

**WAS-G-EASR-003**

**SEPA guidance: Waste composting**

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## Introduction

This document provides guidance for anyone carrying out a composting activity under The Environmental Authorisations (Scotland) Regulations 2018 (EASR). It should be read alongside the overarching guidance on Waste Storage and Treatment.

Most permit and registration conditions are objective-based: SEPA specifies the objective but it is up to the Authorised Person to determine how best to meet that objective. For example, to make sure dust or odour does not result in environmental harm. This guide will help Authorised Persons work out how to meet these objectives.

If the activity has a capacity of more than 75 tonnes per day, it may also be subject to the [Waste Treatment Best Available Techniques (BAT) Conclusions](https://www.sepa.org.uk/media/594490/bat-conclusions.pdf).

The guidance provided in this document is not definitive, and it does not replace the general obligation to manage each operation in the context of its specific location and characteristics. In certain situations, a higher standard of environmental protection may be necessary, for example, where there are local sensitive receptors.

## Composting overview

Composting is the ‘process of controlled biological decomposition of biodegradable materials under managed conditions that are predominantly aerobic and that allow the development of thermophilic temperatures as a result of biologically produced heat that converts the inputs to compost and / or mulch’.

Typically, composting activities consist of:

* Pre-acceptance and acceptance.
* Pre-processing - e.g. shredding and/or mixing.
* Sanitisation.
* Stabilisation.
* Curing/maturation - if applicable.
* Post processing - e.g. screening.

There are several methods of composting, generally categorised as open or in-vessel.

### Open Composting Processes

Source materials, usually in the form of green waste (e.g. from gardens and parks), are shredded, mixed and formed into long piles, known as windrows.

Windrows are turned periodically either with a loading shovel or a specially designed turner to ensure the materials are mixed, moisture is distributed, and the structure enables the compost to be aerobic and reach the required temperature for sanitisation.

Alternatively, there may be a system of perforated pipes or channels in the floor underneath the windrow with a fan to push or pull air through the composting material. This is known as an aerated static pile and usually replaces at least some of the turning of compost piles.

### In-vessel Composting Processes

Enclosed or ‘in-vessel’ composting encloses all or part of the composting process. Most involve a short period of enclosed sanitisation followed by treatment outside the in-vessel system. Enclosed may be inside a building, or in bespoke ‘vessels’ such as tunnels, towers, cages or drums. In-vessel systems generally require more infrastructure than windrow composting and often include aeration equipment and continuous temperature monitoring. In-vessel systems are normally used for animal by-products such as food waste or a mix of food and green waste due to the requirements of the Animal By-Product regulations.

At larger facilities, air extracted from the process is normally treated prior to being emitted to atmosphere.

## Biodegradable waste & biowaste

Biodegradable waste is material that can undergo biological aerobic or anaerobic degradation depending on the environmental conditions of the process.

The term ‘biowaste’ is often used to describe some biodegradable wastes. Biowaste is defined in Article 3 of the Waste Framework Directive to mean, “biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises and comparable waste from food processing plants”.

### Common Biodegradable Wastes

Those operating under Registration are limited to certain lower risk wastes as set out in the relevant Standard Conditions.

Those operating under Permits also have a list of acceptable inputs, but these can be bespoke to the facility and may include a wider list of wastes than those authorised at Registration level.

For facilities which intend to produce a compost product, there is a list of wastes set out in our end-of-waste guidance on composting.

### Animal By-Products

Composting facilities accepting animal by-products (including food waste) must comply with The Animal By-Products (Enforcement) (Scotland) Regulations 2013. This is regulated by the [Animal and Plant Health Agency](https://www.gov.uk/government/organisations/animal-and-plant-health-agency) (APHA). [More information](https://www.gov.uk/government/collections/guidance-for-the-animal-by-product-industry) is available from the APHA on the definition and categorisation of animal by-products and the approval system for premises handling them.

## Additional pre-acceptance procedures for composting

Systems for pre-acceptance should be in place to prevent acceptance of unsuitable wastes which may lead to uncontrolled emissions or result in poor compost quality.

Facilities should have a written input specification with the types and quality of material that can be delivered for composting. Include a list of the target input materials, prohibited materials and maximum acceptable criteria for any physical contamination such as plastic packaging.

