STERIS
Life Sciences

# FINN-AQUA® GLP RESEARCH STEAM STERILIZERS

## APPLICATION

Finn-Aqua GLP Research Steam Sterilizers (510 x 510mm and 675 x 675 mm) are designed for moist heat sterilization of heat and moisture-stable materials used in scientific applications, including various types of dry good products such as laboratory glassware/plastic-ware, cages, racks, bottles, bedding, feed, waste bags as well as liquids in vented or sealed rigid containers.

## DESCRIPTION

Finn-Aqua GLP Research Steam Sterilizers are equipped with the latest features in both state-of-the-art technology and ease of use. A brief description of primary product features follows immediately below, with more detailed information provided later in this document:

**Interior Chamber Dimensions (W x H x L) and Capacities (3 Options):**

- 510 x 510 x 970 mm; 250L (20 x 20 x 38"; 66 gallon)
- 675 x 675 x 990 mm; 450L (26-1/2 x 26-1/2 x 39"; 119 gallon)
- 675 x 675 x 1290 mm; 588L (26-1/2 x 26-1/2 x 50-3/4"; 155 gallon)
- 675 x 675 x 1590 mm; 724L (26-1/2 x 26-1/2 x 62-1/2"; 191 gallon)

**Vertical-sliding door(s)** – Doors, pneumatically-driven, are operated from buttons on the control panel and travel down vertically to open.

**Control system** with enhanced functionality. The control system features a Festo Programmable Logic Controller (PLC) which is programmable for prevacuum, liquid and diagnostic cycles.

FINN-AQUA 77 and FINN-AQUA 55 Sterilizers (Typical - details may vary.)

## STANDARDS

**Standards pertaining to factory quality system –** STERIS factories in which the Finn-Aqua GLP Sterilizers manufactured and assembled meet applicable requirements of the following standards:

- **ISO 9001:2008 Quality Management Systems**
- **EN ISO 3834-2:** Quality Requirements for Fusion Welding of Metallic Materials; Part 2.

**Standards pertaining to sterilizer** – Each sterilizer meets applicable requirements of the following listings and standards, and carries the appropriate symbols:

- **CE Compliance:**
  - » Pressure Equipment Directive (PED): 2014/68/EU
  - » Machinery Directive: 2006/42/EC

## Selections Checked Below Apply To This Equipment

**INNER CHAMBER (W x H x L) /CAPACITY**
- ❑ 510 x 510 x 970 mm (250L) (20 x 20 x 38"; 66 gallon)
- ❑ 675 x 675 x 990 mm (450L) 26-1/2 x 26-1/2 x 39" (119 gallon)
- ❑ 675 x 675 x 1290 mm (588L) 26-1/2 x 26-1/2 x 50-3/4" (155 gallon)
- ❑ 675 x 675 x 1590 mm (724L) 26-1/2 x 26-1/2 x 62-1/2" (191 gallon)

**ELECTRIC SERVICE**
- ❑ 400V, 50Hz
- ❑ 208 VAC, 60 Hz UL/NEC
- ❑ 480 VAC, 60 Hz UL/NEC

**DOOR CONFIGURATION**
- ❑ Single Door (SD)
- ❑ Double Door (DD)

**PRESSURE VESSEL FINISH**
- ❑ Glass bead blasted
- ❑ Polished, Ra < 0.6 µm (25µinch)

**PRESSURE VESSEL CODE**
- ❑ ASME
- ❑ PED
- ❑ SELO

**OPTIONS**
- ❑ Printer
- ❑ Operator Interface Control Function (Sterile Side)
- ❑ Air Back-up System[3]
- ❑ Air Differential Seal (Sterile Side)[4]
- ❑ Bioseal (Sterile Side Only)[4]
- ❑ Side and Back Panels
- ❑ Seismic Restraints & Calculations
- ❑ Load Probe with Hanger
- ❑ Air Detector
- ❑ Utility Shutoff Valves
- ❑ Stainless-steel Valves (for Clean Steam)[5]
- ❑ Chamber Tracks
- ❑ 10" HMI Touch Panel (Non-Sterile Side)[6]
- ❑ Cooling Water Savings Package[7]
- ❑ Domestic Water Savings Package[7]
- ❑ Automatic Sterilization of Air Filter
- ❑ Clean Steam Generator (CSG)
- ❑ Integral Electric Steam Generator

**ACCESSORIES**
- ❑ Tablet Computer Operator Interface
- ❑ Spare Parts Kit
- ❑ Plant Steam Pressure Regulating Valve (PRV)
- ❑ Stainless-steel Pressure Regulating Valve (PRV)
- ❑ Loading Cart (Includes 1 Wire Shelf)[1]
- ❑ Wire Shelf (for Loading Cart)
- ❑ Perforated Shelf (for Loading Cart)
- ❑ Transfer Trolley[1]
- ❑ Rack and Shelves (for 990 mm unit only)

**OPTIONAL CYCLES**
- ❑ Process C (Indirect Water Cooling)
- ❑ Decontamination Cycle with Filter
- ❑ Decontamination Cycle with VIRASURE™Air Decontamination System

