

Pasteurized Milk – What?

Starring:

Many milk terminologies are found around the world and while visiting in market place. Pasteurized milk is included on to it as a common type of milk under dairy segment. Generally, pasteurized milk is the fresh milk which undergoes through the pasteurization process. The purpose of pasteurization is to make the milk safe for consumption with a shorter shelf life [better than the raw milk itself].

Pasteurization generally done by a heat treatment including a certain holding time. There is also another process named HT [Ultra High Treatment]; but this UHT is not our topics here.



Figure: Pasteurized Milk in Pouch Pack

Why Industry performs Pasteurized Milk:

Raw milk is a best source of microbial growth. While milking the microbes get contaminated on to it as well from the surrounding environment. It is also to say that cow's udder has a variety of microbes incorporated which can be lessened by maintaining proper hygiene sanitation.

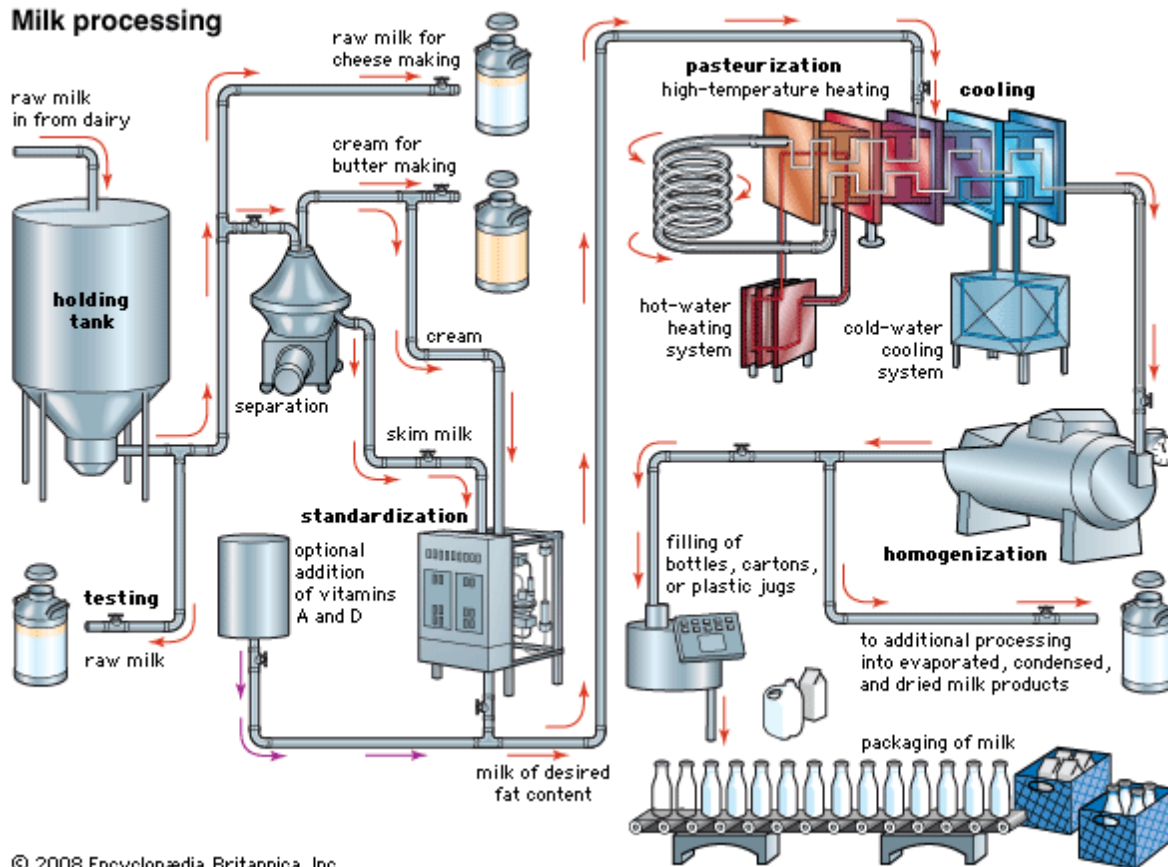
The objective of pasteurization is Food Safety. This ensures public health concern to an acceptable level by disease control and prevention as pasteurized milk is used widely. It is also to say that raw milk has a very short shelf life whereas pasteurization process tends to provide a little bit longer shelf life than the unpasteurized milk [shelf life may be 15-21 days].

Pasteurized Milk:

Pasteurized milk is basically the raw milk that undergoes a heat treatment to a specific temperature at a specific holding time in order to kill the pathogenic bacteria which can be found in the raw milk.

