



BSL3 and BSL4 Autoclaves

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In today's society the need for safe bio-containment systems is increasingly important. This is especially true in the sterilization process where standard autoclaves cannot deal with the threat posed by harmful pathogens and other contaminated materials that are emitted from BSL3/4 laboratories.

Tuttnauer is at the front lines, continuously creating new standards in the field of bio-containment. With years of experience in the market, Tuttnauer produces reliable and safe bio-containment.



BSL Considerations

The Tuttnauer range of BSL autoclaves is designed to meet stringent Bio Safety Level requirements for BSL3 and BSL4 facilities. These include a hermetically sealed barrier between the different risk level zones and effective sterilization and disposal of all effluent and gases.

Special autoclave design consideration is given to:

- Autoclave and piping components
- Biological seal (Bio-shield)
- Effluent sterilization cycle
- Filter sterilization
- Safety valves and expansion vessel



Autoclave Piping and Components

Specifically designed for use with steam systems that demand the highest safety conditions. 316L grade stainless steel is used for the chamber, piping and fittings. The inner chamber walls have a mirror like polished finish ($R_a < 0.4\mu\text{m}$) to create a smooth surface.

Chamber Drain Valve Area

The chamber drain valve area is the coldest spot in the chamber. Tuttnauer BSL autoclaves resolve this problem by applying steam directly to the chamber drain valve area.

Hot-Well

The hot-well is a stainless steel water reservoir in which the feed water is heated to 80-90°C prior to entering the steam generator. The hot-well facilitates the removal of non-condensable gases.

Safety Valve

A safety valve is fitted to the chamber. Steam blasts from the safety valve are captured and condensed in an expansion vessel (optional) and then decontaminated before discharge to drain. Any remaining gases are treated via a microbiological sanitary air filter (optional).

Diaphragm Valves

Separate diaphragm valves (optional) for steam to the jacket and chamber prevent contamination from entering the valve mechanism.

Tri-clamp fittings

Tri-clamp fittings (optional) provide uniformly smooth and crevicefree self-aligning joints for non-contaminating steam flows. They minimise the possibility of external contamination penetration through the valves and piping connection areas.

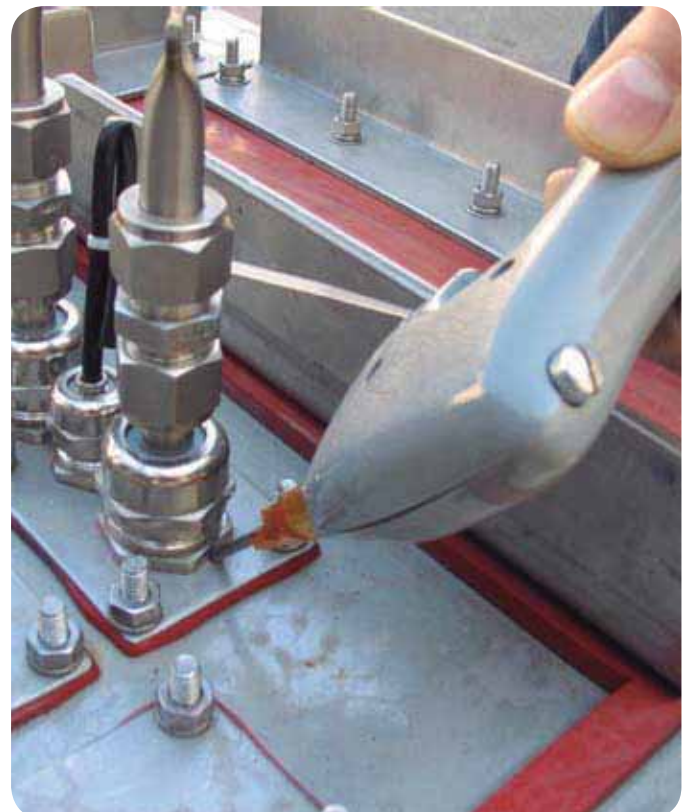
Separate Jacket and Chamber Connections

Separate jacket and chamber connections (optional) prevent contamination from entering the jacket. With this option the jacket is completely separated from the chamber.