***Notes:***

*1. One transfer trolley is required for use with loading car.*
*2. One chamber track system is required for use with loading car.*
*3. For decontamination units with filter.*
*4. Applies to double-door units only.*
*5. Standard valves are brass.*
*6. HMI is Human Machine Interface*
*7. For Vacuum Pump Cooling*

Item _____

Location(s)_____

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  - » Low Voltage Directive: 2014/35/EU
  - » Electro Magnetic Compatibility: 2014/30/EU
- **Applicable Design Standards (North America):**
  - » **Pressure Vessel** – ASME, Section VIII Div1. Description: American Society of Mechanical Engineers with National Board registration, other certifications available upon request.
  - » **Electrical Design and Assembly** – UL508. Underwriters Laboratories. UL, CSA or CE listed or recognized components and designs are used.
- **Applicable Design Standards (Europe and China):**
  - » **Pressure Vessel** – PED 2014/68/EU. Description: Pressure Equipment Directive, (module H/H1).
  - » **Pressure Vessel** – SELO Certification for China is available.
  - » **Electrical Design and Assembly** – Electrical EN 60204-1:2006 International Electric Code: Safety of machinery. Electrical equipment of machines. Part 1: General requirements (IEC 60204-1:2005, modified)

## FEATURES

### Effluent Cooling

Drain effluent discharge is cooled to 60°C or lower through a water saving controlled mixing tank.

### Automatic Vertical Sliding Doors

Finn-Aqua GLP Research Steam Sterilizers are available with one or two vertical sliding, pneumatically driven doors.

A door sensing device automatically stops the door if an obstruction is detected. Door interlocks, on double door units, ensure only one door can be opened at a time. Door logic is configurable.

A control lock out switch prevents a cycle from starting unless doors are closed. A touch-sensitive safety edge is provided to detect obstructions and stop doors from closing if there is an obstruction.

Each door utilizes a one-piece, easily replaceable, silicone door seal gasket. Air pressure activates door seal during normal operation.

Double door units provide a second door on the chamber for loading and unloading purposes. Double door units include an additional chamber pressure gauge.

### Programmable Logic Control System

Finn-Aqua GLP Research Steam Sterilizers use a Festo Programmable Logic Controller (PLC) to maximize flexibility and reliability. The control includes 20 programmable cycles for prevacuum, liquid and diagnostic cycles.

The control system includes a color touch screen with maintenance and diagnostic screens. An optional Tablet Computer Operator Interface is available (described later).

**Control System Hardware** - The control system hardware consists of the following main components:

- **Power Supply Enclosure**, which houses: Main switch, circuit breakers, control power supply and electrical components for vacuum pump control.
- **Control Panel (non-sterile side)** which includes a Festo 4.3" size (109 mm) color touchscreen HMI (Human Machine Interface), RS 485 Modbus RTU port (for PLC interface), USB port, SD card slot and Ethernet interface. In addition, the control panel includes: Door open/close buttons, Power key switch, Emergency stop button, buzzer and a USB port for recording batch data. An optional thermal printer is available.
- **Control Panel (sterile side)** includes: Door open/close buttons, Emergency stop button and cycle running and alarms lights. An optional HMI touchscreen (identical to the one used on the non-sterile side) is available.
- **PLC and Distributed I/O** consist of a Festo controller with Ethernet communication TCP/IP). The PLC includes a Festo CPX Valve terminal with I/O modules and solenoid valves.

**Control System Software** – The system software includes a Central Processing Unit (CPU) Application Program which meets IEC 61131-3 Standard.

The following features are also provided as standard:

- System has four users access levels with up to 50 users names.
- Electronic recording of process data (USB port)
- Automatic utilities start up and shut down programmable capability to conserve energy during idle periods
- Software calibration for all temperature and pressure inputs
- PID control loop modulates the on-off valve ensuring accurate chamber temperature control.

### Sterile Air Filter

Air entering the chamber is filtered through a 0.2 micron hydrophobic autoclave air filter.

### Two-stage Vacuum Pump

Provides quiet and efficient operation, longer expected life, and deeper vacuum than single stage pumps. A separate steam condenser is not required.

### Equipment Documentation

A standard User's Manual is submitted to the customer after the equipment is manufactured. The User's Manual is provided to guide the customer to install, operate, configure, calibrate, troubleshoot, and service the unit. One (1) hard copy and one CD are provided. The following document sections are included:

- Operation manual
- Maintenance manual
- Equipment drawings and parts list
- Manufacturer's component data sheets
- Certificate of Unit Test results
- Pressure vessel certificate per ASME or PED

*NOTE: The drawings in electronic format are provided in PDF and ACAD formats. Additional copies of the User's Manual can be provided at an extra cost. The Base language is English. The operator manual and HMI screens will be provided in one of the official languages used in CE countries, if applicable.*

## PROCESSING CYCLES

### Description

As standard, Finn-Aqua GLP Research Steam Sterilizers are provided with *Steam Sterilization Process B*.

Process B is a general-purpose cycle designed for steam sterilization of various types of products such as filter housings and cartridges, equipment parts, baskets, racks, textiles, rubber stoppers, products in pouches, and liquids in vented containers.

