Medical waste treatment

WaSter®
The biological risk coming from the management of infected or potentially infected solid waste, produced by hospitals, nursing homes, clinics and labs is extremely high and may be a cause of transmission of infections for the population and a real risk for the community.

WaSter is a new-generation compact equipment, designed with innovative concepts to inactivate the biological risk through a combined treatment of shredding and sterilization with saturated steam for a final SAL of 10^-6 of Biohazard waste.

WaSter complies with the required standards and limits for the treatment of Biohazard waste, “Bio Safety Level” classes (3 and 4 BLS), that showing a high individual risk, also transmittable via aerosol.

Technology

WaSter is the result of the most advanced design by Angelantoni Life Science, leader in the world of the Infection Control. The high technological level combined with creativity and design, together with a Corporate Know-how matured over decades of activity and experience in the sector, has supported the development of equipment based on the concept of “total quality”, able to meet the requirements of an Elite market requiring total safety assurance, absolute reliability and processes that can be repeated in time, without burdening operators with the risk of assessment for the treatment of “biohazard” waste with high construction standards, advanced techniques and innovative solutions.

Waste flow

The constructive concept of a treatment centre requires equipment, flows, paths, procedures and checks that must be implemented in order to consider safe the treatment of any waste going inside and coming out. WaSter is designed with a pass-through execution, preventing any contact between the dirty area and the sterile area.
Handling of Biohazard waste

All solid and liquid waste coming from hospitals, nursing homes, clinics, Labs and Research Centres are classified and handled as Biohazard.

Once sterilized, waste is no longer a risk for people and can be assimilated to solid urban waste. This type of treatment combined with shredding simplifies disposal management. Proper waste management includes a control of all phases from the packaging, storage and treatment process.

WaSter works in compliance with current regulations for the management of potentially infected and infected waste and can be installed in different operating environments.

Treatment combined with 5 Guarantees

The combined treatment of WaSter has a number of guarantees that are essential for a safety final result and a repeatability over time:

- Treatment takes place in a tightly closed place, avoiding the risk of transmission via aerosol.
- The shredding system is extremely rigid to reduce the waste in unidentifiable small pieces, avoiding the risk of recyclable.
- The highly fragmented waste obtained through the shredding allows an easy removal of air, enhancing steam penetration and sterilization, avoiding any risk of biological contamination.
- The device is made by innovative technical and construction solutions, with controlled drains and emissions, reducing the environmental risk.
- The pass-through execution of equipment allows a unidirectional path of the waste, guarantying a separation between the dirty area and the sterile area, with no risks of contaminations.
WaSter® offers 5 competitive advantages

- 80% decreasing of waste volume allowing a reduction in transport costs
- At the end of the treatment the waste is dry, ensuring an easy and secure management for staff
- The shredding takes place into the chamber, making the handle safer through sterilization
- The cycle takes place in a tightly closed pressure vessel, without emission of unpleasant smells
- The installation with chamber bottom at floor level, simplify the loading and unloading of the trolley.

WaSter® material treatment

1. The waste is placed into chamber.
2. The waste is shredded.
3. The waste is sterilized by saturated steam.
4. The waste is dried.

Directives, certificates and construction standards

The WaSter line is built in compliance with the latest European and international standards:

- 2006/42/EC for Machinery Directive
- 2014/68/EU for Pressure Equipment (PED)
- 2009/125/EC for Eco-friendly design (ERP)
- 2014/35/EU for Low voltage
- 2014/30/EU for Electromagnetic compatibility
- UNI EN ISO 285:2016 (specific requirements and tests for large steam sterilizers)
- UNI EN ISO 17665-1:2016 (specific development, validation and routine testing)
- CEI EN ISO 61010-1:2013 (safety requirements for electronic equipment)
- CEI EN ISO 61010-2-040:2015 (specific requirements for sterilizers and washer-disinfectors used for the treatment of medical materials)
- UNI EN ISO 15614-1:2012 (qualification of welding procedures)
- UNI EN ISO 9606-1:2013 (welder qualification test)
- UNI CEI EN ISO 17050-1:2005 (conformity assessment)
- UNI EN ISO 14971-1:2012 (risk analysis)
- EN IEC 62304:2006 (software validation)
- IEC 62366-1:2015 (usability)
- UNI EN ISO 9001:2015 (quality management system)
- UNI CEI EN ISO 13485:2012 (quality management system)
**WaSter® composition**

**WaSter** consists on a vertical sterilization chamber with a relative loading door and a horizontal pass-through system at the bottom with two doors for the collection of sterilized waste in a trolley. The module can operate independently and reach a productivity of 50 kg/h. Waste trolley is introduced from the dirty side door, the Biohazard waste is loaded from the top door. Treatment starts once the three doors are closed and is fully automatic by the touch screen. The cycle starts with shredding and continues with the sterilization by saturated steam.

