

Rota-Loo

Risk Management Plan



Phone: (03) 5135 3900
 Fax: (03) 5135 3955

enquiry@rotaloo.com
admin@kielindustries.com.au

www.rotaloo.com

	<p><i>AS/NZS 1546.2:2008 is the Standard that sets out the requirements for the design and performance of Waterless Composting Toilets to assure of safe, effective and efficient operation.</i></p> <p><i>Authorities regulating the installation of Waterless Composting Toilets (local Councils etc) require Certification to the Standard to approve the installation of a system like Rota-Loo</i></p>
---	---

	<p>Proudly Made in Australia by Kiel Industries Pty Ltd</p> <p>A Quality Assured Company</p> <p>www.kielindustries.com.au</p>	
---	--	---

OVERVIEW

The Australian Standard for Waterless Composting Toilets (AS/NZS1546.2:2008) requires that a Risk Management Plan be provided to inform Rota-Loo Operators and Users how to cope with unusual or emergency situations.

Most of these issues are dealt with in the Operations Manual. This Risk Management Plan contains additional information and refers to the Operations Manual to demonstrate that a Risk Management Analysis has been carried out and to provide additional support to operators and users if required.

Design and Operation of Rota-Loo

Inherent in the design of the Rota-Loo are factors that mitigate many of the risks, however it is essential to understand that some care and maintenance is required.

The design of the Rota-Loo intends to ensure effective composting occurs in most environments with little operator effort (see Operations Manual "Theory" section for greater understanding), however some occurrences may render the Rota-Loo ineffective.

**PLEASE READ THE OPERATION MANUAL CAREFULLY
IT IS IMPORTANT THAT YOU MAINTAIN THE ROTA-LOO PROPERLY**

The Troubleshooting Guide from the Operations Manual is copied below for reference

If in doubt about what to do - Contact a Rota-Loo Agent or Kiel Industries

RISK ASSESSMENT

This assessment is based on the criteria set out in AS/NZS1546.2:2008 Appendix J for WCT deemed to be acceptable risk

Inspections by Authorities



The Rota-Loo is a fully contained WCT system that has no need for inspection or maintenance by any outside agent or authority for safe operation. The design cycle time for waste composting is 12 months so should an authority require regular inspection, 12 monthly or greater is sufficient.

The Operations Manual contains sufficient information for the operator/user to carry out all servicing and maintenance tasks and includes a Trouble-Shooting guide to address most unusual situations. The manufacturers contact details are included on the serial number plate for contact in unknown situations.

Storage of, and Access to Uncomposted Material



Being fully self contained, all uncomposted waste is retained inside the Rota-Loo in the controlled aeration and drainage system until fully composted. All material is held inside the bin/bucket into which it is deposited and moved only by rotating the turntable, which does not require operator contact with the waste. The Operations Manual includes instruction to wear gloves when rotating to ensure random contact with skin is not possible.

Service and maintenance access is by a door on the Rota-Loo. The door is securely fitted with catches and note is made in the Installation Manual that the installer should consider security of access against unauthorised persons (e.g., small children) in the placement of and access to the Rota-Loo.

Waste is only removed from the Rota-Loo when fully composted and is removed by removing the entire bin and emptying (instruction to bury as per Regulatory requirements) - with instruction to wear gloves, even the composted material does not come into contact with persons.

An option noted in the Operation Manual is for the possibility in very high use situations for additional bins to be purchased to extend the composting time outside the Rota-Loo. In these cases the first part of the composting (approx 6 months) will occur in the Rota-Loo controlled environment. Instruction in the Operations Manual includes the need to store extra bins outside the Rota-Loo for additional composting time in a flat, safe place.

End Product Quality



Rota-Loos have been operating in diverse climates from cold and alpine to tropical for many years achieving effective composting results and safe end product quality. Records of testing date back to 1975 showing end product quality conforming to AS/NZS1546.2:2008 standards.

As part of the Product Certification process, end product tests were carried out on an installation in a temperate climate (monthly average temperature <12°C for 3 months and relative humidity ~80% for 2 months) under 'worst case' (high use, low maintenance) conditions and found end product results conform with AS/NZS1546.2:2008 standards.

