

# Vertical & Benchtop Autoclaves

For Life Sciences

 Laboratory Line

  
Your Sterilization & Infection Control Partners



## Designed for Your Laboratory Applications

### Advanced Laboratory Autoclaves

Tuttnauer laboratory autoclaves have been designed to provide high quality repeatable performance and accountability for a wide range of applications used in modern laboratories, which include:

- Liquid sterilization (using two flexible PT100 probes) with various cooling options
- Pipette and Glass sterilization
- Instrument sterilization (wrapped or unwrapped)
- Biohazard and Waste sterilization
- Agar preparation
- Specialized customized cycles

For life science applications the Tuttnauer line of vertical and benchtop autoclaves successfully meet the challenges in today's laboratories with a flexible range of features and a sophisticated control system.

## Vertical & Benchtop Autoclaves



The laboratory autoclave line is designed for laboratory applications used in research institutes, universities, medical, pharmaceutical, biotechnology, food and chemical industries.

Each model has a number of optional added-value features which can be configured for fast cooling, efficient drying, biohazard and waste sterilization, Fo control, and more.

Benchtop lab autoclaves are designed to save space on your laboratory workbench.

Vertical lab autoclaves are designed for your convenience and ease of use when vertically loading the autoclave.

For over 90 years Tuttnauer, as a family owned business, has been an industry leader satisfying customer expectations with top quality, high performance products and a dedicated service support team. Tuttnauer's sterilization & infection control products are trusted at over 350,000 installations worldwide including Laboratories, Pharmaceutical Facilities, Hospitals and Clinics.

# Vertical Autoclaves - ELV

Tuttnauer vertical laboratory autoclaves are top loading autoclaves available in chamber sizes from 31 to 160 liters. ELV models have an advanced multi-color control panel and a chamber made of 316L or 316Ti stainless steel.



## Vertical D-Line Models - Technical Data

D-Line Model	Chamber Dimensions ØxD (mm)	Chamber Volume (Liter)	External Dimensions WxHxD (mm)
2840 ELV	280 x 460	31	540 x 980 x 440
3850 ELV	380 x 500	65	730 x 1000 x 540
3870 ELV	380 x 690	85	730 x 1000 x 540
5050 ELV	500 x 500	110	870 x 860 x 770
5075 ELV	500 x 750	160	870 x 1090 x 770

## Erlenmeyer Flasks (ml) Loading Capacity

Model	250	500	1000	2000	3000	5000
2840	2 x 5	2 x 3	1	1	1	1
3850	2 x 12	2 x 8	1 x 5	1 x 2	1	1
3870	3 x 12	3 x 8	2 x 5	2 x 2	2 x 1	1
5050	2 x 21	2 x 14	2 x 8	1 x 5	1 x 4	1 x 2
5075	3 x 21	3 x 14	3 x 8	2 x 5	2 x 4	1 x 2

## Schott-Duran Flasks (ml) Loading Capacity

Model	250	500	1000	2000	3000	5000
2840	2 x 8	2 x 5	1 x 3	1	-	1
3850	2 x 19	2 x 12	1 x 8	1 x 4	-	1
3870	3 x 19	3 x 12	2 x 8	2 x 4	-	1
5050	2 x 32	2 x 21	2 x 15	1 x 8	-	1 x 4
5075	3 x 32	3 x 21	3 x 15	2 x 8	-	2 x 4

\* External dimensions may change when an optional internal steam generator is added. Please see page 12.

## Benchtop Autoclaves

Tuttnauer benchtop laboratory autoclaves are front loading autoclaves available in chamber sizes from 28 to 160 liters. EL models have an advanced multi-color control panel and a chamber made of 316L or 316Ti stainless steel.