**Treatment**

**WaSter** is configured with the following treatments:

1. Trituration and sterilization treatment at 134°C for Biohazard solid waste
2. Sterilization treatment at 134°C for Biohazard liquid waste in open containers
3. Steam penetration test (Bowie&Dick Test)
4. Automatic and electronic steam penetration test cycle according to EN 285
5. Vacuum seal test (leak test)
6. Open cycle designed by the user

---

**WaSter® - Operation**

**-85%**

Water consumption

**-40%**

Energy consumption

**100%**

Recyclable

**-25%**

Total cycle time
1- Arrival of infected material

The infected material is transported inside with a trolley and placed inside the cargo area (elevator). A dedicated trolley is loaded into WaSter to receive the shredded waste.

2- Manual loading of infected material and cycle starting

The transport trolley containing the infected material is raised by the integrated elevator at the charge level. The load of the waste is manual. After the loading, the chamber is hermetically sealed and the cycle starts.

3- Discharge of sterile material

The dedicated trolley containing shredded and sterilized waste is unloaded from the sterile side of the WaSter.
Safe treatment

Waster was designed to last over time. The generous size, ample safety factors and innovative, robust construction of the structures provide a top performance, which increases the safety of the waste treatment compared with equipment currently on the market. Safety is not limited to the process but extended to all components and devices affecting the reliable and safe result.

Environmental impact

Waster was studied by applying the concept of an eco-project design, with the objective of preserving the environment in which we live. Pollutant emissions have been considerably reduced throughout the machine's entire life cycle by introducing innovative technical solutions and top quality components.

Starting from the idea of producing a piece of equipment with sustainable consumption to reduce the environmental impact, significant measurable objectives were set and achieved, all of which enhance the performance achieved by the Waster line.

The vacuum is generated by an innovative vacuum pump that runs fully dry and is compatible with steam. Water consumption for generating vacuum is almost zero. The only water consumption, even if minimal, is related to the production of steam and the discharge temperature cooling device.

Validation

The validation operations make sure the design conditions are complied with after installation.

More specifically, during the sterilisation cycle the following values are checked continuously: pressure, temperature and non-condensable gases. The monitored parameters guarantee not only the effectiveness of the sterilisation process in compliance with the reference standard UNI EN ISO 17665-1:2006, but also a Sterility Assurance Level (SAL) of $10^{-6}$.

---

**Pressures and Temperatures**

<table>
<thead>
<tr>
<th>Time</th>
<th>Pressure (KPa)</th>
<th>Temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14:05</td>
<td>103.6</td>
<td>319.9</td>
</tr>
<tr>
<td>14:06</td>
<td>103.6</td>
<td>319.9</td>
</tr>
<tr>
<td>14:07</td>
<td>103.6</td>
<td>319.9</td>
</tr>
<tr>
<td>14:08</td>
<td>103.6</td>
<td>319.9</td>
</tr>
<tr>
<td>14:09</td>
<td>103.6</td>
<td>319.9</td>
</tr>
<tr>
<td>14:10</td>
<td>103.6</td>
<td>319.9</td>
</tr>
<tr>
<td>14:11</td>
<td>103.6</td>
<td>319.9</td>
</tr>
<tr>
<td>14:12</td>
<td>103.6</td>
<td>319.9</td>
</tr>
<tr>
<td>14:13</td>
<td>103.6</td>
<td>319.9</td>
</tr>
<tr>
<td>14:14</td>
<td>103.6</td>
<td>319.9</td>
</tr>
<tr>
<td>14:15</td>
<td>103.6</td>
<td>319.9</td>
</tr>
<tr>
<td>14:16</td>
<td>103.6</td>
<td>319.9</td>
</tr>
<tr>
<td>14:17</td>
<td>103.6</td>
<td>319.9</td>
</tr>
<tr>
<td>14:18</td>
<td>103.6</td>
<td>319.9</td>
</tr>
<tr>
<td>14:19</td>
<td>103.6</td>
<td>319.9</td>
</tr>
<tr>
<td>14:20</td>
<td>103.6</td>
<td>319.9</td>
</tr>
<tr>
<td>14:21</td>
<td>103.6</td>
<td>319.9</td>
</tr>
<tr>
<td>14:22</td>
<td>103.6</td>
<td>319.9</td>
</tr>
<tr>
<td>14:23</td>
<td>103.6</td>
<td>319.9</td>
</tr>
</tbody>
</table>
WaSter® main technical features

