BMT USA

MMM Group

cGMP

Steam & Terminal Sterilizers

STERIPRO / VENTIPRO / AQUAPRO / COMBIPRO

BMT USA. Pure Results.

Assuring the quality and safety of pharmaceutical products

Reliable, repeatable sterilization is essential to prevent contamination, protect product quality, and streamline pharmaceutical production.

Pharmaceutical production environments require sterilization systems that deliver dependable process performance across every cycle. From terminal sterilization of pre-filled liquid products to pre-vacuum steam sterilization of instruments and materials, each process must operate reliably while integrating seamlessly into manufacturing workflows. BMT USA cGMP sterilizers are purpose-built to meet the specific requirements of each facility and production process, ensuring reliable, repeatable sterilization while supporting efficient operations.

Purpose-Built cGMP Sterilizers

Built different for industries that demand it.

BMT USA is built around sterilization. While larger equipment suppliers may offer sterilizers as one product line among many, sterilization is the core of our business and the expertise behind every solution we deliver. That focused approach allows us to design equipment around your process, from chamber configuration and utility requirements to cycle development, so each system integrates seamlessly and supports the demands of your operation. By building our sterilizers with standard, readily available components rather than proprietary parts, we also give you greater service flexibility, lower long-term maintenance costs, and a partnership defined by long-term value.

The Right Process for Your Production

Saturated Steam Process

- Pre-vacuum with drying (porous materials and wrapped goods)
- Gravity air removal (solid goods, glassware and open liquids)
- Gravity air removal w/jacket water cooling (heat/pressure sensitive liquids in open or loosely sealed containers)

Steam-Air Mixture Process

(Terminal sterilization of liquids in sealed containers)

Hot Water Cascade Process

(Rapid terminal sterilization of liquids in sealed containers that are heat or pressure sensitive)

PLC Control System

Industrial-grade Allen-Bradley or Siemens PLC controls with large, user-friendly touch interface for ease of operation.

Sanitary Piping

Sanitary piping and fittings are constructed of 316L stainless steel and sloped to drain with no dead legs.

Non-Proprietary Parts

Built with high-grade standard components to eliminate vendor lock-in, supporting greater parts availability, lower long-term maintenance costs, and more control over spare parts inventory and service planning.

Precision Sliding Doors

Automatic pneumatic driven precision sliding chamber doors improve safety and convenience. Lubricant-free door gaskets are long lasting and eliminate particle shedding into clean rooms.

Integrated Steam Generator

Integrated electric or plant steam heated clean steam generators save floor space and provide tight clean steam pressure control.

Engineered Features

BMT USA sterilizers are standard equipped with features designed to improve ergonomics, durability, and long-term serviceability. Precision-machined sliding doors with integrated safety sensors support smooth, effortless operation while helping protect operators during daily use. Lubricant-free door gaskets provide long-lasting performance while reducing maintenance requirements, and PLC controls support repeatable operation, reliable data collection, and seamless integration with other systems and equipment.

ENGINEERED & ASSEMBLED IN THE USA

Setting the standard for sterilizer quality and performance

Chamber Construction

BMT USA cGMP sterilizers are engineered and built to deliver lasting quality in design, construction, and workmanship for demanding pharmaceutical and laboratory environments. The chamber, jacket, and doors are fully constructed of 316L stainless steel for superior durability, while stainless steel framing and insulation covers further strengthen the system and help prevent rust and premature wear.

Precision-machined door brackets retain the door on all four sides to support smooth travel and secure performance throughout the sterilization cycle, while sanitary clamp-type chamber connections are sloped to drain for cleaner, more serviceable construction. Industrial-grade, non-proprietary components are used throughout, and lubricant-free door gaskets help extend service life while eliminating particle shedding into cleanroom environments.

Repeatable Cycle

Designed for pharmaceutical production environments where repeatability is essential to validated sterilization, BMT USA sterilizers combine high-performance vacuum pumps, precision instrumentation, and PLC controls to maintain consistent process conditions from cycle to cycle, even as load configurations change. The result is tighter process control, reliable sterilization, and confidence in every cycle.

