

JBT proposal for the new hydrostat



A. OPERATING SPECIFICATIONS

The machine quoted has been dimensioned on the basis of the below information. For this proposal JBT has made some assumptions based on the e-mails received and the current system in Long Sutton on can sizes, process times and temperatures, and required capacities. If more information is available, please contact us and we can update the system configuration and proposal accordingly. JBT offers a great variety on process options and infeed/discharge systems.

<i>Can specification (assumed)</i>	<i>Ø65 x 102 mm (A1)</i> <i>Ø73 x 105 mm (TBC)</i> <i>Ø73 x 62 mm (U8)</i>
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<i>Line speed</i>	<i>Requested 600 cpm</i>
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<i>Sterilization time (assumed)</i>	<i>20 – 100 minutes</i>
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<i>Sterilization temperature</i>	<i>Max. 128°C</i>
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<i>Altitude of factory</i>	<i>Sea level</i>
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Notes

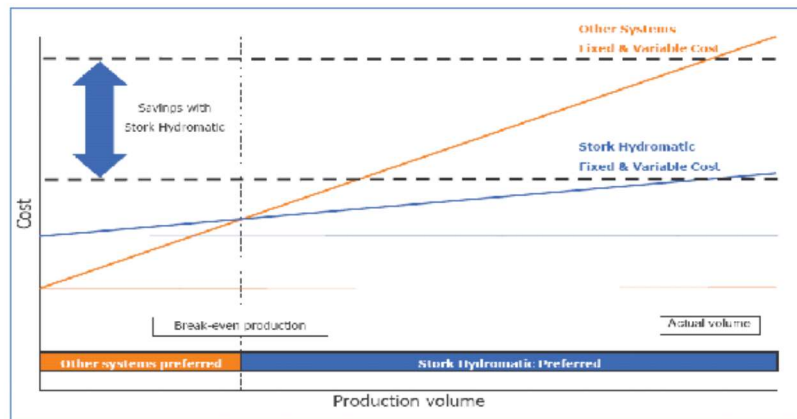
- The mechanical format and characteristics of the Equipment are based on the process parameters suggested by the Buyer or on the process parameters which JBT assumes to be commercially acceptable taking into account the information that was provided by the Buyer.
- This proposal is preliminary - the Operating Specifications and any other specification requirements are not binding on JBT until JBT receives and has tested all product and container samples to be used on or with the Equipment, and confirmed in writing that use of the containers and products tested successfully with the Equipment are expected to achieve the Operating Specifications and any other specification requirements under proper operating conditions.
- The products and containers to be used on or with the Equipment under this Proposal/Agreement are natural products which can vary considerably in their characteristics. The Buyer accepts that if such products or containers (i) are not tested by JBT; or (ii) are not tested successfully by JBT; or (iii) when the product or container characteristics are in any way different to those tested, including in tests made in accordance with the preceding paragraph; the Equipment may not satisfy all the Operating Specifications or other specification requirements and in any of these cases JBT shall not be liable for any failure to satisfy the Operating Specifications or other specification requirements.



1. BENEFITS OF JBT HYDROMATIC® STERILIZER

- High and consistent product quality
 - each product is sterilized with the exactly the same process conditions
 - no under- or over processing
 - gentle handling
- Energy efficiency
 - regenerative cooling and heating systems
 - very low steam usage
 - very low water usage
- Minimal floor space requirements
 - up to 80% savings on floor space requirements
 - continuous system - easy in-plant logistics
- Total reliability and “peace of mind”
 - 96% guaranteed efficiency
 - built on experience of over 650 systems supplied
 - low maintenance cost
 - minimal operator interference
- Long service-life
 - designed for a life expectancy of >30 years
 - active retrofit policy

+ Resulting in the lowest sterilization cost per product!



Please contact our sales representative to make a comprehensive Total Cost of Ownership comparison based on your specific requirements and costs and let us convince you of the benefits of a JBT Hydromatic sterilizer.



