



PHARMA DIVISION

cGMP Process equipment

TERMINAL STERILIZER TS-AS / OW

Air + Steam mixture / Overheated Water

APPLICATION

The Terminal Sterilizer type TS is designed to process aqueous solutions in sealed containers.



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KEY CONCEPTS OF TERMINAL STERILIZATION

The liquids solutions are loaded in hermetically sealed containers such as: flexible bags, glass bottles, BFS bottles, syringes, cartridges, ampoules, vials, blister packs.

Terminal sterilization can be distinguished in two different cycles, dedicate to different products and type of containers:

- AIR + STEAM MIXTURE
- OVERHEATED WATER



TERMINAL STERILIZER TS-AS

Air + Steam mixture

AIR + STEAM MIXTURE STERILIZATION

LAST TECHNOLOGY highly recommend the terminal sterilization performed by air + steam mixture for applications where a liquid is being sterilized in a small volume heat sensitive sealed containers, made in complex plastic, or not-deformable glass.

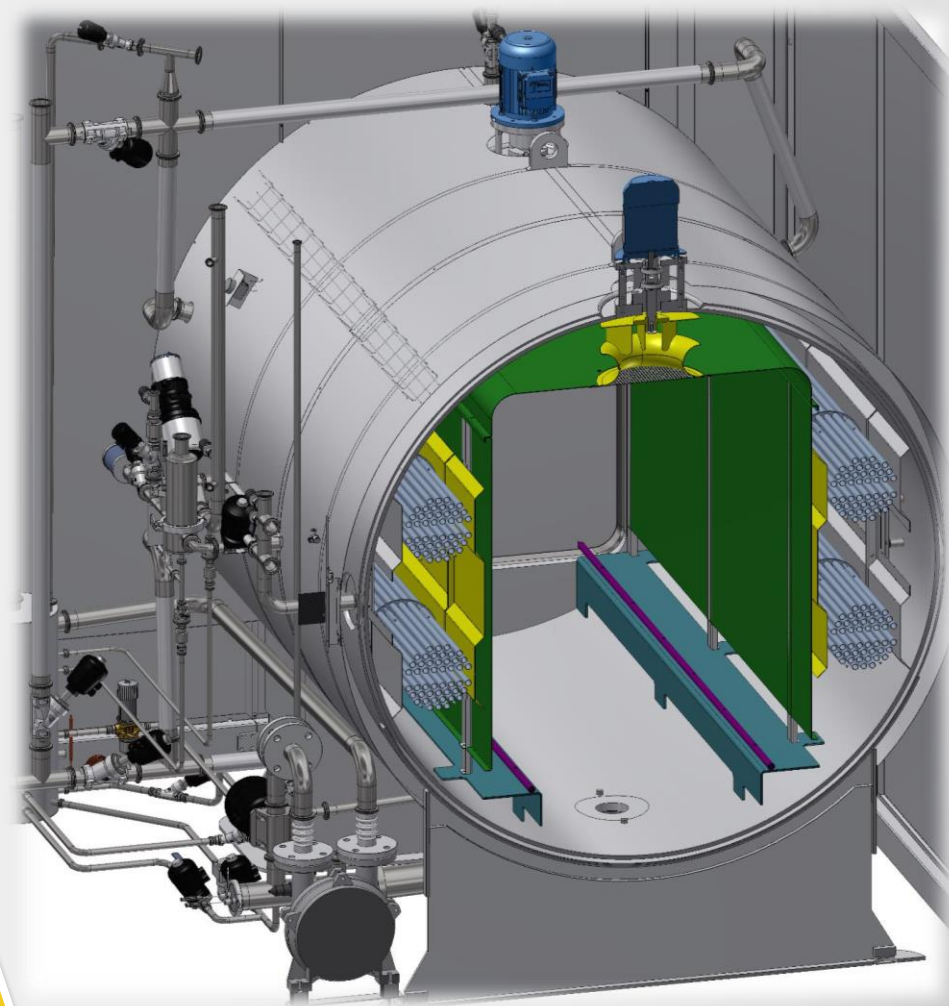


TERMINAL STERILIZER TS-AS

Air + Steam mixture

TERMINAL STERILIZER TS-AS

In this equipment, the sterilization media is clean steam, uniform mixed with compressed air, by an integrated fans system, to balance the internal chamber pressure with the liquid pressure inside the containers, during the entire cycle. This special design grants that the primary packaging integrity is maintained and there is no deformation.