Validation Testing

Validation is a critical concern when purchasing a cGMP sterilizer. Special attention has been given to the documentation and repeatability of each system. Every BMT USA cGMP sterilizer is subject to rigorous pre-validation testing at the factory and shipped with an extensive documentation package to help minimize the time required for on-site validation. IQ/OQ protocols and on-site execution are also available as options.

Industrial-Grade PLC Control System

Secure, user-friendly control system for repeatable operation.

BMT USA cGMP sterilizers are equipped with industrial-grade Allen-Bradley or Siemens PLC control systems that provide superior reliability, serviceability, and cycle repeatability. The control systems are developed under the latest Good Automated Manufacturing Practices (GAMP) to ensure reliability and ease in validation. Each system is also supported with a comprehensive documentation package.

The control system can configure and store up to 50 sterilization cycles, all accessible through a large touchscreen operator interface secured by multi-level user authentication. On pass-through units, a second operator interface is mounted on the unload side of the sterilizer to support cycle accept and pass-back functions, with the option to upgrade to a PVP 1000 operator interface for full control on both ends.

For facilities requiring electronic recordkeeping, the control system can be configured to support 21 CFR Part 11 compliance when connected to a PC or central computer system. It can also be equipped with a range of printers and recorders to provide paper-based data storage when needed.

Steripro

Saturated Steam Sterilizers

Steripro saturated steam sterilizers are designed for pharmaceutical and biotech production environments where sterilization equipment must support validated processes without introducing unnecessary complexity into daily operations. Suitable for hard goods, filters, linens, porous materials, rubber components, hoses, and liquids in vented, sealed, heat-sensitive, or pressure-sensitive containers, Steripro can be configured to align with your load requirements, facility layout, and process demands. Its sanitary, serviceable design helps simplify cleaning, reduce downtime, and support cleanroom use, while flexible cycle development and validation support help teams move from installation to routine production with fewer compromises.

Key Features

- Meets and exceeds US FDA cGMP standards.
- Purpose-built to your exact process, facility and workflow requirements.
- Temperature distribution inside the chamber better than +/- 0.5°C.
- 316L stainless steel chamber, jacket and sanitary piping.
- Piping sloped to drain with no dead legs.
- Sanitary valves and components.
- Fully insulated chamber and piping to reduce utility consumption.
- Assembled with all non-proprietary components.
- Automatic pneumatic driven precision sliding chamber doors.
- Lubricant-free door gaskets.
- Allen-Bradley or Siemens PLC control system.
- Extensive validation documentation.
- 21 CFR part 11 compliance for secure electronic data storage.

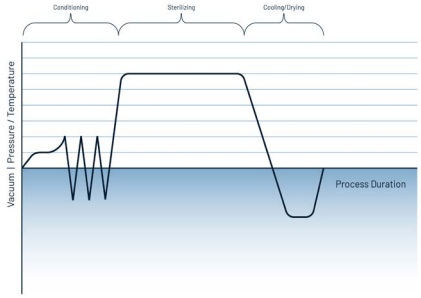
Sterilization Cycles

Steripro saturated steam sterilizers can be programmed with a combination of sterilization cycles, with configurable parameters for each phase based on load type and the most effective method of air removal. Cycle recipes are stored in the control system memory and can be quickly recalled and started from the operator interface. To protect process integrity, all recipes are secured against unauthorized changes through a multi-level user authentication system.

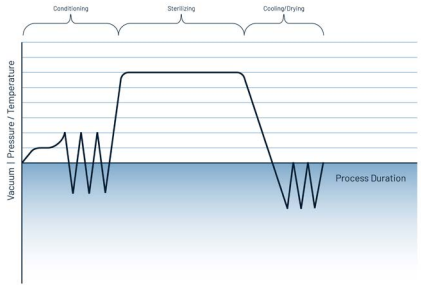
Pre-Vacuum Air Removal

Pre-vacuum process sterilizing at temperatures between 110°C up to 135°C provides effective sterilization of porous materials, including filters, linens, rubber stoppers, hoses, wrapped goods, and materials unaffected by vacuum.