Process C (Air over-pressure cooling) should also be considered for liquids to minimize volume loss and improve cooling time.

*NOTE: For other sterilization applications refer to the Options section of this document.*

### Cycle Configuration

The operating parameters of process B are configurable. This allows the Customer to develop and optimize cycles for a variety of applications. Twenty individually configurable cycles are provided.

In addition, each cycle is divided into separate phases.

**Pre-conditioning phase:** The purpose of the pre-conditioning phase(s) of a cycle is to remove air from the chamber prior to the exposure phase. *Pulsed Air Removal* or *Forced Air Removal* cycles are available. After air removal the chamber under goes *Heating Up* to reach the defined exposure temperature.

**Exposure phase:** The standard process operates with Time Based Exposure. The timer runs only when the chamber reaches and maintains the pre-selected exposure temperature.

**Post-Conditioning phases:**

Three post-conditioning methods are available:

- Pulse Drying uses vacuum pulses followed by unheated dry air pulses to evaporate moisture from the chamber
- Slow Exhaust is designed to release pressure through the drain line at a configured rate until atmospheric pressure is obtained. Slow exhaust can be selected only if load probe is installed
- Fast Exhaust is designed to vent the chamber pressure to atmospheric pressure by opening the drain line and simultaneously running the vacuum pump.

## TEST CYCLES

**Leak Test** is a **standard** test provided for verification of chamber and piping integrity. Test parameters are user-configurable.

Default values for the leak rate test may be used, or specific leak rate test parameters may be configured in accordance with the Customer's Standard Operating Procedure (SOP).

**Bowie-Dick Test Cycle** is used to test 121°C prevacuum cycle for verification of effective air removal in chamber and load. Test cycle determines if even and rapid steam penetration into test load has occurred. Cycle is pre-programmed per parameters set by the Bowie-Dick Test.

## CONSTRUCTION

### Chamber and Jacket

The chamber is available in four sizes. Cross-section dimensions (W x H x L) and chamber capacities are as follows:

510 x 510 x 970 mm; 250L // (20 x 20 x 38"; 66 gal.)

675 x 675 x 990 mm; 450L // (26-1/2 x 26-1/2 x 39"; 119 gal.)

675 x 675 x 1290 mm; 588L // (26-1/2 x 26-1/2 x 50-3/4"; 155 gal.)

675 x 675 x 1590 mm; 724L // (26-1/2 x 26-1/2 x 62-1/2"; 191 gal.)

Temperature distribution within the chamber is 1 °C. Chamber is manufactured from AISI 316L stainless steel whereas Jacket is manufactured from AISI 304. The jacketed chamber construction guarantees superior temperature distribution.

Chamber and Jacket pressure gauges are provided on the front face (non sterile side) of the sterilizer. A chamber pressure gauge is provided on the sterile side of double door units.A chamber steam baffle provides uniform steam distribution to the chamber.

A 2-½ inch hygienic clamp chamber penetration validation port is provided for validation purposes.

### Pressure Vessel

The chamber and chamber door are manufactured from AISI 316L stainless steel. Jacket material is AISI 304 as a standard.

All pressure vessels are designed and manufactured in accordance to the required pressure vessel standards. An identification nameplate is permanently mounted on each pressure vessel.

Other features include:
Chamber is rectangular design with full structural jacket and radius corners.

- Door is sealed to chamber by an active non-lubricated gasket that is driven by air pressure. Note: Door gasket requires lubrication only during initial installation.
- Internal surface of chamber is standard glass bead finished. In place of the standard glass bead satin finish, inner chamber walls and doors can be mechanically polished to minimum Ra < 0.6 µm (25µinch) or better. All chamber welds are ground smooth with this configuration.
- Chamber and jacket are provided with safety relief devices per code requirements.
- Chamber bottom is sloped to promote drainage of condensate.
- Chamber is provided with a single 2-½ inch penetration with blind hygienic clamp assembly for validation purposes.
- Pressure vessel and doors are insulated with mineral wool. Chamber is covered with rigid aluminum sheathing. Door is also covered in stainless steel sheathing.
- Drain line penetrations (in bottom of chamber) are provided with removable debris screens for easy cleaning.
- Each pressure vessel is hydrostatic pressure tested.
- Chamber is designed from full vacuum to a maximum allowable working pressure 3.1 barg (45 psig).
- Jacket design pressure is 2.5 barg (36 psig) internal pressure with full vacuum in the chamber.
- All pressure vessel fittings are equipped with double bolt hygienic clamps.

### Electrical Design

Electrical design includes the following features:

- Standard configuration requires one 3-phase connection. Power supply transformer is provided for control power.
- All mechanical limit switches used are designed to be failsafe to ensure deactivation if an abnormal situation occurred during operation.
- Unit is equipped with Emergency stop switch for critical situations. When pushed, the E-stop switch will activate a safety relay that mechanically deactivates all digital outputs from the PLC and will cause an emergency stop alarm. When released, a cycle abort screen is displayed and prompts the operator to either abort or continue the cycle.
- Door operation push buttons and emergency stop switch (mushroom type) are located on fascia panel at each door.
- Relay outputs (dry contacts). The following relay outputs are provided for customer monitoring purposes. Relays are labeled in the control panel.
  - » Common alarm relay
  - » Unit on/off relay
  - » Door open/close relay

### Panel and Frame Assembly

The panel and frame assembly supports pressure vessel, piping, electrical construction and fascia panels. The frame:

- Is a fully welded structure fabricated from carbon steel.
- Painted with corrosion and heat resistance epoxy paint.
- Includes adjustable stainless-steel leveling legs to level unit.
- wheels under frame for easy installation (Finn-Aqua 55 Sterilizers only)

Sterilizer is designed and manufactured to allow access for maintenance and service from the front. Certain options may require access from one side. Refer to applicable equipment drawings for specific requirements.