Pasteurization:

Pasteurization is a process, named after scientist Louis Pasteur, that applies heat to destroy pathogens in foods. For the dairy industry, the term “pasteurization,” “pasteurized” and similar terms means the process of heating every particle of milk or milk product, in properly designed and operated equipment, to one of the temperatures given in the following chart and held continuously at or above that temperature for at least the corresponding specified time: [Source: IFDA]



© 2008 Encyclopædia Britannica, Inc.

Figure: Pasteurization Process to Filling

Pasteurization Type, Temperature and Holding Time:

Temperature	Holding Time	Pasteurization Type
63 C [145 F]	30 minutes	Vat Pasteurization
72 C [161 F]	15 seconds	High Temperature Short Time [HTST]
89 C [191 F]	1.0 seconds	Higher Heat Shorter Time [HHST]
90 C [194 F]	0.5 seconds	Higher Heat Shorter Time [HHST]
94 C [201 F]	0.1 seconds	Higher Heat Shorter Time [HHST]
96 C [204 F]	0.05 seconds	Higher Heat Shorter Time [HHST]
100 C [212 F]	0.01 seconds	Higher Heat Shorter Time [HHST]
138 C [280 F]	2.0 seconds	Ultra Pasteurization [UP]

Source: IFDA

If the fat content of the milk product is 10% or more, or if it contains added sweeteners, or if it is concentrated (condensed), the specific temperature shall be increased by 3C [5F]. the below mentioned table can be maintained.

Temperature	Holding Time	Pasteurization Type
69 C [155 F]	30 minutes	Vat Pasteurization
80 C [175 F]	25 seconds	High Temperature Short Time [HTST]
83 C [180 F]	15 seconds	High Temperature Short Time [HTST]

Source: IFDA

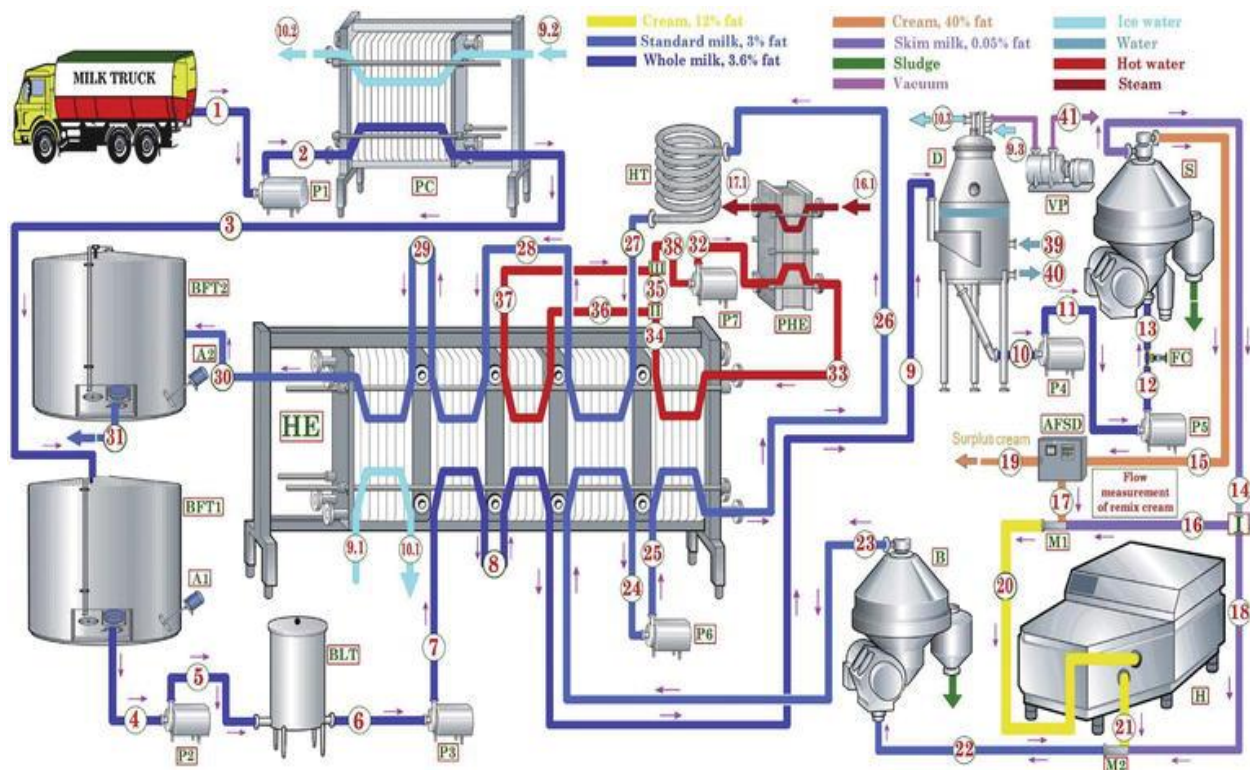




Figure: Pasteurization Process

Different types of thermal processing methods:

