

## Summary

### **Analytical design of the prototype system.**

This report refers to the presentation of data related to: i. the lab testing of the operation and the efficiency of three alternative household composting systems that are available in the market and ii. the lab testing of the individual components of the prototype system, as well as economical data related to the manufacturing and the operation of the system and finally, the analytical technical specifications of the prototype system. In particular:

Three household composting systems available in the market were provided in order to examine their operational functions and performance, under actual conditions, using organic waste from the households of the three Municipalities that are participating in the project. The examination of each composting system was developed by applying the procedures referring to their operational and technical characteristics (e.g. quantity of waste, treatment time period, mixing and aeration conditions) through four experimental cycles. During each experimental cycle, all the data related to the operational performance of the systems was recorded and after the completion of the experimental procedure, samples of the product were collected and subjected to laboratory measurements and analyses in order to determine their quality characteristics. The parameters that were examined for each sample are: pH, Organic Matter, Total Organic Carbon, Humic substances and C/N ratio.

According to i. the observations that were recorded during the operation of the systems and ii. the results obtained from the characterization of the end products process, the overall performance of the systems was determined and evaluated.

Then, taking into consideration:

- i. the results obtained from the lab testing of the three systems
- ii. the overall evaluation of the performance of the three systems
- iii. the most effective technical and operational characteristics of the other systems that were examined through the application of the multicriteria analysis and based on the experience of the working team on the development, control and optimization of the composting process,

the first version of the components of the prototype system were manufactured and tested. In this deliverable, analytical data concerning the evaluation of the components is given, which include:

- Description of the technical and operational characteristics of the individual components
- Dimensions of the components and manufacturing material
- Operational functions of the components in the framework of the operation of the entire prototype system (from the feeding stage to the stage of collection of the end product)

- Evaluation of the performance of the prototype system in relation to the performance of the other available household composting systems (determination of the improvements that were incorporated)

In addition, economical data concerning the cost for the manufacturing of the prototype system as well as for its operation are given.

After the completion of the testing of the individual components of the prototype system, the first pieces of the entire system were manufactured and its functions were re-examined in order to be ensured that the required performance has been achieved. By completing this re-examination, the procedures for the production of the 100 pieces of the prototype system have begun. In this deliverable, the analytical technical specifications on which the manufacturing of the 100 pieces was based are given (full engineering design). The prototype system has the following unique characteristics:

- Separate feeding system
- Reactor vessel isolated from the feeding system
- Collection of the mature compost on a continuous basis
- Collection of leachate
- Agitate system without contacting waste on compost
- Odor control system using specific additives



Fig. 1: Prototype composting system



Fig.2: Organic household waste for



Fig. 3: Composting cycle