Loading/unloading ends of the unit are sheeted with AISI 304 stainless steel. Fascia panels are ground finish to No. 3 American Society for Testing and Materials (ASTM) (EN 10088-2: 2G).

Fascia panels are easy to remove to save time and effort during maintenance. Their clean surface finish facilitates tight fits in clean room installations.

### Piping

Piping connections terminate within the confines of the sterilizer. The following line piping categories are constructed from stainless steel:

- steam supply line
- air-line to chamber
- chamber drain line

Associated valves for the above lines are brass; however, there is an option for stainless-steel valves for clean steam. All connections are threaded.

Note that all gaskets, used for piping connections, are of the synthetic plastic, rubber or silicone material.

## MOUNTING ARRANGEMENT

The sterilizer is designed for either freestanding or recessed installation, as specified. Each sterilizer is height-adjustable.

## OPTIONS

### Process C (Indirect Water Cooling)

Sterilization process C is designed to efficiently process liquid products in either vented or non-vented (solid) containers that require cooling after the sterilization. During the post-conditioning phase cooling water flows through the jacket with simultaneous air over-pressurization in the chamber preventing the product from boiling. The sterilization process C includes the processes B cycle with the following additional features:

Post-Conditioning Phases

- Indirect water cooling (addition to Process B)
- Sequential Post-Conditioning Processing (examples):
  - » Indirect water cooling followed by vacuum drying
  - » Vacuum drying followed by indirect water cooling
  - » Pulse drying followed by indirect water cooling

Option includes Probe for Load Temperature which can be freely placed into chamber for controlling and monitoring purposes.

*NOTE: It is recommended that RO/DI quality water is used to cool the jacket for maximum jacket lifetime. The minimum water quality used for jacket cooling must not exceed 20 mg/l total chlorides and 250 mg/l total dissolved solids.*

### The Effluent Decontamination Cycle with Filter

The decontamination cycle is designed for applications that risk contaminating the sterilizer drain line or facility drain system with effluents from the chamber. The cycle sterilizes effluents prior to their discharge by injecting steam through the drain. The decontamination cycle includes the following features:

- A fixed decontamination pre-conditioning phase is added to pre-conditioning menu selection. The pre-conditioning phase uses one vacuum pulse that is pulled through a dedicated decontamination filter assembly (0.2 micron sterile cartridge and 316 stainless-steel housing).
- During *heat-up* and *exposure* phases, steam is injected into the chamber through the drain line to ensure the entire system is sterilized.
- Chamber steam is bled through the decontamination filter during *exposur*e phase.
- The controlling temperature probe (located after the decontamination filter housing) ensures the load, condensate, and decontamination filter assembly are sterilized.
- Sterilized condensate (that has accumulated in the drain line and chamber) drains during the *post-conditioning drying* or *equalization* phase.

### Decontamination Cycle with VIRASURE™ Air Decontamination System

When this option is selected, the 0.2µm HEPA filter is replaced by a heated strainer element.

The VIRASURE air decontamination system combines forced hot surface contact at high temperature with a 0.1 µm straining element in a controlled, fail-safe process environment to improve the safety and redundancy of the sterilizer decontamination cycle.

For more information, please request a copy of Technical Monograph LSEP-TMD4061.A-EN-E.

When the decontamination cycle option is used on a Double Door sterilizer, in addition, the use of the bioseal option (discussed later in this document) is recommended.

*NOTE: Decontamination option with Virasure will be on the right of the unit (looking from NS side) increasing 300mm total width of the unit.*

### Operator Interface Control Function (Sterile Side)

With this option, a Festo 4" Human Machine Interface (HMI) touchscreen is provided on the sterile side of the unit, instead of the standard indicator lights.

The HMI (sterile side) is used for selecting and starting cycles and displaying real-time process data and alarms on the sterile (unload) side of the sterilizer.

*NOTE: This option is only available when double doors are provided.*

### Printer

This option includes a high print quality, panel mounted, thermal printer that makes use of 58 mm width paper. The printer includes RS 232/TTL and mini-USB interfaces.

With this option real time process parameters can be printed during each cycle.

### Air Backup System

This option has been designed specifically for applications which require the chamber door to remain sealed even when utilities are lost. Typical applications may include bio-safety levels 2 and 3 areas, as well as sealed liquid sterilization cycles.

