

I. Common Specifications

1st. Registration in Europe

- i. The machines and the system for the treatment of infectious medical waste by means of shredding and subsequent sterilisation with saturated water vapour are registered and approved by European authorities (Registration Number: XX88587UP2021).

2nd. Country of Origin

- i. MACS is produced and assembled in the Federal Republic of Germany; a corresponding certificate of origin is supplied with the individual device.

3rd. Vibration and Noise Level

- i. MACS complies with the emission guidelines for noise emission valid in the Federal Republic of Germany, the sound level is less than 65 dB at 1 m distance.

4th. Certificate:

- i. MACS devices are CE certificated.
- ii. MACS devices will be certified as US regulation, certification under development. (ASME, UL Labelling)

5th. Maintenance and Service Centre

- i. The maintenance and service centre for MACS is ERMAFA Environmental Technologies GmbH located in Austria and Germany online to cover 24/5 schedule.

6th. Closed design and single cycle

- i. The MACS device offered are designed in such a way that all aggregates, e.g. the steam generator and water treatment are accommodated in one housing and are designed for double loading in one cycle per hour.

7th. Treated waste unrecognizable

The treated waste is not visible and has a size of max. 8/30 mm.

8th. Wastewater free of contamination

- i. The wastewater from the treatment process is cooled down to max. 70°C and is sterilised like the waste.

9th. No chemicals used

- i. MACS device uses only steam, pressure and vacuum for efficient sterilisation of infectious medical waste, no chemicals are added.

10th. No rest between cycles, continuous working

- i. As soon as a sterilisation cycle is completed, the next cycle can be started, there are no pauses to be observed.
- ii. MACS devices are designed to operate 24/7, i.e. 24 hours 7 days a week.

11th. Hopper volume only for two loads calculated

- i. ERMAFA Environmental Technologies confirms that the devices offered have the required filling volumes and materials recommended per machine type shredder:

Machine Type	Volume in Litre per hour	Shredder Type	Recommended materials
MACS 700	700 Litre	2 Shaft	All medical waste as example Plastic bags, needle boxes etc. Metal parts with max. diameter of 3mm. all sizes above will be excluded from the warranty. Metal parts can be only 10% of the mass of the waste input.

- ii. The MACS solution on your offer is designed for double filling.

12th. Printer for record cycle stages

- i. All MACS devices are equipped with a printer that documents the date, temperature, time, prevailing pressure, and cycle number of each cycle/load.
- ii. In addition, these values can also be stored on an SD card and read out during a check.
- iii. As a special option, direct transmission of these values to the customer is also possible.

- 13th. Emitted air free of contamination
- i. The interior (feed hopper, shredder, and treatment chamber) of the MACS device is sterile, the escaping air is additionally passed through a HEPA filter as a safety step. This ensures that the air is not contaminated in any case.
- 14th. Automatic unload
- i. After completion of the sterilisation process, the unloading gate opens automatically, and the unloading process begins.
 - ii. In any case, the operator must ensure that the collection tray for the sterile goods is positioned in suitable time.
- 15th. Costs for site preparation at customer cost
- i. The costs incurred for the adaptation of the installation site for the MACS device, such as water and wastewater connection, electricity connection and tiling of walls and floor are not included in our offer price.
- 16th. Treatment of blood bags
- i. MACS devices are designed so that blood bags and other liquids can be placed in the machine as well.
 - ii. The devices also have an additional program where liquids can be safely sterilised and thus disposed of in the sewer.
 - iii. Chemicals are excluded from this option.
- 17th. Power of steam generator
- i. All MACS devices are equipped with a steam generator whose power is adapted to the volume to be treated. In addition, our MACS are equipped with a water treatment system as standard, which significantly extends the service life of the steam generator.
 - ii. All steam generators comply with the technical regulations of the Federal Republic of Germany.
- 18th. Indicators start – finish of cycle
- i. Display for start and end of cycle with showing temperature and pressure. The start is made by pressing the corresponding two buttons on the operating panel, the end of the cycle is indicated by opening and emptying the treatment chamber by screw conveyor. After the loading of the material, a leak test must be conducted and then the machine automatically starts the cycle.