### Benchtop D-Line Models - Technical Data

D-Line Model	Chamber Dimensions ØxD (mm)	Chamber Volume (Liter)	External Dimensions WxHxD (mm)
2840 EL	280 x 400	28	530 x 440 x 630
3850 EL	380 x 500	65	720 x 540 x 765
3870 EL	380 x 690	85	720 x 540 x 940
5050 EL	500 x 500	110	860 x 740 x 890
5075 EL	500 x 750	160	860 x 740 x 1120

\* External dimensions may change when an optional internal steam generator is added

### Erlenmeyer Flasks (ml) Loading Capacity

Model	250	500	1000	2000	3000	5000
2840	1 x 9	1 x 4	1	0	0	0
3850	1 x 17	1 x 11	1 x 6	1 x 3	0	0
3870	1 x 23	1 x 17	1 x 10	1 x 5	0	0
5050	1 x 25 1 x 16	1 x 15 1 x 12	1 x 7	1 x 4	1 x 2	1 x 2
5075	1 x 50 1 x 18	1 x 18 1 x 18	1 x 15	1 x 7	1 x 4	1 x 3

### Schott-Duran Flasks (ml) Loading Capacity

Model	250	500	1000	2000	3000	5000
2840	1 x 12	1 x 9	1 x 5	0	-	0
3850	1 x 27	1 x 16	1 x 11	1 x 6	-	0
3870	1 x 36	1 x 23	1 x 18	1 x 9	-	0
5050	1 x 35 1 x 27	1 x 20 1 x 16	1 x 12	1 x 6	-	1 x 3
5075	1 x 55 1 x 39	1 x 32 1 x 27	1 x 20	1 x 10	-	1 x 5

\* Optional shelves are needed to accommodate some of the loading capacities mentioned above.



## Advanced Control System for Your Laboratory

Take Advantage of Tuttbauer's state-of-the-art Control System with Multi-Color Display

### Features

- F<sub>0</sub> software control
- PID (Proportional Integral Differential) pressure control
- Stores the last 200 cycles in built-in memory
- Two independent flexible PT100 temperature sensors to prevent over-boiling of liquids and explosions of bottles
- Up to 6 temperature sensors and 4 pressure sensors can be connected
- 30 Identification Codes and Passwords for access level control
- The controller and software comply with the 21 CFR part 11 standard

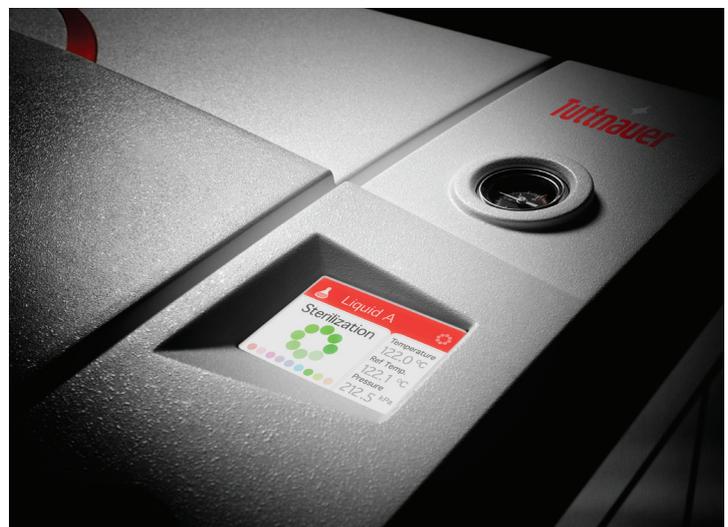
### Innovative Multi-Color Display

- Multi-color display for easier reading
- Color is used to indicate the stage of the cycle
- Quick access to important information
- 26 Languages
- Built-in view of historical cycle data

### Documentation Package

An optional full documentation package is available:

- IQ - Installation Qualification
- OQ - Operation Qualifications
- PQ - Performance Qualification



## Digital Cycle Data on Your PC

Save cycle data files on your PC with no additional software or specialized hardware



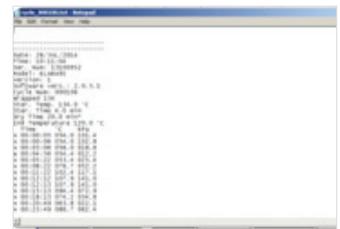
Connect USB memory



Select "Export History"