There is a high level of confidence that Rota-Loo will deliver safe end product quality in all situations, provided some operator/user care is taken and instructions are followed.

RISK IN UNUSUAL SITUATIONS

The following are "unusual situations" listed in AS/NZS1546.2:2008 Appendix J that may be considered to pose a risk to the safe operation of a WCT, together with notes on how these risks are or may be mitigated.

Appendix J, J3 d, e and g are not relevant to the Rota-Loo design.

Transfer of owner/occupier

If on transfer of ownership the new owner/occupier does not receive information about how to operate the Rota-Loo they may not attend to it's operation properly.

Rota-Loo provide with the kit a Wall Poster to be attached near the toilet to inform users of the basic operational needs of the system. Manufacturer contact details are also provided on the Rota-Loo access door and serial number plate and the Operations Manual is readily available to anyone who requests it.

Should the new operator/user not learn of the need to attend to the Rota-Loo before a bin overfills, they will need to address the issue as per "Carousel not turned" below and as addressed in the Troubleshooting Guide.

No Bulking Material is Fed in

While the addition of bulking material is recommended it is not essential for effective composting. The use of toilet paper and the design to drain the compost pile of moisture is sufficient to ensure correct composting conditions. The C/N balance may result in less efficient composting, but the design composting time is sufficient to cope with this - test site for Product Certification verified this.

The Carousel/Turntable is not turned

If the Turntable (Carousel) is not rotated the waste bin will over-fill, which is not good.

The risk to health and safety in this event is mitigated by:

- The top of the bin is very close to the waste chute, so overflow of waste to the turntable and 'tank' should be minimal before being noticed and rectified.
- The waste chute is long enough so that even if the waste chute starts to fill, the level of waste will be greater than the minimum required by the Standard.
- The bin is contained within the Rota-Loo so all waste will be contained within the Rota-Loo system.

Should the bin overflow, the Rota-Loo will need to be cleaned out carefully. The overflow bin will need to be removed and excess waste can be transferred to the next bin. Any overflowed waste solids can be cleaned out by flushing with water and pumping out the Rota-Loo base (block-off the excess liquid outlet). It is recommended that this be done by a contracted septic clean out specialist. (This eventuality is also addressed in the Troubleshooting Guide in the Operations Manual.

The Compost gets too hot

The Rota-Loo design has continuous air ventilation so excess generated heat will be removed preventing the compost pile retaining excess heat. Should the compost pile get hot, the chimney effect of the ventilation system to increase air flow and remove more heat.

The Compost gets too cold

Should the compost pile fall below 6°C for an extended period (2-3 months) composting will slow to the point that it's retained time may not achieve full composting. This risk is mitigated by:

- The design has natural insulation which helps retain composting heat in cold climates.
- The Installation Instructions stipulates that in cold climates the Rota-Loo must be installed in a solar collecting area and with further insulation. This allows the system to gain and retain heat to continue the composting process even in cold periods.
- The Rota-Loo capacity design anticipates 12 months composting time, which in theory will ensure full composting as low as 2°C (see Figure E1, AS/NZS1546.2:2008 Appendix E) in with a safety factor of about 50%.

In the rare event that the composting process has stopped due to low temperature and lack of compostable material, it can be restarted by adding compostable material and a dose of Bio-Stimulant.

The Compost gets too humid

If the compost gets too humid, (above 70% moisture) the composting process will become anaerobic which will be noticeable by the odour produced. This event can occur for a number of reasons and is addressed in the Troubleshooting Guide.

It is important to maintain aerobic composting and the Rota-Loo design uses a number of features to separate and evaporate the liquids from the solids for this purpose.

Should the composting become anaerobic due to excessive liquid (high humidity of the pile) there is no immediate health risk. The odour will be unpleasant which will encourage rectification. The fan-driven ventilation system will clear any produced methane.

The Compost is removed too early

This should not occur - the design provides for a factor of safety in time for composting.

In the case of very high use when compost may be removed before the design 12 months, instructions stipulate storing in additional bins (Operations Manual pg 4).

The Operations Manual instructs to bury the composted waste when emptying the bin and using personal protective equipment (Operations Manual pg 4) so in the case that composted waste is inadvertently removed before full composting, there will not be personal contact or significant health risk.