Facilities should have contracts in place with regular suppliers (e.g. Local Authorities) which specify clear criteria for input contamination. These should be set depending on the input source (e.g. garden waste or mixed food and garden waste) and any pre-treatment equipment or procedures available on site. The aim should be to ensure the final compost meets the plastic contamination level in SEPA’s end-of-waste guidance, regardless of whether the compost is certified to PAS 100. This limit is 0.06% mass/mass of an air-dry sample for fragments greater than 2mm.

Be clear with suppliers that non-native invasive species such as Giant Hogweed, Japanese Knotweed, Himalayan Balsam and toxic species such as Ragwort and Yew are unsuitable for composting.

Only accept separated loads of packaging, single-use food service ware and/or single-use tableware items (for example, from closed loop sources such as festivals, coffee shops or individual buildings) if the packaging/items are independently certified as industrially compostable, home compostable or that have both certifications. They can be collected on their own without food waste or co-collected with food waste.

Other compostable plastics can be accepted mixed with food or garden waste if they are independently certified as industrially compostable, home compostable or have both certifications. Examples are tea bags that do not have a string and a label that performs a presentation function, kitchen caddy liners, food bin liners and garden waste sacks.

Industrially compostable packaging and non-packaging items must be independently certified compliant with at least one of the following:

* EN 13432.
* EN 14995.
* ASTM D6400.

Home compostable packaging and non-packaging items must be independently certified compliant with at least one of the following:

* EN 17427.
* AS 5810-2010.
* NF T51-800.
* TÜV Austria’s certification requirements for home compostable packaging under their ‘OK compost HOME’ scheme.

Only accept food retailers’ unsold food waste if the facility has adequate methods to remove non-compostable packaging during pre-processing. This applies where food waste arises in non-composable packaging, and it is not feasible to remove it before collection. An example may be supermarket back-of-store food waste streams.

Do not accept waste containing animal by-products unless the facility has been approved by the [Animal and Plant Health Agency](https://www.gov.uk/government/organisations/animal-and-plant-health-agency) (APHA) to accept these materials.

During pre-acceptance consider whether highly odorous wastes such as decaying meat and fish or highly de-composed food waste and poultry litter are suitable for the site.

Sample analysis is not necessary at the pre-acceptance stage for well understood waste streams such as:

* Food waste from food manufacturers or food retailers.
* Biodegradable agricultural waste direct from the agricultural premises.
* Green (e.g. garden and parks) waste.
* Food waste and co-mingled green and food waste from household collections.

However, where the waste is of unknown composition and may pose a risk to the process, compost quality or to the environment, obtain a representative sample or analysis, including:

* Physical form (solid, sludge, liquid etc).
* Total moisture.
* TOC.
* pH and alkalinity.
* Ammonia and nitrogen content.
* Heavy metals and PTEs.

## Additional waste acceptance procedures for composting

Visually check incoming waste on arrival. This may require a reception area separate from the main storage area. Loads of consistent waste from regular suppliers do not need to be checked at reception but must be checked before treatment.

Identify non-conforming wastes and manage them in line with a clear procedure. This could include separate storage in a designated quarantine area or enhanced pre-processing to bring the inputs into conformance (i.e. in line with acceptance criteria), or rejection of part of the load or the whole load. Record non-conformances and provide feedback to suppliers if agreed acceptance criteria are not being met.

## Waste storage

To reduce the environmental risk associated with waste storage and handling, use a combination of the following techniques.

### General

Where possible, locate storage areas away from watercourses and sensitive perimeters, for example those close to housing. If storage options are limited then consider taking extra precautions to limit any impact on the receptors.

Store waste within a secure area of the facility to prevent unauthorised access and vandalism.

### Capacity

Document the maximum storage capacity of the facility and its designated storage areas. Monitor the quantity of stored waste against the allowed maximum capacities, and do not exceed them. Take account of factors like seasonal changes in inputs and in markets for outputs and the impact this will have on the stored waste.

### Duration

Treat wastes or remove them from the site as soon as possible. Treat the oldest waste first, unless it is necessary to prioritise more recently received wastes because they pose a higher risk of environmental harm, such as odorous waste.