Connect USB memory to your PC



View cycle data files on your PC

### Optional



Create reports with R.P.C.R



## R.P.C.R Software

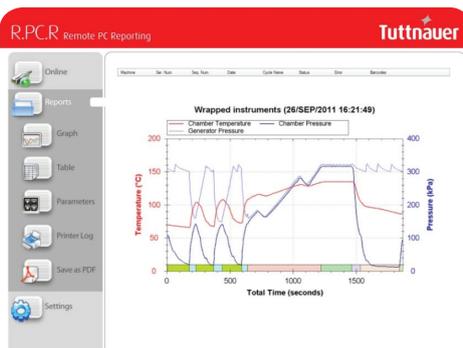
### Automatic Recording of Cycle Information to Your PC

#### Reporting You Can Rely On

- Remote PC Reporting (optional PC software)
- Automatic recording of cycle information to any PC on your network
- Convenient access to graphs and tables that are easy to understand
- Easily generate PDF reports
- No need to file printouts, saving you time

#### Be in Control with Real-Time Remote Monitoring

- See the real-time autoclave display on your PC
- Monitor all activity for up to 8 autoclaves



With R.P.C.R you can see: Graphs of the cycle data, numeric cycle data, cycle print-outs, measured values table, table of parameters.

# Liquid Loads

## Liquid Load Fast Cooling Applications

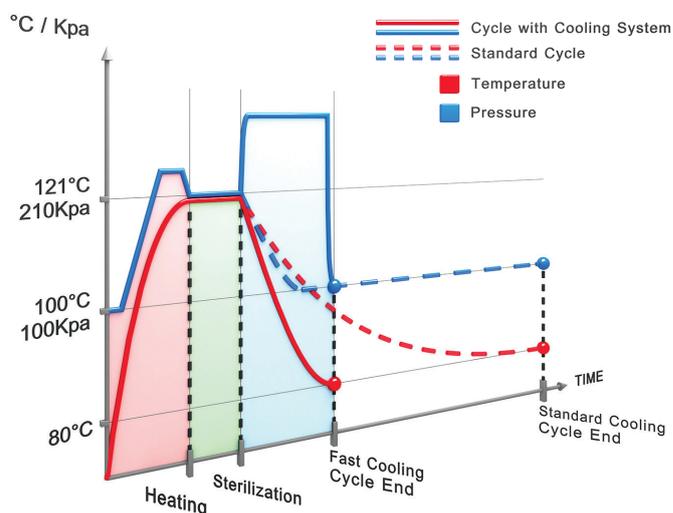
Sterilizing liquid requires longer heating and cooling times for completing a cycle, especially with sensitive liquid loads. When time is critical, advanced optional fast cooling features are available with Tuttnauer's laboratory autoclaves that prevent a sudden drop in chamber pressure which can cause liquids to boil over.

### Fast Liquid Cooling

After sterilization is completed, compressed air is passed through a microbiological filter into the autoclave chamber in order to prevent a drop in pressure which also prevents load deformation, cracks or spills. Cold water is then circulated through cooling pipes that rapidly reduces the chamber temperature and that of the liquid load to a safe temperature.

**Tuttnauer's fast liquid cooling technology reduces cycle time by as much as 75% and minimizes load exposure to high temperatures.**