Name of Treatment	Temperature	Holding Time	Target	Remarks
Thermization	57C – 68C	15 min	Pathogenic bacteria	Low temperature don't change the structure and taste of milk
Batch pasteurization [LTLT] [Low Temp Long Time]	63C	30 min	Pathogenic bacteria	Long holding time changes the protein structure and taste
Flash Pasteurization [HTST] [High Temp Short Time]	72C – 74C	15 – 20 sec	Pathogenic bacteria	-

		Ameera Consultancy Sample Copy to Boost You on Another Way			
UHT [Ultra High Temperature]	135C – 140C	02 – 04 sec	<i>Coxiella burnetii</i>	Kills all vegetative form of microbes. Extended shelf life.	
Canned Sterilization [Autoclave] [Wet Treatment]	115C – 121C	10 – 20 min		Kills all vegetative form of microbes. Extended shelf life.	

Differences in between Pasteurized Milk & UHT Milk:

It is clear that pasteurized milk and UHT milk both undergo through a heat treatment as well as holding time. But UHT treatment is more and more sensitive rather than the pasteurization.

For pasteurized milk, the milk is safe to consume, but the milk has a shorter shelf life [shelf life may be 15-21 days]. Pasteurized milk must be kept in freezing condition. Pasteurized milk should be consumed instantly [with or without having a further heat treatment]. While long time travelling, pasteurized milk can't be kept long time in ambient temperature. Based on the heat treatment, pasteurized milk colour, taste and texture differs a little than UHT milk. Pasteurized milk is creamier. After the heat treatment, the microbial load will be found [except pathogenic microbes]

For UHT milk, the milk is safe to consume, but the milk has a longer shelf life [shelf life may be 06 – 09 months]. UHT milk can be kept in normal temperature on in the ambient condition. UHT milk can be consumed immediately. While long time travelling, UHT milk can easily be kept long time in ambient temperature [longer shelf life]. Based on the heat treatment, UHT milk colour, taste and texture differs a little than pasteurized milk. UHT milk has got a slightly brownish colour. After the heat treatment, the microbial load must be nil.

Criteria	Pasteurized Milk	UHT Milk
Heat Treatment	Below 100C [lots of treatment point]	Over 100C [135 – 145C]
Holding Time	30min or 15sec [based on heat]	02 – 05sec
Shelf Life	Shorter shelf life [15 – 21 days]	Longer shelf life [06 – 09 months]
Keeping condition	In freeze	In ambient
Consumption condition	With or without having a further heat treatment	Can be consumed instantly
Travelling feasibility	Can't take while long time travelling	Can take easily
Colour, taste and texture	Little bit differed from UHT milk. Have fresh milk colour and creamier.	Little bit differed from pasteurized milk. Have a slightly brownish colour than pasteurized milk
Microbial load after industrial treatment	Microbial load will be found [except pathogenic microbes]	Microbial load must be nil.

A normal diagrammatic flow is shown here for easy understanding.