Drying of the load is accomplished by fast exhaust and pulling a deep vacuum to remove moisture. Optionally, pressure pulses can be added to the end of the cycle, improving steam penetration for porous loads where trapped moisture can be difficult to remove. The air can also be heated to accelerate the drying process.



Dry Goods Cycle - Vacuum Drying



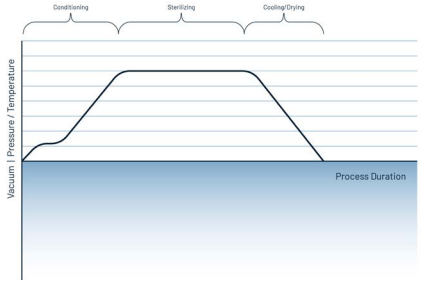
Dry Goods Cycle - Pulsed Air/Vacuum Drying

Gravity Air Removal & Air Overpressure with Jacket Water Cooling

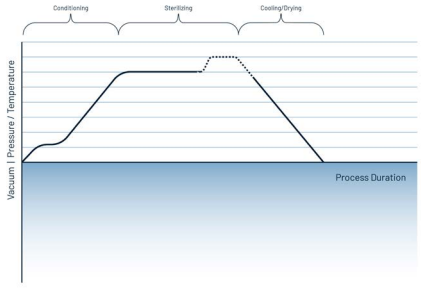
Gravity cycles are used for effectively sterilizing glassware, utensils, waste and liquids in open or vented/loosely sealed containers.

For utensils, glassware and open liquids, the load is preconditioned utilizing steam pulses. The cycle then heats to an exposure temperature of 110°C up to 135°C. After the exposure time is completed, exhaust ramping gradually cools the load.

For vented or loosely sealed liquids, cooling begins by injecting air at a pressure similar to that of the load to avoid breakage of the container. Cold water is then added to the chamber jacket to cool the load at a faster rate.



Solution Cycle - Gravity Air Removal Ramped Exhaust



Solution Cycle - Air Over-Pressure/Jacket Water Cooling

Ventipro

Steam-Air Mixture Terminal Sterilizers

The Ventipro is a cGMP-compliant steam-air mixture sterilizer engineered for pharmaceutical, biotech, and CDMO operations where terminal sterilization of liquid products requires uniform heat distribution without compromising container integrity. Using a controlled steam-air mixture process with air overpressure capability, the Ventipro helps maintain product and package integrity across sealed liquid formats such as vials, pre-filled syringes, IV bags, and bottles. Designed for integration into cleanroom environments and GMP-regulated liquid filling lines, the Ventipro combines precise cycle control with secure electronic batch records and audit trails to support 21 CFR Part 11-compliance. Purpose-built to your process and facility requirements, the Ventipro provides a tailored solution for regulated liquid sterilization.

Key Features

- Terminal sterilization of liquids in pressure-sensitive containers such as PVC bags, plastic bottles, syringes, blister packs and glass.
- Product containers leave the chamber dry and ready for labeling.
- Purpose-built to your exact process, facility and workflow requirements.
- Assembled with all non-proprietary components.
- Allen-Bradley or Siemens PLC control systems.
- Unique sealing of the fan shaft for ease in inspection and maintenance.
- 316L stainless steel chamber and sanitary piping - piping sloped to drain with no dead legs.

Sterilization Cycle

Steam-Air Mixture Cycle

Effective sterilization of pressure sensitive products and packaging, including syringes, flexible plastic and sealed or vented glass containers.

The chamber is filled with pure steam while also being injected with compressed air at a preset differential over-pressure. The steam and air are circulated and mixed by internal fans to ensure rapid heating to the user-configured exposure temperature, between 110°C and 135°C. The air over-pressure and saturated steam pressure are each independently controlled; however, both correspond to the temperature and pressure inside the load.

Once reached, the exposure temperature is maintained for a duration specified by the controller or a manually entered time period. After the exposure countdown completes, the pure steam is stopped and the fans begin blowing cool air across the load.

During the cooling step, a preset support pressure is maintained in the chamber to prevent damaging the product containers. The load is cooled to a safe temperature and the pressure in the chamber is vented to atmosphere before the door can be opened.

