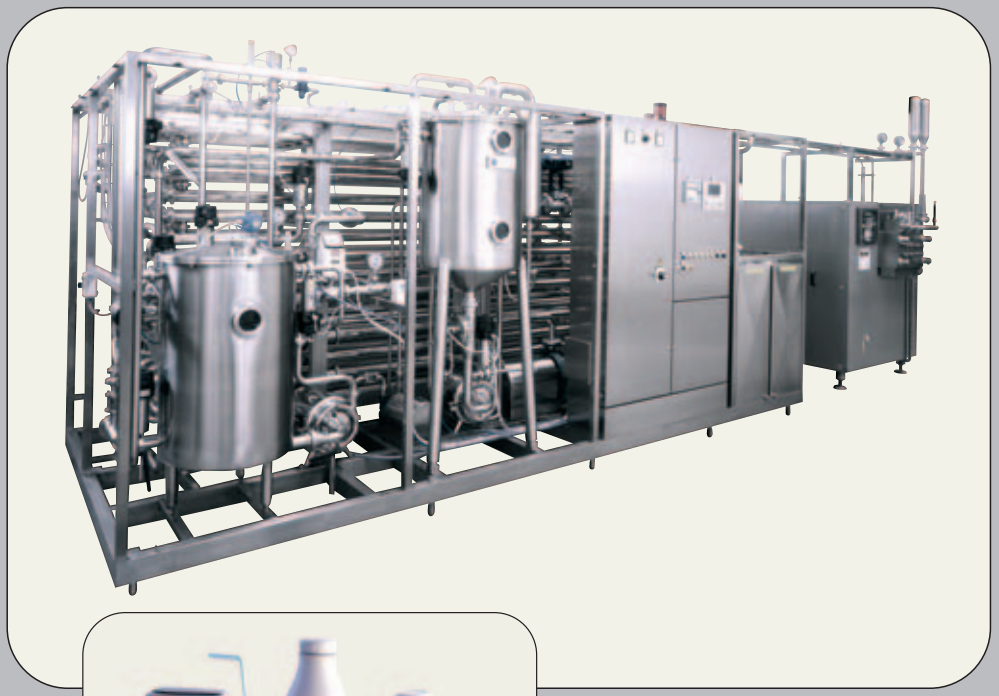
REDA *UHT* PLANT

Aseptic Technology



REDA
Food Processing Plants

PRINCIPLES OF *UHT* TREATMENT

The UHT treatment (Ultra High Temperature) is a modern and innovative technological process that consists in carrying a foodstuff fluid to an high temperature and after a short holding time cooled quickly up to the room temperature.

The product, sterilized, is then filled in aseptic conditions. So treated products keep freshness, taste and nutritional value similar to the fresh products but with the very great advantage that can be kept at room temperature for several months, or year, without the use of conservancies.

The milk by-products, but more generally the products with PH>4,5 must be treated at the temperature of aproximately 140°C for few seconds eliminating, further to the bacterial charge, also the thermoresistant spores. The high acidity products, PH<4,5 can be processed at lower temperatures, between 90°C and 121°C, as the thermoresistant spores survived shall remain innocuous blocked in the acid ambient.

The choice of treatment temperature, between 90°C and 121°C, and holding time from 30 sec. to 120 sec., shall depend from the type of product.

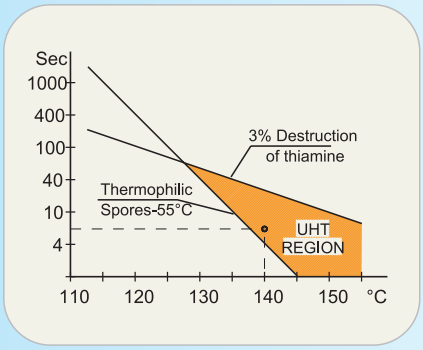


FIG. 1)

In the milk temperature-time diagram the zone "UHT-REGION" shows the area inside which it is possible to operate to have the certitude that the product is sterilized

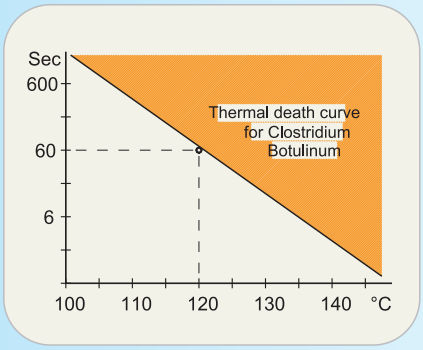


FIG. 2)

The clostridium Botolinum is the most dangerous micro-organism present in the food fluids.
The diagram shows for each temperature the time necessary to destroy this micro-organism.

REDA *UHT* PLANT

The tubular sterilization plant REDA "ATR-UHT" (Aseptic tubular Reda-UHT) is a modern plant where have been applied the more advanced techniques of thermal exchange and automation.
The tubular exchanger unit is composed by modules of 4 mt. in stainless steel AISI 316L, connected in series by special clamp type connections, permitting an easy internal pipes check.
Each module contains the thermal exchange pipes that can be smooth or corrugated type to improve the thermal exchange with difficult treatment products at medium-high viscosity.