- ii. The temperature, pressure and time are shown on the display and printed on paper by the built-in printer. In addition, it is possible to save the values on an SD card and read them out later.
- iii. In addition, MACS has the possibility to transfer all values directly online to the customer.

19th. Alarm system in case of errors:

- i. If for any reason the cycle is interrupted, e.g. because the shredder is blocked, pressure and temperature are not within the programmed limits, then the MACS automatically goes into the emergency mode provided for in the program, which provides for steaming for at least 50 min so that the waste that is in the machine is safely sterilised. No lid can be opened while the emergency program is running.

20th. PLC controls

- i. The MACS devices are equipped with a backup battery for the controller, thus ensuring that the program does not crash in the event of a power failure.
- ii. The machine stops and when power is available again, the program is completed from this point.

21st. Height limit, lifter, shredder materials

- i. MACS height for filling:

Machine Type	Height for filling in (mm)
MACS 700	see information at Annex B, estimated dimension.

- ii. The discharge of the sterilised waste takes place on the lower floor.

22nd. Cycle time less than 60 min

- i. ERMAFA Environmental Technologies guarantees compliance with the required maximum cycle time of 60 min. excluding loading and unloading.

23rd. Sterility assurance

- i. ERMAFA Environmental Technologies guarantees compliance with the values of SAL= 10^{-6} required by the WHO and STATE.
- ii. MACS offers various programs, which are available with steaming times of:
 1. 10 min in a SAL = 10^{-18}
 2. 20 min up to a SAL = 10^{-48} is reached.

- iii. The minimum level of MACS is Log SAL = 10^{-8} .
- iv. The program for solids and 20 min steaming time is also capable of destroy prions, as in Creutzfeldt-Jacob, Ebola, BSE, and thus safely sterilise the infectious material.
- v. This is also confirmed in the test protocol of Bad Elster Laboratory effect according to Robert Koch Institute

XV. Annex C – Data Overview MACS 700

Fact MACS	Unit	MACS 700
Capacity in one cycle	kg	700
Waste capacity per hour	Liter	70-210
Weight per hour maximum	lbs.	700
Hopper capacity (liter)	Liter	350
Autoclave capacity	Liter	245
Cycle time	min	less than 60 min
Cycle per hour	cycles	1
Loading per cycle		2
Power consumption peak	kW	55/85
Power supply voltage	V	400
<i>main frequency</i>	Hz	50/60
<i>Approx. Fuse</i>	A	137,5/212,5
Water connection pressure	bar	4,5
required minimum water flow rate	liter/ min	35
required water inlet temperature	°C	15-25
required maximum water hardness	mmol/ liter	1,5
required water filtration	micrometer	25
Approx. Average power consumption	kW	25/35
Approx. water consumption per cycle	Liter	300
(less than)	gal	79,2
Approx. electricity consumption per cycle	kWh	25/35
Noise level	dB	65
Application		On Site
Steam generator	kW	51/80
Dimensions		
Width	mm	2800
Depth	mm	1850
Height Lid closed/ open	mm	2850/3450
Total Weight	Kg	4400
Floor load average	kg per sqm	800

Benefits for your business – and a smaller footprint!



Sustainability – environmentally safe



- Only water and energy are needed – no chemicals; connections only required for energy, water and wastewater
 - ✓ No expensive transportation
 - ✓ No special bags needed
 - ✓ Cross contamination therefore excluded
 - ✓ Reduction of volume for waste up to 97 percent
- On-Site Solution: disposal of hazardous waste directly in the respective facility
- No negative air emissions
- Long lifetime; extended warranty available on request
- Costs very favourable against collection costs (amortization of the investment within 2 years)
 - ✓ MACS has the best quality-price-ratio on the market

Usage



- safe and economic high-end solution for the decontamination of medical, infectious and other hazardous waste – the type of waste doesn't matter
- MACS are stand-alone-solutions
 - ✓ Easy Plug and Play-installation
 - ✓ Available in various sizes and capacities, customized solutions
- automatic processing
- highest security standards
 - ✓ All applications equipped with emergency programs
- Remote access

In 10 minutes
Log SAL=10⁻²⁴

In 20 minutes
Log SAL=10⁻⁴⁸

MACS sterilizing:
Covid-19
SARS B.1.1.7 / B.1.351
Creuzfeldt Jacob
Hepatitis
HIV

MACS serves any industry



- e. g. hospitals, laboratories, research facilities, military services, airports, cruise ships, hotels and many more
 - ✓ Safer for patients, employees and the community!