High Performance Fans

Ventipro sterilizers are equipped with high performance fans that intensify the streaming of the steam-air mixture through the chamber and around the load. The fan wheel and all parts mounted inside the chamber are made of 316L stainless steel. The motor is installed outside the chamber and connected to the fan wheel with a unique sealing system that simplifies inspection and maintenance.

Aquapro

Hot Water Cascade Terminal Sterilizers

The Aquapro is a cGMP-compliant hot water cascade sterilizer designed for terminal sterilization of liquid products in heat or pressure-sensitive containers, including vials, pre-filled syringes, IV bags, plastic bottles, and sealed glass or plastic containers. Using superheated recirculating water, the Aquapro delivers rapid heating and cooling to shorten overall cycle times and minimize thermal stress on products and packaging, making the sterilizers well suited for high-throughput production.

Key Features

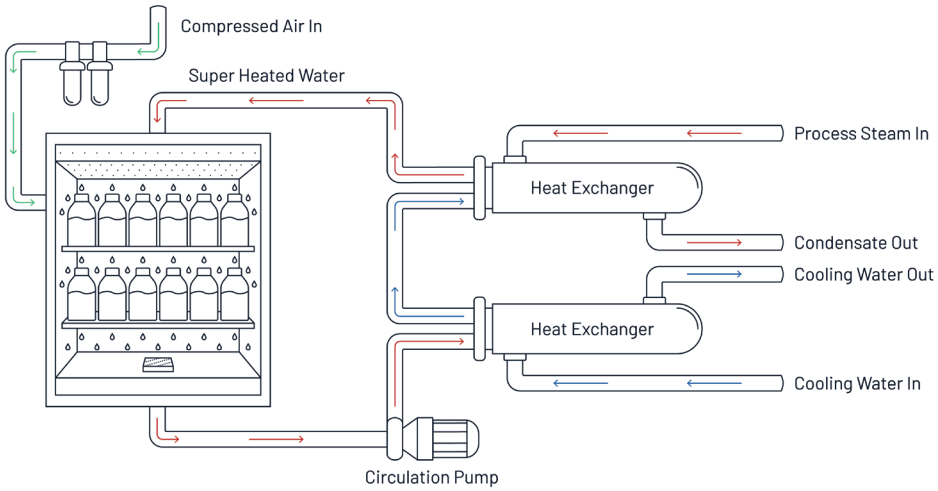
- Fastest method of terminal sterilization of liquids in sealed containers, ideal for high-throughput operations.
- No pure steam required as water is heated indirectly by plant steam.
- Allen-Bradley or Siemens PLC control systems.
- Purpose-built to your exact process, facility and workflow requirements.
- Assembled with all non-proprietary components.
- High capacity recirculation pump for even temperature distribution.
- External heat exchangers for heating and cooling of the recirculation water.
- Perforated tray for evenly distributing water across the entire load.
- 316L stainless steel chamber and sanitary piping - piping sloped to drain with no dead legs.

Sterilization Cycle

Hot Water Cascade Cycle

The cycle begins by filling the chamber with purified water to a predetermined level. The water is circulated by a high-capacity pump through an external heat exchanger until reaching a set temperature between 110°C and 125°C. The heated water is then distributed through a perforated tray onto the load. The load is rapidly heated due to the efficient heat transfer properties of water. At the same time, compressed air is injected into the chamber at an over-pressure to compensate for the rising pressure that builds inside liquid containers when heated, protecting the integrity and shape of products and packaging.

After the exposure phase is complete, the circulating water is cooled by an external heat exchanger using chilled softened water, which has no direct contact with the circulating chamber water. The circulating water is then continuously sprayed over the load until cooled to ambient temperature. The hot water cascade cycle is the fastest and most gentle method of terminal sterilization.



Sterilization Process Overview

The Aquapro uses a high-capacity water pump and large-diameter piping to maintain the flow rates needed for effective hot water cascade sterilization. Recirculating chamber water is heated and cooled through external heat exchangers supplied by plant steam and softened water, with no direct contact between the utilities and the chamber water. The recirculating water is then directed over a perforated distribution tray to create an even cascade across the load. The result is uniform water coverage and consistent heat distribution throughout the sterilization cycle.