*NOTE: This feature is included in the Decontamination Cycle Process with VIRASURE™ Air Decontamination System and can be ordered for units with regular Decontamination Process with Filter.*

The following enhancements are provided to the standard compressed air system:

- A compressed air tank provides air pressure to the door seals for a period of at least 1 hour if the normal air pressure falls below the minimal supply pressure. Air loss is not monitored.
- A manual connection on the air tank is present to provide indefinite air pressure to the gasket using an air compressor or gas cylinders.

### Air-differential Seal (sterile side)

The sterilizer is provided with an air-differential seal at the sterile end of the sterilizer to maintain pressure difference between the sterilizer service area and classified area.

### Bioseal

A bioseal is designed for Biolevel 3 (BL-3) and Biolevel 4 (BL-4) applications. The seal system is located on the side opposite of the primary control of the sterilizer. It is recommended to purchase option Operator Control Panel (sterile side) so cycles can be selected and started from either side of the unit.

The bioseal is provided to prevent the passage of airborne microorganisms from the space between the vessel body and the structural wall opening.

### Enclosure Side and Back Panel

This option is designed to enclose both sides (and back of a single door unit) of a sterilizer with AISI 304 stainless steel enclosure panels to conceal the internal piping, mechanical and electrical components of the unit.

### Seismic Restraints and Calculations

This option provides the equipment with seismic anchorage restraints that are designed to meet the seismic zone four (4) requirements. The angle brackets and frame mounting hardware are manufactured from AISI 304 stainless steel and are provided by STERIS FINN-AQUA. The Hilti type, or equivalent, floor anchors are provided and embedded into the concrete floor by others than STERIS FINN-AQUA.

Calculations are per latest California UBC as standard and certified by a California registered Engineering Company. Other calculations are available on request and may require additional cost.

### Probe for Load Temperature

This option is included in Process C.

With process B this probe can be freely placed into the chamber for controlling and monitoring purposes. Typically it is used for big single-packs like rubber stoppers and large textile packs or sterilization of liquids in vented containers. A support is provided to store the probe at a convenient location in the chamber when not used.

### Utility Shut off Valves

As standard, the unit is provided with single-point utility connections for easy installation. This option provides manual shutoff ball valves on domestic water, steam and air lines as required (excluding the drain) to isolate the utility lines. Customers who do not have utility shutoff valves located near the equipment typically select this option.

### Stainless steel valves for clean steam

When this option is selected, valves constructed of Stainless Steel 316 replace the regular brass valves.

### Chamber Tracks

Provides the chamber with 316L stainless-steel tracks (removable). The tracks are used to guide the cart during loading and unloading of the sterilizer.

### Air Detector System

The Air Detector System is design to automatically detect the presence of air in the chamber during the sterilization cycle.

### 10" HMI Touch Panel on the Non-Sterile Side

As a standard sterilizer is equipped with a 4" FESTO (Human Machine Interface) HMI touch panel on the NS side and optionally on the ST side also.

With this option it will be possible to equip NS side with 10.4" FESTO CDPX-X-A-S-10 HMI touch panel. Resolution: SVGA, 800x600 pixels. IP65 protection class (front). Equipped with RS 485 Modbus RTU port for PLC interface, USB port, SD card slot and Ethernet interface.

### Cooling Water Saving Package for Vacuum Pump Cooling

The Cooling Water Savings Package is designed to utilize a customer-supplied closed loop water (tower or chilled) utility to minimize the consumption of domestic water. This is done by cooling and recirculating the initial charge of vacuum pump seal water back to a break tank with a heat exchanger. The following components are added to the system:

- 316 SS plate heat exchanger for vacuum pump
- Recirculation tank for vacuum pump water
- Closed loop cooling water supply and return piping

### Domestic Water Savings Package for Vacuum Pump Cooling

With this option, domestic water is supplied only when the vacuum pump seal water temperature is insufficient to draw to the necessary vacuum level. A small, non-pressurized recirculation tank is used to supply most of the vacuum pump seal water during the cycle. The control system monitors and determines when to add supplemental water to maintain a vacuum pump efficiency of approximately 90%. This option saves up to 50% of domestic water on average compared to the standard system. Water saving efficiency depends highly on pre and post conditioning parameters, for example, the required vacuum level and amount of pulses. A separate chilled water supply is not required with this option.

The following components are added to the system:

- Monitoring instruments for vacuum seal water temperature
- Recirculation tank for vacuum pump water

*NOTE: Water saving options will be assembled on the right hand side of the unit (looking from NS side) increasing 300 mm total width of the unit.*

### Automatic Sterilization of Air Filter

The Automatic Sterilization of Air Filter option is used to sterilize the 0.2 µm sterile air filter, filter housing, and piping from the filter housing to the chamber air shut-off valve. It is configured as an exposure phase in a sterilization cycle. Filter does not have separate temperature measurement therefore chamber temperature measurement is used to verify required temperature for sterilization.

### Clean Steam Generator (CSG)

CSG 100 is an Integral Shell-and-Tube Steam Generator that is designed to produce steam of a quality equal to feed water that is introduced into the clean steam generator. Plant steam is supplied to the shell while process quality water is fed to the inner tubes according the falling film principle. Plant steam vaporizes the feed water to produce clean process steam. Feed water that is not vaporized in the process is removed from a column as blowdown.

