

Waste Medical Treatment



1. Most common technologies

1. Incineration
2. Autoclave
3. Microwaves
4. Chemical treatment

2. Converter

1. Main features
2. How it works

3. Comparison

4. Conclusions

1. Most common technologies

The most common technologies used to treat bio-medical waste are mainly 4:

1. Incineration
2. Autoclave
3. Microwaves
4. Chemical treatment

1. Most common technologies

To compare all the technologies the main features to value are:

- Bacterial charge reduction (**Sterilization capacity**);
- **Final appearance** of the treated product;
- **Management & handling** of the different sorts of wastes.
- **Costs** (sunk and not)

1. Most common technologies

- Bacterial charge reduction (Sterilization capacity)

The **Sterilization** capacity is one of the most important parameter for comparing various appliances.

A higher reduction factor of bacterial charge corresponds to a higher sterilizing capacity.

Choosing a system which ensures a high reduction factor is crucial, by considering the practical impossibility of establishing the initial bacterial concentration present in the waste on a case-by-case basis.

1. Most common technologies

- Final appearance of the treated product

In addition to the sterilization capacity, the various appliance on the market differ for the **final appearance** of the treated waste.

Treated waste features affect:

- Operator safety;
- Environmental impact;
- Transports in terms of methods and costs.

1. Most common technologies

- Final appearance of the treated product

The final appearance of the product treated by the various appliance examined can be classified in one of the following categories:

- I. Dry, without cutting or sharp parts, finely shredded or powdered;
- II. Moist, with cutting sharp parts, coarsely shredded;
- III. Moist, with cutting and sharp parts.

1. Most common technologies

- Incineration

Incineration systems burn the waste in the presence of fuel.

Pros	Cons
Sterilization is achieved regardless of the bacterial charge present in the initial.	Very high environmental impact both during normal operation and in the case of anomalies (release of dioxins..).
The final appearance of the treated material is dry without cutting or sharp parts, in powder form.	High purchase and running costs.

1. Most common technologies

- Autoclave

Waste treated by the blowing of high pressure water steam.

Pros	Cons
Commonly found on the market.	Sterilization factor is equal to $\approx 10^{10}$
	The final appearance of the treated material is moist, dripping and identical to initial conditions.
	Special rooms are required to store the boiler and high qualified personnel is required to manage it.
	Pressurized container: risk of contaminated aerosol release into the working environment.

1. Most common technologies

- Microwaves

Waste treated by microwaves which heat the waste to a temperature of approximately 95°-100° at ambient pressure by energizing the water molecules contained in the waste.

Pros	Cons
Possibility of high hourly waste treatment.	Impossibility of obtaining sterilisation due to low temperatures. Disinfection only could be obtained
	High purchase costs.
	Final waste same as initial conditions (average volume reduction about 80%).
	Risk of fire because of the presence of metallic parts.
	Generation of high electromagnetic fields.

1. Most common technologies

- Chemical sterilization

Waste treated by submersion in chemical solutions.

Pros	Cons
Possibility of high hourly waste treatment.	Reactants are only effective if the waste is finely shredded.
	Moist and dripping waste.
	A monitoring system is required to control emission of chemical substances into the environment.

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- 2. Converter**

- 1. Main features**
- 2. How it works**

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2. Converter H series

1. Main features

Converter H series is an apparatus purposely designed for the treatment and sterilization of **all pathogenic-hazardous sanitary waste**.

The process allows to get **full sterilization no matter what the waste microbial load is** but it doesn't change the status of what is loaded in (if loaded radioactive material, it'll remain radioactive even after the process).

This system is a very **innovative** equipment and it has all the **Certifications and Patents**, also for USA market and **no modifications in the usual rules of sanitary waste collection** are required by adopting the Converter H series equipment.

2. Converter H series

1. Main features

In the **Converter H series** all the **bio-medical** waste is treated **together**, at high temperatures (155° C.) in the presence of saturated steam, with a particular working principle that allows to obtain the sterilization temperature and humidity conditions without necessity of pressurized equipment.

The Converter process is characterized by a **powerful motor and a system of blades, that grinds** the waste at high speed, until the mass reach the temperature of 155°C. by friction.

During the cycle, water is sprayed a in a controlled way. By contact with hot material steam is generated, thus producing sterilization effects known as “dump heat”, without needing any pressurized equipment.

It's **not an autoclave** and it doesn't need pressure to reach a temperature of 155°.

2. Converter H series

1. Main features

The final product is sterilized, dry and odour-free with a reduction of 70% in volume and 30% in weight. The appearance is like a kind of fluff that could be sold as RDF (Refuse Derivate Fuel) or sent, as common wastes to landfill.



2. Converter H series

1. Main features

The Converter H series doesn't need specialized operators for its operations because it is easily put into operation and the sterilization cycle is performed in a fully-automatic way. The loading phase can be done manually or automatically, depending on the kind of converter.

Additionally, in this machine the cooling water can be also recovered by adding the **Cooling Tower** (optional) thus transforming the machine into a closed circuit avoiding water waste.