TERMINAL STERILIZER TS-AS

Air + Steam mixture

BENEFITS

- Uniform heat penetration and temperature distribution
- Indirect steam exposure
- Sterile liquids keep their physical and chemical properties
- Packaging integrity is maintained
- No deformation of elastic packages
- High drying performance thanks to the ventilator system
- At the end of the cycle the containers are dry ready for inspection or labelling



Terminal Sterilizer TS-AS

Utilities consumption comparison chart: 1000 liters chamber

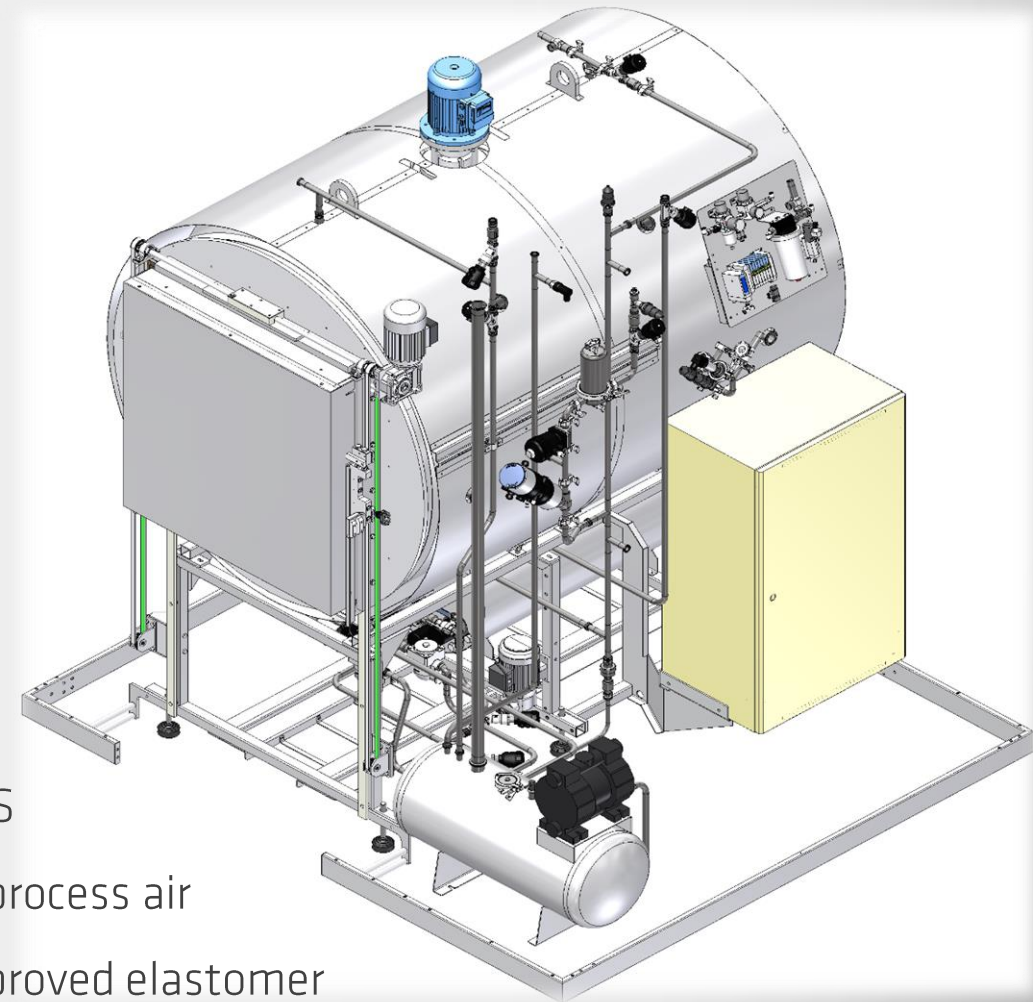
UTILITY / EQUIPMENT	CONNECTIONS		PRESSURE		FLOW RATE		TEMPERATURE		CYCLE CONSUMPTION	
	TS-AS	TS-OW	TS-AS	TS-OW	TS-AS	TS-OW	TS-AS	TS-OW	TS-AS	TS-OW
POWER LINE ELECTRIC CABLE CONNECTION	1,5" PIPE	1,5" PIPE	/	/	/	/	/	/	/	/
RAW/TAP WATER	3/4 TRICL.	3/4 TRICL.	3 barg	3 barg	80 lt/1'	50 lt/1'	15°C	15°C	80 lt	20 lt