### Fast Cooling Graph



### Benchtop ELC Models

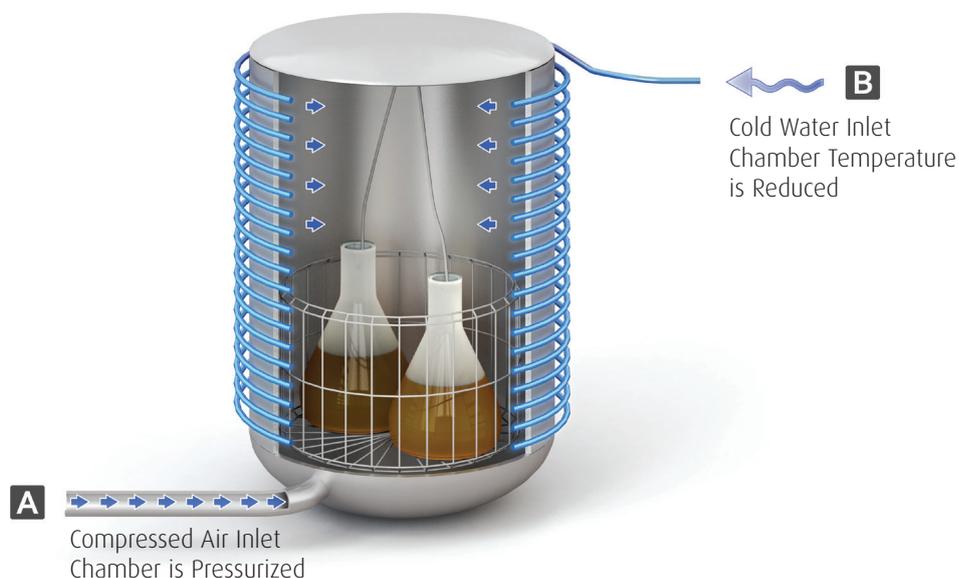


Compressed Air Inlet Chamber is Pressurized

**A**

**B** Cold Water Inlet Chamber Temperature is Reduced

### Vertical ELVC Models



**A**

Compressed Air Inlet Chamber is Pressurized

**B**

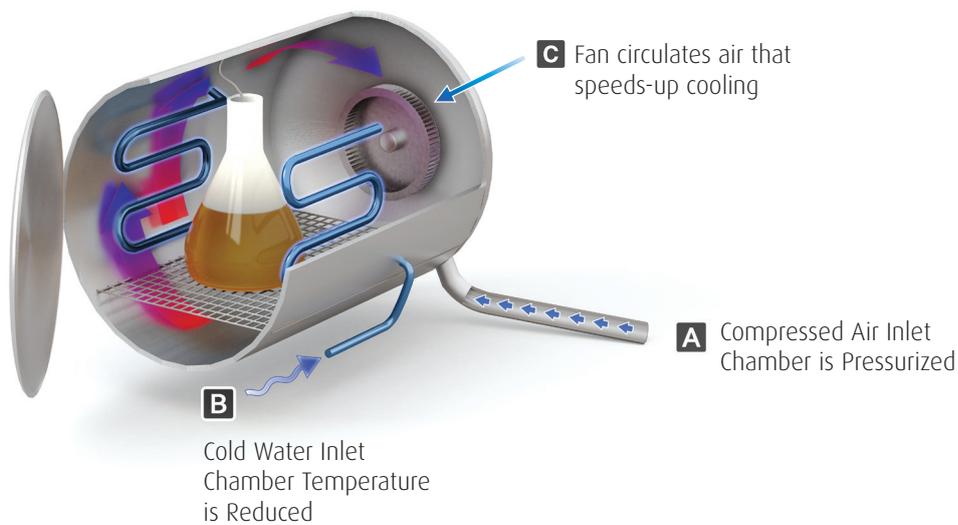
Cold Water Inlet Chamber Temperature is Reduced