2. JBT HYDROMATIC® CS 1,6-1-3K-2K-4/120-2S/1051-1775

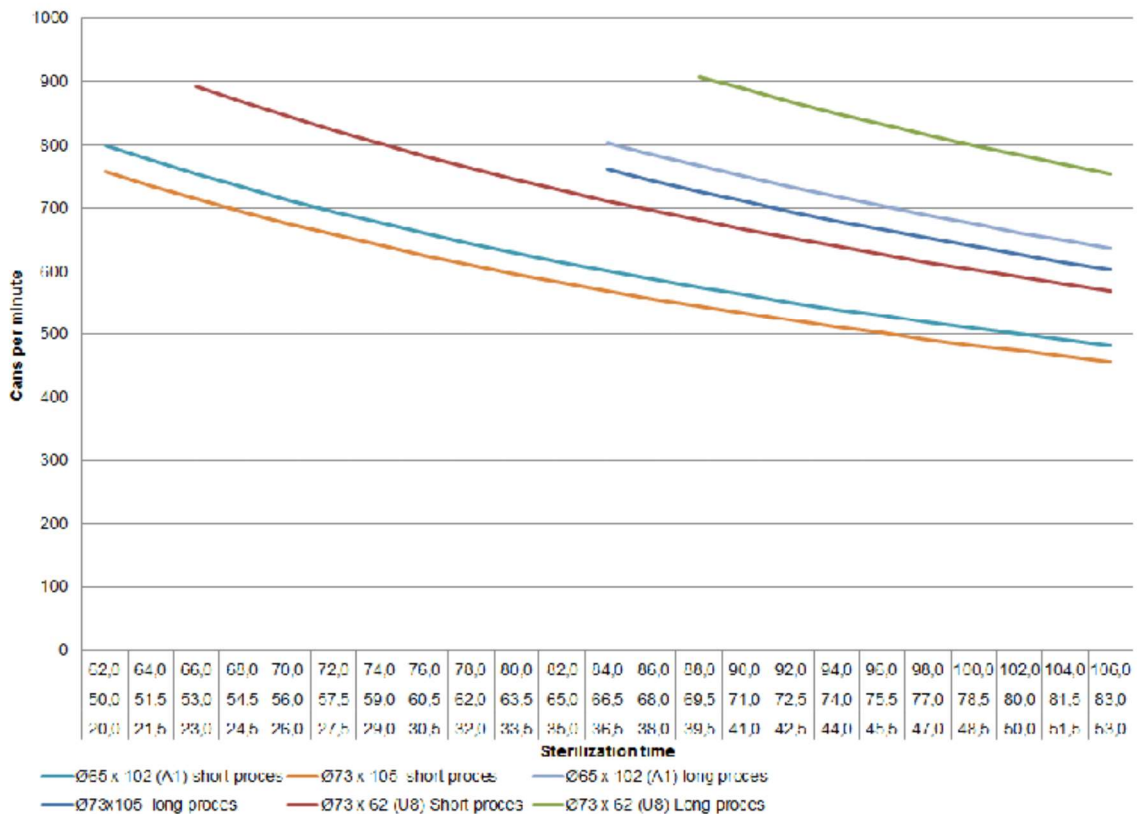
2.1. SYSTEM CONFIGURATION

CS 1,6-1-3K-2K-4/120-2S/1051-1775:

CS	Continuous Sterilizer
1,6	maximum working pressure [bar] in the sterilization towers
1	1 hydrostatic preheat leg
3K	1 sterilization tower with 3 chain loops, K-height
2K	1 sterilization tower with 2 chain loops, K-height
4	1 hydrostatic cooling leg and a cooling section with 3½ chain loop
120	1 double side load- and unload systems, chain pitch is 120 mm
2S	Standard Unicon side loader carrier
1051-1775	# of carriers in the sterilization section (short process: # 1051 carriers and long process # 1775 carriers)

2.2. SYSTEM CAPACITY

The system is designed to operate at a requested capacity of 600 cpm. The table below shows the capacity in relation to the sterilization time.