Combipro

3-in-1 Combination Sterilizers

Combipro sterilizers combine multiple sterilization processes in one system, giving contract manufacturers and process development centers greater flexibility across changing products, container types, and development requirements. Equipped with vacuum capability for dry goods, a fan system for steam-air mixture sterilization, and recirculation pipework for hot water cascade processing, the Combipro supports the sterilization method best suited to each application. The sterilizer can also be configured with the ports and controls needed for gas-based sterilization methods such as H2O2 when processing loads that cannot tolerate conventional steam sterilization.

Key Features

- Combination saturated steam, steam-air mixture, and hot water cascade process built into one sterilizer.
- Allows for programming any type or combination of cycles.
- Purpose-built to your exact process, facility and workflow requirements.
- Assembled with all non-proprietary components.
- Allen-Bradley or Siemens PLC control systems.
- Options for adding the necessary ports and controls to utilize gas, including H_2O_2
- 316L stainless steel chamber and sanitary piping - piping sloped to drain with no dead legs.

Examples of Sterilizer Chamber Sizes

BMT USA sterilizers are offered in almost any chamber size and volume. The table below contains examples of our standard sizes; however, **custom sizes are available upon request to meet your exact requirements.**

Models	Internal Chamber Dimensions (w x h x d)	Overall Unit Dimensions (w x h x d)	Chamber Volume	Door Slide Direction	Unit Mounting	Weight
202038	20″ x 20″ x 38″ 508 x 508 x 965 mm	60″ x 74″ x 50″ 1270 x 1880 x 1270 mm	8.8 ft^3 0.24 m^3	Vertical	Floor	1,485 lbs 674 kg
262639	26″ x 26″ x 39″ 660 x 660 x 990 mm	66″ X 80″ X 51″ 1423 x 2032 x 1296 mm	15.8 ft^3 0.44 m^3	Vertical	Floor	2,600 lbs 1,179 kg
262649	26″ x 26″ x 49″ 660 x 660 x 1245 mm	66″ x 80″ x 61″ 1320 x 2032 x 1541 mm	19 ft^3 0.54 m^3	Vertical	Floor	2,985 lbs 1,354 kg
263639	26″ x 36″ x 39″ 660 x 915 x 990 mm	100″ x 80″ x 51″ 2540 x 2032 x 1296 mm	21 ft^3 0.59 m^3	Horizontal	Floor	3,400 lbs 1,542 kg
263648	26″ x 36″ x 48″ 660 x 915 x 1220 mm	100″ x 80″ x 60″ 2540 x 2032 x 1524 mm	25.9 ft^3 0.73 m^3	Horizontal	Floor	4,500 lbs 2,041 kg
263660	26″ x 36″ x 60″ 660 x 915 x 1524 mm	100″ x 96″ x 72″ 2540 x 2438 x 1829 mm	32.5 ft^3 0.92 m^3	Horizontal	Floor	5,200 lbs 2,360 kg
363648	36″ x 36″ x 48″ 915 x 915 x 1220 mm	128″ x 96″ x 60″ 3251 x 2438 x 1524 mm	36 ft^3 1.02 m^3	Horizontal	Floor	6,500 lbs 2,950 kg
363660	36″ x 36″ x 60″ 915 x 915 x 1524 mm	128″ x 96″ x 72″ 3251 x 2438 x 1829 mm	45 ft^3 1.27 m^3	Horizontal	Floor	6,900 lbs 3,130 kg
375760	37″ x 57″ x 60″ 940 x 1448 x 1524 mm	129″ x 114″ x 72″ 3277 x 2896 x 1829 mm	73.2 ft^3 2.07 m^3	Horizontal	Floor	7,200 lbs 3,260 kg
375786	37″ x 57″ x 86″ 940 x 1448 x 2184 mm	129″ x 114″ x 98″ 3276 x 2896 x 2489 mm	102.4 ft^3 2.9 m^3	Horizontal	Floor or Pit	8,700 lbs 3,950 kg