## Super Fast Liquid Cooling

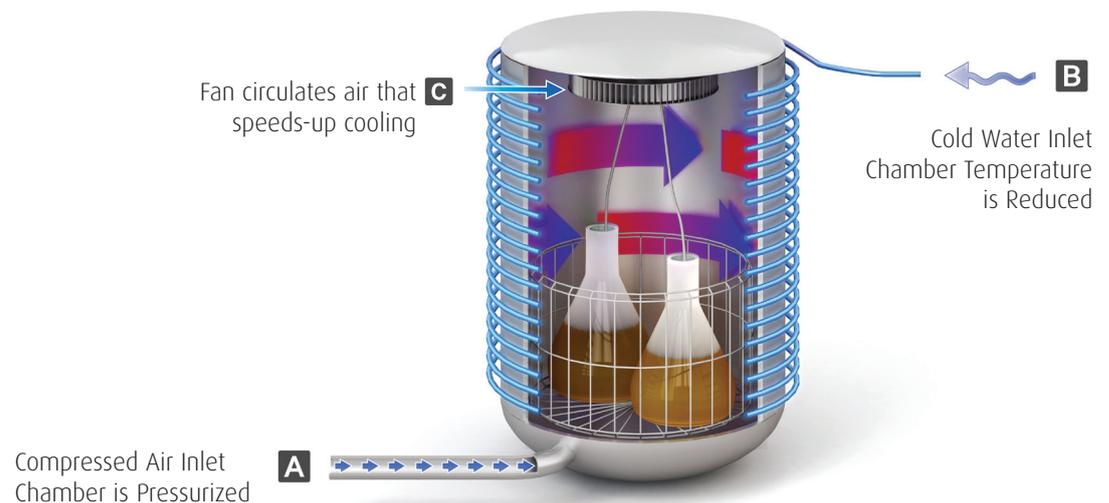
In addition to fast cooling, an optional fan can be applied to further circulate the compressed air in the chamber. This speeds up the heat exchange during the cooling stage in order to safely achieve super fast cooling of the liquid load under pressure.

Tuttnauer's accelerated fast liquid cooling technology reduces cycle time by as much as 90% and minimizes load exposure to high temperatures.

### Benchtop ELC Models



### Vertical ELVC Models



## F<sub>0</sub> – Protect Your Liquid Media, Save Time, Save Energy

An additional challenge with liquid sterilization is the need to prevent extended exposure of liquid media to high temperatures which may harm the quality of the liquid media. The advanced F<sub>0</sub> optional feature assists in minimizing the time liquids are exposed to high temperatures during sterilization thereby protecting liquid media, saving your laboratory time and reducing energy consumption.

# Glassware, Hollow and Tip Applications

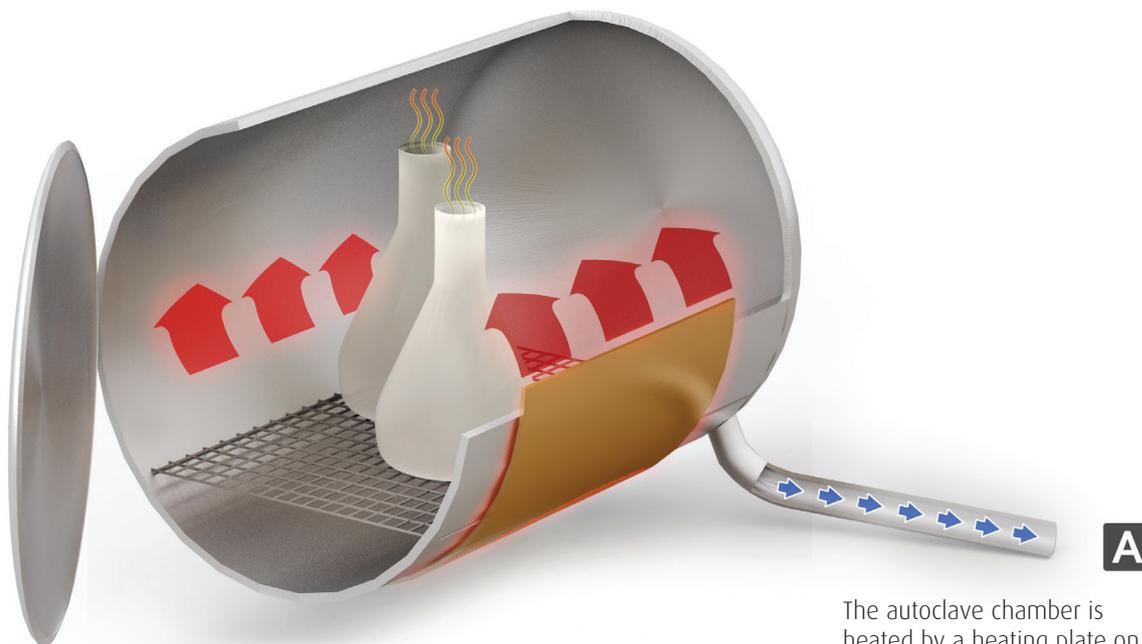
Efficient air removal is an important requirement for sterilizing hollow loads such as laboratory glassware and tips where the standard gravity displacement air removal method is not effective. Air removal after sterilization also assists in fast drying of your laboratory glassware.