The feed water for the integral steam generator system should be either deionized, RO or WFI quality water.

As standard the CSG 100 unit is built on the right hand side of the sterilizer. Additional 300 mm is required for installation and right hand side service access is also necessary. One CSG 100 unit can feed one sterilizer. Sterilizer control system is used to control the CSG 100 unit.

The steam generator is provided with the following features:

- CSG is controlled by a pneumatic feed water valve that is controlled by sterilizer steam valves.
- The pressure vessel is designed in accordance with ASME or PED standards.
- All piping and components in contact with the feed water or clean steam are constructed of AISI 316 or 316L stainless steel.
- The steam generation unit includes the stainless steel (AISI 316L) shell and tube (double tube sheet) vertical heat exchanger. The finish of the interior tube surface is an Ra of 0.6 µm (25?inch).
- The plant steam and discharge components are constructed of bronze or cast iron.
- The required plant steam pressure is 5-8 barg (75-116 psig).
- Clean steam pressure is controlled by a pressure reducing valve.
- The unit is equipped with a pressure gauge to indicate the steam pressure inside the generator.

### Integral Electrical Steam Generator

The Integral Electrical Steam Generator is designed to produce steam of a quality equal to the feed water that is introduced into the system. The Integral Electrical Steam Generator does not include any entrainment device to remove pyrogens.

The feed water for Electrical Generator system should be either deionized, RO or WFI.

The system is built under the sterilizer chamber and includes the feed water system, steam generation system and the controls. The Integral Electrical Steam Generator is provided with the following features:

- The pressure vessel meets ASME or PED pressure vessel codes.
- The AISI 316L stainless steel vessel is rated for 3.1 barg (44 psig) per code requirements and stamped.
- The heating element contains stainless steel AISI 316L tubular elements.
- The unit is equipped with three water level sensors.

## ACCESSORIES

### Tablet Computer and WLAN System

A nine inch computer tablet is provided to facilitate remote monitoring of the sterilizer status. Also included is a Wireless Local Area Network (WLAN) modem and antenna.

### Spare Parts Kit

A Spare Parts Kit containing selected mechanical and electrical components will be provided to fulfill the need for two years normal maintenance and operation of the sterilizer. Components typically provided are valve rebuilt kit, steam trap, solenoid valve, temperature sensor, door gasket, strainer screen, printer paper. Additional parts may be required for other processes or options.

### Plant Steam Pressure Regulating Valve (PRV)

With this option the plant steam line is fitted with a Pressure Regulating Valve. It is designed to limit the incoming steam pressure to the pressure vessel design requirements (recommended if steam pressure is higher than 3.1bar/45psig). A pressure indicating gauge is supplied with this option.

### Stainless Steam Pressure Regulating Valve (PRV)

With this option the clean/pure steam line is fitted with a stainless steel 316 Pressure Regulating Valve. It is designed to limit the incoming steam pressure to the pressure vessel design requirements (recommended if steam pressure is higher than 3.1bar/45psig). A pressure indicating gauge is supplied with this option.

## LOADING ACCESSORIES

### Loading Cart

The loading cart is made of AISI 316 L stainless steel and is used to support and convey assorted products in the loading, sterilizing and unloading process.

*NOTE: A transfer trolley is required with this accessory.*

### Transfer Trolley

The transfer Trolley is made AISI 304 stainless steel of and is designed to support and convey the loading cart to and from the chamber and throughout the facility. A mechanical interlock system is provided to lock the transfer trolley to the sterilizer chamber while loading/unloading the cart. Another mechanical interlock system is provided to lock the loading cart to the transfer trolley to enable safe movement of the combination.

*NOTE: The transfer trolley is required for sterilizer applications that use a loading cart.*

### Wire Shelf for Loading Cart

The wire shelf is designed to be used on the loading cart to support assorted products. It is constructed from AISI 316L stainless steel and electro-polished.

### Perforated Shelf for Loading Cart

The perforated shelf is designed to be used on the loading cart to support assorted products. It is constructed from AISI 316L stainless steel and electro-polished. The maximum weight per shelf is not to exceed 75 kg (150 lbs).

### Rack and Shelves (990 mm long units only)

Rack and Two Shelves provides loading efficiency for a variety of mixed or single item loads. The inclusion of two shelves is standard. It is constructed from heat resistant austenitic AISI 316L stainless steel, angle guides support the shelves for safety, and mechanical stops allow each shelf to be withdrawn approximately halfway.

## PREVENTIVE MAINTENANCE

Preventive Maintenance programs designed to maximize equipment uptime can be tailored to meet Customer's requirements. A typical contract provides preventive maintenance site visits twice per year. This maintenance is

performed by factory trained STERIS Technicians following documented preventive maintenance procedures to inspect and adjust the equipment.

The exact Customer requirements can be determined by a visit with the STERIS District Service Manager before the equipment arrives.

A maintenance-training program can be designed to provide training on preventive maintenance and first response troubleshooting. This training will take place at the Customer site on their equipment and will be customized to address specific training needs. The Service Engineering department at a daily rate provides STERIS Maintenance Training. A typical maintenance-training program is performed for two (2) days.