INSTRUMENTAL COMPRESSED AIR	PIPE 10x7.5	PIPE 10x7.5	6 barg	6 barg	30 Nlt/min	30 Nlt/min	/	/	180 Nlt	180 Nlt
PROCESS COMPRESSED AIR	PIPE 10x7.5	/	6 barg	/	60 Nlt/h	/	/	/	600 Nlt	/
COUNTER PRESSURE COMPRESSED AIR	/	PIPE 10x7.5	/	4 barg	/	100 Nlt/min	/	/	/	1000 Nlt
PLANT/INDUSTRIAL STEAM	3/4 TRICL.	3/4 TRICL.	2.4 barg	6 barg	50 kg/h	150kg/h	134° C	165°C	50 kg	100 kg
CLEAN STEAM	3/4 TRICL.	/	2.4 barg	/	100 kg/h	/	134° C	/	100 Kg	/
STEAM CONDENSATE DRAIN	/	1/2" TRICL.	/	6 barg	/	50 lt/min	/	/	/	/
PURIFIED WATER	/	1" TRICL.	/	3 barg	/	50 lt/min	/	15° C	/	200 lt
COOLING/CHILLED WATER INLET	3/4" TRICL.	1" TRICL.	3 barg	3 barg	50 lt/1"	100 lt/min	6° C	6° C	1500 lt	1500 lt
COOLING/CHILLED WATER OUTLET	3/4" TRICL.	1" TRICL.	3 barg	3 barg	50 lt/1"	100 lt/min	15° C		1500 lt	1500 lt
EXHAUST AIR DISCHARGE	1-1/2" TRICL.	1-1/2" TRICL.	/	/	150 Nmc/h	30 Nmc/h	120° C	/	/	/
MAIN DRAIN	1-1/2" TRICL.	1-1/2" TRICL.	/	/	20 lt/min	150 lt/min	60°C	70°C	50 lt	200 lt

