Tanks & Vessels

Dairy

Products

- Yogurt
- Starter (culture)
- Quark
- Custard
- Porridge
- Lactose
- Cream
- Buttermilk
- Whey powder

Applications

- Preparation of yogurt, starter culture, quark, buttermilk
- Tubular cooler for yogurt
- Crystallisation of lactose
- Pre-crystallisation of whey concentrate
- Preparation of custard, porridge, cream

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Tubular Yogurt Cooler

To cool the fermented yogurt after stirring in the fermentation tank, in order to prevent continued acidification and achieve the correct final viscosity.

Process

The normal procedure is to cool the yogurt the next day using the Terlet tubular cooler within 60 to 90 minutes at the most, until it has reached a temperature at which acidification stops for all practical purposes. The point at which the cooling commences is determined by the pH specification of the yogurt. From experience we know that when cooling begins at a pH value of 4.40 (at the start of filling), the last yogurt from the tank, after about 1 hour of filling, has a pH value of 4.25. It is therefore recommended that the capacity of the yogurt cooler is geared to the content of the yogurt fermentation tanks, and that the filling machine also has the capacity to empty the tank in about 60 to 90 minutes. The ideal situation is to have the yogurt fermentation tanks on one floor and the filling machine on the floor below. The yogurt cooler can then be placed between the yogurt fermentation tanks and the filling machine, the ideal arrangement being to have the yogurt cooler as close as possible to the filling machine. In this way, the yogurt can flow through the yogurt cooler without the need for pumping, so that there is no loss of viscosity. Most of the transport of the warm yogurt takes place before cooling, thus reducing the loss of viscosity to a minimum. If the yogurt fermentation tanks and the filling machine are set up on the same floor, it is necessary to pump the yogurt using an impeller pump in the warm section. The yogurt cooler is always filled from above, and transport through the cooler is achieved by gravity. The capacity of the yogurt coolers depends on the cooling process, and generally lies between 1,000 and 12,000 litres (250 and 3.200 gallon) per hour.

Design

Suitable for cooling yogurt from ca. 30°-36°C to 4°C (86°-97°F to 39°F) using ice-cold water at a maximum of 2°C (35°F). We base the dimensions of a yogurt cooler on the data that Terlet has determined empirically and that the NIZO has also researched. Important factors in the structural deterioration of yogurt include the speed of the yogurt in pipes, the diameter of the pipes (also important in connection with heat transfer) and the length of the pipes. In order to reduce loss of viscosity to a minimum, it is desirable that the pipes running between the yogurt tanks, the yogurt cooler and the filling machine should be of adequate size. It has been empirically determined that pipes with an internal diameter of 25 mm (1 inch) are best for the cooling of yogurt with a laminar flow. The cooler can be C.I.P. cleaned in-line, possibly using a secondary cleaning pump.

The yogurt cooler comprises the following parts.

- Pipe bundle with length an quantity dependent on the capacity
- Flange plates into which the pipes are welded
- Special end pieces for the entry and exit of yogurt
- Cooling jacket incorporating a compensator with supply and drainage of ice-cold water
- Support for vertical positioning
- Various connections
- Insulation if needed
- Cooling if needed

Features and benefits

- The only way of cooling yogurt without structural damage
- Very even and effective cooling
- Result of scientific research
- Hygienic design
- Little space needed
- Excellent distribution amongst the tubes
- Low pressure drop – equal in all tubes
- C.I.P.- cleaning possible

Yogurt tank

To allow milk to ferment in a tank in a low-spore environment and to effectively separate the resulting yogurt by stirring after it has reached the desired level of acidity.

Process

The current method of production is based on milk that has previously been standardised, pasteurised and homogenised. It is also advisable to de-aerate the yogurt as it flows. Homogenisation of the milk helps to produce a firmer yogurt and to prevent separation inside the packaging. The milk is usually pumped into the tank at a somewhat higher temperature than the required fermentation temperature, so that the correct temperature is achieved by cooling the milk somewhat in the tank.
For the stirred yogurt, which is primed with a concentrated culture and stands fermenting for 14-16 hours it is usual to cool this over a period to a temperature at which acidification ceases for all practical purposes. The concentrate is added using a priming funnel. The point at which the cooling commences is determined by the pH specification of the stirred yogurt. When the correct level of acidity has been attained, the yogurt must be quickly and effectively separated by stirring in such a way that the separated whey is quickly mixed into the yogurt at the beginning of the operation.

Design

The yogurt tank must actually be suitable for a slight overpressure of sterile air. This sterile air is essential to the successful accomplishment of the production process, in order that the process is not disrupted by infection from outside phages. Yogurt tanks are fitted with a top-driven gate stirring mechanism. The gate stirring mechanism designed by Terlet produces sufficient flow movement against the side to cool the milk to the desired fermentation temperature. The gate stirring mechanism itself is made entirely of solid stainless steel. It consists of a number of pressing paddle blades in combination with offset positioned vertical blades. The blades are linked to each other with rods to ensure proper cleaning. The stirring blades help to produce both axial and radial flow movements of the yogurt, so that a good, smooth yogurt is created by the effective stirring action.