Maintenance Training, provided by the Service Engineering Department, can be scheduled by contacting the STERIS District Service Manager three weeks prior to the requested training to allow scheduling of personnel.

## UTILITY REQUIREMENTS

Refer to the following table (Table 1) in regard to utility requirements, including utility codes connection types and parameters.

*NOTE: For detailed information always refer to associated equipment drawings.*

**Table 1. Typical Utility Requirements**

| Utility & Code | Connection | Parameter |
|---|---|---|
| Steam (saturated)[1] *Code 042* | 3/4" Male NPT / G 3/4 BSP Female | 2.5 bar +0.0/-0,2 bar (36 psig +0.0/-2,9 psi) |
| Domestic Water[2,3] *Code 010* | 1/2" Male NPT / G 1/2 BSP Female | 1-3 bar (15-44 psig) |
| Compressed Air[4] *Code 051* | 1/2" Male NPT / G 1/2 BSP Female | 5.3-8.3 bar (77-120 psig) |
| Drain[5] *Code 060* | — | Open (Atmospheric Break); Gravity Discharge |
| Safety Relief Device for Chamber *Code 071A* | 1-1/4" Male NPT / G 1-1/4 BSP Female | 3.1 bar (45 psig max) Release to open air, no back pressure. |
| Safety Relief Device for Jacket *Code 071B* | 1-1/4" Male NPT G 1-1/4 BSP Female | 2.5 bar (36 psig max) Release to open air, no back pressure. |
| Electricity *Code 90* | Termination Blocks | 400V, 3 Phase, 50 Hz |

**Table 1. Typical Utility Requirements**

Notes:

1. Dry saturated steam is required by a vapor quality to 97 to 100%

2.Maximum recommended water temperature is 20 °C (68 °F). Efficiency and the depth of vacuum reached with the liquid ring vacuum pump is reduced as water temperature increases.
Contact STERIS for temperatures above 20 °C (68 °F).

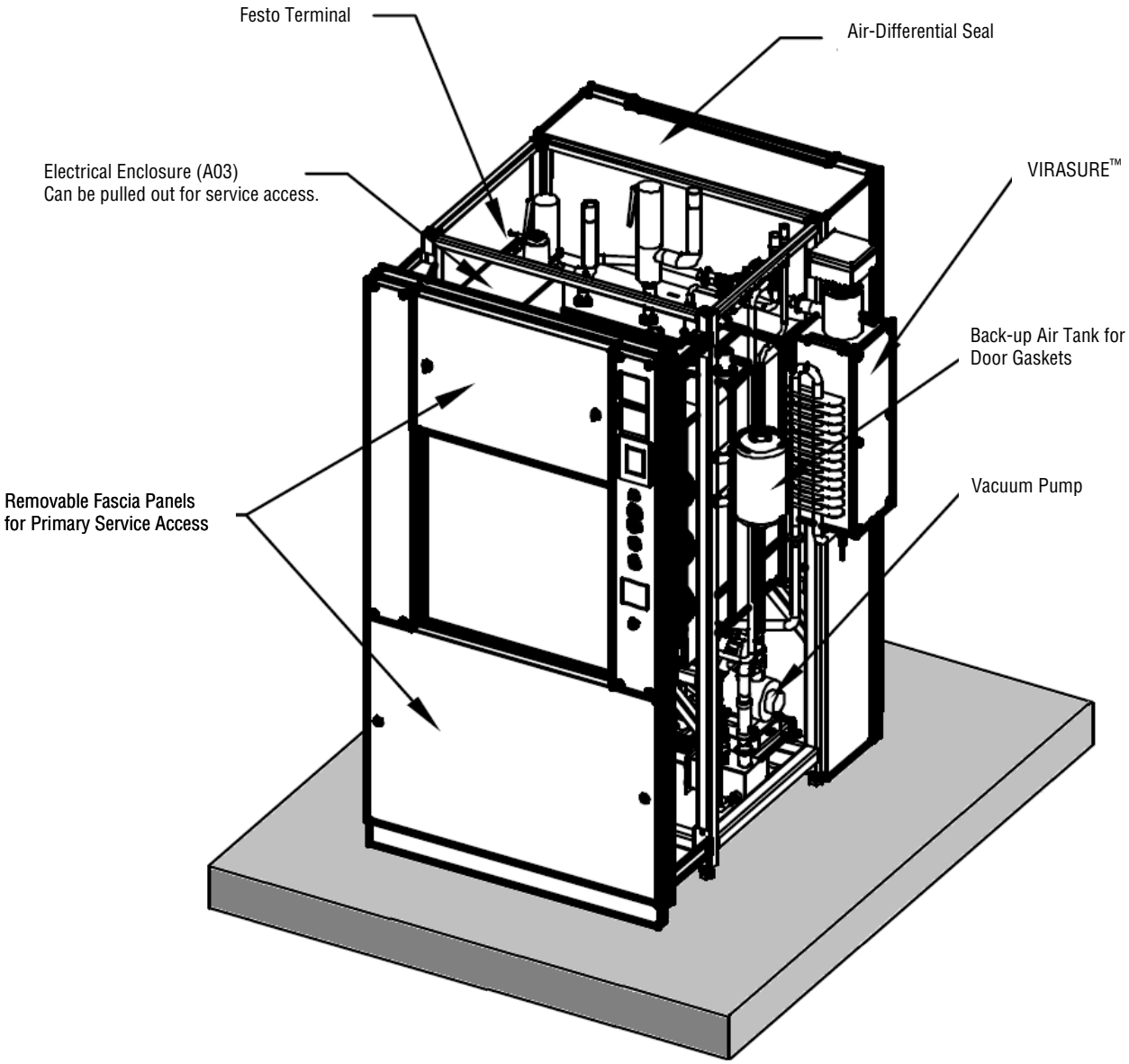
3. Conductivity of supplied water shall not exceed 500 micro-Siemens/cm.