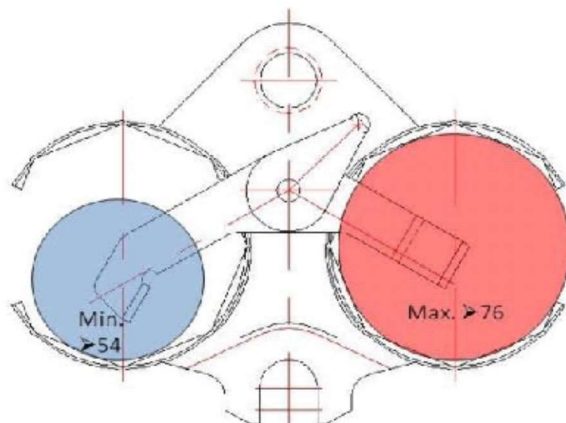
Specifications

Sterilization by saturated steam	
Minimum sterilization temperature	105 °C
Maximum sterilization temperature	Max. 128,1 °C (at min. 0.96 bar atm. pressure)
Sterilization temperature accuracy	+1/-0,5 °C
Sterilization time	between 50 – 100 min (20 min optional in 3 loop sterilisation tower (short process mode price option 1.2)

Can size for 2S (120 mm pitch) carrier

Ø65 x 102 mm	36 cans per carrier
Ø73 x 110 mm	34 cans per carrier
Ø73 x 115 mm	32 cans per carrier
Ø73 x 62 mm	45 cans per carrier

max. can diameter (incl. tolerance) Ø76mm



Standard UNICON® carrier pitch 120 mm

2.2.1. Location / altitude of the machine:

- on sea level

2.2.2. Performance:

The hydromatic sterilizer is a key function in a production line. A high performance rate is one of the features of the hydromatic sterilizer. Due to the continuous presence of the desired process conditions and the reliable product handling functions, the performance rate of the sterilizer can reach 96% or more (DIN Norm 8782). This is the ratio of the performed total production time of the sterilizer vs. available production time of the sterilizer.

Execution of the Performance Test

- During the Performance Test, all interruptions will be classified.
- Should the Installation not achieve the required efficiency of 96% during the Performance Test, JBT has the right to modify the Installation and to recommence the Performance Test.



- JBT will notify Princes Foods, when they intend to carry out the modifications and necessary repairs in order to achieve an efficiency of 96%.
- The Installations should be operated according to running conditions set by JBT for successful production, being a.o.:
 - a. Minimum required steady pressure of cans on infeed and lining- up of the infeed lines. The cans should be presented to the Installation in an undamaged state and equally filled (which means maximum approx. 15 grams deviation from net weight). The cans should be conveyed to the Installation in a constant stream and after having left the Installation, also be carried off in the same constant stream.
 - b. The supply of water, air and electricity has to be within the limits of the original settings (if applicable)
 - c. The Installation has to be treated and kept conform the service instructions of JBT.
- The efficiency will be calculated as follows:

$$\% \text{ Efficiency} = \frac{(\text{Total Time} - \text{Downtime})}{\text{Total Time}} \times 100$$

Downtime – Time duration in which vendor's equipment is stopped or causes upstream or downstream production stoppage. Causes NOT attributable to machine downtime will be interruption of container supply, out of specification containers at infeed or operator inefficiency.

Total Time - Actual production run time when cans are available at the sterilizer infeed.

2.2.3. Estimated process

Process parameters like: sterilization time, sterilization temperature, product filling temperature, average product exit temperature, pressure settings and temperature gradients have to be determined by simulation if not available. It is recommended to perform simulation tests by JBT's process technologists to optimize the processes for all product-container size combinations including pressure profiles. Also water and steam consumptions can be determined.

2.2.4. Energy / water / electrical consumption:

Due to the continuous presence of the desired process conditions and the continuous product flow through the sterilizer, the energy and water consumption per product unit is low. The consumption is related to the product/container combination and the process parameters. The energy consumptions are based on reference products in the JBT database, and are not based on actual product test. Product tests should be performed to validate the actual energy consumption.