Features and benefits

- Effective mixing while the rennet is being added
- Extremely even flow during separation. This means that the structure of the product remains completely intact
- Stirring mechanism completely made-to-measure for yogurt processing
- Hygienic design

Fermentation tank






Culture tank

To allow milk to ferment in a tank in a low-spore environment and to effectively separate the resulting rennet by stirring after it has reached the desired level of acidity.

Process

The current method of production for the preparation of rennet is based on a starting product that has previously been standardised and pasteurised. The milk is usually pumped into the tank at a somewhat higher temperature than the required fermentation temperature, so that the correct temperature is achieved by slightly cooling the milk. A concentrated culture is used in the preparation of the rennet, and is introduced using a priming funnel, whereby the milk stands fermenting for 16 to 18 hours at 20° C (68°F). After that, cooling takes place as deeply as possible using a rotating stirring mechanism with ice-cold water. It is normal to work with at least 3 tanks, with the content of one being used for one day's production. The first day is for the fermentation process, the second for deep cooling and examination of the rennet's virulence by the laboratory, and on the third day the rennet can be used for production. The point at which the cooling commences is determined by the pH specification of the rennet.

Design

The rennet tank must be suitable for a slight overpressure of sterile air. This sterile air is essential to the successful accomplishment of the production process, in order that the process is not disrupted by infection from outside phages. The system consists of a pre-filter, a low-pressure ventilator and a set of absolute filters. The unit not only filters out bacteria, it especially filters out phages. The advantage of this system is that the tank does not have to be hermetically sealed. Infection of the product is made impossible by the bacteria and phage-free screen. Because of the system's low pressure, it is not possible to push phages through the absolute filter. Because of the large quantity of sterile air, a slight overpressure is always maintained in the tank during cleaning, especially during cold rinsing. No (re-)infection can occur during pasteurisation, cooling, priming (on applying a priming funnel), acidification or pumping out. Terlet rennet tanks are fitted with a top-driven gate stirring mechanism. The gate stirring mechanism designed by Terlet produces sufficient flow movement against the side to cool the milk to the desired fermentation temperature. When the correct level of acidity has been attained, the rennet produced must be quickly and effectively separated by stirring in such a way that the separated whey is quickly mixed into the rennet at the beginning of the operation. The gate stirring apparatus is produced entirely of solid stainless steel; this applies to both the shafts and the stirring blades, so that no problems can arise from product remnants being left behind (this can happen if tubular materials are used and holes are created by corrosion). For the rest, the gate stirring mechanism consists of a number of pressing paddle blades in combination with offset vertical blades. The blades are linked to each other with rods to ensure proper cleaning. The stirring blades help to produce both axial and radial flow movements of the rennet in the product, so that a smooth rennet is created by the effective stirring action. The pressing and scooping bottom blade produces turbulence over the bottom, while both the uppermost scooping blades produce an axial stirring action. The offset vertical blades, which are directed inwards, produce both the axial and radial flow movements.

Features and benefits

- Even heating
- Even cooling
- Optimum mixing action
- Hygienic design

Processing tank for the dairy industry

The "MMR" is a processing tank that is employed as a mixing tank for mixing cream, fruit or herbs into curds and soft cheese.

Process

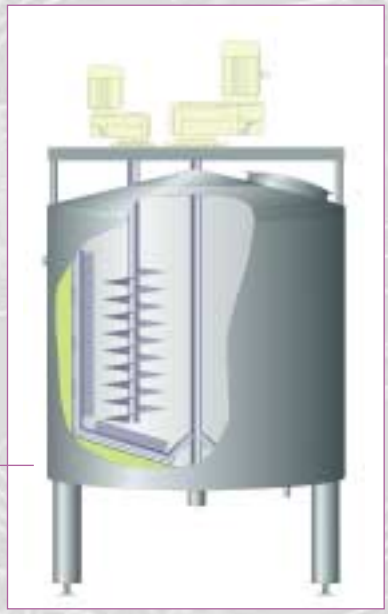
Because of its sophisticated stirring and mixing system, this type of MMR is excellently suited to very sensitive mixing processes. An anchor agitator mechanism, with or without scrapers, supplies the most important mixing element - a propeller with a certain speed - with a suitably low number of revolutions. The propeller provides the vertical and homogeneous mixing action without damaging the structure and viscosity of the product. When mixing low-fat curds and cream with fruit, herbs etc., a homogeneous mix is produced in a very short time without damage to the product. The mixing tank is positioned in the production line after the actual preparation of the curds. At that point, the structure that is so characteristic of these products has already formed.