Minimise the time waste is stored in reception areas before treatment. Wastes that are liable to decay quickly, such as food waste, should be processed within 72 hours. Treat waste within 24 hours if there is an increased risk of:

* Attracting vermin.
* Causing fugitive emissions such as odour.

Green waste, agricultural waste and oversize can be stored for longer providing measures to prevent uncontrolled decomposition and emissions are taken.

### Site Surfaces and Drainage

Unless specifically authorised by the permit or registration, store waste on an impermeable surface with sealed drainage.

For new sites, infrastructure should be designed and installed in line with CIRIA C736. Use a chartered civil or structural engineer to provide construction quality assurance and validate the construction of all facilities.

Storage areas should:

* Contain contaminated run off.
* Prevent incompatible wastes from coming into contact with each other.
* Be designed to allow access for inspection and cleaning.

Impermeable surfaces must have sealed construction joints and be designed to prevent spillage escaping off site.

Storage area surfaces used for putrescible waste should be of a type and quality suitable for effective cleaning and or disinfection. Putrescible wastes include odorous wastes, ammonia-rich wastes and wastes containing animal by-products.

Design bunkers, bays and pits so that waste and debris does not build-up in inaccessible areas such as corners. Regularly clean bunkers, bays and pits.

Where possible, keep clean rainwater separate from wastes and waste waters to limit storage and treatment requirements.

Drainage should be accessible to allow cleaning and maintenance. Inspect drainage channels, aeration channels and collection sumps to identify blockages. Remove debris and clean the channels and sumps to prevent odour, pest infestations and maximise drainage.

Have a documented inspection and maintenance programme for impermeable surfaces and containment facilities.

### Above Ground Tanks and ‘Bulk’ Storage

Locate above ground tanks on an impermeable surface with secondary containment.

Secondary containment (bunds) must:

* Be impermeable, stable and resistant to the stored materials.
* The greater of 110% of the capacity of the largest container the bund is protecting or, in cases of two or more containers, 25% of the combined volume of all the tanks the bund is protecting.
* Have pipework routed within bunded areas with no penetration of contained surfaces.
* Be designed to catch leaks from tanks or fittings.
* Have regular visual inspections – any contents must be pumped out or otherwise removed under manual control after checking for contamination.
* Be fitted with a high-level alarm (where appropriate) if not frequently inspected.
* Have tanker connection points within the bund (where possible), and if not possible provide adequate containment for spillages or leakage.
* Have programmed engineering inspections (extending to water testing if structural integrity is in doubt).
* Be emptied of rainwater regularly to maintain the containment capacity.

It should be possible to close all connections to vessels, tanks and secondary containment using suitable valves. Fit a valve close to the tank where there are bottom outlets and have at least two isolation points in case of valve failure.

Direct overflow pipes to another vessel, holding area or an appropriate treatment system.

Cover bulk storage tanks. Where there is a risk of offensive odour emissions, vent tanks and vessels through suitable abatement, or direct emissions to a gas recovery system.

### Submerged or Underground Tanks

Minimise using subsurface storage infrastructure and decommission it where possible.

For subsurface structures:

* Establish and record the routing of all site drains and subsurface pipework.
* Identify all subsurface sumps and storage vessels.
* Engineer systems to minimise leakages from pipes and make sure they can be detected quickly if they do occur.
* Provide secondary containment or leakage detection for subsurface pipework, sumps and storage vessels.
* Establish an inspection and maintenance programme for all subsurface structures, for example, pressure tests, leak tests, material thickness checks or CCTV.

### Lagoons

Where lagoons are used, design them to prevent emissions, rainwater ingress and maintain a freeboard of at least 750mm.

New lagoons should consider installing an engineered, impermeable, rigid flexible cover with a gas collection system. Floating covers can used and should be applied in line with manufacturers’ recommendations and cover the whole surface area.

### Containers, IBCs and Drums

Where practicable, store containerised waste under cover. Under cover storage provides better protection for containers than open air storage and minimises the generation of contaminated water. Covered storage also:

* Lowers temperature fluctuations that can cause a pressure build-up in containers.
* Reduces the degradation of containers through weathering.

