

Waterless Sanitation

ZerH₂OTM

Safe, Sealed Containment of Faecal Matter Until Dry

The ZerH₂O Waterless Toilet addresses the need for safe, sealed, sustainable, cost-effective sanitation; providing human dignity; while conserving and protecting water resources and the environment. It directly addresses the South African Millennium Development Goals (MDGs).



Waterless Sanitation
ZerHOTM
2

PURPOSE OF THE ZerH₂O TOILET

- Completely eliminates the use of water in sanitation infrastructure.
- Provides safe containment and drying (sterilising) of human faeces.
- Acts as in-house toilet for families (maximum 6-10 users per unit).
- Creates entrepreneurial opportunities in communities.



Easy Waste Removal

Urine Diversion



The toilet pan has a urine diversion, which routes the urine to a simple soak-away. A separate male urinal is also supplied.

BENEFITS OF THE ZerH₂O TOILET

- Provides acceptable sanitation where water-borne sewerage is not a viable option.
- Uses air and sunshine to dry solid waste.
- Quick, cost-effective installation and maintenance.
- Small footprint (160cm diameter x 60cm high) - can be installed almost anywhere.
- Safe and easy extraction of the dry waste.
- Manufactured of a hardy, durable plastic material - polyethylene - contributing to sustainability.
- Most top structures can be adapted to house the ZerH₂O Toilet.
- The ZerH₂O Toilet can be extracted and relocated.
- The dry waste is a feedstock for earth worm trenches; earth worms are a feedstock for chickens; and the resultant compost is used for community gardens.

Waterless Sanitation

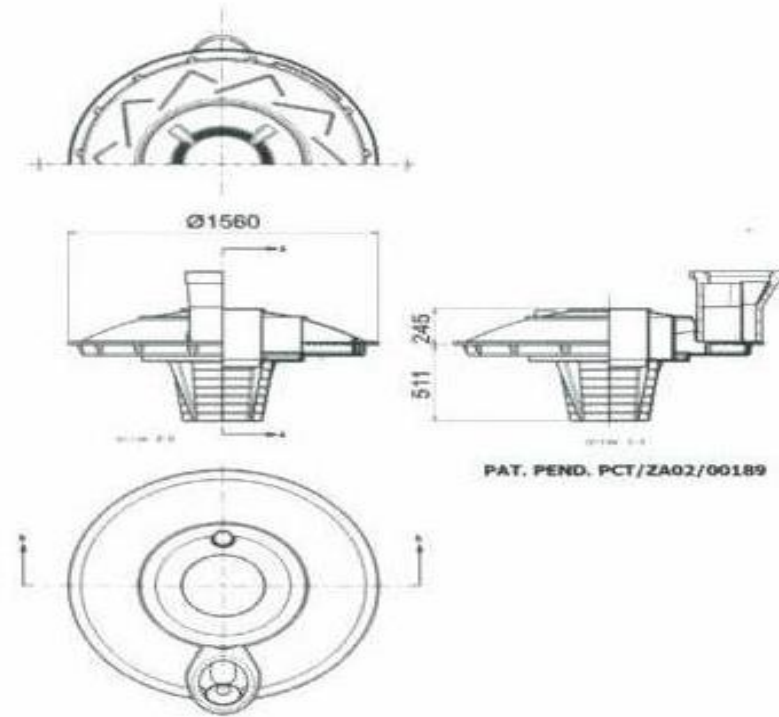
ZerHO₂TM

Quick and Easy Installation



Any structure, any soil, small spaces





The ZerH20 is sealed, compact, needs minimal excavation and is retro-fittable



ZerH20 exhibit at CSIR, Pretoria.



ZerH20 installation at
Siyakhana Gardens, Jhb.



Client installation in Midrand,
Gauteng.







The Heart of the Zerho

BUDGET COST PER INSTALLATION

Ex-works Pretoria, South Africa = ZAR9 500 per unit

Toilet unit only = ZAR9500. Approximately USD/EU635 (at 1:15).

