Composting Technology

MemberAirX
Membrane Covered Composting

Enviroflex Environment & Energy Separation Technology

Enviroflex GmbH, based in Vienna, Austria, is a member of the Enviroflex Group and specializes in advanced environmental technologies. Our core areas of expertise include solid-liquid separation systems and composting solutions designed for sustainable waste management. Within our composting division, we offer both Membrane-Covered Composting Systems **"MemberAirX"** for high-performance odor and emission control, as well as the innovative Smart Windrow Composting System with Subsurface Aeration and Mechanical Turning **"AerolaneX"**, engineered for cost-effective and scalable organic waste treatment.
With a focus on reliability, efficiency, and environmental compliance, Enviroflex delivers tailored solutions for municipalities, agricultural operations, and industrial clients worldwide.

MemberAirX
Membrane Covered Composting

Enviroflex GmbH designs and constructs complete Membrane-Covered Composting Plants, offering:

- Odor control solutions
- Reduction of pests (insects, birds)
- High-performance composting membranes under our brand name

These systems are suitable for any organic waste treatment.
Enviroflex GmbH offers a pressurized aeration process in concrete tuneless (Boxes) covered by a semipermeable membranes process. It is a simple, easy to build, and very cost-efficient project.
Thanks to Covering the feed by Membrane, the odour insects and birds are minimized around the plant ad odor is controlled.

These plants can be used for these applications:

- Composting of the organic part of MSW
- Composting of Biowaste and green waste composting
- Composting of digested or sewage sludge (mixed with other waste & Structure material)
- Biological stabilization to reach the parameters of landfill directives
- Biological drying prior to incineration
- Production of refused derived fuel (RDF)

Enviroflex GmbH can offer this technology in the following configuration:

Windrows or piles: simplest solution, pressurized aeration on a sealed surface than is covered by membrane.

Concrete Tuneless or Boxes:
The membrane is spread over the surface of the substrate between the concrete sidewallsan entirely seals the box. The supply of fresh air and the discharge of leachate are reached by special aeration ducts in the floor.

Membrane Composting Solutions in boxes for Municipal & Industrial Organic Waste

Brief Description of system

This pilot membrane composting plant consists of Serveral separate compartments (composting boxes). Each box is individually aerated by a separate ventilator, controlled by the individual field instrumentation which are temperature probe, Oxygen probe and pressure indicator.
The leachate collection system is connected to a central leachate collection system (Pump sump)

Composting Boxes or Tunnels

The plant consists of several compartments (Tunnels or boxes or Windrows) with different sizes and volume.
Each box is individually filled, aerated and discharged.
The box slab and walls are made of reinforced concrete that withstands the temperature of composting as well as the operation by wheel loader.

Aeration Ducts with Slotted Plates
The slab of each box is holding two aeration ducts. The ducts are reinforced with metal profiles and closed with slotted PE plates. The slots have a size to allow sufficient air to go through from the ducts into the waste body and avoid waste falling through it into the ducts as good as possible. They have to be cleaned and checked regularly.

MemberAirX Plant in Bikfaya Lebonan **(financed by European union)**

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Membrane

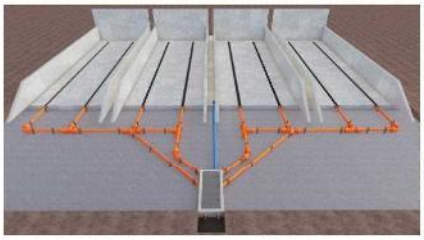
The applied three-layer laminate is based on an antibacterial inner layer, a UV-stabilized outer layer, and the proper functional and breathable membrane as an intermediate layer. Due to the combination of these layers to the composite material, the achieved performance allows high breathability for vapor, highest possible retention concerning odor, dust, and germs, prevention of rainwater penetration, sturdiness in handling, and long product durability.
To improve the wear resistance, the outside edges are protected with tarpaulin which also holds the loops and back straps for easy handling, winding, and fixing.
To ensure the correct insertion of the probes into the substrate, necessarily required for an appropriate process control, special openings are stitched off.
Depending on the size of the membrane, the handling is either done manually or mechanically operated by designed cover placement.

Ventilators (Fans) with Distribution Manifold

Each box has a radial ventilator to press the ambient air into the aeration ducts under the compositing material.
Each ventilator is individually controlled by the control system.
The ventilator has a protection mesh to avoid leaves or larger particles to be sucked in into the rotor.
At the exit side the hose is leading to a manifold (Y-shape) which is providing the compressed air into the two aeration ducts of each box.
At the manifold there is a pressure indicator to survey proper pressure inside the system. The pressure is indicated at the visualization of the PLC.

Underground Leachate Collection with Sump Pump &Syphon

The aeration ducts are followed by the leachate collection underground pipes made of PVC. They are conveying the leachate which comes from the fresh waste of from the humidification into the collection pit. In the collection pit, all 4 pipes (one from each box) are collected.
They are arranged below water level to allow a water lock, that the pressure inside the aeration system can be used to press the air through the waste body.