Empty, re-package or otherwise manage containerised waste under cover. If this activity could give rise to emissions carry it out within an enclosed building with suitable air extraction, abatement and drainage.

Provide secondary containment for all drums and other containers which:

* Are greater than 200 litres in capacity and are kept outside.
* Contain liquids (waste or otherwise) that could be harmful to the environment if spilled.

All containers should be fit for purpose, that is:

* In sound condition.
* Undamaged not corroded, if metal.
* Have well-fitting lids.
* Suitable for the contents.
* With caps, valves and bungs in place and secure within the manufacturers use-by date, particularly for plastic containers.

Containers should remain labelled during storage in the way it was labelled at acceptance. Handle and store containers so that the label is readily visible and continues to be legible.

Store all containers in a way that allows easy inspection. Check any containers (and pallets they may be stored on) regularly. Non-compliant containers and pallets should be made safe. Immediately manage any unsound, poorly labelled or unlabelled containers (for example, by re-labelling, over-drumming and transferring the container’s contents).

Do not use containers, tanks and vessels beyond their specified design life. Only use them for the purpose, or substances, they were designed for.

## Waste Treatment

### Overarching Concept

Composting must have a clear and defined benefit. Treated output material should meet expectations and be suitable for its intended disposal or recovery route.

Have up-to-date details of the treatment activities set out in the written environmental management system (or working plan). Include information about the characteristics of the waste to be treated and the waste treatment processes, including:

* Simplified process flow sheets that show the origin of any emissions.
* Diagrams of the main plant items where they have environmental relevance, for example, storage, tanks, treatment and abatement plant design.
* Details of the treatment stages.
* The processing capacity of composting pad or treatment equipment or process.
* The control system philosophy and how it incorporates environmental monitoring information.
* A summary of operating and maintenance procedures.

The extent of the information about the treatment activities will depend on the nature, scale and complexity of the facility and the range of environmental impacts it may have.

### Pre-Processing

Pre-processing may include one or more of the following:

* Hand-sorting.
* De-packaging.
* Removing contaminants, for example screening, separation, sifting, or floatation.
* Optimising particle size, for example using shredding or maceration.
* Mixing and blending – e.g. to obtain correct carbon to nitrogen ratios.
* Using additives, for example trace elements.

Remove all non-compostable plastic, non-compostable packaging, any items that are not packaging but also non-compostable, and other contaminants in the feedstock or reduce them to levels that are as low as reasonably practicable prior to composting.

Where there is an identified risk of impacts on sensitive receptors carry out pre-treatment in a suitably designed building with an air ventilation and extraction system connected to an air abatement system.

### Composting

To improve environmental performance and reduce emissions to air, control (and where applicable monitor) the main composting parameters, including:

* Waste input characteristics (e.g. Carbon to Nitrogen ratio, particle size range and distribution, pH, porosity).
* Temperature and moisture content (at different points if in a windrow).
* Aeration (e.g. through windrow turning frequency, O2 and CO2 concentrations, air stream temperatures for forced aeration).
* For windrow composting, the height and width of composting piles, to enable aerobic conditions.
* Visual and olfactory assessment of the material, to detect fly infestation and odours.

Maintain optimal parameters to these ranges:

* pH 5.5 to 8.5.
* Temperature 55oC to 75oC (reducing after sanitisation & during stabilisation / maturation).
* Moisture 60% to 65% (start of the process), 30% to 65% (during the process).
* Carbon to Nitrogen ratio 20:1 to 35:1.
* Oxygen content of 5-15%.

These ranges are advised optimal parameters, and active management is required to maintain these conditions. If operating outside these ranges, be able to demonstrate no adverse impact on the treatment process or the environment.

Where temperature profiles are allowed to increase to 70-80°C there is an increased likelihood of the production of ammonia which can result in poor organic stabilisation and odour. The potential fire risk also increases especially in dry oversize material. Therefore, if a temperature of 70°C or above is required at sanitisation phase, ensure the compost is only held at this temperature for the minimum period required.

### Temperature and moisture monitoring

Monitor moisture and temperature during sanitisation and stabilisation. Where possible, recognising that open windrow composting sites are open to the weather, control the moisture in dry periods to prevent dusty conditions and in wet periods to prevent anaerobic conditions.