1. Frame, front and side panels in stainless steel AISI 304
2. Vertical and horizontal chamber in stainless steel AISI 316Ti, thickness 8 mm
3. Chamber bottom with central drain and filtration, fully drainable and cleanable
4. Jacket totally covering the chambers in stainless steel AISI 316Ti, thickness 5 mm
5. Doors in stainless steel AISI 316Ti, thickness 5 mm thick
6. Chamber and doors mirror finished with a final superficial reduction of 35%
7. Door/s vertical and horizontal automatic sliding device
8. Door/s sealing by dynamic «air chamber» gasket
9. Vertical chamber with integrated shredder
10. Dual waste pushing device against the shredder
11. Chambers, doors, steam generator and pipeline insulated by kevlar fabric
12. Hydraulic pipes and pneumatic valves in stainless steel AISI 304
13. Steam generation by Electrical steam generator in stainless steel AISI 304 (E)
14. Steam generation by Centralized steam directly to the chamber (S)
15. Steam generation by Electrical steam generator and Central steam (ES)
16. Dry mechanical vacuum pump compatible with steam
17. Double data detection system (2 probes for temperature and 2 for pressure transducers)
18. Siemens integrated safety programmable electronic controller
19. Touch screen (9 inches), full colour and high resolution
20. Alphanumeric recording device installed on the front panel
21. USB connection for data back-up
22. Sterilization cycles for empty glassware, rubber materials, fabrics, liquids in sealed containers and liquids in open containers and cycle for infected liquids and materials
23. Microbiological filtration at discharge
24. Burner at chamber air outlet
25. Front access for routine maintenance, with telescopic electronic panel and IP protection

Optional

26. Possibility to connect the equipment to a traceability system
27. Second touch screen Siemens on the unloading side
28. Bioseal: internal barrier consists of an AISI 304 stainless steel structure, aligned with the wall and sealed, ensuring a total separation between dirty side and sterilized side
29. Discharge temperature control and setting device
30. Remote maintenance control device
31. Condensate vaporisation device
32. B&D Test Electronic / Automatic
33. Metal detector
External optionals

- Loading waste elevator
- Trolley for shredded waste
- Waste transport trolley
<table>
<thead>
<tr>
<th>Model</th>
<th>Productivity</th>
<th>Waste weight volume ratio</th>
<th>Waste volume reduction ratio</th>
<th>Waste loading volume</th>
<th>Treated waste final volume</th>
<th>Cycle time</th>
</tr>
</thead>
<tbody>
<tr>
<td>WaSter 50</td>
<td>50 kg/h</td>
<td>1/10</td>
<td>1/5</td>
<td>500</td>
<td>100</td>
<td>1h</td>
</tr>
</tbody>
</table>

**Dimensions (mm)**
ALS is one of the worldwide leading manufacturers of biomedical refrigeration, non-contamination and sterilization equipment constantly committed to innovation and to environmental or biological safety.

Research centres, hospitals, universities, chemical and pharmaceutical companies are ALS Customers: our company can satisfy any requirement of scientific refrigeration, infection Control (autoclaves) and microbiological safety through a wide range of standard and special products.

In this field we can offer now a complete range of equipment and services to meet the needs of sterilization (CSSD), disinfection stations (CSDD) and special applications BSL3 laboratories - BSL4 and treating infected wastes (Biohazard).

ALS can be an ideal partner in Science and Technology due to a wide range of products and to the market presence in more than 50 Countries with local Agents and Distributors.

ALS invests more than 5% of its turnover in research and development involving a multidisciplinary team of scientists that support clients with cutting-edge, standard and customized solutions in terms of quality, reliability and innovation.

ALS is a subholding of Angelantoni Industrie Group established in 1932, worldwide known for innovation, R&D and high tech (19 active patents) such as climatic chambers and space simulators (Angelantoni Test Technologies), spattering machines for thin film technology (Kenosistec), solar receiver tubes for concentrated solar power plants (Archimede Solar Energy) refrigeration turbo devices for energy saving (Turboalgor) in addition to ALS advanced and patented products such as Hemosafe, Smartfreezers and Waster.