4. Dry, oil free, compressed air is required.

5. Discharge temperature is controlled as to not exceed 60 °C (140 °F). Peak values may be higher.

*NOTE: Refer to equipment drawings for further notes concerning utilities and installation.*

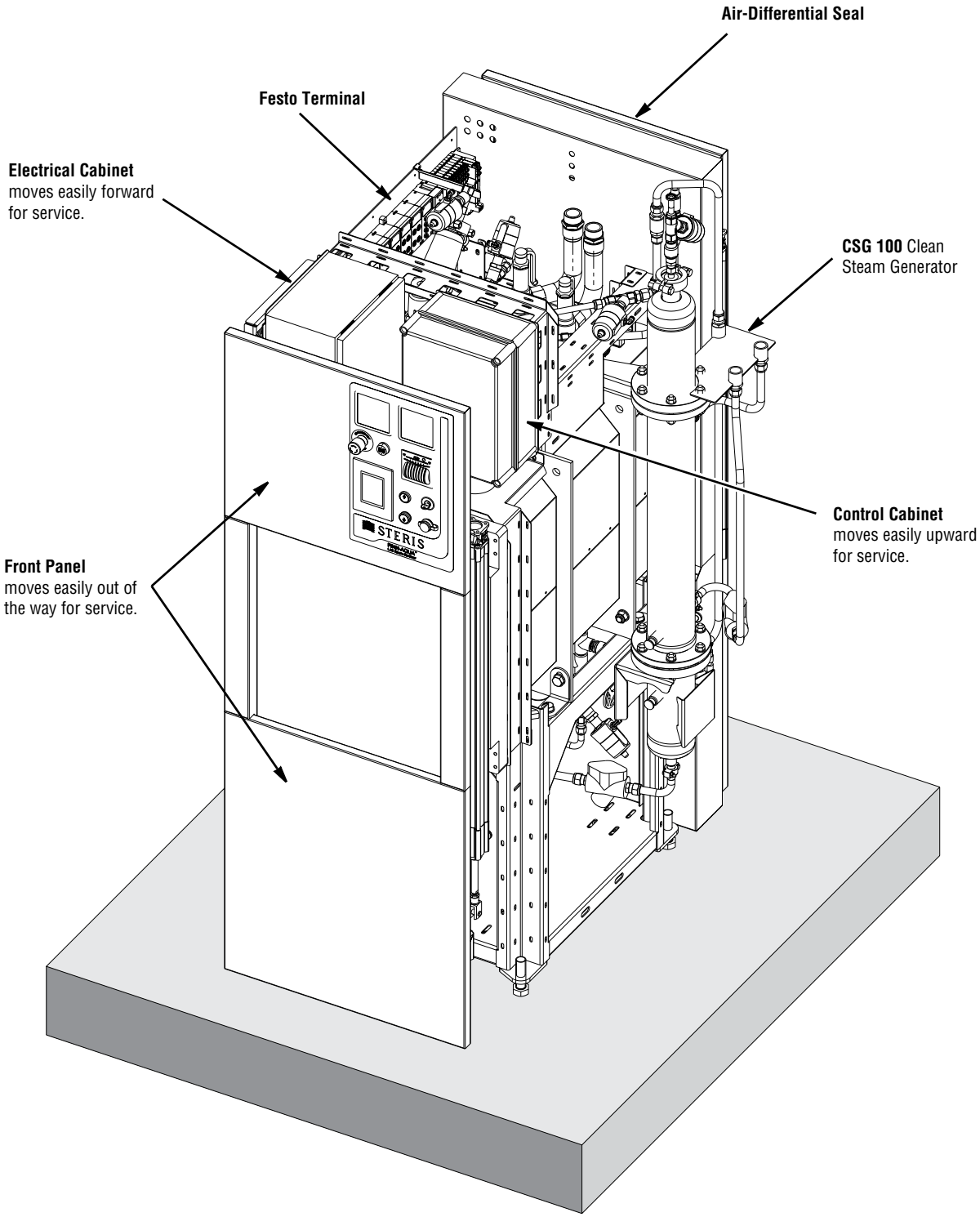
## NOT FOR INSTALLATION*




**Finn-Aqua 77 Series Sterilizer**

***Refer to applicable equipment drawings for installation details.***

NOT FOR INSTALLATION*




**FINN-AQUA 55 Series Sterilizer**

***Refer to applicable equipment drawings for installation details.***

# Life Sciences Capital Equipment

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