Monitor the temperature of composting waste during sanitisation every working day. This can reduce to weekly during stabilisation and maturation. For small open composting sites at Registration level, daily temperature monitoring may not be required but a procedure must be in place to confirm the appropriate temperatures have been reached to achieve a sanitised material.

Locate monitoring points so they give representative data from the core of the pile. PAS100 requires a minimum of three monitoring points per windrow, and one every 250m3 for windrows larger than 750m3. Probes should be capable of obtaining a representative sample of the core of the windrow at its deepest point.

Vessels used for batch processing should be able to carry out continuous (or semi continuous every 5 or 15 minutes etc), and representative temperature monitoring during sanitisation. Temperature of the batch should be checked prior to release from the vessel. Only material that has met the required time/temperature criteria should progress to the next stage of the process.

Assess moisture using visual control and one of the following methods:

* Squeeze or fist test (when carried out by an experienced operator).
* Moisture monitoring device with read-out or connectivity to a data capture system.
* An accurate oven-drying method.

Take measures against excessive moisture by:

* Adding input materials with high absorbency.
* Balancing the mix of materials and maximising porosity.
* Turning at appropriate intervals.
* Making sure windrows are appropriately structured and the construction allows for passive drainage and temperature convection.
* Placing oversized material at the base of the windrow.
* Maintaining clear space between windrows (including after settlement) to prevent waterlogging at the base.

### Sanitisation and stabilisation batch management

Keep batches undergoing sanitisation, stabilisation or maturation separate from each other and label batches to allow traceability from the receipt of the waste to its despatch from site. Windrows at different stages of treatment can be stored side by side but separate along a pad.

Do not combine multiple stabilising or maturing waste piles or windrows into single larger piles where this could result in:

* The inability to carry out representative monitoring and safe handling.
* Increased fugitive emissions, odour or over-heating.
* Anaerobic conditions developing.

Stop composting liquors from pooling at the base of waste piles and windrows. Do this by:

* Installing sloping ground infrastructure and appropriate drainage.
* Regular cleaning.
* Minimising over-watering.

Do not use liquor drained from waste in sanitisation and reception areas on stabilising or maturing waste.

## Waste Treatment – Open Composting

Establish the appropriate dimensions of windrows providing enough space between windrows so that:

* Batches are kept separate and identifiable.
* There is sufficient passive aeration.
* Plant and equipment can access the windrows, if necessary, without compacting the waste or causing cross-contamination.

Design for the meteorological conditions. For example, where there is a risk to sensitive receptors consider:

* Locating windrows and piles at the lowest elevation within the overall site layout with the freshest material at the lowest elevation.
* Orientating windrows so that the smallest possible area of composting mass is exposed to the prevailing wind.

Depending on scale and local conditions it may be necessary to consider additional measures such as enclosing, extracting and abating emissions from windrows or adopting static pile aeration in the stabilisation phase, particularly post in-vessel treatment.

### Static-pile aeration

Design the aeration system to cope with differences in feedstock and the demands of the treatment process. The system must be able to treat emissions from the process.

Positive or forced aeration is not an appropriate measure to control fugitive emissions. Forced aerated piles should be covered with semi-permeable membranes to prevent fugitive emissions.

Negative aeration by drawing air down through the waste into the base of the waste provides improved control and opportunity to treat emissions.

Remixing aerated static piles is not usually a routine operation if the windrows and aeration systems are maintained, and the windrow is well-constructed. Remixing statically aerated composting waste may be needed periodically to prevent preferential pathways developing.

## Waste Treatment – In Vessel and Enclosed Aerobic Systems

Larger in-vessel or enclosed facilities at Permit level and those for which there is a risk of impact at sensitive receptors must have localised air control, extraction and abatement systems. Smaller scale composters at Registration level such as ‘rocket composters’ may not require extraction and abatement where they can be operated without impact at sensitive receptors.

An in-vessel system should incorporate air extraction above the loading and unloading doors. This minimises the emissions released when the doors are opened, directing them to appropriate abatement.

Regularly inspect and maintain aeration and exhaust system to make sure it remains fit for purpose, this means it is both:

* Free from debris.
* Functioning correctly at all times in line with designed performance specifications.

