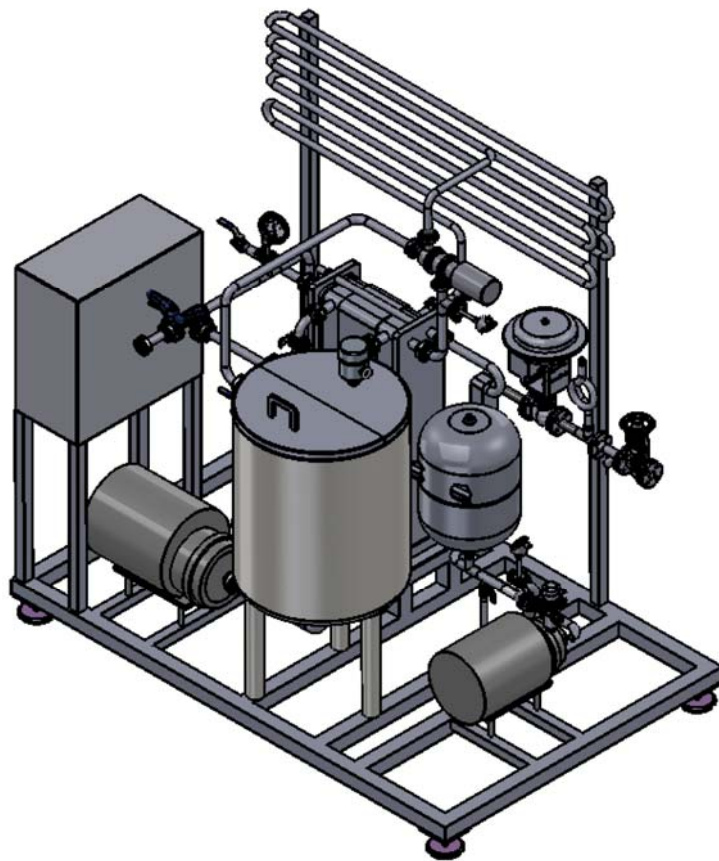




SALES ARGUMENTS

STANDARD RANGE OF PASTEURISERS



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DESIGN CONCEPT

Our range of standard pasteurisers was designed with one main objective: to offer a range of simple and economical equipment suitable for competing mainly in emerging markets or those of limited purchasing power where highly complex pasteurising equipment with a high level of process automation will be unsuccessful.

The standard pasteurisers are targeted mainly at the dairy sector, for which they have been specifically designed. However, this equipment can also be used for the thermal treatment of other food products.

CLASSIFICATION OF THE STANDARD PASTEURISERS RANGE

The standard pasteurisers incorporate the following technologies:

HTST pasteurisation: Pasteurisation equipment with this technology enables heat treating of products requiring high pasteurization temperatures, always below the boiling point, with short temperature maintenance times. Typically, pasteurisation is carried out at 72°C, this temperature being maintained for 15 to 30 seconds. The temperature/time profile depends on the product and/or on the user's requirements.

Plate heat exchangers (PHE): The use of plate heat exchangers in pasteurisation equipment allows for fast and cost-effective modifications in equipment design compared to systems with tube heat exchangers. In addition to requiring less floor space and lower transport costs PHE-based equipment is more efficient and more modular. The main drawback compared to tube heat exchangers is that they are not suitable for products with high content of suspended solids, or for products of high viscosity.

Semiautomatic operating mode: These systems have very low control requirements, with limited operational safety devices, requiring much more equipment supervision than in the case of an automatic machine. The safety devices to be fitted as standard by any manufacturer of these types of systems are a by-pass in the case of low pasteurisation temperature and an alarm for low level of product in the balance tank.

DESIGN OF THE PASTEURISATION EQUIPMENT RANGE

The design and selection parameters of the pasteurisation equipment are as follows

- Product: milk
- Product inlet temperature: 4°C
- Pasteurisation temperature: 72°C
- Product outlet temperature: 4°C
- Holding time: 15 seconds
- Hot water temperature: 74°C
- Flow rates from 500 to 5000 litres / hour

The most significant design features are

- The entire system is mounted on a base plate of standard dimensions for all models, thus allowing all options available for this range to be installed on the same frame. The base plate is made of stainless steel AISI 304.
- Heat exchanger with stainless steel AISI 316 plates and stainless steel AISI 304 frame.
- Parts in contact with the product: AISI 304L.
- Balance tank (BTD) with 150 litre capacity.

Functions and safety devices

- Heat exchange stages: Systems are available with one to three stages in order to allow selecting the most appropriate equipment for the respective task, be it a specific heat treatment process the product has to be subjected to or the particular end user's requirements.
 - a) Single-stage equipment: this configuration is suitable for product heating only.
 - b) Two-stage equipment: this configuration allows heating and cooling of the product. The cooling is usually carried out either with energy recovery or by the application of a cooling medium (glycol water). In these two-stage systems, in the case of energy recovery the exit temperature tends to be higher than when a coolant is used.
 - c) Three-stage equipment: this is the typical configuration found in simple HTST pasteurisation systems, i.e. heat recovery, heating and cooling.
- Low pasteurisation temperature: the equipment is fitted with an automatic 3-way valve (type KH) that is actuated in the case of low pasteurisation temperature, returning the product to the BTD tank.
- Minimum volume protection level in the balance tank: this device prevents the occurrence of a lack of pasteurisation product in the system.
- Maximum volume level in the balance tank: the control panel includes a relais that allows the external feeding of product to be stopped, thus preventing an overflow of the balance tank.