## Efficient Air Removal

An optional vacuum pump can be used for fractioned pre vacuum air removal eliminating air pockets from all load types and maximizing efficient steam penetration throughout the entire load.

## Active Drying with Post Vacuum

For benchtop autoclaves, an optional vacuum pump can be used for post vacuum drying, at the end of the sterilization cycle, ensuring improved drying of porous loads and hollow instruments such as pipette tips. The benchtop autoclave is equipped with a heating plate attached under the chamber that heats the chamber during the drying phase. The low pressure in the autoclave chamber, caused by the vacuum, reduces the boiling temperature forcing moisture to evaporate rapidly. The vapour is then removed from the chamber by vacuum resulting in a dry load.



The autoclave chamber is heated by a heating plate on the outer chamber wall.

## Vacuum Pump

- used for pre-vacuum air removal
- used for post-vacuum moisture removal for fast drying



## For Applications that Need High Performance

Tuttnauer's high performance laboratory autoclaves are equipped with the following optional features: a built-in steam generator, a vacuum pump and a coiled pipe around the chamber. These autoclaves provide efficient heat-up and complete drying.

### Fast and Efficient Heat-up

#### Immediate Steam and Efficient Air Removal

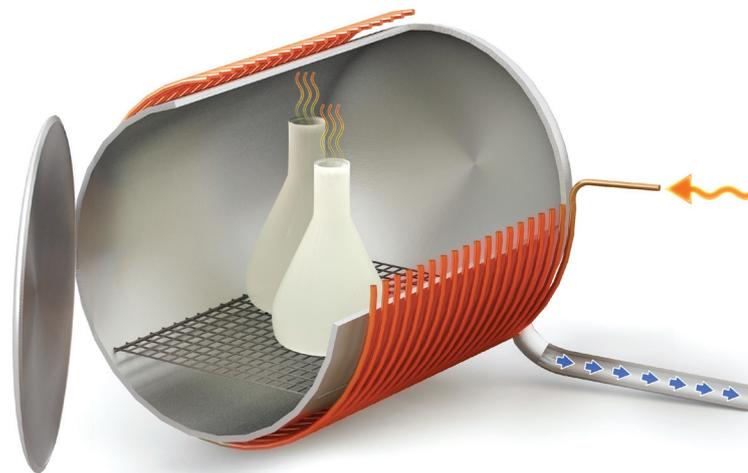
During the heat-up phase air is efficiently removed from the chamber by a strong vacuum pump. Steam, that is immediately available from the built-in steam generator, is then injected into the autoclave for immediate chamber heating.

### Complete Drying

#### Chamber Heating and Post Vacuum

Highly efficient drying is achieved by uniformly heating the chamber wall of the benchtop or vertical autoclave. The chamber is heated by passing steam through a coiled pipe around the chamber. The post vacuum stage reduces the boiling point which speeds up drying. This results in faster and complete drying, and guarantees that even the most difficult loads such as textiles, porous loads, hollow instruments and tips, will dry.

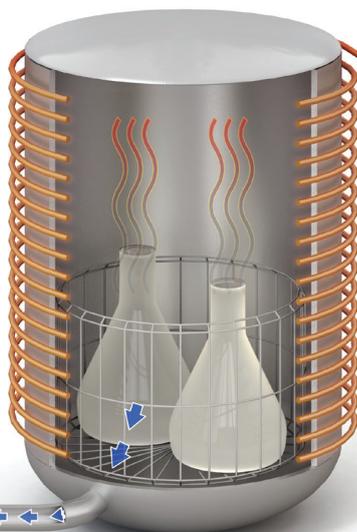
### Benchtop EL Models



**B**  
The autoclave chamber is heated by injecting steam into the coiled pipe around the chamber.

**A**  
**Moisture Removal with Vacuum Pump**  
Low pressure results in low boiling point and fast drying.

### Vertical ELV Models



**B**  
The autoclave chamber is heated by injecting steam into the coiled pipe around the chamber.

**A**  
**Moisture Removal with Vacuum Pump**  
Low pressure results in low boiling point and fast drying.



**Integrated Steam Generator**  
Integrated steam generator for vertical and benchtop autoclave models

# Autoclaves with Built-in Steam Generator

## ELVC-G models & ELC-G models

Vertical and Benchtop laboratory autoclaves with built-in steam generators provide fast & efficient heat-up and complete drying. Chamber sizes from 28 to 160 liters.