Toilet With top structure = ZAR20 000 per full installation. USD/EU1334

PROJECT REACH

Six Thousand Homes in Limpopo Province, South Africa are part of the current project planning.

Ground-up support for the implementation is in place.

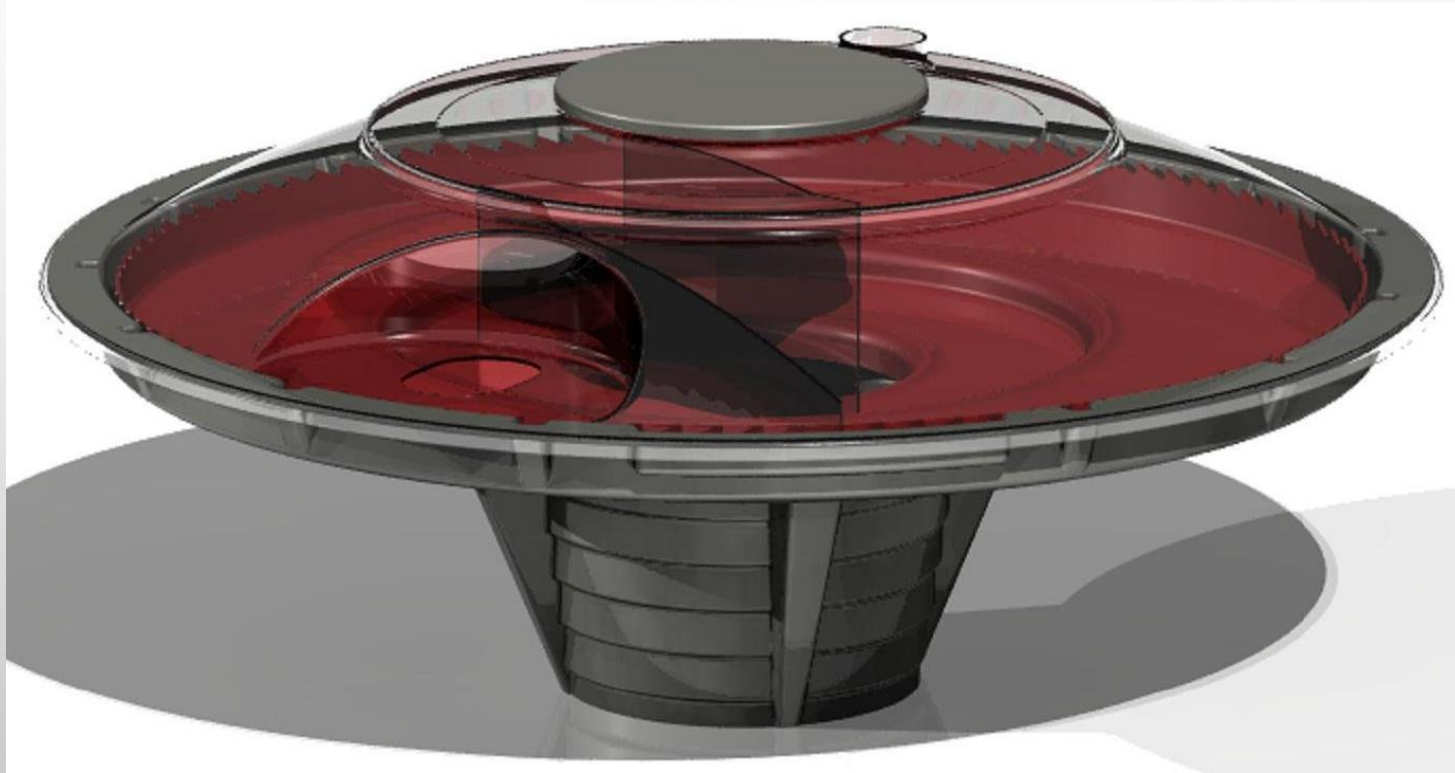
Rollout at a pace of 200 units per month, would take three years.

To speed up implementation and cut expenses, decentralised manufacturing is part of the Plan.