- Flow regulation: the flow can be manually adjusted via a micrometer valve by varying the pressure drop at the centrifugal pump. This valve has to be adjusted when starting up the equipment and must have two positions: one for production and the other for cleaning of the equipment, where the valve is fully open.
- Cleaning of the equipment: the centrifugal pump must be able to maintain a sufficiently high flow that enables adequate cleaning of the equipment. The control panel is provided with a switch which, when the cleaning position is selected, will actuate the low pasteurisation temperature safety valve for a specific period of time and enable cleaning of this pipe section.

Equipment options

- Single-channel chart recorder to record the product pasteurisation temperature on paper and, if required by the client, for recording the cleaning and/or sterilisation temperatures of the pasteurisation equipment.
- 3-channel electronic recorder or video recorder for electronically recording the fundamental control parameters of the pasteurisation process, allowing the recording and processing of the information on a PC.
- Variable speed drive: regulates the production and cleaning flow rates, eliminating the need to use the micrometer valve, by means of a variable speed drive installed in the control panel of the equipment.
- Flow rate control: maintaining a constant flow during pasteurisation is very important because by minimising flow instabilities we also minimise sudden temperature changes as a result thereof. One of the most efficient ways to achieve a constant flow is to install a flow meter and a variable speed drive to adjust the desired flow by changing the frequency of the pump.

- Generation of hot water: in those cases where the end user does not have hot water available in the quantities and temperatures necessary for the operation of the equipment, and has only steam available, the equipment allows the installation on the same structure of a hot water generation system that will supply the necessary hot water flows. The main components of this optional system are a welded plate heat exchanger, a water recirculation pump and a steam control valve.
- Pasteuriser outlet temperature control: this option enables the automatic regulation of the outlet temperature by means of a temperature sensor and a control valve installed at the cooling stage of the equipment.

WHAT ARE THE APPLICATIONS OF THESE SYSTEMS?

Even though a series of specific applications will be mentioned here, it is crucial to first consult and inform the technical department about the intended application since the heat treatment field and its applications is somewhat complex.

Our range of pasteurisers has been designed for the following applications:

Dairy sector: the following tasks can be carried out with or without small modifications to the equipment:

- a) Heat treatment of milk to be stored: in this process it is possible to use two-stage heat exchangers as well as equipment with exit temperatures suitable for centrifugal separators for milk purification or for separation of the fat phase.
- b) Pasteurisation of milk to be packaged: short-term packaging (1 week). If the milk has been standardised, it is common practice to install a fourth stage in the exchanger to feed a homogeniser.
- c) Pasteurisation of milk to be sent to milk curdling vats: as in the heat treating of milk, the common practice is the use of two-stage equipment.

- d) Pasteurisation of whey: it is usually necessary to change the pump to a lobe-type pump.
- e) Pasteurisation of cream to be stored for subsequent standardisation of the fat content of milk.
- f) Pasteurisation of milk for use in yoghurt production: an additional stage is needed to feed the homogeniser.

ATTENTION with the following dairy sector applications:

- a) Pasteurisation of cream to be packaged: normally, elevated temperatures of around 95°C are required.

Other processes: as in the case of the dairy sector, with small modifications it is possible to carry out the following heat treatment operations:

- a) Pasteurisation of juices without suspended solids
- b) Pasteurisation of freeze-dried coffees: lobe pumps are usually required for this process.
- c) Pasteurisation of non-carbonated soft drinks
- d) Pasteurisation of wine
- e) Pasteurisation of filtered infusions

APPLICATIONS FOR WHICH THESE SYSTEMS ARE UNSUITABLE

These systems are not designed for the following functions and applications:

- Pasteurisation of products with suspended solids and/or unfiltered products: the plates have a narrow gap and will quickly obstruct if the product contains suspended particles.
- Pasteurisation of egg products: this type of products is usually pasteurised at low temperatures and requires long retention times.
- Pasteurisation of high viscosity products: the equipment needs to be totally redesigned and the treatment of viscous products usually requires elements such as scrapers that prevent the product from adhering to the walls of the process equipment.
- Pasteurisation processes that require a holding time of more than 30 seconds: in the case of long holding times, an additional base plate is required for the holding section, which needs to be isolated. In addition, a series of controls are necessary for maintaining the temperature in the entire holding section.
- Processes requiring heat exchangers with more than four stages: the equipment needs to be completely redesigned.
- Processes requiring steel alloys with better corrosion resistance than stainless steel 316L, e.g. pasteurisation of products with a high salt content.
- Pasteurisation of products for the pharmaceutical industry.
- High level of automation and control, such as the need for PLCs, operator panels, industrial communications, etc.
- Installation of pressure control systems by way of pump boosters and pressure control valves.
- Specific client requirement: the equipment must comply with the PMO and FDA standards. Some users in Central and South America require compliance with these standards.