## Emissions

Identify and record all sources of emissions in the environmental management systems (or working plan). This includes all emissions to air and water (including emissions to sewer).

For larger facilities at Permit level, SEPA may set emission limits and monitoring requirements in the authorisation, based on the emissions inventory and environmental risk assessment.

## Enclosure in buildings

Where the risk of environmental harm at sensitive receptors cannot be addressed by alternative measures, it may be necessary to carry out waste storage and treatment within an enclosed building.

Where enclosed buildings are used, design them with an air extraction system capable of maintaining negative pressure within the building. Ensure the ventilation, extraction and air handling system is suitably designed and engineered. The system may be a combination of local extraction, capturing emissions close to source, and whole room extraction.

Consider fitting the reception buildings with fast-acting roller shutter doors to allow delivery and other vehicles to enter and leave. If the risk is high, consider additional measures to minimise fugitive emissions, for example installing an airlock entry system.

Regularly assess enclosed building’s integrity where potential faults are likely to cause odour.

## Point source emissions to water

Identify point source emissions to water and sewer as part of an inventory of emissions.

Discharges to water or sewer must comply with the conditions of an environmental authorisation or trade effluent consent. Emissions limits and monitoring requirements may be set in the authorisation.

Sources of wastewater include:

* Process water.
* Condensate collected from a treatment process.
* Vehicle washing.
* Vehicle oil and fuel leaks.
* Washing containers, tanks and vessels.
* Spills and leaks in waste storage areas.
* Loading and unloading areas.

Direct wash waters from cleaning vessels to foul sewer or a contained drainage system for disposal or re-circulation.

Use all the following techniques:

* Optimise the waste’s moisture level to minimise generating leachate.
* Segregate run-off from operational areas such as compost piles and windrows other site drainage (roofs etc) where possible.
* Re-circulate process water streams, where beneficial to the composting process.

If wastewater is treated before discharge or disposal, use a combination of these techniques:

* Preliminary or primary treatment – e.g. equalisation, neutralisation or physical separation.
* Physico chemical treatment – e.g. adsorption, distillation or rectification, precipitation, chemical oxidation or reduction, evaporation, ion exchange, or stripping.
* Biological treatment – e.g. reed beds, denitrification.
* Solids removal – e.g. coagulation and flocculation, sedimentation, filtration or flotation.

For relevant emissions to water or sewer identified by the emissions inventory, monitor key process parameters (for example, waste water flow, pH, temperature, conductivity, or BOD) at key locations. For example, these could either be at the:

* Inlet or outlet (or both) of the pre treatment.
* Inlet to the final treatment.
* Point where the emission leaves the facility boundary.

## Fugitive emissions to water and land

Fugitive emissions are generally controlled by installing correct site infrastructure (impermeable surfaces, drainage systems, tank bunding) and managing surface water runoff.

In addition, implement a spillage response plan and ensure spillages are dealt with immediately.

Stop spillages from entering drains, channels, gullies, watercourses and unmade ground. Make available proprietary sorbent materials, sand, booms or drain mats for use when required.

Keep spill kits at locations close to areas where a spillage could occur and make sure relevant staff know how to use them. Make sure kits are replenished after use.

## Bioaerosols

For all facilities, where the activity takes place within 250m of a sensitive receptor, take measures to minimise the release of bioaerosols from the process.

Document potential bioaerosol emission sources and identify measures to minimise their release. Measures include, for example:

* Processing waste promptly and monitoring it according to defined processing conditions.
* Taking corrective measures to address unfavourable composting conditions.
* Covering actively composting windrows using semi-permeable membranes.
* Using slow-speed shredders in sensitive locations with misting devices fitted or carrying out these activities in covered areas.
* Avoiding activities such as turning and shredding in unfavourable weather conditions.
* Stopping activities when the wind is blowing in the direction of sensitive receptors.
* Dampening haul roads and processing areas and stopping activities when the wind is blowing in the direction of sensitive receptors.
* Using static aeration and covering piles where possible and practicable.
* Using screening techniques such as bunds or trees that can prevent bioaerosols reaching sensitive receptors.