There is poor drainage of excess liquid

The Rota-Loo 'tank' has a significant liquid capacity (to depth of about 150mm) while still being able to properly drain the composting material pile.

The Excess Liquid drainage point is significantly lower than this level. Should a blockage occur in the drain point, the high liquid level will most likely cause some anaerobic composting which will produce an odour that will be investigated - dealt with in the Troubleshooting Guide (Operations Manual)

The Rota-Loo is Flooded

The Rota-Loo is not intended to be installed underground or submerged. In the event of a major flood event it may be possible that the water level is above the base of the Rota-Loo for a period of time.

The Rota-Loo is designed to be air tight to improve ventilation and will therefore resist ingress of water so in minor events the waste material should be protected from flooding.

If significant water does enter the Rota-Loo (to above the turntable deck) the water needs to be considered contaminated. The sealed design of the Rota-Loo should prevent leakage and thus contamination of the surrounds but the Rota-Loo must be pumped out by a septic tank specialist and washed and reset before restarting use.

If the installation is in an area that may experience flooding, consideration should be given to adequate drainage of the area around if necessary securing the Rota-Loo to prevent floating in a flood situation (noted in Instruction Manual pg 4).

Decommissioning

Decommissioning may be required if the Rota-Loo is no longer needed, is to be relocated or if major maintenance is required.

When decommissioning a Rota-Loo to minimise any health and safety risks the critical issue is to ensure un-composted wastes are properly dealt with.

- All bins can be removed - only bins that have been in the Rota-Loo for 10 months or more may be emptied according to normal bin emptying procedures. All other bins are to be emptied to proper septic waste handling facilities (septic pump out truck or similar).
- The Rota-Loo can then be removed after disconnecting the waste chute and pipe connections. Re-fit the door to contain any remnant waste inside. Or the Rota-Loo can be closed up and left till future need.
- If work is to be done internally (replace turntable) the inside of the Rota-Loo should be washed out - use hose and drain through drain point - and left to dry before removing the lid for maintenance.
- If relocating, ensure all wastes are removed and the inside of the Rota-Loo is dry before transport.

Removing the Lid from a RL2000 Maxi requires a person sitting on the turntable to hold the nuts securing the lid.

If this is to be attempted, the Rota-Loo must be left open and have a fan connected to ensure adequate clean air flow for the person - knowledge of working in confined spaces is advisable. Replacing the whole unit may be cost effective and is recommended.

RL650 and RL950 Lids can be removed from outside the unit

TROUBLE-SHOOTING

The Rota-Loo is a simple system that if maintained, will operate without problems for many years. However, sometimes things go wrong! This section will help you diagnose and rectify some issues that may arise, and addresses a few common questions. If in doubt, please call your Rota-Loo agent or Kiel Industries (see front cover of the manual) for help and advice.

If the Liquid level in the bottom of the Rota-Loo is greater than 50mm deep.

The liquid needs to be drained off. Do this by placing a container under the drain outlet (near the access door) and removing the cap.

If the Rota-Loo emits an unpleasant odour.

The composting matter is probably too wet. Excess liquid may need to be drained off as above.

Check the fan operation and Turbo vent. Insufficient air flow which may be caused by a failed fan or blocked air piping (a bird's nest in the Turbo vent!) will reduce evaporation. Or, if the fan stops, the airflow from the Rota-Loo may flow up the pedestal bringing what odour there is into the room.

Restart the fan (failed power supply maybe) or replace the fan.



*Use an extra dose of **Bio-Stimulant** to get the bacteria balance right again*

APPLICATION

Dilute 1 part Bio-stimulant in 10 parts water (1:10). Apply 50-100ml of diluted mix three times a per week in active bins (pour down the pedestal).

If the Liquid Level is continuously building.

Check the fan, as above. It may be that the airflow is not enough to evaporate the liquids.

Or, more heat is needed for the system to evaporate the liquid properly. A Soltran Module may need to be installed or an excess liquid handling system should be constructed.

If the turntable won't rotate.

Check for obstructions.

On the RL650 the bins are quite close to the chamber sides and it may be that a bin has got caught on a Vent Pod screw that is a little long.