OPERATION OF A PASTEURISING SYSTEM

The operation of a pasteurisation system is described below. We will begin with the finishing of a pasteurisation batch.

- **Final removal of product:** after pasteurising a batch, the product remaining in the interior of the equipment is flushed out with water, using the same parameters as during the production process and with the cold water service valves in the open position.

The procedure involves drainage of the BTB and, before reaching the minimum level, filling the balance tank with water. This water is used to flush out the product remaining in the pasteuriser until the system is pasteurising water only.

After a certain period of time, diluted product will be passing through the outlet. This diluted product must be filled into recovery or drainage drums until no traces of the product being pasteurised remain inside the equipment. Once the water leaving the system is clean, the equipment is set to recirculation mode without stopping pasteurisation.

These time periods will depend on production flow and distances, and must be set when starting up the equipment.

Once this batch has been finished, there are various operation options, such as finalising the day's production or to pasteurise again (the same type of product or a different type).

- **Pasteurise another product batch:** if the product to be pasteurised has similar characteristics than the previously processed one (as decided by the user), the reverse operation to the previously described has to be performed, i.e. first drain water through the equipment outlet to empty the BTB, and, before the minimum level is reached, fill the equipment with the product to be pasteurised. In terms of times, wait until undiluted product comes out and send to filling.

If the product is not compatible, turn off the system and proceed to clean the equipment immediately.

- **Shutdown cycle:** if the equipment is to be shut down and we do not want to clean it immediately after production, the shutdown procedure involves gradually decreasing the pasteurisation temperature set point until the equipment is cold and can be turned off. Remember to close the manual service valves.

- **Cleaning of the equipment:** once product residues have been removed from the equipment, it must be cleaned immediately. If we start from the point where we are pasteurising water that is recirculating through the system, the procedure to follow is the following: close the cold water service valves (the water used for cleaning does not need to be very cold), adjust the cleaning temperature set point on the temperature controller, actuate the cleaning switch to clean the low temperature bypass pipe, and fully open the micrometer valve to increase the cleaning water flow rate.

Once the BTM has reached a temperature close to the cleaning product activation temperature, the necessary amount of chemical cleaning product is added manually and left to recirculate as long as required by the user's normal practice.

When the chemical cleaning is completed, the manual valves are opened in order to clean all the valves and pipes in the equipment.

Rinsing: After the cleaning stage has been completed, the equipment is to be rinsed by first emptying the BTM, removing the solution through the drain or the chemical product recovery line on the plant. The drainage remains active during the entire rinsing process. When the volume is low enough, clean water is added during the entire rinsing process until any cleaning solution residue has been eliminated. This can be checked either with reactive strips or with an analyser.

During the rinsing process, the temperature set-point needs to be lowered and the manual valves actuated in order to rinse all the pipes and valves on the equipment.

If, after rinsing, we want to clean the equipment with another cleaning solution, repeat the previous steps for every cleaning solution used.

Disinfectant: Once the equipment has been cleaned, it is recommended to let cold water recirculate through the system and add peracetic acid or *Oxonia* based disinfectant. Leave recirculating with disinfectant for 5 or 10 minutes and leave the disinfectant containing water in the system until the next production batch (add a quantity that does not corrode the stainless steel). These disinfectants prevent the proliferation of bacteria in the water that remains in the equipment during longer periods of time. These chemical products are easily eliminated (volatile) when subjected to higher temperatures.

- **New production:** when starting a new shift, the equipment contains water with or without disinfectant and the supplies are closed.

The first thing to do is to carry out an initial rinse of the equipment. We then proceed in the same manner as previously described: empty the BTM until close to the minimum level and introduce clean water into the system. The micrometer valve must be fully open and the switch must be in the cleaning position. After this short rinse, the equipment is ready to operate.

Sterilisation: during this stage, water is recirculated through the system and the equipment heated to 90-95°C. Once the BTM reaches this temperature, maintain this condition during 30 minutes. After this period of time, actuate the valves and let the hot water flow through all the lines in the equipment. During the sterilisation process, the micrometer valve and the operating mode selector switch must be in production mode.

Stabilisation: once sterilisation is complete, the cold water service valves are opened and the water in the balance tank is renewed by emptying the BTM and proceeding in the same way as described above. Once the BTM is empty, it is filled again with clean water. When cold water flows through the pasteuriser outlet, the equipment is set to recirculation. The heating temperature is set to pasteurising temperature.

Filling with product: to initiate the pasteurisation process, perform the same draining operations as described above, drain the water until close to the minimum level of the BTM, and proceed to fill the product into the equipment, replacing the water inside the system. When non-diluted product reaches the drain, the drain is closed and the product is sent to the equipment to be filled.

This ends the work cycle of a pasteuriser. In the case of an automatic system, a program with operator-adjustable parameters would carry out the functions described above.