MACS is the most modern high-speed steam sterilizer / on-site solution for treating infectious waste using a lethal heat pressure thermal process (136 ° C - 142 ° C), simultaneously shredding, sterilizing and destroying HIPAA media in one compact environment. The device converts „red bag“-waste (biohazardous-/biomedical waste including sharps) into sterilized municipal trash in minutes!

MACS is economical, easy-to-use and install, (plug and play) fully automatic, uses an operating touchscreen with a web-based monitoring.

The **MACS** technology is certified by the German Robert Koch Institute, it reaches a Sterility Assurance Level (SAL) up to Log SAL = 10-48. It surpasses the standards of WHO, which require Log SAL = 10-6.



TECHNICAL FACTS

Capacity per hour	70-210kg (depending on waste density 0,1/0,3)
Filling hopper capacity	350 liters
Autoclave capacity	245 liters
Process	Pre-vacuum plus plateau phase 10 alternatively 20 mins., temp. 136° C, pressure up to 5 bar
Biological inactivation	SAL log-24 standard program, SAL log-48 (20 minutes program)
Waste reduction	Approx. 97% on volume, depending on waste density

CONNECTIONS

different connection valves can be adapted

Power consumption (customizable)	Unit-average 25/35 kW. 3 phase, 400 V, 50 Hz - 60 Hz optional
Water consumption	Approx. 300 l/cycle
Water inlet (customizable) A water softener is required, available as option.	3/4" water connection (Standard size)
Water outlet	32 mm / 1-1/2"
Condensate/ air	All exhaust air is going through a 0,2-micron HEPA filter
Noise level	< 65 dB
Steam Generator	351/80 kW
Air Compressor	Oil free, max. 1 kW
Documentation (integrated on board printer) pressure in bar, temperature, time, cycle #, every minute during plateau phase	USB Data pass, step documentation on SD Card, connection to local IT system possible

SAFETY/ EMERGENCY FEATURES

- Automatic leak test before a cycle starts, will not start if leak is discovered
- Fast stop and emergency program in case of process is interrupted during the cycle period
- A sterilization with hot steam is guaranteed every time before the lid is opened
- Gaseous discharges are filtered with a 0,2 µ microbiological filtering system
- integrated water softener and steam generator
- The shredder and its parts are sterilized with saturated steam every cycle
- Programmable daily cleaning cycles
- Liquids are only released into the sewer after sterilization and confirmation that the cycle performed correctly. Cycle continues where it stopped
- technicians don't need an education background

Materials used	All parts in connection with steam made from stainless steel 1.4301
Frame	Steel, powder coated
Casing/ Bodywork	Steel, powder coated optional: customer's choice of colour
Shredder	Electrical motors 3 kW each with reverse drive, knives made from Hardox steel
Shredding time	Max. 6-10 minutes according to material used

DIMENSIONS

(current data, all data approximately) *

Length/ height/ depth in mm	Approx. 2110 mm/ 2280 mm/1850 mm
Length/ height/ depth in feet	Approx. 6.9 feet/7.4 feet/6 feet
Height machine opened	Approx. 3450 mm / 11.3 feet
Weight net	Approx. 4400 kg, plus options
Shipping weight	depending on customer request
Shipping Dimension	depending on customer request

* May change due to design changes or customer requirements.

PROCESSABLE TYPES OF WASTE

- sharps (WHO-sharps)
- metallic packing, but no pressure containers VOC's
- blood bags and blood preserves (WHO-pathological waste)
- VOC's Volatile and semi-volatile organic compounds, chemotherapeutic wastes and radiological wastes should not be treated in a MACS
- wastes whose collection and disposal are subject to special requirements in order to prevent infection (i.e. dressings, plaster casts, linen, disposable clothing, diapers (WHO non-risk or „general" health-care waste)