### Vertical Top Loading Models - Technical Data

D-Line Model	Chamber Dimensions ØxD (mm)	Chamber Volume (Liter)	External Dimensions WxHxD (mm)
3850 ELVC-G	380 X 500	65	730 x 1000 x 700
3870 ELVC-G	380 X 690	85	730 x 1000 x 700
5050 ELVC-G	500 X 500	110	870 x 1090 x 770
5075 ELVC-G	500 X 750	160	870 x 1090 x 770



### Horizontal Front Loading Models - Technical Data

D-Line Model	Chamber Dimensions ØxD (mm)	Chamber Volume (Liter)	External Dimensions WxHxD (mm)
2840 ELC-G	280 X 400	28	530 x 440 x 760
3850 ELC-G	380 X 500	65	730 x 1366 x 1190
3870 ELC-G	380 X 690	85	730 x 1366 x 1190
5050 ELC-G	500 X 500	110	870 x 1578 x 1175
5075 ELC-G	500 X 750	160	870 x 1578 x 1175



## ELV-WR

### Top-loading vertical autoclave without drain or water connection

ELV-WR is the perfect choice for laboratories that require a high-quality autoclave without the need for fast cooling, closed door drying and vacuum for porous loads.

The ELV-WR is specially designed with a water reservoir that is filled manually and eliminates the need for drain or water connections. Only an electric power connection is needed.

\* Water reservoir is a standard feature on the tabletop autoclave line.



D-Line Model	Chamber Dimensions ØxD (mm)	Chamber Volume (Liter)	External Dimensions WxHxD (mm)
2840ELV-WR	280 x 460	31	530 x 988 x 530
3850ELV-WR	380 x 500	65	739 x 1075 x 800
3870ELV-WR	380 x 690	85	739 x 1075 x 800
5075ELV-WR	500 x 750	160	739 x 1075 x 800



## Program Cycles

30 program cycles are available with each autoclave. Up to 8 cycle programs are factory set according to optional features. The remaining cycles are fully customizable by the user.

### Standard Cycles

- Solid and glassware loads at 134°C or 121°C for delicate loads (plastics)
- Liquid loads and waste liquids at 121°C

### Standard Cycles added with Optional Features

- Feature: Cooling Coil + Compressed Air
- Fast cooling for liquid loads at 121°C

### Feature: Biohazard Air Filter

- During air removal all exhaust air is filtered through a 0.2 µm biological filter to prevent contamination of the laboratory
- Biohazard solid loads at 134°C
- Biohazard liquid loads at 121°C

### Feature: Vacuum Pump

- Pre-vacuum cycles
- Solid and glassware loads at 134°C or 121°C for delicate loads (plastics)
- Liquid loads and waste liquids at 121°C
- Air Leakage Test Cycle

### Feature: Vacuum Pump + Steam Generator

- Pre and Post vacuum cycles
- Hollow, porous and textile loads at 134°C
- Waste: hollow, porous and textile at 121°C
- Bowie & Dick steam penetration test at 134°C

### Media Processing Cycles

#### Isothermal Processing

For preparing agar and other biological media with a temperature range from 60°C to 95°C that allows for gentle heating and cooling down of agar.

#### Holding Temperature

Special program with programmable holding temperature at the end of the cycle to prevent cooling of media.

#### Over Pressure Cycle

Prevents distortion of packaging containing liquids during sterilization. Requires compressed air and fan.

### Special Custom Cycles

Tuttner is able to provide specifically customized cycles upon request. These may include material stress test, ageing test, varnish test, and others.