Estimated installed electrical power:	35 – 50 kW
Estimated steam consumption:	100 – 150 g/kg product
Estimated water consumption	2 – 3 m ³ /h (refreshment water)

2.3. STANDARD DESIGN FEATURES

2.3.1. Water flow and process system:

A standard JBT water flow system is proposed. The process components like pumps, control valves and pipe sizes are calculated for the worst feasible product - process combination, regularity of the production flow and heat radiation of the sterilizer. Features:

- One buffer tank for catching up expelled water from hydrostatic legs
- Coupled hydrostatic legs for optimal heat regeneration
- Closed cooling system; cooling water temperature reduction via plate heat exchanger (heat recovery or cooling tower system not included)
- Pump circuits for water circulation
- Control valves loops for steam-, water and air regulation
- Level-, pressure- and temperature software controllers
- Multiple spray points in cooling section
- Multiple temperature recorder points

2.3.2. Piping:

- Mild steel, Schedule 40 piping for steam piping and stainless steel piping for process water piping in preheat, cooling towers and base section (price option 1.3)
- CIP connection on plate heat exchangers
- Provisions for corrosion coupons
- Pumps protected by filters
- Insulation of steam condensate piping, steam piping are included around the base sections (cladding to be stainless steel) (price option 1.6)
- Interfaces to main steam, water and air are not included
- All drains with open end; collection drain pipe not included

2.3.3. Towers & bases:

The towers and bases are mild steel and constructed according the applicable code for pressure vessels and inspected by a notified body:

- 1 hydrostatic preheat tower with 1 chain loop and baffle wall
- 1 sterilization tower with 3 chain
- 1 sterilization tower with 2 chain loops
- 1 hydrostatic cooling leg
- 1 atmospheric cooling section with 3½ chain loops and spray points in top
- 1 tensioning section
- 3 bases
- 2 foundation beams
- The outside surface of the mild steel components is finished with two-layer industrial primer.

2.3.4. Foundation and layout:

JBT provides layout & foundation information including calculations of reaction forces on foundation. Calculations of the foundation and foundation bolts & nuts are not in the scope.

2.3.5. Main chain drive system:

- The drive system consists of one frequency-controlled drive with a reduction box and worm gear boxes on all top shafts.
- 5 open top shafts with sprockets; sprockets executed with SS plate and carbon steel hub

- 5 pressure top shafts with SS sprockets, carbon steel hub and sustainable steam seal construction.
- Shafts in infeed and discharge frame; separately driven in master/slave execution.

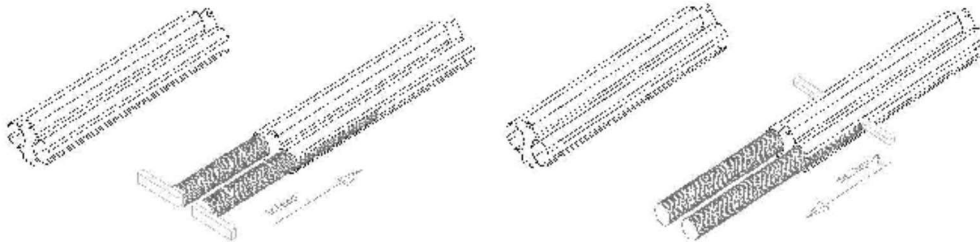
2.3.6. Side loader infeed & discharge frames:

- SS frame with shaft & sprocket wheels assemblies
- Indexing gearbox to introduce stop/start of the main chain only in the infeed and discharge section
- Material frame: SS 304

2.3.7. Infeed systems:

The frame has 1 double infeed system, which consist of different sections;

- 2 Dosing stars; to ensure uniform supply of cans
- 2 Counting stars; metering number of cans in a stick
- 2 Toppling devices; cans from standing to laying position
- 2 Clamps; stops supply of cans in case of an emergency stop
- 2 Stick forming sections; forms a stick
- 2 Finger conveyors; for pushing stick in carrier
- 1x Oscillator system for speed control of finger conveyors



