

MAIN CHARACTERISTICS OF THE PLANT

Surface area of intervention	27.000 m ²
Maximum annual intervention potential	70.000 ton/year
Daily treatment potential	27 ton/hour
Working days / year	350 days/year
Quantity of compost produced	21.500 ton/year
Average electricity used	75 kWh/ton
Air flow	200.000 m ³ /hour



DESORPTION PROCESS

The plant, authorized with D.D.S. n. 120 of 12/02/2014 and subsequent D.D.G. n. 1212 of 05/09/2016, has a maximum treatment capacity of 70,000 tons / year and is aimed at carrying out the operations of waste R13 and R3 as indicated in Annex C of the fourth part of Legislative Decree 152/2006.

The composting process takes place through a series of biological aerobic transformations of organic matrices that leads to the stabilization and humification of the organic substance. The process must have a duration of no less than 90 days and includes different phases:

- conferment and storage;
- mechanical pretreatments;
- accelerated aerobic biostabilization;
- final maturation;
- storage of the finished product.

THE COMPANY

OWAC Engineering Company is located in Palermo, Via Resuttana 360, Sicily, Italy; the company has been operating in the "waste to energy" for many years and has a long time experience in the field of management consultings for the development and diversification of industrial assets. In particular the company develops its activities in the designing and building of waste treatment plants and environmental remediation.

The more relevant characteristic of OWAC's activities is the development of an idea, the designing of the system and the management of the construction works all culminating with the start-up of the initiative. Therefore OWAC is the catalyst for all the phases which bring to the final start-up of industrial plants.

The working team is very flexible, qualified and adaptable, able to develop all the required activities with care, high precision and "tailor made" solutions. Company references and activities, both in progress and already made, are available on our website.



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PLANT FOR THE PRODUCTION
OF COMPOST



INTRODUCTION

The objective of the proposed composting plant stems from the need to prevent and reduce as far as possible the negative effects on the environment and human health deriving from the management of the organic fraction of urban waste and to achieve the objectives set by the European Union in theme of recycling and reduction of landfilling of biodegradable waste.

The organic fraction of municipal solid waste deriving from separate collection, through aerobic biological treatment, is transformed into quality soil improver to be used for the restoration and / or maintenance of an adequate organic matter content of soils for the purpose of fertility conservation and limitation of erosion and desertification phenomena. For the collection of organic waste in a differentiated manner, actions were implemented to increase this percentage, in compliance with the provisions of art. 205 paragraph 1 letter c) of Legislative Decree 152/2006 and ss.mm.ii. and to Directive 2008/98 / EC. In accordance with the waste hierarchy established by art. 4 of the aforementioned Directive and for the purposes of reducing the emissions of greenhouse gases deriving from the disposal of waste in landfills, in fact, it is envisaged that the separate collection and the appropriate treatment of organic waste is facilitated in order to produce waste-based materials. organic that do not present risks for the environment.

The OWAC Engineering Company on behalf of SICULA COMPOST Srl, a company engaged in the treatment of waste for the city of Catania and neighboring municipalities, has developed, designed and directed the works for the construction of a recovery plant for non-hazardous biodegradable organic waste, aimed at the production of compost.

PRETREATMENT

The incoming waste, once all the entry and conferment procedures are carried out, are deposited in an adequately sized storage area for a maximum period of 2 days. The pretreatment and mixing line of the structuring with the organic fraction at the entrance, consists of:

- shredder;
- magnetic separator;
- disc screen;
- shredder mix.

The maximum treatment potential of this line is about 20 tons / hour, from which the right wet / structuring mix is obtained at the entrance to the biocells (value between 65/35% and 75/25% with the seasonal variation of the characteristics of the waste). The area dedicated to the conferment, pre-treatment and mixing is located in a shed completely closed to the outside, with air intake and recirculation of the same to the biocells.



AEROBIC BIOSTABILIZATION

The biostabilization process takes place within n. 10 biocells (dimensions 12.55 x 20.00 m) closed and confined with rapidly opening / closing doors to prevent the spreading of foul-smelling emissions to the outside world. The maximum volume of material that can contain each biocell is about 700 m³, considering an average height of the cumulus of 2.80 m.