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CONSTRUCTION DESIGN

- cGMP/ GAMP V guidelines
- Round cross section chambers made of 316L or 316Ti SS
- Jacket made of 304 or 316L or 316Ti SS
- Piping completely made in 316L SS with in-line sanitary fittings
- Orbital piping welding
- Product contact surfaces mechanically polished below to 0.35 μm
- Chamber doors of automatic vertical or horizontal sliding type
- Bio-seal flange for ducting to a VHP isolator
- Areas separation by means of bio-seal frame made of 304 or 316L SS
- Chamber and doors sealing by pneumatically pressurized gasket by process air
- Components and instruments made of 316L or 316Ti SS and FDA approved elastomer



TERMINAL STERILIZER TS-AS

Air + Steam mixture cycle / Overheated Water

SUPERVISORY, TRACEABILITY AND CONTROL SYSTEMS

All process equipment engineered by LAST Technology are automated through a Programmable Logic Controllers (PLC).

A color touch screen Panel PC (IPC) performs as Human Machine Interface (HMI). A P&ID control interface manage all process parameters, recipes, settings, sequence of operations and their storage with an intuitive design that grants an easily accessing to the information, minimizing the risk of human error.

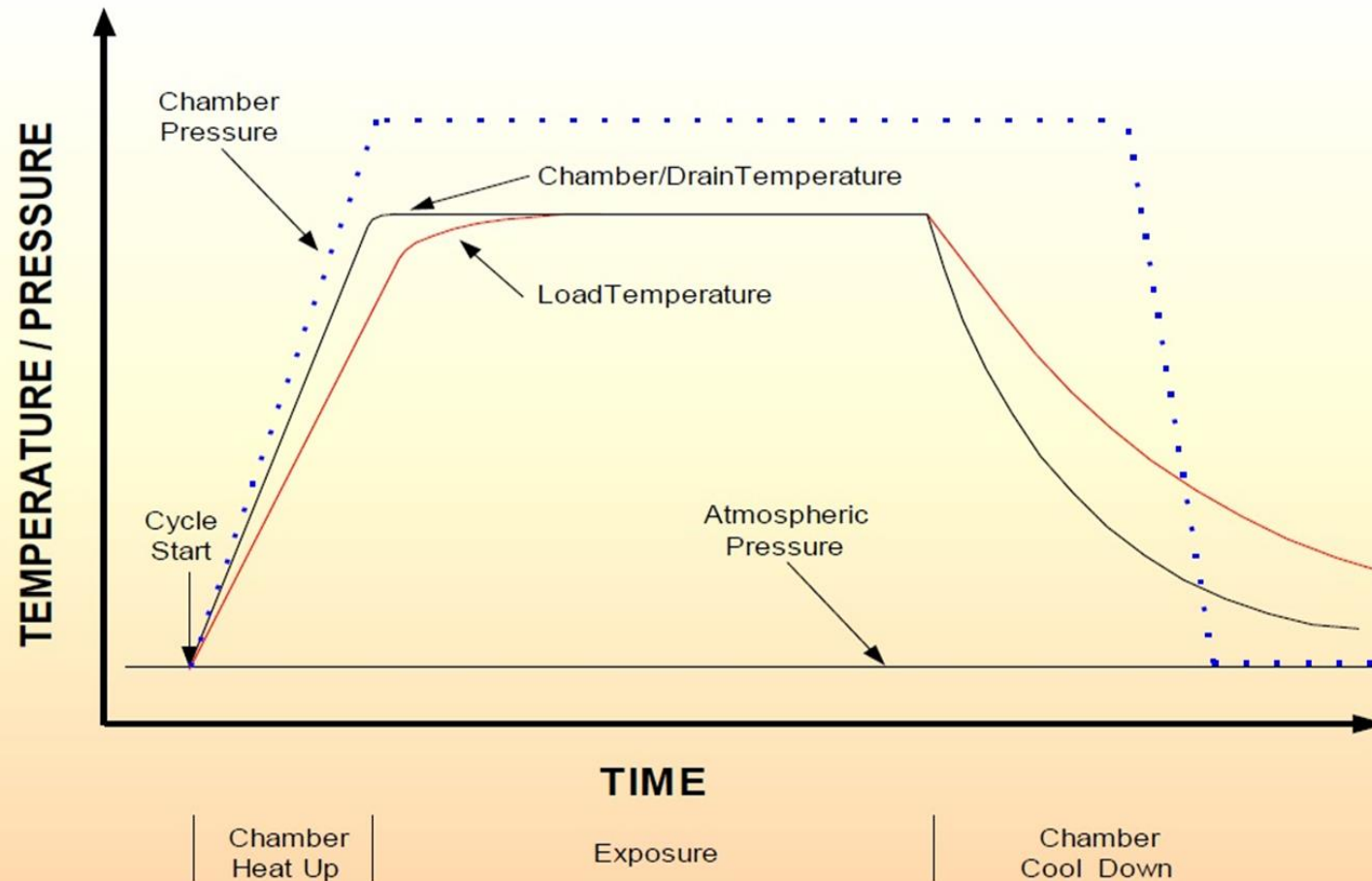
Hardware and software are provided only from the most well known brands such as Siemens, Allen Bradley, ASEM, Rockwell.

