

# Proving the efficacy of sterilization treatment of potentially infectious solid waste

## Medical waste: from sterilization to the End of Waste

sterilization

## Solid infectious waste

hospitals

microbiological analysis

Gruppo C.S.A. S.p.A. has defined and executed in collaboration with Newster System s.r.l. the validation tests of the efficacy of the sterilization process of Newster sterilizers:

- Physical validation test, based on the verification of the sterilization temperature according to the Italian technical standard UNI 10384
- Biological indicator test, based on the use of Geobacillus Stearothermophilus spore vials and verification of the achievement of a level higher than that defined by the State and Territorial Association on alternative treatment technologies, for non-combustion devices for wet thermal treatment of healthcare waste
- Microbiological efficacy test, based on the execution of microbiological analyzes to verify the sterile conditions of the medical waste residual produced by the sterilizer
- Bacterial regrowth test, based on the execution of microbiological analyzes up to the 28th day from sampling.

Specialization AREA

Health and wellness - Safety in wellness and healthcare infrastructures

Platform and catalogue section

Energy and Environment – tools and methods for sustainability, Industrial symbiosis: use, reuse, enhancement and substitution of matter

Microbiological analysis  
preparatory activity: plate  
inoculation



Gruppo C.S.A. S.p.A.

### Contacts

Ivan Fagiolino [ifagiolino@csaricerche.com](mailto:ifagiolino@csaricerche.com)  
Sara Lazzarini [slazzarini@csaricerche.com](mailto:slazzarini@csaricerche.com)  
Roberto Giani [rgiani@csaricerche.com](mailto:rgiani@csaricerche.com)

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## PRODUCT DESCRIPTION

C.S.A. helped Newster to define a protocol to verify the sterilization effectiveness of Newster sterilizers, designed for the on-site treatment of potentially infectious medical waste.

C.S.A. provided the study and planning of the steps and methods to evaluate the Newster sterilization process and then performed the tests, including microbiological analysis activity on the residue of the sterilization process.

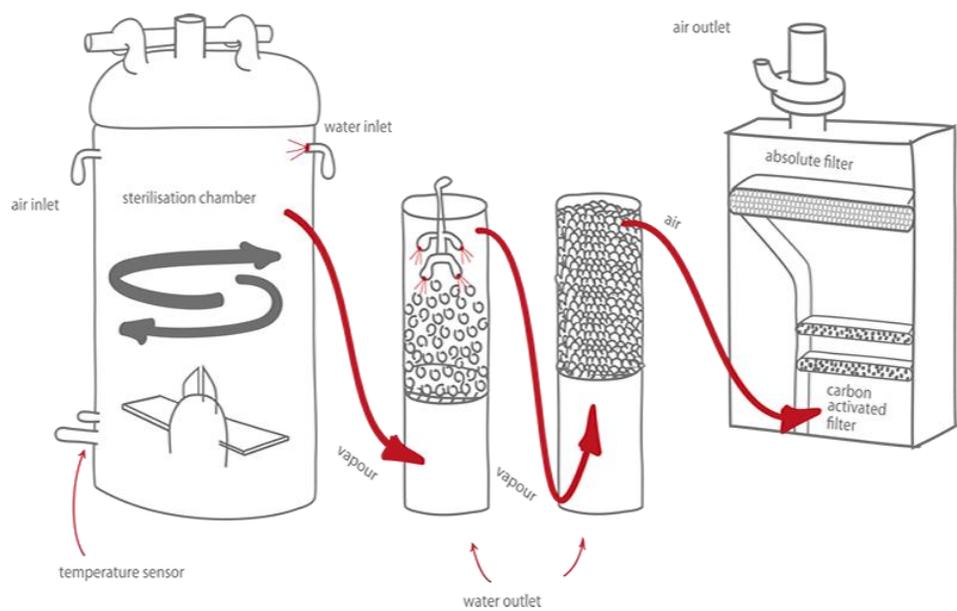
## INNOVATIVE ASPECTS

The results obtained from the laboratory tests and analyses demonstrated that Newster sterilizers comply with the international requirements for the sterilization of medical waste, represented by STAATT level IV. for the evaluation of the efficacy of the sterilization processes which corresponds to the inactivation of bacteria, fungi, lipophilic and hydrophilic viruses, parasites, mycobacteria and spores of *Geobacillus Stearothermophilus* with a concentration equal to or greater than  $6\log_{10}$ .

## POTENTIAL APPLICATIONS

Newster sterilizers can be used by public or private hospitals, of various sizes, for the disposal of solid waste, through the installation of the system on site for the treatment of potentially infectious waste generated by the structure itself. The installation does not require authorization from the competent PPAA, but a simple communication pursuant to the Decree by the President of the Republic n. 254, 15 July 2003. Thanks to its characteristics, the residue can be considered as RDF or assimilated to the undifferentiated municipal waste.

