in the hole to the correct orientation of the inlet duct. Check the base module is level.
4. Ensure the top of the base module precludes ground water from entering the unit, even in storms or floods.
5. Check the top module locates to the desired height. There is a maximum depth that the top module will locate down to. It can sit higher, but should sit down onto the base module by at least 100mm. If the top of the base module is still too high, this can be trimmed down by up to 100 mm later.
6. Install the inlet duct. Ensure the duct is sloped back to the pump station to ensure self-draining. Seal the penetration to the pump station or chamber.
7. Backfill the base module ensuring that the sides remain vertical. The anti-flotation flange ensures it is held in position.
8. Verify that the perforated plate, nylon mesh, and layer of foam packing used to support the carbon are in position.
9. The carbon can be installed now or later but must be kept dry at all times. Best place to keep it dry is inside the Green Dome® with the lid on. The carbon comes either loose in bags (up to 25kg in weight), or in one or more mesh bags. Follow the correct order for installing the carbon: SHM carbon goes at bottom, and VOC carbon on the top. The carbon bed should be levelled between different carbon types, and also when the loading operation is complete.
10. Install or pour a concrete support ring to which the top module will be bolted. The hold down bolts can be located in the concrete during the pour.
11. When everything is finished and all cable ducts and openings are sealed, install the dipstick and telltales supplied. These must be kept in their plastic wrapping until just prior to installation.
12. Observe safety requirements at all times. We recommend wearing gloves and dust mask when handling carbon. Wash hands when finished. Do not enter a pump station without taking confined space safety measures.


13


14

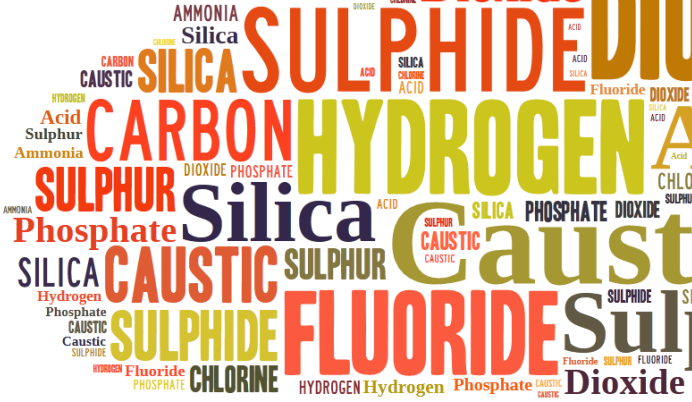
VIDEO: Green Dome® Installation
http://youtube/1OC9VII3OcU
15


16

13: Install base module to grade, ensure level, and connect duct sloped to pump station. Top must be above maximum ground water level. **14:** Check top module sits down to desired height. Base module can be trimmed later if needed. **15:** Carbon can be loaded in at any time. Keep it dry - inside the Green Dome® is a good place. **16:** Pour concrete with hold down bolts positioned to secure Green Dome® in place.

Reducing emissions to the environment

armatec ENVIRONMENTAL



We deliver world-class industrial fibreglass products and solutions to reduce emissions to the environment.

We provide full service from quality technical advice at concept through detailed design, pilot plant trials, fabrication, installation, commissioning and optimisation services.

We combine strong, established solutions with leading edge technologies to create the best outcomes for our customers. We are on the forefront of technological innovation in environmental protection as well as manufacture many best-in-class products under international licenses.

Our company is made of skilled, passionate and highly experienced specialist Chemical Engineers & Fibreglass Technicians with many years of experience between us. We have established a reputation as a leading supplier of air pollution control equipment and industrial fibreglass products, with a reputation for highest quality products for tough environmental and corrosion resistant applications.

Air Pollution Control
Hoods, Covers, Fans, Ducting, Scrubbers, Void Towers, Venturis, Strippers, Stacks, & more

Odour Control
Carbon Bed Adsorbers, Biological Scrubbers, Wet Scrubbers, Green Dome® Odour Filters

Surface Protection
Coatings, Linings, Floorings & Grouts

Wastewater Management
Manholes, Pump Stations, DAF & IAF, Clarifier Components, Flumes, Vortex Dropper Formers, Phos/Algae Removal & more

Chemical Containment
Tanks, Piping, Drainage, Sump liners & more

xylem
Let's Solve Water

Xylem are distributors of the Green Dome® Odour Filter

P: 13 19 14
E: Enquiry.au@xyleminc.com
W: www.xylemwatersolutions.com/au