REDA exchanger specific characteristics allows:

- Possibility to operate at high pressures with very viscous products like purées or creams.
- Possibility to treat products with particles or fibres in suspension without obstructions.
- High flow speed and consequently:
  - High thermal coefficients exchange, with consequent higher thermal regeneration up to 87%, shorter time for the full process and then better products.
  - Working autonomy up to 16-20 hours with milk and up to 120 hours with juices.
  - More efficient cleanings with shorter cleaning times.
- Minimum water-product mixing at the start and at the end production.
- Easy inspection of the thermal exchange pipes.
- Very low maintenance cost.
- Great reliability for long time.

The product flows inside the thermal exchange pipes only and never outside. Thermal regeneration is obtained by a sterile water recirculating system that cools the sterilized product DOWN STREAM transferring the heat to the UP STREAM , inlet product that will be heated.
The REDA "ATR-UHT" plants with output from 1.000 to 24.000 l/h, are supplied pre-assembled and tested.
Consequently the time necessary for connections and start-up will be the minimum.
The very sophisticated automation makes simple the operation and grant an constant high quality and a certitude on the sterility of the treated products.

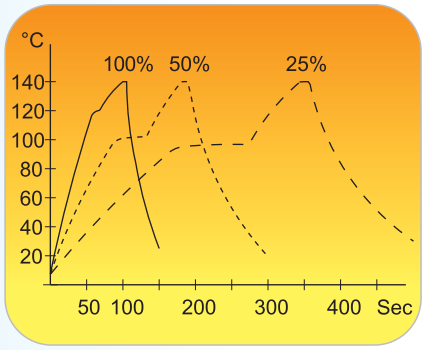


FIG. 3)

The very restricted temperature-time diagram over 80°C grants a good UHT product.
Reduced flows of 50% and up to 25% are possible by sterilization section choking system and modulating of the thermal regeneration effect.

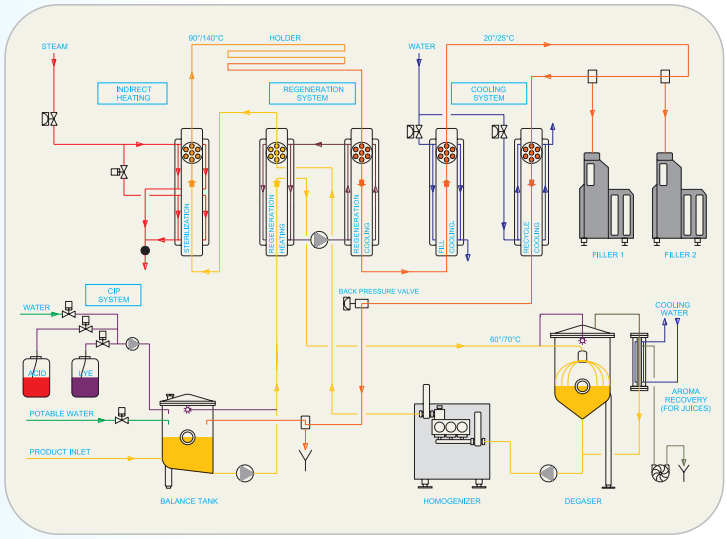
Applications:

Dairy-products

- Milk
- Flavoured milk
- Cooking cream
- Coffee cream
- Ice cream
- Yoghurt
- Soya milk
- Milk shake mix

Fruits and vegetables

- Fruit juices
- Fruit nectars
- Juices with particles
- Tomato juice
- Fruit-vegetables shake
- Fruit puree
- Vegetables puree
- Tea



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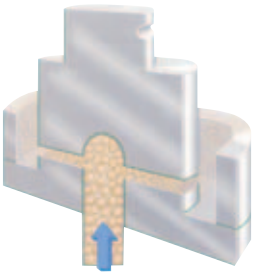
HOMOGENIZING



Homogenizer valve

The homogenizing action obtained at 150/250 bar grants a dispersion of particles, or fat globules, on the mass avoiding phase separations during the conservation.
Usually UHT milk is homogenized at 220/250 bar at 60/70°C during the heating phase.

The milk cream can be aseptically homogenized during the cooloing phase in order to brake the proteinic aggregates created by the high temperatures.
Changing the homogenizing pressure it is possible to obtain products with different consistences.
The two-stages homogenizing can be interesting when creams are processed while benefit for milk is unimportant.

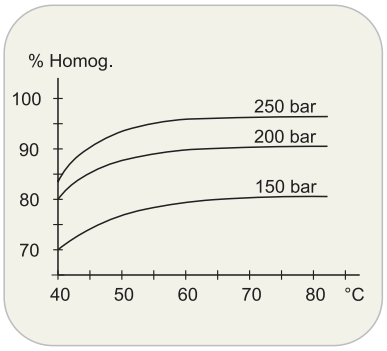


FIG. 4)

The diagram shows how change the homogenizing level according to the temperature variations and to different homogenizing pressures. A 90% homogenizing means that the 90% of the fat content is composed of globules with a diameter lower than 1 micron.