In compliance to the 21 CFR Part 11 LAST install a Supervisory Control and Data Acquisition (SCADA) system, developed and engineered following the Good Automated Manufacturing Practices (GAMP 5).



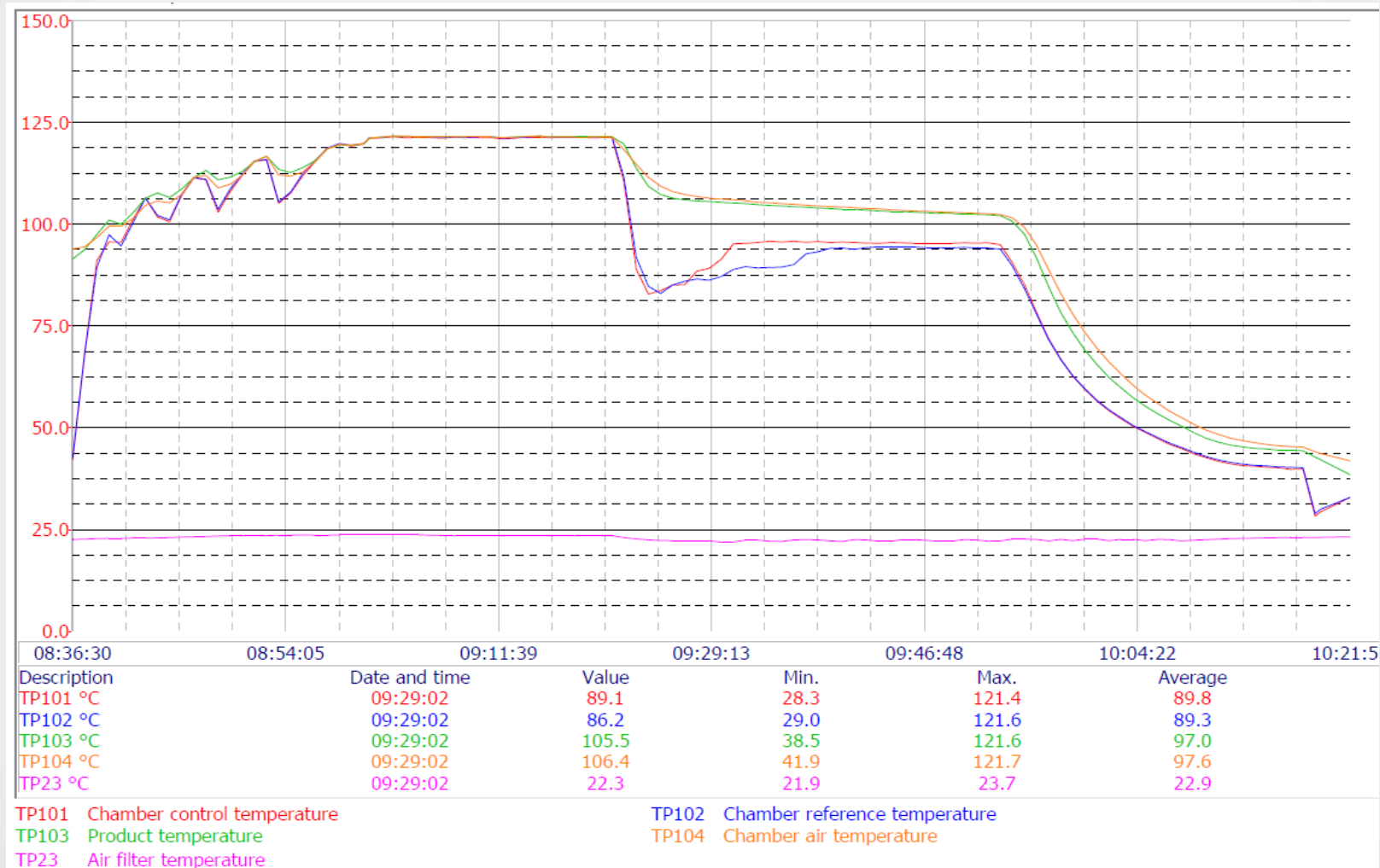
TERMINAL STERILIZER TS-AS

Air + Steam mixture cycle graphic trend



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Air + Steam mixture cycle graphic trend