At permit level, bioaerosol monitoring will be required at composting sites with sensitive receptors within 250m. The current standard for monitoring of bioaerosols is detailed in the [Environment Agency Technical Guidance Note M9: Environmental Monitoring of bioaerosols at regulated facilities](https://assets.publishing.service.gov.uk/media/5b5ec012e5274a3fdd5efd40/M9_Environmental_monitoring_of_bioaerosols_at_regulated_facilities.pdf#:~:text=This%20technical%20guidance%20note%20is%20one%20of%20a,from%20stacks%2C%20open%20biofilters%20and%20in%20ambient%20air.). The frequency of sampling for bioaerosols should be determined by the level of risk from a particular site. Where the level of bioaerosol emissions will initially be unknown, e.g. for new sites, frequent sampling (quarterly) should be undertaken, until the emissions and controls are well understood.

## Odour

Where there is a risk of offensive odour at sensitive receptors, or where odour events at sensitive receptors have been substantiated, implement and regularly review an odour management plan.  The plan should incorporate all the elements described in [SEPA’s odour guidance](https://www.sepa.org.uk/media/h4ocmt2z/sepa-odour-guidance-2025.docx).

## Point source emissions to air

Where emissions are collected and channelled through air extraction systems, use one or more of the abatement techniques to reduce emissions:

* Bio filtration, bio trickling or bio scrubbing.
* Scrubbing (for example wet or chemical).
* Adsorption, for example activated carbon.
* Thermal oxidation.
* Fabric filter – for mechanical biological treatment to remove dust.

Carry out an options appraisal to determine the most appropriate abatement techniques using the following information:

* A characterisation of the pollutants in the emission to be abated (including an appropriate level of speciation, concentration, temperature, pressure, wet or dry etc.).
* The flowrate of the emission stream and its variability over time.
* The frequency of the emission and its variability.
* The reduction required so offensive odours are not detectable beyond the boundary.
* Cost, space, reliability, maintenance, and spare part availability.

Ensure the abatement system is effective in treating odour and monitor and maintain abatement to achieve optimum conditions at all times. Depending on the level of reduction required the use of more than one technique may be required.

### Biofilters (open and closed fixed bed systems)

Use a filter bed material that is suitable for maintaining bacterial communities and that will hold its structural integrity. Consider water retention capacity, bulk density, porosity, surface area, nutrient viability and particle size.

The biofilter should provide uniform waste gas distribution through the bed and enough residence time to make sure effective treatment takes place. The residence time should be 40 to 100 seconds depending on the odour chemicals to be treated.

Pre-treat the waste gas if untreated gas can harm the biofilter, for example ammonia.

Design biofilters on a modular basis so they can keep operating during staged refurbishment.

Drain any liquid which accumulates in the base of the biofilter to an appropriate leachate collection or treatment system.

Ensure pipework to the biofilter is made from corrosion resistant materials and incorporates low drain points to prevent the build-up of condensate, corrosion and loss in efficiency.

Monitor the biofilter for the following:

* Gas inlet temperature (inlet and outlet on closed systems).
* Gas inlet flow rate (inlet and outlet on closed systems).
* Filter media moisture.
* Thatching and compaction using back-pressure measurement.
* pH (this should be monitored from the biofilter drainage effluent).
* Gas inlet humidity.
* Gas inlet and outlet concentrations for ammonia, hydrogen sulphide and odour.
* Bacterial viability.

Visually monitor the biofilter for:

* Vegetation, moss and fungus – media should be in good condition and clear of vegetation.
* Media depth to identify decomposition and compaction over time – using vertical rulers located in the biofilter bed.
* Surface condition – to identify any channelling, gaps or signs that the bed is shrinking.
* Irrigation – to identify wet and dry spots and the uniformity of any sprinkler systems.

Maintain the biofilter with a vigorous and healthy microbial community operated at optimum designed values. Periodically review:

* Emission removal efficiency, for example odour removal.
* Media health, for example bacterial viability, particle size distribution and depth.
* Volumetric air flow or surface air flow distribution in open biofilters.

Calculate removal efficiency using the concentrations sampled from the biofilter inlet and outlet.

Carry out periodic sampling to make sure the abatement system is functioning as designed and can treat and mitigate emissions.

Re-mix or replace biofilter media, either during planned routine maintenance or more frequently if your monitoring assessment identifies it is needed.