484860	48″ x 48″ x 60″ 1219 x 1219 x 1524 mm	148″ x 96″ x 72″ 3759 x 2438 x 1829 mm	80 ft^3 2.26 m^3	Horizontal	Floor or Pit	10,500 lbs 4,760 kg
484872	48″ x 48″ x 72″ 1219 x 1219 x 1829 mm	148″ x 96″ x 84″ 3759 x 2438 x 2133 mm	96 ft^3 2.72 m^3	Horizontal	Floor or Pit	11,500 lbs 5,220 kg
484886	48″ x 48″ x 86″ 1219 x 1219 x 2184 mm	148″ x 96″ x 98″ 3759 x 96 x 2489 mm	114.5 ft^3 3.24 m^3	Horizontal	Floor or Pit	12,500 lbs 5,670 kg
495748	49″ x 57″ x 48″ 1219 x 1448 x 1219 mm	148″ x 114″ x 60″ 3759 x 2896 x 1524 mm	77.5 ft^3 2.19 m^3	Horizontal	Floor or Pit	9,500 lbs 4,300 kg
495760	49″ x 57″ x 60″ 1219 x 1448 x 1524 mm	148″ x 114″ x 72″ 3759 x 2896 x 1829 mm	96.9 ft^3 2.74 m^3	Horizontal	Floor or Pit	10,500 lbs 4,760 kg
495772	49″ x 57″ x 72″ 1219 x 1448 x 1829 mm	148″ x 114″ x 84″ 3759 x 2896 x 2133 mm	116.3 ft^3 3.29 m^3	Horizontal	Floor or Pit	12,000 lbs 5,443 kg
495786	49″ x 57″ x 86″ 1219 x 1448 x 2184 mm	148″ x 114″ x 98″ 3759 x 2896 x 2489 mm	138.8 ft^3 3.84 m^3	Horizontal	Floor or Pit	13,000 lbs 5,897 kg
495796	49″ x 57″ x 96″ 1219 x 1448 x 2438 mm	148″ x 114″ x 110″ 3759 x 2896 x 2794 mm	155 ft^3 4.39 m^3	Horizontal	Floor or Pit	14,000 lbs 6,350 kg
488660	48″ x 86″ x 60″ 1219 x 2184 x 1524 mm	148″ x 133″ x 72″ 3759 x 3378 x 1829 mm	143 ft^3 4.05 m^3	Horizontal	Floor or Pit	15,000 lbs 6,804 kg
488686	48″ x 86″ x 86″ 1219 x 2184 x 2184 mm	148″ x 133″ x 98″ 3759 x 3378 x 2489 mm	205 ft^3 5.8 m^3	Horizontal	Floor or Pit	16,000 lbs 7,258 kg
548686	54″ x 86″ x 86″ 1371 x 2184 x 2184 mm	166″ x 133″ x 98″ 4217 x 3378 x 2489 mm	230.7 ft^3 6.5 m^3	Horizontal	Floor or Pit	17,000 lbs 7,711 kg

Pure & Clean Steam Generators

Fully integrated or stand-alone steam source for safe and effective steam sterilization.

BMT USA pure and clean steam generators produce steam free of additives, impurities, and other unwanted substances. When equipped with an optional steam separator, the generators produce pure steam that meets U.S. Pharmacopoeia (USP) requirements and, when condensed and tested, can also satisfy Water for Injection (WFI) standards.

Constructed with 316L stainless steel and assembled with all non-proprietary components, BMT USA pure and clean steam generators are designed for long-term durability and dependable operation. Each unit can be configured as a central steam source or integrated directly into a sterilizer for a more compact, fully integrated solution.

Electrically Heated

BMT USA electric pure and clean steam generators utilize 316L stainless steel heating elements with 3-phase voltage to heat and evaporate purified water, resulting in clean steam that is dry and free of pyrogens. Electric steam generators are ideal for facilities without access to utility steam and are available in capacities ranging from 50 lbs/hr up to 900 lbs/hr,

Electric Vertically Integrated

BMT USA is one of the only manufacturers offering both horizontal or **vertical electric steam generators** integrated directly into a sterilizer for a reduced the overall footprint.