TERMINAL STERILIZER TS-AS

Air + Steam mixture

THE RANGE

Type	Chamber Dimensions (mm - inches)				Useful Capacity (litres / cu. ft.)	Overall dimensions (mm - inches)		
	Diameter	Width	Height	Lenght		Width	Height	Lenght
TS-AS 250	900 / 35.5	600 / 23.5	600 / 23.5	700 / 27.5	250 / 9	1100 / 43.5	1900 / 75	1050 / 41.5
TS-AS 500	900 / 35.5	600 / 23.5	600 / 23.5	1400 / 55	500 / 17.5	1100 / 43.5	1900 / 75	1750 / 69
TS-AS 1000	1200 / 47	800 / 31.5	800 / 31.5	1600 / 63	1000 / 35.5	2200 / 86.5	2300 / 90.5	1950 / 77
TS-AS 2000	1200 / 47	800 / 31.5	800 / 31.5	3100 / 122	2000 / 70.5	2200 / 86.5	2300 / 90.5	3450 / 136
TS-AS 3000	1600 / 63	1000 / 39	1000 / 39	3000 / 118	3000 / 106	2400 / 94.5	2500 / 98.5	3350 / 132
TS-AS 4000	1600 / 63	1000 / 39	1000 / 39	4000 / 157.5	4000 / 141	2400 / 94.5	2500 / 98.5	4350 / 171
TS-AS 5000	1600 / 63	1000 / 39	1000 / 39	5000 / 197	5000 / 176.5	2400 / 94.5	2500 / 98.5	5350 / 210.5
TS-AS 6000	2000 / 79	1250 / 49	1600 / 63	3000 / 118	6000 / 212	3000 / 118	3000 / 118	3350 / 132
TS-AS 7000	2000 / 79	1250 / 49	1600 / 63	3500 / 138	7000 / 247	3000 / 118	3000 / 118	3850 / 151.5
TS-AS 8000	2000 / 79	1250 / 49	1600 / 63	4000 / 157.5	8000 / 282.5	3000 / 118	3000 / 118	4350 / 171
TS-AS 9000	2000 / 79	1250 / 49	1600 / 63	4500 / 177	9000 / 318	3000 / 118	3000 / 118	4850 / 191
TS-AS 10000	2000 / 79	1250 / 49	1600 / 63	5000 / 197	10000 / 353	3000 / 118	3000 / 118	5350 / 210.5
TS-AS 11000	2000 / 79	1250 / 49	1600 / 63	5500 / 216.5	11000 / 388.5	3000 / 118	3000 / 118	5850 / 230
TS-AS 12000	2000 / 79	1250 / 49	1600 / 63	6000 / 236	12000 / 424	3000 / 118	3000 / 118	6350 / 250

Upon request LAST Technology is able to provide further chamber sizes up to 40 m3

TERMINAL STERILIZER **TS-AS**

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DRYING PHASE

Product storage in a quarantine area

Blowing of hot air for product drying

Product delivery to the labeling machine

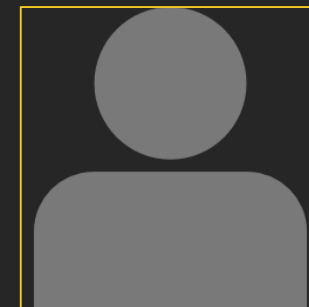
TERMINAL STERILIZER TS-AS

Air + Steam mixture cycle



CUSTOM OPTIONS AND ACCESSORIES

- Customizable overall dimensions
- Dedicated recipes for various products
- Vertical or horizontal automatic sliding type doors
- Floor standing configuration
- Pit mounted design for direct floor level load
- Automatic loading and unloading system
- Internal swing and rotation system
- Pick & place robots
- Electrical or steam heat exchanger
- Wide range of high quality OEM components



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