ZerHO₂
Product of
South Africa

Waterless Sanitation

ZerHOTM₂



ZerH2O waterless toilet

ZerH₂O Waste Management Pty Ltd



Product Description

The ZerH₂O toilet is a urine-diverting dehydrating toilet. Faeces drop down onto a disk, which is rotated after each use by a user operated manual advance mechanism. While on the disk, the faeces are dried out by a combination of heat from the sun and ventilation through the vent pipe supplied. The faeces spend approximately 2 weeks on the disk before being dumped into the sump basket in the center of the disk. The dried product is removed when the basket is approximately half full and transferred to a compost pile for further treatment and reuse. After the faeces have been around one rotation of the disk, a wall constructed of flexible plastic directs the faeces into a slotted sump basket inside a sealed container. The sealed container prevents any leaching of effluent into the surrounding soil. However, in the case where excess water or other liquid builds up in the sealed container, adjustments must be made to remove the liquid and maintain the drying process.

Operation & Maintenance

Removal of the sump basket after two weeks is relatively simple, with an accessible handle in the centre of the unit. After removal, the basket can easily be carried by one person to a compost trench or added to a vermicompost pile with a small amount of water to produce nutrient-rich compost.

Sump basket needs to be emptied every two weeks under normal loading.

Health and Hygiene Benefits

The ZerH₂O has a number of health benefits, including: reduction in flies, reduction in faecal pathogens due to the drying process; isolation of faeces from human contact.



First Installation

June 2011

Total Number of Units

12 (to July 2015)

Location

Gauteng
Limpopo

Product Materials

Rotomoulded polyethylene
PVC vent pipe

Budget Cost

excluding top structure
and floor covering

Supplier Contact Details

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Functionality Assessment

The large surface area provided by the plastic tank is expected to assist effective drying. Potential operational issues revolve mostly around user behaviour. Not advancing faeces after use can cause odour in the toilet units. Additionally, improper use of the urine-diverting toilet pan can cause urine to enter the faeces drying unit, increasing time necessary for drying and causing odours. Furthermore, as noted in one of the visited toilets, faeces can get stuck onto the urine-diversion pan, bringing it close to the user. Additional loading will increase the rate that faeces passes through the desiccation system which could result in wetter faeces entering the collection basket. In the case where excess water or other liquid builds up in the sealed container, adjustments can be made to remove the liquid and maintain the drying process.

Site Verification

The discs for the two toilets were facing north. There was no smell in the women's toilet, which did not seem to be used often because the basket and the turn-table were almost empty. There was also a small amount of faeces on the urine section of the pedestal, which demonstrates the potential for misuse of the UD toilet. Users had not properly advanced their faeces after use in the men's toilet, which caused the smell inside the superstructure and the rubber wall on the turn-table had been dislocated, such that it blocked removal of the basket. The inspectors had to move the rubber wall in order to remove the basket, which made it slightly non-ideal to remove. However, the overall removal process appeared to be very simple and easy. The compost pile on the site appeared to be very active with worms, further breaking down the faecal matter. Although the faeces were dry and hard in texture upon collection, the *E.coli* count was above authorisation limits.

Parameter	Unit	Target	Observed Effluent
<i>E.coli</i>	No./100mℓ	<1000	965 to 4600
pH		5.5 – 9.5	8.11 to 8.38
Electrical Conductivity	mS/m	<150	416 to 568
Moisture Content	%		19.5 to 20.4
Volatile Solids	g/g dry		0.80 to 0.84
Fixed Solids (Ash)	g/g dry		0.16 to 0.20

Recommendations

The liquid collected in the urine diversion system is likely to be contaminated with faeces and should be handled with caution. Excess liquid could possibly wash through the drying system which in turn would contaminate the faeces in the collection basket. This liquid would also build up over time below the collection basket. In light of the above, and the above lab results, the dried faecal waste will require the subsequent composting step before it can be considered sterile. Careful consideration of this manual handling process is required to minimise the potential health risk. The lab results indicate that the decomposition of the waste is not complete, (indicated by the low ash:volatile solids ratio). This results from the rapid dry process. Improved design of the urine diversion component should be considered to prevent risk of blockage and contamination of collected urine.

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