#### Durham Program Cycle

Sterilizes Durham Tubes and is configured according to the customer's typical load for the test tubes.

#### Extended Sterilization Time

Special program with extended sterilization times up to 999 minutes.

#### Multiple Cycle (Material Stress Test)

Special program to automatically run multiple cycles on the same load.



## Codes for Main Optional Features

All Tuttbauer advanced laboratory autoclaves are equipped with an advanced control system and multi-color display panel. Optional advanced features are described by the following codes for EL (front loading) and ELV (vertical loading) autoclaves:

Feature Code	Feature Name	Feature Description
<b>C</b>	Fast cooling (up to 75%)	Water circulation through cooling pipes cools chamber
<b>C + F</b>	Super fast cooling (up to 90%)	Water circulation through cooling coils and air ventilation with fan rapidly cools chamber
<b>PV</b>	Efficient air removal Efficient moisture removal	Efficient air and moisture removal by vacuum pump
<b>G</b>	Efficient heating	Efficient heating by steam from steam generator
<b>PV G</b>	Complete drying	Steam from generator in combination with vacuum for complete drying
<b>BH</b>	Biohazard and Waste System	Biohazard filtration of air removed from chamber before sterilization. Also used for waste sterilization.
<b>WR</b>	Water Reservoir	Mineral free water reservoir for vertical autoclave to avoid water filling & drain connection.

## Baskets and Containers

Stainless steel wire baskets and containers in different sizes for all autoclave models.

### Vertical Baskets



### Benchtop Baskets



## Lifting Device

The lifting device assists in easy loading and unloading of heavy items. The lifting device is attached to the autoclave and is equipped with an integrated swivel arm for maximum maneuverability. It is also equipped with an electronic remote control for smooth handling of all load types.

### Loading Equipment

Loading carts and transfer carriages on rails to assist the loading and unloading process. Constructed of high quality, durable stainless steel. The adjustable loading cart rolls from the transfer carriage onto the interior chamber tracks for easy handling of heavy loads.



## Safety

Safety for personnel, autoclave and load are priority in the design, construction and operation of any Tuttnauer autoclave. Tuttnauer is committed to the highest industry safety standards and directives to ensure safety not only for your employees operating the autoclaves but also for your laboratory and the loads being sterilized.

- A safety device prevents the operator from opening the door when the chamber is pressurized
- A cycle cannot start if the door is open or not properly locked
- The door cannot unlock until liquid temperature reaches the predetermined end temperature
- Two independent flexible PT100 temperature sensors to prevent over-boiling of liquids and explosions of bottles

## Standards

**Tuttnauer pressure vessels are both ASME and PED certified. All ASME certified vessels are inspected by an independent authorized ASME inspector.**

- DIN 58951-2:2003 Steam Sterilizers for Laboratory Use

Directives & Guidelines:

- PED 97/23/EC Pressure Equipment Directive
- 2002/95/EC RoHS Directive
- 2006/95/EC Electrical equipment
- 2004/108/EC Electromagnetic compatibility
- 2006/42/EC Machinery Directive
- 2002/96/EC WEEE Directive
- ANSI / AAMI – ST55: 2010 Table Top steam sterilizer
- EN 13060: 2004+A2: 2010 Small steam sterilizer

Safety and EMC Standards:

- EN 61010-1: 2010 Safety requirements for laboratory use
- EN 61010-2-40: 2005 Safety requirements for sterilizers
- EN 61326-1: 2006 Electrical Equipment for EMC Requirements
- EN 17665-1: 2006 Sterilization of health care products – moist heat

Pressure Vessel and Steam Generator Construction Standards:

- ASME Code, Section VIII, Division 1, Unfired Pressure Vessels
- ASME Code, Section I, for Boilers

Quality System Compliance:

- ISO 9001:2008 (Quality Systems)
- EN ISO 13485: 2012 Quality Management System
- Canadian MDR (CMDR) SOR/98-282 (2011)
- In compliance with FDA QSR 21 CFR part 820 & part 11

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## Laboratory Line

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