DEGASING

With the milk by-products the under-vacuum degaser eliminates the dissolved gasses which give bad smell.
For products like juices, purées and nectars Degaser is useful to eliminate the oxygen that is responsible of the product oxidation which causes changes of colour and losses of product nutritional value.

By a condenser, cooled by low temperature water, the aromatic parts are recovered while the incondensable gasses, including the oxygen, are extracted by the vacuum pump. Inside the under-vacuum chamber the product is distributed in a thin film to optimize the degasing effect (max 0,3 mg/lt Oxigen residual).

AUTOMATION

The automation purpose is to enable easier and more safe the plant operation and furthermore grants a constant and high quality. Operator disposes therefore of few control elements to run the main plant sequences:

1. Pre-sterilization at 140°C
2. Production
3. End production
4. Normal cleaning (end production)
5. Aseptic cleaning (for long productions)

The automation is controlled by PLC while the operator interface (O.P.) permits the monitoring of the working parameters, possible alarms, products flow and all secundary fluid flows during all phases. The working parameters can be modified always by the Operator Panel.

All the working phases, the parameters such as time, temperatures, pressures, possible alarms, etc., shall be memorized on "Working Report" page.

The automation system can be connected to the net for a possible centralized control or for a remote checking by Modem (Teleservice).

REDA UHT PLANT GUARANTEES

1. Guarantee of maximum quality of the UHT products

The effects which can be obtained by a REDA "ATR-UHT" plant are:

- Bacteriologic effect B = 1,44
  Thermophilous spore reduction in the UHT milk shall be: $10^{9 \times 1,44} = 10^{13}$ (optimal effect).
- Chemical effect C = 0,50
  Thiamine percentage damaged in the UHT milk shall be: 3 x 0,50 = 1,5% (insignificant loss)
- Lactulose, found in the UHT milk, shall be lower than 30 mg/100 ml (optimal value).

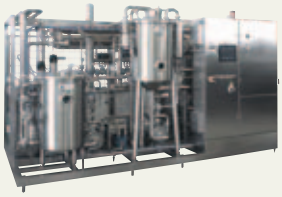
With above mentioned parameters the obtained UHT milk is similar to a pasteurized milk.

2. Sterility guarantee of the UHT products

REDA "ATR-UHT" plant grants the certitude that the processed product is sterilized:

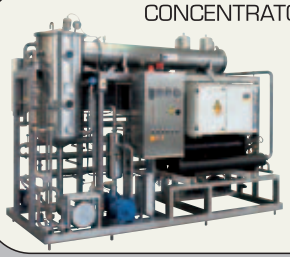
- The sterilizing temperature is constantly monitorized and recordered with double alarm set point:
  - 1st. Alarm: Filler STOP and wait
  - 2nd. Alarm: Automatic end production with the only possibility to do the cleaning and then the plant sterilization.
- Thermal regeneration by sterilized water auxiliary circuit recirculating in a closed circuit. A pollution is therefore impossible.
- Overpressure of the sterilized product respect to cooling water pressure is constantly monitorized and recordered with low overpressure alarm.
  A pollution is therefore impossible.

PASTEURIZERS



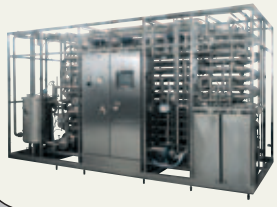
- Milk and dairy-products
- Juices
- Eggs
- Beer

CONCENTRATORS



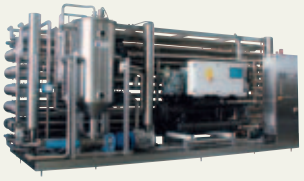
- Low temperature (20°C) grapes must-juices-yeast
- Hot temperature (79-80°C) milk-juices

UHT PLANTS



- Milk and dairy-products
- Juices
- Purée and concentrated

POLYPHENOLS EXTRACTORS

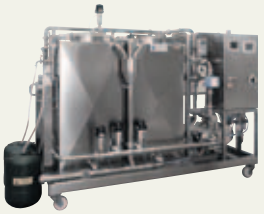


- Extraction of polyphenols from red grapes

CENTRIFUGAL SEPARATORS

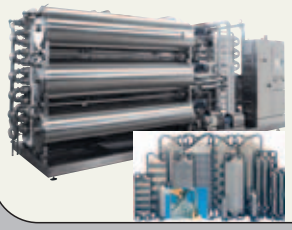
- Milk and dairy-products
- Wine
- Beer
- Juices

CLEANING PLANTS (CIP)



- Fixed units
- Movable units

HEAT EXCHANGERS



- Plates
- Tubulars
- Scraped

ENGINEERING / AUTOMATION

- Milk and dairy-products
- Eggs
- Juices
- Beer
- Wine

REDA 03/03

REDA
Food Processing Plants

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