Control Panel & Probes, Automation

The **PLC Control Panel** holds the entire control system and the monitor/panel for the visualization of the process. Also, the cables from the Oxygen and temperature probes as well as the pressure indicator are connected to a switchboard which is adjacent to each box.
Temperature: Each box has a temperature probe with cable. The probe is measuring the temperature at 5 levels of the pole
Oxygen: Each box has an Oxygen probe with cable The probe is measuring the rel. Oxygen content in the porous air inside the waste body.
Pressure: For supervision or proper aeration conditions in a box, the pressure indicator is measuring the pressure inside the hose at the manifold.

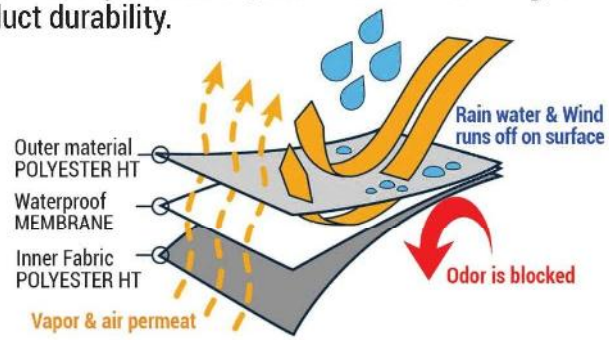
The control system of each box is generally running through a fixed time-program, which can be influenced by the parameters of the field instruments (temperature, Oxygen, pressure).

CompostMemX

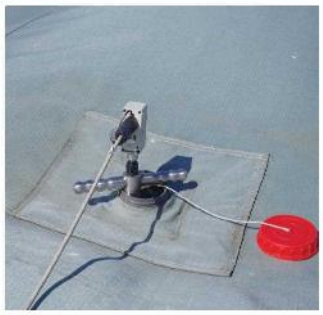
Membranes for Composting Plants

3-Layer Membrane

Enviroflex GmbH supplies quality membranes for the composting Plants with registered Trademark Enviroflex and product name **ENF-CompostMemX** . The applied 3-layer laminate is based on an antibacterial inner layer, a UV-stabilized outer layer, and the proper functional and breathable membrane as intermediate layer. Due to the combination of these layers to the composite material, the achieved performance allows high breathability for vapor, highest possible retention concerning odor, dust, and germs, prevention of rainwater penetration, sturdiness in handling, and long product durability.



Opening in the Membrane with Twisted Cap for Insertion of a Probe



Cover for biodegradable material:
The material textile structure consists of three layers, a fabric interior (PES HT Taslan), an external fabric (PES HT Taslan), and a membrane breathable waterproofed inside. This textile contributes to the fermentation process of material to compost.
Composting is a biological aerobic process through which micro-organism act on the matter quickly biodegradable allowing compost.

TECHNICAL PROPERTIES OF ENF-CompostMemX COVER:
Flame retardant: ENF-CompostMemX has the property of being Flame Retardant with this avoids any spreading of flame in the events that occur in combustion not desired.
A priority objective of the treatment process of aerobic decomposition of organic matter is to get the clearing of material.

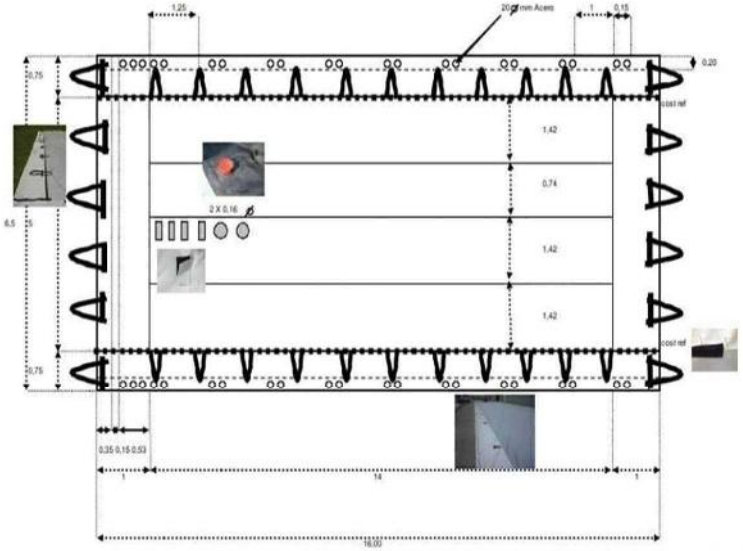
So that they are destroyed pathogens by prolonged effects of high temperatures that are generated since it is a process exothermically. Generated some physical conditions prone to auto-combustion of organic material that has acquired a significant degree of dryness in the fermentation process. Compost piles can reach a temperature of 80 °C attributed to the heat generated by microbial breathing during the process of fermentation of organic matter.