### Scrubbers

Select the most appropriate aqueous absorbing solutions for treating the waste gas stream. Flow rates should allow sufficient gas residence time and minimise carry-over of scrubbing solution into the waste gas stream.

Monitor the abatement scrubber for the following:

* Gas temperature and flow rate, inlet and outlet.
* Moisture content or humidity.
* Back-pressure, for packing scrubbers.
* pH of scrubber solution.
* Chemical injection rate (redox potential).

Continuously monitor the scrubber solution for:

* Flow rate.
* Pressure.
* Temperature.
* pH.

Periodically measure the inlet and outlet of the scrubber for:

* Ammonia.
* Hydrogen sulphide.
* Odour.

### Activated carbon

Monitor activated carbon filter for the following parameters:

* Inlet and outlet gas temperature and flow rate by continuous monitoring.
* Inlet moisture content or humidity.
* Back-pressure.
* Carbon bed temperature.
* Ammonia.
* Hydrogen sulphide.
* Odour.

Replace or regenerate the carbon before saturation. This will be determined through monitoring and appropriate trigger points so that carbon is replaced prior to media saturation and odour breakthrough.

Make sure the concentrations of volatile organic compounds within the gas stream are below their lower explosive limit.

Follow the manufacturers’ recommended maximum operating temperature.

Minimise particulates in the waste gases before they reach the carbon filter.

Do not allow exothermic reactions when maintaining activated carbon filters.

Store activated carbon safely to prevent spontaneous combustion following supplier or manufacturers’ recommendations.

### Stacks and vents

Assess and design vent and stack locations and heights to ensure dispersion capability is adequate. Dispersion modelling may be needed to establish whether the height of the vent or stack allows emissions to disperse appropriately, preventing any impacts on receptors.

Where monitoring is required, including for odour, install suitable monitoring points which meet the sampling standard for the relevant pollutants.

### Masking agents and chemical neutralising agents

The use of masking agents and neutralising agents are generally not considered appropriate for providing routine odour control. There are very few situations where the addition of another chemical to the air rather than dealing with the problem at source is considered appropriate.

Whilst each case should be examined on its merits, the following indicates situations where the use of these agents might be appropriate.

* As a temporary measure whilst process or plant modifications are made and/or an odour management system is being put into place.
* For dealing with a short-term problem, or perhaps to provide additional abatement for infrequent odour events (e.g. windrow turning).
* Where the agent is used in a duct or scrubber such that it is contained and there is no carry over of the agent to the atmosphere.

Take care when using masking agents (for example deodorisers) as the combination of chemicals can result in an odour becoming even more offensive. This may cause or exacerbate pollution and amenity impacts.

## Fly prevention and management

To prevent fly infestations and manage them if they arise, you should do the following:

* Implement measures to proactively decrease the incidence of flies on site.
* Have a process to monitor as well as count and record the number of flies on site at times when they are problematic.
* Have a process to investigate and resolve fly infestation.
* Reject maggot and fly infested waste.
* Have effective cleaning and housekeeping.
* Use fly treatment equipment and chemicals where approved and appropriate and you have assessed their use in your HACCP plan.
* Use all knockdown sprays, pesticides and larvicides according to the manufacturer’s instructions.

## Compost Outputs

Material produced by the composting process must be suitable for the intended use, in terms of grade, stability and other quality parameters. The site should have operating procedures that define the process and the outputs, with regard to requirements of intended customers or markets.

Use the correct waste code and description for the outputs produced. Only describe your waste compost as ‘off-specification’ using code 19 05 03 if it has completed the full composting cycle and it is not certified compliant with the Compost Certification Scheme. Certified compost that meets the end-of-waste position, does not require waste regulatory control, nor an EWC code.

Do not describe compost as ‘off-specification’ for waste that has only been through sanitisation (and not stabilisation). This is because it has not completed a full compost treatment. It must be sanitised and stabilised before it can be described as compost.

Correctly characterise and describe partially treated (sanitised) waste that will be transferred off-site to complete the composting process elsewhere. This waste is either 19 05 01 or 19 05 02. 19 05 03 should not be used for classifying sanitised only waste.

## Disclaimer

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