On models with turntable castors (RL950 and RL2000), check for salt build up on the base of the chamber as it may be that salt crystals block the turntable wheel path - flush with water and drain from the excess liquid outlet.

Some early models experienced turntable wheel failures. The Rota-Loo design has overcome that rare failure, but if you find one with a wheel failure they can be replaced. Contact your supplier or Kiel Industries for advice.

The turntable hasn't been rotated and a Bin has become overfilled.

Should the bin overflow, the Rota-Loo will need to be cleaned out carefully. The overflow bin will need to be removed and excess waste transferred to the next bin (after emptying). Any overflowed waste solids can be cleaned out by flushing with water and pumping out the Rota-Loo base (block-off the excess liquid outlet) to be disposed of properly (a septic pump out truck will take the waste to a proper disposal facility).

Take particular care when cleaning out after a bin overflow as you will need to handle raw waste. Use gloves, eye protection and a dust mask and wash cloths immediately after.



It is strongly recommended that a septic tank cleanout specialist be contracted to do this task.

There was a power failure during the last few days. Will this affect the composting?

No. The heat generated from the composting process is usually sufficient to maintain the correct temperature in the composting pile. Also, the heat from the compost will set up a natural draught, which should take away the odours and keep the toilet free of smell.

What should be done if the area will be closed down for a while?

If the toilets will not be used for only a few days, we would recommend you keep the fan on, but if the toilets are not to be used for a few weeks, the fan may be turned off.

When you turn the fan off, a smell may enter the room. However, this should be gone in a few hours, after the heat from the composting process starts to push the gases up the vent on its own or the fan is restarted on return.

It is also recommended that you add a dose of Bio-Stimulant down the pedestal before shutting up. This works to keep the right balance of bacteria while nothing is being added.

If there are too many flies in the composting chamber.

Generally, flies are attracted by excessive amounts of carbon dioxide and methane, which is a result of anaerobic bacteria indicating that the composting pile is too moist, there is not enough heat or the wrong things have been dropped down the pedestal.

A few flies may be part of the process and may be helpful, but if they become a nuisance they can be dealt with.

- First check all the other ventilation systems (fan etc.) are working properly. and that liquid drainage and evaporation is adequate.
- Commence using a bulking regime to aerate the pile. This allows more air through the pile and will increase aerobic activity and evaporation.
- The most effective way to kill the flies is by using the Rota-Loo Bio-Stimulant. Bio-Stimulant helps the compost pile, by increasing and sustaining a higher metabolic rate of aerobic bacteria therefore increasing the compost rate and producing less gases to attract the flies.
- It is also recommended that a pyrethrum (natural insect repellent) spray or powder be added to the pile and the bin rotated. Two tablespoons of boracic acid can also work.
- Another option to kill these flies is by pouring boiling water down the waste chute. The boiling water kills the larvae and stops the breeding cycle. About 4 litres of boiling water down the chute, everyday for about 14 days is required. Make sure you have a drainage system in place first.
- If flies are still present and all methods have failed, it would be worthwhile emptying all bins and flushing the whole system out with water. This will allow you to start afresh.

The toilet seat cover should always be kept closed when the toilet is not being used to prevent flies from entering the compost bins.

Check the Inlet Filter.

It's rare for flies to enter via the Turbo Vent - if you wish to add a filter to the vent outlet take care not to restrict the airflow

Sphaeroceridae are a family of true flies in the order *Diptera*, often called ***small dung flies***

The larvae are microbial grazers found in abundance in many microenvironments with decomposing organic material. Most species appear to be associated with decaying plants or fungi and they are a part of the nutrient cycle. Many species are associated with various kinds of faeces including human faeces. Sphaerocerids may abound in decomposer communities such as compost and manure.



<https://en.wikipedia.org/wiki/Sphaeroceridae>

Vinegar Flies or Ferment Flies are a small, yellowish fly (3-4mm) with distinct red eyes and are commonly seen around rotting fruit

The Vinegar Fly is not actually a fruit fly as it does not feed on fruit directly, just the yeasts associated with rotting fruit.

They are common in homes and restaurants and wherever food is allowed to rot and ferment. With a life cycle of 1 week and the ability to lay 500 eggs, they can become very plentiful very quickly.



<https://australianmuseum.net.au/vinegar-fly>