Conditions that contribute to the spontaneous combustion of piles are:

. Biological activity
. Materials relatively dry
. Piles of large size of dry material
. The flow of air is limited.

The size and shape of the membranes are according to the size of boxes or heaps of the composting plants and can be delivered according to the requirement. The outside edges are protected with tarpaulin which are holding the loops and back straps for easy handling.

Size and Shape of Membrane (Concept Indication, Some Details may Vary)



Key Featurs:

Antibacterial Finishing
PES Taslan High Tenacity yarn
High Tear Strength
High tensile strength
High air permeability
High steam permeability
High waterproofing

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AeroLaneX

Smart Windrow Composting with Intgrated Subsurface Aeration & Mechanical Turning

A Sustainable Solution for Recycling Urban Organic Waste

In modern composting plants, organic waste is not discarded but transformed into a valuable product for agriculture: compost. This process takes place in a structured and step-by-step engineered system:

1. Receiving and Preparation of Raw Materials

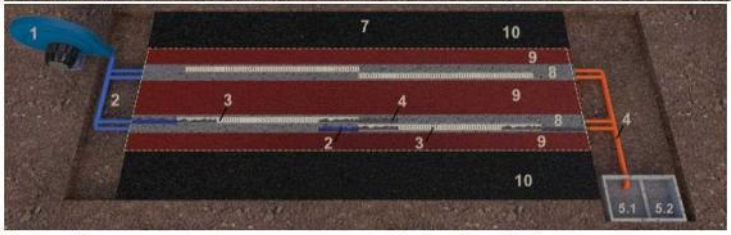
Organic waste is received, physically sorted, shredded, and mixed with dry or bulking materials (such as sawdust or shredded branches) to balance the carbon-to-nitrogen ratio (C/N) and control moisture.

2. Aerobic Decomposition in Compost Rows

The compost material is placed in rows (Windrows). The biological decomposition process is initiated by microorganisms and improves significantly with an adequate supply of oxygen. The one of the most important success factors in industrial composting is proper aeration. In these facilities, electric ventilators are used to inject fresh air into the compost piles. This ventilation is typically implemented in two ways:

2.1. Mechanical turning with that direct oxygen into the material. Windrow turner optional with Irrigation hose-Reel machine.

2.2. Bottom-up aeration via underground channels—a network of concrete ducts beneath the piles. These ducts deliver air through perforations or nozzles into the compost mass.



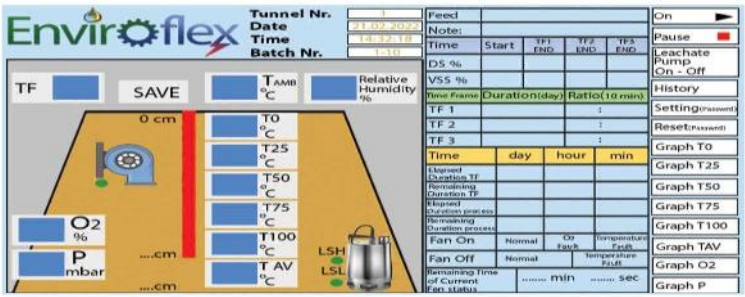
1- Ventilator
2- Air Pipe
3- Aeration channel
4- Leachate Pipe
5.1- Leachate SUMP- Compartment 1
5.2- Leachate SUMP- Compartment 2
6- Feedstock Pile
7- Windrow Area (Lane)
8- Concreate Floor
9- Asphalt or concrete Floor in lane
10- Asphalt or concrete Floor of corridor between lanes

These systems enable:

* Temperature regulation and prevention of overheating
* Significant odor reduction (Membrane Cover on windrow piles is also an option)
* Reduced decomposition time (up to half)
* More complete and uniform composting

Control System

PLC Control Panel with SKADA consits of Tempratore, Oxygen, and Level Controls.



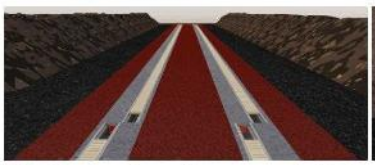
Leachate Management

During decomposition, a liquid known as leachate is produced. If not managed properly, it can pollute the environment. In industrial systems, beneath the compost rows, double-walled or sloped channels are installed to:

* Direct the leachate toward a collection tank
* Prevent leakage into soil and groundwater
* Enable recycling or treatment of the leachate

Advantages of Smart Windrow Composting "AeroLaneX"

* High-quality, consistent compost production
* Fast processing time (reducing months to a few weeks)
* Significant reduction of odors and greenhouse gas emissions
* Precise control over temperature, humidity, and airflow
* Suitable for urban, rural, and industrial scales
* Possibility to install automated systems for ventilation and moisture control



This technology is a smart choice for urban waste management and environmental protection. Recycling organic waste not only reduces pressure on the planet, but also creates added value for society, agriculture, and the economy.

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