The Converter H can be put everywhere and in Europe is installed inside the hospitals thus avoiding the infected wastes leave the hospital, or in Waste Treatment Centre that got the authorization to treat the medical waste.

The smallest ones usually are put on each floor of the hospital, the biggest ones are installed or at the hospital underground (Hospital Central Treatment) or in a Wastes Treatment Centre

Sizes go from **10Kg/h** up to the biggest one which treats **1500kg/h**.

2. Converter H series

1. Main features

Pros	Cons
Sterilization complete with high bacterial load reduction factor: at least 10^{18} certified.	Treatment capacity related to dimensions of the sterilization cell.
No need to make a selection of waste put in.	
The final appearance of the treated material is: <ul style="list-style-type: none"> • Average volume reduction 70% and weight 30% • Completely dry • Finely shredded (no cutting sharps) • Inert and odour-free 	
The final product can be sold as RDF.	
No pollution effluents are released.	
No need of specialized operator to run the system.	
Can be placed in the hospitals	
Costs reduction	

2. Converter H series

2. How it works

Process steps:

1: Loading

2: Heating

3: Dehydratation

4: Temperature raised to 155°

5: Temperature maintained at 155°

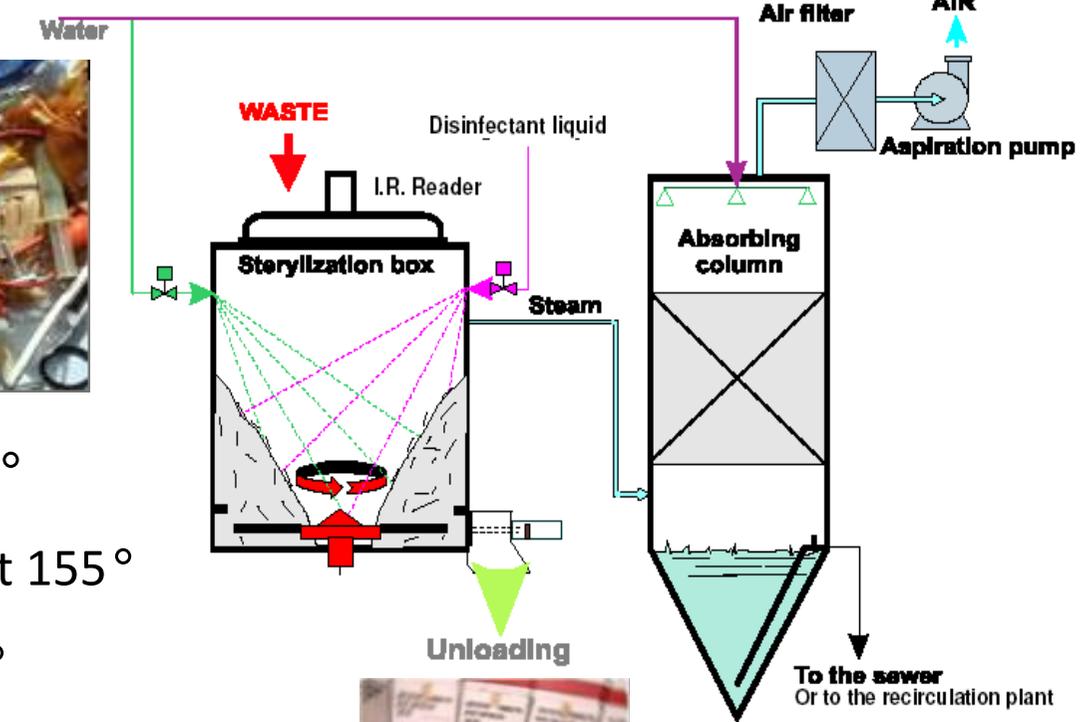
6: Temperature cooled at 95°

7: Unloading

Total Process Time: 25 min.
Loading can be manual or automatic



PROCESS



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3. Comparison*

	Dry	Physically inert	Sterilized	Weight reduction	Volume reduction	Safety	Optionals	No building work needed for installation	No pollutant effluents
Incineration	Green	Green	Green	Green	Green	Green	Green	Red	Red
Autoclave	Red	Red	Green	Red	Green	Red	Red	Red	Red
Microwaves	Red	Red	Red	Red	Green	Red	Red	Red	Red
Converter	Green	Green	Green	Green	Green	Green	Green	Green	Green

According to this comparison, the Converter H series best answers to all needs regarding bio-medical waste treatment.

* Comparison take into consideration machinery structured for the disposal of 150 kg/h

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4. Conclusions

The Converter H series fits with all Medical Waste legislation because:

- Can be loaded with all categories of medical wastes together helping the hospital in saving time and money.
- The waste can be **loaded in the bags** or can be **loaded directly from the boxes**.
- The **final waste can be kept for long time** because it is absolutely sterilized, **dry, odor free , and finely shredded** without cutting or sharp parts

4. Conclusions

And it is also:

- Environmentally friendly with no pollution emissions. The Converter works in light vacuum conditions, thus making impossible the leakage of gaseous mixtures
- It is easy and absolutely safe for the personnel because the process is done automatically.
- Waste transportation is easy and cost saving.