**Scheme of the sterilization flow using Newster friction heat treatment technology**



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## APPLICATION EXAMPLE

### Treatment of waste from small hospitals

## APPLICATION DESCRIPTION AND RESULTS

Newster NW5 machine was designed for use in small hospitals.

On-site sterilization significantly reduces the costs of disposal of healthcare facilities, increases hygiene standards by improving staff safety and helps to reduce both the quantity of waste produced and the environmental impact thanks to the 30% reduction of CO<sub>2</sub> emissions due avoided transport.

The sterilization process involves 6 stages:

1. Loading of waste and start in automatic mode.
2. The rotor starts to rotate faster and faster, changing the direction according to needs. The temperature begins to rise as the materials are finely pulverized.
3. When 96 - 100 °C is reached, the temperature remains stable until the moisture in the waste has completely evaporated. The vapors are cooled in the heat exchangers and discharged into the sewage system in compliance with the discharge table pursuant to the legislative decree n.152/06 and as amended.
4. The temperature starts to rise rapidly, reaching 150 °C. Sterilization is reached in a few seconds.
5. By using tap water, the waste is cooled down to 95 °C before unloading.
6. Once the sterilization cycle is completed, the hatch can be opened and the product extracted and collected in the integrated stainless steel box.

Newster NW5 machine was designed for use in small hospitals

## INVOLVED PARTNERS

Newster System s.r.l.

## IMPLEMENTATION TIME

6 months

## TECHNOLOGY READINESS LEVEL

TRL9 - Actual system proven in operational environment

## EXPLOITATION

The Newster "FHT" sterilizer is covered by an international patent and has been available on the market for 25 years. The project implemented in collaboration with C.S.A.Group allowed to validate the sterilization efficacy of the machine through an objective and scientifically proven verification protocol.



## REFERENCES

Altroconsumo Edizioni S.r.l., Celli S.p.A., Eco Pets Italia s.r.l., Hen food group s.r.l., ALIA S.P.A. OCU - Organización de Consumidores y Usuarios, Romagna Acque s.p.a., Arcadis Italia S.r.l., AECOM URS Italia S.p.A., The It Group Italia S.r.l., Tamoil Italia S.p.A., Ecotherm S.r.l., Sogepu S.p.A., Sogliano Ambiente S.p.A., GESENU S.p.A., HERAtech S.r.l., Planeta Studio Associato, Saipem S.p.A., Alia Servizi Ambientali S.p.A., Yara Italia S.p.A., Italferr S.p.A., A2A Ambiente S.p.A., Api Raffineria di Ancona, Caviro Distillerie S.r.l., Golder Associates S.r.l., Comune di Sant'Antioco, Jacobs Italia S.p.A., Enomondo S.r.l., Enel Produz. S.p.A., Consiglio Naz.le delle Ricerche, Conai, Tamoil Raffinazione S.p.A., Project Automation S.p.A., Cesi S.p.A., FERONIA S.r.l., Water & Soil Remediation S.r.l., Stantec S.p.A., Kuwait Petroleum Italia S.p.A., Consorzio Naz. Riciclo e Recupero Imb. Acciaio, Newster System srl, Regione Emilia-Romagna

**Gruppo C.S.A. S.p.A.**  
headquarters in Rimini

## LABORATORY DESCRIPTION

Gruppo C.S.A. S.p.A. is an analysis laboratory and a private research institute specializing in the management of complex environmental monitoring plans, and capable of guiding and supporting a mainly application activity by research and development and following and coordinating complex and interdisciplinary projects that require a high level of professionalism and experience. The chemical-physical-microbiological analysis laboratory accredited according to ISO/IEC 17025 with number L0181, and equipped with a quality, safety and environmental management system certified according to ISO 9001, ISO 14001 and ISO 45001, is equipped with modern analytical systems that allow you to deal with a very wide range of investigations, ensuring reduced times and high quality standards. The high professional profile, the skills acquired in over thirty years of activity, and the continuous updating of staff, allow Gruppo C.S.A. S.p.A. to integrate sampling and analytical determination on various environmental and agri-food matrices, with high-level consultancy providing innovative and interdisciplinary solutions to complex problems, developing existing services and creating new ones, and thus representing a reliable partner. Always at the forefront in methodological, instrumental and technological applications of applied research in the environmental field.



[www.csaricerche.com](http://www.csaricerche.com)

## Contacts

Ivan Fagiolino  
[ifagiolino@csaricerche.com](mailto:ifagiolino@csaricerche.com)