- All drives are frequency controlled and synchronized with the main drive
- Safety device which detects wrongly positioned cans at the infeed

2.3.8. Discharge systems:

The system has 1 double discharge system, consisting of:

- 2 Finger conveyors; for pushing stick out of carrier
- 2 Conveyors; transport cans out of frame
- 2 Inclined belts; deliver the cans in rolling position
- 2 Open twists; deliver cans in upright position
- safety system for disturbances in operation



2.3.9. Insulation and cladding of the towers:

- The sterilization tower is insulated all-around with insulation blankets as well as the longitudinal sides of the sterilizer. The insulation is covered with corrugated panels connected to the towers.

2.3.10. Platforms:

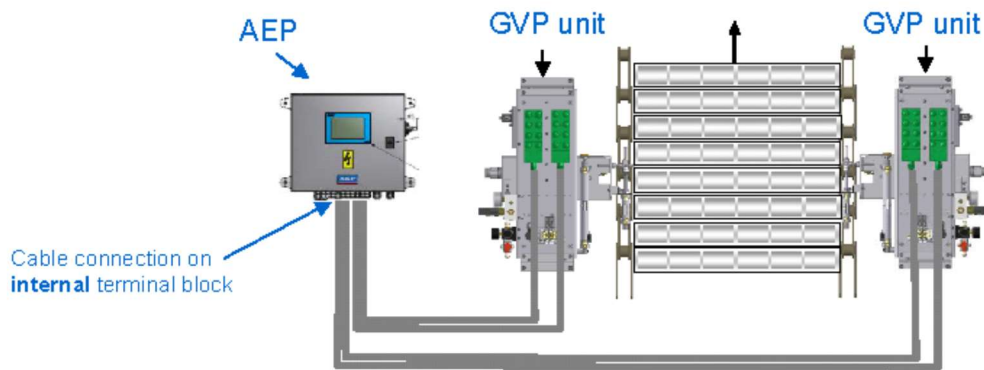
- All-round the tops of the towers a galvanized mild steel platform is used to be able to maintain the mechanical parts of the top shafts and drive components.
- Access to the top platform by means of stairway with intermediate platforms starting from roof level. (exact height needs to be determined in further discussions and can be subject to price changes)
- Closed construction (top cover) with provisions on the sides for placement of hoisting equipment. (hoisting beam and equipment is not included)



2.3.11. Chains and carriers:

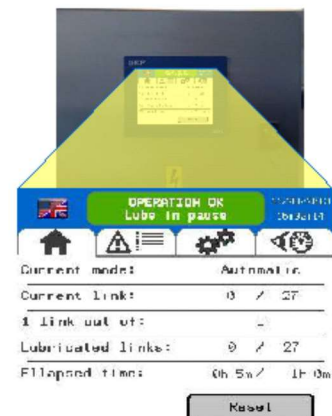
- Container transportation in the sterilizer with two main chains and the carriers fixed in between.
- Every chain link pin is provided with a grease nipple and a roller (for horizontal transport).
- The carriers and chains are made of stainless steel.

2.3.12. Automatic chain lubrication system



A complete system capable of greasing 2 chains (one on each side of equipment running in parallel). The systems consists of 1 grease pump, 2 greasing units, 1 control system with HMI, all necessary sensors, and home position.

- Lubrication system can operate automatically and unattended
- Greasing cycle can be started manually and/or programmed
- Greasing cycle can be started by a set time or a counted number of cycles of the chain
- The number of greasing nipples to be greased per cycle can be manually defined
- The system can operate intermittently, e.g. skipping fixed number of grease nipples.
- Alarm signal for empty grease container
- Alarm signal in case of malfunction



2.3.13. Water treatment & passivation:

Water treatment and corrosion control of the sterilizer is an important issue to guarantee flawless performance, to insure full integrity of the containers, to maintain hygienic conditions and to limit corrosion of the machine parts resulting in a long life-time of the machine. Water treatment and corrosion control is excluded. However, JBT can assist in finding an appropriate water treatment specialist on your request.