Each biocell is equipped with an integrated system of insufflation (through conduits with spigot nozzles) and air intake, of a product leachate collection system and an irrigation system to prevent product drying. The duration of the process is 21 days, during which it must guarantee 3 days with temperatures inside the heap more than 55 °C, in order to eliminate all the pathogens present and to sanitize the material.

A monitoring and control system is provided, using a system of temperature, humidity and pressure detectors and a software dedicated to the continuous processing of these parameters remotely. This allows the maintenance of optimal process values that guarantee a correct timing and therefore the right degree of stabilization of the material in the accelerated oxidation phase. At the end of the 21 days of stabilization, analytical tests will be performed on the output material for the evaluation of the Dynamic Potential Respirometric Index which stands at values of about 800 mg O₂ / kg SV h.

At the end of the biooxidation we proceed, before bringing the material to the ripening shed, to a coarse sifting from which we obtain a raw compost (under-size material) and the structuring (over-size material) to be recycled at the head of the production cycle.



FINAL MATURATION

The crude compost is further degraded during the ripening phase, the stage in which humification takes place or the formation of the humic substances that characterize the quality of the compost.

This phase is divided into two stages:

- the phase 1 of maturation in which the material is placed in n. 10 macrocumulus (swaths), with dimensions 5.0 x 3.0 m and length of 40 m, periodically turned by means of a turning machine; the material is kept under these conditions for a period of 42 days, in a confined environment and on a stalls with an air insufflation system;
- the ripening phase 2 in which the product from step 1 is arranged in heaps in a closed shed; this final maturation process takes place naturally for 27 days.

FINISHED PRODUCT STORAGE

Following the ripening phases, after a refining of 10 mm, the compost obtained is placed under covered roof and sheltered with a perimeter wall 3,00 m high. The amount of compost obtained is equal to 23,500 tons / year, which represents about 33% of the 70,000 tons / year of waste entering the plant.

AIR EXHAUST TREATMENT

The plant mainly has a single emission diffused in the atmosphere, represented by the biofilter: garrison for the treatment of exhausted air coming from all the closed and confined sheds in which the process phases take place, in which odorous emissions linked to the processes are present. fermentation of piles of biodegradable material. The exhausted air flow rate of 200,000 Nm³ / h, extracted from the different compartments, is sent, for the treatment and the abatement of powders and odorigens, to the humidification towers (scrubbers) and to the biofilter through electric fans, which create the depression necessary for ensure air collection. The plant is equipped with two scrubbers that condition the incoming air:

- increasing the relative humidity level of the air up to values close to saturation, to avoid drying the biofilter;
- reducing the temperature of the air entering the biofilter;
- breaking down incoming dust;
- reducing aggressive chemical and physical substances.

The biofilter will be made with a structure in c.a. of total dimensions 24.0 x 48.0 m, divided into two distinct sectors, in order to facilitate monitoring and maintenance operations (net dimensions 12.0 x 48.0 m for each sector). The maximum height of the filter biomass is 2 m and a specific treatment capacity of 100 Nm³ / hm³ will therefore be guaranteed, with a minimum residence time of 36 seconds.

The filtering biomass that is used is made up of a mixture of ligno-cellulose chips deriving from composting cycles of only vegetable matrices, with a variable size of between 25 and 150 mm, composed of various materials (cellulose, bark, wood and torbified wood), in order to give the mixture itself sufficient porosity to the air flow and a good structural resistance, especially over time. The distribution of the air to be treated within the biofilters sectors is carried out by means of a plenum (expansion chamber in the aforesaid made behind the biofilters) that distributes the air at the base of the biofilter.

From here the air passes through the perforated flooring, formed by plates measuring 5.99 x 1.835 m, and meeting the filter biomass begin the processes of biodegradation of volatile organic substances.

The additional parameters that will be maintained within the biofilter are:

- humidity of the filtering material: 40-60%;
- porosity: 80-90%;
- optimal operating temperature: 15-40 ° C.