Biological Seal

The bio-shield is a barrier whose purpose is to create a complete hermetic seal between the differently qualified zones, providing maximum biological containment between the zones. The bio-shield system meets BSL3 and BSL4 bio-safety levels using a combination of stainless steel plates and flexible neoprene wall seal to prevent micro-organisms from passing between zones.

- **Jacket Frame** – A fully welded metal flange with threaded studs surrounds the jacket. A counter plate is attached to the flange using the nuts provided. Any necessary fittings for electrical connections pass through this section of the bio-shield via specially sealed conduits.
- **Wall Frame** – A wall frame is built into the concrete wall of the building. Continuous neoprene sealing is used to seal the sterilizer completely in the aperture in the wall.



Prevacuum Air Sterilization

All air that leaves the chamber prior to sterilization is treated as highly infectious and passes through a stringent biological decontamination system that renders the air sterile.

Thermal Sterilization

Prevacuum air leaves the chamber and makes contact with high temperature steam and is then passed through a high temperature heat exchanger which greatly increases the heat applied to the air making the air sterile and safe. The sterilized air is then cooled and any condensate is discharged to the drain.

Sterilization by Filtration

Double Filter Option

For BSL 4 facilities a double filter system is recommended. Air from the chamber is passed through a double filtration system that ensures the air is decontaminated before discharge. The double filtration system uses two double-jacketed 0.2 μm filters sequentially mounted for added security. The filters are sterilized during the sterilization process.

Single Filter Option

Prevacuum air is sterilized by passing it through a 0.2 μm biological filter. In order to maintain proper and effective filtration, the filter is sterilized in-place during every sterilization cycle.



Advanced Control System for Your Laboratory

Take advantage of Tuttnauer's sophisticated user-friendly PLC control system based on the advanced Allen-Bradley platform.

Standard Features

- 7" Multi-color touch screen for easy access to control parameters and information via the panel
- PID (Proportional Integral Differential) pressure control
- Stores the last 200 cycles in built-in memory
- 4 access levels and 11 user passwords to control access/operation of the autoclave
- Up to 6 temperature sensors and 4 pressure sensors can be connected
- Diagnostic In/Out test (enables technician to check each system component separately)
- Sterilization Temperature range 110°C to 137°C
- Ethernet connection for remote monitoring, remote maintenance, and software updates
- Filter replacement notifications

Optional Features

- 21 CFR part 11
- F₀ software control
- 10" Multi-color touch screen
- Up to 16 different Barcodes
- Independent Recording for cross-checking cycle measurements
- Disinfection/Isothermal Temperature range from 60°C to 105°C



Sophisticated Touch Screen HMI

The HMI (Human Machine Interface) has been designed with the following considerations:

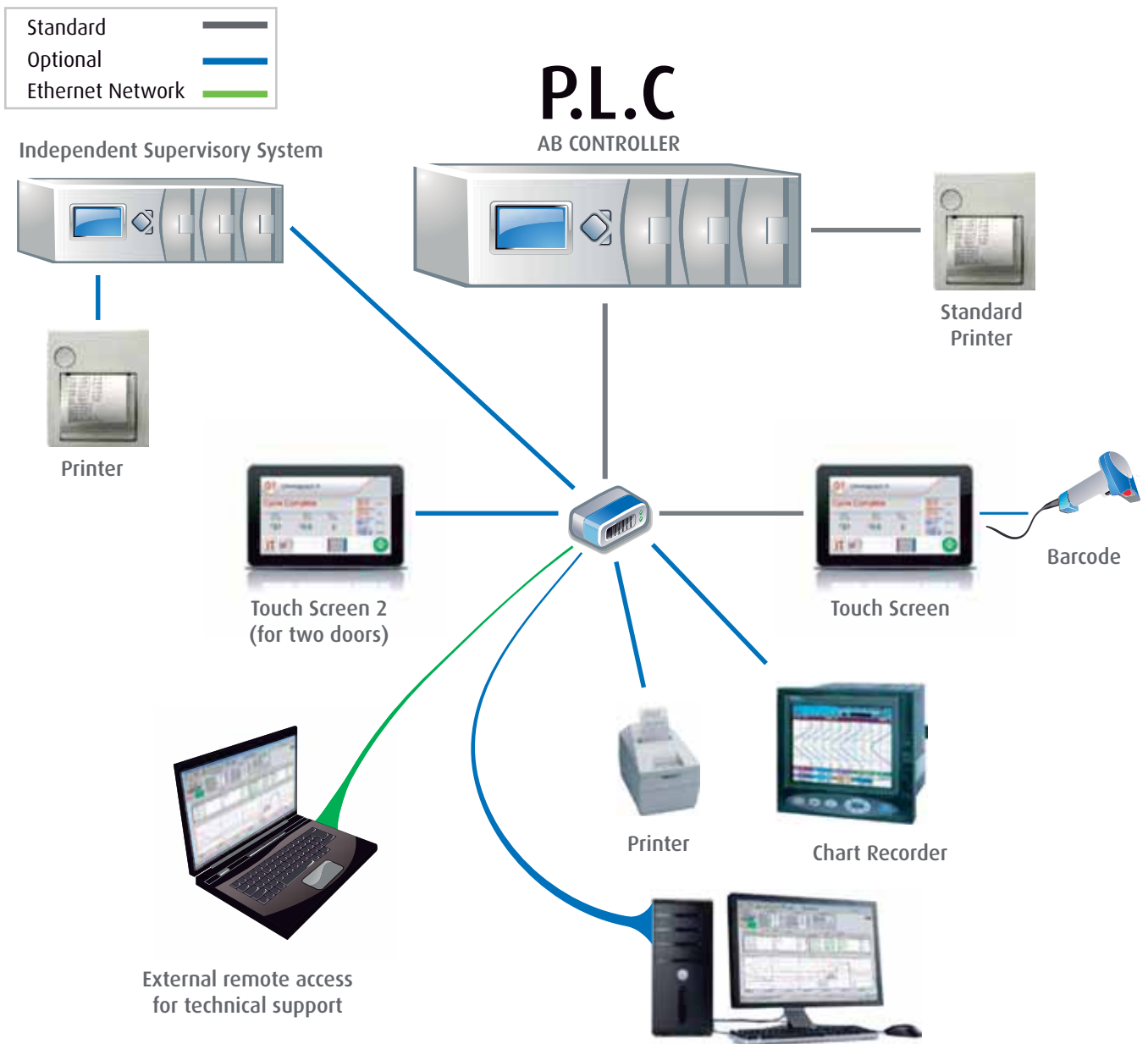
- Multi-color display for easier reading
- Color is used to indicate the stage of the cycle
- Easy operation
- Quick access to important information
- 26 Languages
- Built-in view of historical cycle data
- Graphical display of Temperature and Pressure trend graphs

Documentation Package

An optional full documentation package is available:

- Installation Qualification (IQ)
- Operation Qualification (OQ)
- Performance Qualification (PQ)





SCADA Software & Hardware

SCADA software (optional) allows for control and monitoring of up to 16 sterilizers on an external PC. The software retrieves data, creates graphs, tables and printouts. Thousands of hours of cycle data can be stored in the cycle history.



A Wide Range of BSL Autoclaves

Tuttnauer offers an unmatched range of BSL Autoclaves that are available with chamber volumes ranging in size from 250 Liters to 5100 Liters.

The 55 BSL Series

Available with the following door options:

- Fully automatic vertical sliding door
- Manual door

Model	Chamber Dimensions (WxHxD) mm	Chamber Volume (Liter)
5596	508 x 508 x 970	250
55120	508 x 508 x 1210	310



Manual Hinged Door



Vertical Sliding Door

The 66 Mid Range BSL Series

Tuttnauer medium size BSL autoclaves with chamber volumes ranging in size from 450 Liters to 610 Liters.