Design

The MMR is a top-driven tank with a conical bottom and a central outlet. To enable it to perform the aforementioned operations the MMR is equipped with a combined agitator mechanism. First, there is an anchor agitator mechanism with scrapers along the side and bottom that provides the horizontal stirring action, and also serves to keep the sides clean. Next, there is a screw blade that provides the vertical stirring action. The turning speeds of both agitator mechanisms are matched in such a way that there are no collisions. In principle, the screw draws away the same quantity of material that the anchor supplies.

Features and benefits

- Optimum mixing
- No damage to structure
- Hygienic design
- No separation of whey



MMR Process tank






Crystallisation tank for the production of lactose

To allow the lactose in concentrated whey to crystallise out, with continuous supersaturation of the lactose contained in the solution during cooling.

Process

It is important when preparing both types of lactose to avoid large differences between the temperatures of the medium and the product during the cooling process in order to allow the crystals to grow. By employing a bottom drive, whereby the inner cylinder also takes part in the cooling process, it is possible to achieve even cooling because the core cooling has a beneficial effect. A rule of thumb for this is that the inner cylinder creates about another 10 percent of cooling surface, resulting in an improvement of about 20 percent in cooling power in combination with a better stirring effect. This results in a higher lactose yield in the same processing time. The large heat-exchanging surface ensures extremely even cooling of the product. The objective is that a maximum amount of lactose crystals should eventually form during the cooling process, with a reasonable size (100-150 µm) and as uniform in size as possible. It is important to have the best possible stirring effect. On the one hand, there must be sufficient turbulence to continuously provide the crystals with a saturated solution so that they can grow. On the other hand, excessive turbulence is undesirable, because the vulnerable, growing crystals could be damaged.

Design

The Terlet crystallisation tank for the preparation of lactose is a vertical tank fitted with cooling jackets on the side and bottom. Its trademark is the bottom-driven agitator. By using a tank with bottom-driven agitator, it is possible to achieve extremely even cooling of the concentrated whey (or whey paste, as it is also termed) for the preparation of edible lactose. In addition, this kind of stirring apparatus is also suitable for use, after the preparation of edible lactose, for the preparation of refined lactose, which is also known as "pharmaceutical lactose". The crystallisation agitator developed by Terlet is suitable in its standard form for the processing of concentrated whey with a dry material content of 65%, without damage to the crystals. If higher dry material content ratios are to be processed, it is also possible to develop a stirring apparatus for this. Because the drive shaft runs through the inner cylinder, and the inner cylinder itself projects above the level of the product, it is not possible for oil to leak from the drive system into the product. The stirring apparatus itself is produced entirely of solid stainless steel; this applies to both the shafts and the stirring blades, so that no problems can arise from product remnants being left behind. For the rest, the stirring apparatus consists of a number of stirring agitator blades that are designed to keep the crystals floating once they have formed, so that there is no deposition on the bottom. Moreover, the stirring speed must ensure that there is movement to allow the crystals to grow. Partly because of the offset inner cylinder, the product is stirred both axially and radially; this ensures homogeneous cooling. The unique agitator construction and the inner cylinder ensure optimum agitation, minimal variation in crystal size, and maximum yield.

Features and benefits

- Optimum mixing action
- No damage to crystals
- Even cooling
- Maximum cooling surface resulting in large, regular crystals
- Hygienic design

Crystallisation tank with bottom-driven agitator

Pre-crystallisation tank for whey powder

To allow the lactose in concentrated whey to crystallise out at a constant temperature for the preparation of non-hygroscopic whey powder ("non-caking" whey powder)

Process

The pre-crystallisation agitator developed by Terlet is suitable in its standard form for the processing of concentrated whey with a dry material content of 65%, without damage to the crystals. If higher dry material content ratios are to be processed, it is also possible to develop a stirring apparatus for this. For the rest, the stirring apparatus consists of a number of scooping agitator blades that are designed to keep the crystals floating once they have formed, so that there is no deposition on the bottom. Moreover, the stirring speed must ensure that there is movement to allow the crystals to grow. The objective is to obtain the maximum yield of crystals during the pre-crystallisation process. Because of the effective stirring action, together with the duration of crystallisation, as many small, uniform crystals as possible will be obtained in order to get a good result in the next process in the drying tower.

Design

A tank with a top-driven stirring mechanism is used to produce a homogeneous distribution of the crystals in the concentrated whey (whey paste). This type of tank is extremely suitable for use as a pre-crystallisation tank for the preparation of "non-caking" whey powder. An important factor in the preparation of whey powder is that the stirring mechanism should operate continuously during the crystallisation process. As no cooling takes place in principle, unless it is desirable to remove heat produced by crystallisation and mechanical action, single-skin and insulated tanks will suffice for this crystallisation process. Because the extending shaft of the drive mechanism runs through the top cap, the shaft conduit is fitted with a dust/oil cap to prevent oil leaking from the drive mechanism.

Features and benefits

- Optimum mixing action
- Even cooling produces regular crystal structure
- Hygienic design

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