Plant Steam Heated

Steam-to-steam generators utilize plant steam as the heat source to produce pure or clean steam. The shell and tube heat exchanger is made from 316L stainless steel with either single or double-tube-sheet construction. The evaporator utilizes a wetted design to minimize the temperature difference between the feed water and the heating steam, resulting in less stress on the evaporator tube sheet. Available in capacities up to 5000 lbs/hr.

Steam Generator Features & Options

Double-Tube-Sheet Construction
Heat Exchanger

Steam Sample
System

Feed Water Booster
Pump System

BMT USA steam generators include a range of standard features and configurable options designed to support consistent steam quality, dependable operation, and long-term durability while giving facilities greater flexibility to address utility requirements, installation constraints, and process demands.

Standard Features

- All stainless-steel construction ensures no rusting or roughing.
- Fast response times and tight steam pressure control without the need of a pressure regulator.
- Industrial-grade Allen-Bradley or Siemens PLC-based control system.
- Non-proprietary components are readily available and easier to maintain.
- 100% drainable design ensures there is no standing water.
- Extensive validation documentation to reduce on-site validation time.

Additional Options

- Double-tube-sheet construction.
- Sanitary feed water piping with sanitary components and connections.
- Automatic drain valve for prolong shut down.
- Stainless steel and/or sanitary feed water booster pump system.
- Electropolishing of the vessel and piping.
- Steam separator for pure steam demands.
- Steam conductivity monitoring and recording.
- Feed water conductivity monitoring and recording.
- Steam quality sample system.
- Block and bleed valve arrangement to drain feed line when fed with USP or WFI feed water.

Loading & Testing Equipment

Optimize space, improve ergonomics, streamline validation.

Loading Carts & Trolleys

Loading carts and transfer trolleys are designed to support safe, ergonomic movement of materials, containers, and equipment into the sterilizer chamber, whether by transfer trolley on floor-mounted units or directly from the facility floor on pit-mounted installations.

Loading carts are constructed of 316L stainless steel and feature height-adjustable shelves, while transfer trolleys are built from 304 stainless steel for durable daily use.

For pit-mounted sterilizers, non-marking wheels are available, and chamber tracks or rub rails can be configured to accommodate nearly any wheel arrangement. Drop-down wheel carts are also available for facilities where space is limited.

Validation Flange

BMT USA's validation flange is designed to seal each thermocouple lead wire individually, making load probe replacement faster and less disruptive during validation work. If a single thermocouple fails, the affected wire can be replaced without disturbing the seals of the surrounding probes, reducing service time and simplifying maintenance. The validation flange is available for 16- or 24-probe configurations and can be fitted to 1.5-inch or 2-inch tri-clamp validation ports, with custom sizes available upon request.

Sterilizer Trays

For sterilizing vials and other materials that require special handling, BMT USA offers custom trays and boxes tailored to your specific load to maximize the capacity of your sterilizer. Our trays and boxes are constructed from 316L stainless steel and available in a range of finishes.

Committed to supporting our clients at every stage

We recognize the important role our equipment plays in your process. Therefore we are committed to providing the highest quality equipment that is backed up with excellent customer service and support. Our team of highly experienced field-service technicians provide the following expert services:

Installation Supervision
Eliminates installation errors.

Start-up
On-site optimization of equipment performance.

Training
Proper equipment operation and ease of use.

Calibration
Accurate and reliable instrumentation.

Validation
Expert knowledge for accurate validation.

Preventative Maintenance
Reduce or eliminate downtime.

Emergency Service
On-site or remote service to restart operations as quickly as possible.

BMT USA Equipment:

cGMP Steam & Terminal Sterilizers

Pure & Clean Steam Generators

Class 5 & 7 Depyrogenation Ovens

cGMP Washers

Laboratory Steam Sterilizers

Laboratory Washers

Laboratory Ovens

Laboratory Incubators

Climate & Stability Test Chambers

BMT USA
MMM Group

BMT USA, LLC
14532 169th Dr. SE
Suite 142
Monroe, WA 98272

Tel: +1 360-863-2252
Email: sales@bmtusa.com
www.bmtusa.com

BMT USA. Pure Results.