The 66 series is available with the following door options:

- Fully automatic vertical sliding door
- Hinged door with automatic locking

Model	Chamber Dimensions (WxHxD) mm	Chamber Volume (Liter)
66120	610 x 610 x 1215	450
6671130	660 x 710 x 1295	610



Vertical Sliding Door



Automatic Hinged Door

The 69 Large Capacity BSL Series

Tuttnauer Large BSL Autoclaves with chamber volume ranging in size from 680 Liters to 1010 Liters.

The 69 series is available with two door options:

- Fully automatic horizontal sliding door
- Hinged door with automatic locking

Model	Chamber Dimensions (WxHxD) mm	Chamber Volume (Liter)
69120	610 x 910 x 1215	680
69150	610 x 910 x 1515	840
69180	610 x 910 x 1815	1010



Automatic Hinged Door



Horizontal Sliding Door



Bulk BSL Series

Tuttnauer offers Bulk BSL Autoclaves with chamber volumes up to 9500 Liters. Additional sizes are available.

The Bulk BSL autoclave series is available with fully automatic horizontal sliding doors.

Model	Chamber Dimensions (WxHxD) mm	Chamber Volume (Liter)
364853	910 x 1220 x 1360	1500
364872	920 x 1220 x 1820	2000
428686	1070 x 2200 x 2185	5890

Loading Equipment

Tuttnauer loading equipment assists with the loading and unloading process. The equipment is made of high quality, durable stainless steel. We offer three options:

Pull-Out Trays: Stainless steel trays equipped with rails for easy loading and unloading.

Loading Carts and Transfer Carriages: The loading cart rolls from the transfer carriage onto the chamber tracks for easy handling of heavy loads. The carriage is equipped with swivel wheels, maximizing mobility in limited space. The wheel breaks prevent the carriage from rolling and the loading cart is equipped with a lock that prevents it from sliding.

Automatic Loader: Designed for loading/unloading. The control of the loader is integrated with the control of the autoclave.



Loading Cart on top of Transfer Carriage

Technical Standards and Directives

- PED 97/23 EEC
- EN 61010-1:2010; EN 61010-2-040:2005- Safety of Autoclaves
- IPX 4
- EN 285:2006 - Large Autoclaves
- ASME Sec. VIII; ASME BPE
- EN 61326-1:2006
- ISO 17665-1:2006 - Validation and routine control

Quality Standards

Tuttנauer manufacturing plant meets the following quality standards:

- ISO 9001:2008 - Quality Management Systems
- ISO 13845:2003 - Quality Systems for Medical Devices

Your Sterilization & Infection Control Partners

Global Partnerships

At Tuttנauer we feel that business means people dealing with people. We pride ourselves on our reputation for having long-lasting relationships with our customers, spanning over decades and distances and for building solid, long-term relationships based on commitment and trust.

Our Flexibility is Your Advantage

Beyond our unmatched range of products, we also manage complete turnkey solutions, including planning, design and installation of equipment, as well as consultation and feasibility studies, for projects of all sizes.

More from Tuttנauer:

Featuring Tuttנauer's range of cleaning, disinfection and sterilization solutions



Pharmaceutical autoclaves designed in accordance with cGMP guidelines



Vertical autoclaves for liquid, glassware, and biohazardous waste



Benchtop autoclaves for life science applications

Laboratory Line

International Sales and Marketing
E-mail: info@tuttנauer-hq.com
www.tuttנauer.com

Tuttנauer Europe b.v.
Hoeksteen 11, 4815 PR
P.O.B. 7191, 4800 GD Breda
The Netherlands
Tel: +31 (0) 765 423 510, Fax: +31 (0) 765 423 540
E-mail: info@tuttנauer.nl

Tuttנauer USA Co.
25 Power Drive,
Hauppauge, NY 11788
Tel: +800 624 5836, +631 737 4850 Fax: +631 737 0720
E-mail: info@tuttנauer.com

Tuttנauer
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Distributed by:



217142066
217145674
info@ert.pt
www.ERT.pt

Rua Soeiro Pereira Gomes, Lote 5, Cave Drt.
P2845-387 Amora Portugal