2.4. PROCESS CONTROLLER

2.4.1. Controls

JBT controls are equipped with the latest platform standards in hardware and software. All process and handling functions are controlled in a standalone Siemens PLC.

2.4.2. Hardware

The control cabinets are made of stainless steel. It is built up in different sections:

- Motor control section, containing the main switch, the drive current switch, the motor safety switch, fuses, circuit breakers, connection terminals of motors and pumps.

- Control and safety section, control of infeed and discharge and main drive
- PLC section. PLC with I/O rack
- Process control section, containing the transformers and the connection terminals for the transmitters and the control valves.
- Additional PT 100's plus recorder for additional logging besides the temperature control in the HMI ((price option 1.5)

2.4.3. HMI

The HMI (Human Machine Interface) consist of a color touch screen with several pages and local pushbuttons at the handling area. After start-up a minimum of operator interference is required.

The pages on the HMI present information of:

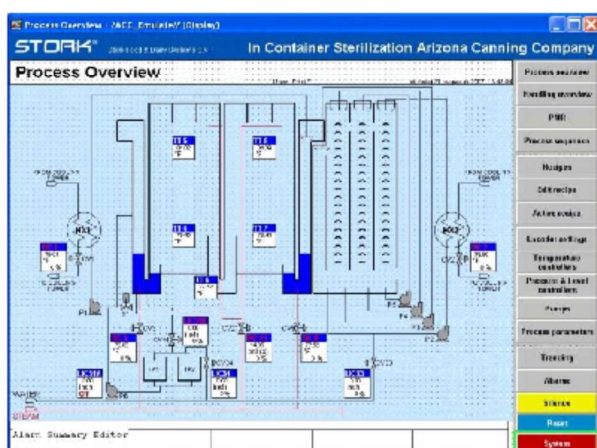
- Process sequence
- Process values
- Process settings
- Process control loops, pumps, valves and other devices
- Product handling systems
- Recipe selection
- Alarms
- Trending
- PMR

2.4.4. Access levels

The software is provided with 2 password protected access levels. One 'operator mode' and one for maintenance/recipe editing.

2.4.5. Recipe selection

The control settings can be changed via the HMI. The process and product handling parameters are stored in a recipe. A total of 20 recipes can be stored in and retrieved from the database.



2.4.6. Start-up sequence

The start-up sequence is completely automated by the selection of a recipe. The machine will automatically be filled to the required levels. Steam is injected through control valves for a precise control of the set point temperatures and pressures in every section of the machine.



2.4.7. Shut-down sequence

The shutdown process is completely automated. There are two shut-down procedures available.

- Production stop:
 - At a production stop or if production continues the next day the standard stop procedure can be selected. In this case the pressure will be gradually reduced to atmospheric pressure. The process water remains in the machine. This water can be used at the next start-up. This saves water required at start-up.
- Complete shut-down
 - At a complete shut-down all the water in the machine will be drained after the pressure in the steam section has been reduced to atmospheric pressure. This stop is only necessary for longer stops or in case maintenance is required.

2.4.8. Trending

A selection of parameters can be chosen for visualizing trends and for data logging. The trends are shown in graphs on the HMI and can be stored. Every parameter can be programmed to trend.

2.4.9. PMR

The machine is equipped with a product tracking system. The process parameters (real residence time and temperature) a carrier goes through are assigned to this specific carrier in the software. For every range of products in the carrier, the parameters are logged. The upper and lower limits for the process can be set in the recipe. In case a certain range of products does not meet the requirements (undercook or overcook) an alarm will warn the operator. The specific carrier will be marked and can be tracked through the machine, and a signal can be given to auxiliary equipment for discharging these products.

A bundle of carriers is displayed on the HMI by a dot. This dot will turn red in case the process parameters required are not met.

2.4.10. Data exchange

All collected data can be logged and exchanged with an external management system. The details of the kind of management system and the selected data will be discussed in detail at order .

2.4.11. Alarms

If an error occurs, the location and cause of the alarm will be marked on the HMI for a quick fix of the cause of the problem.