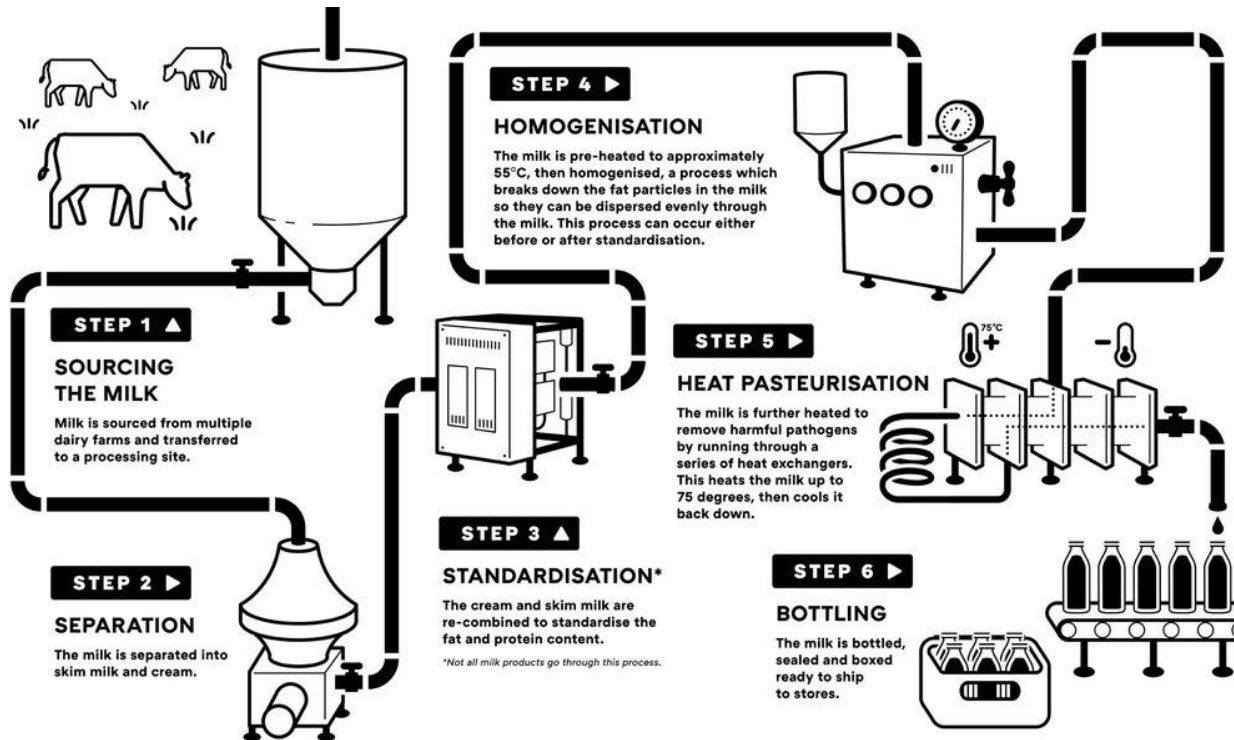


Figure: Pasteurization Process to Filling



Figure: Pasteurized Milk in Pouch Pack

Pasteurized Milk – Merits:

- A little prolonged shelf life milk
- Pathogenic micro-organism free, hence prevent disease
- Milk quality is as natural
- Highly cleaning & sanitation is maintained, so product quality is consistent, safe sanitized.

Liquid Product Heating System

Direct Heating System

02 Types of heating process is available

- Direct heating system
- Indirect heating system

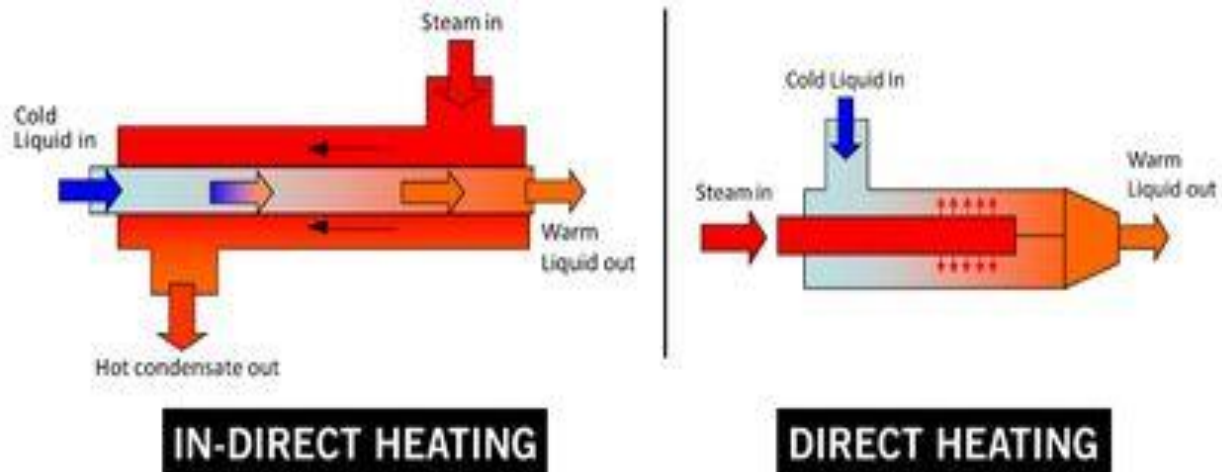


Figure: Direct Heating System & Indirect Heating System

Direct Heating System:

In direct heating system, steam is injected into the liquid product and this heating is followed by a flash cooling system [generally, the product gets directly contact with steam]. This process requires relatively high energy consumption comparing to indirect heating system.

In direct heating system, the product is held at a high temperature for a short time. So, thermal damage for the sensitive product is not happened [eg. Milk]

- Injection Based – High pressured steam is injected into milk maintaining fast heating and cooling. This method is suitable only for some products. A local overheating takes place, as the product comes in contact with the nozzle.
- Infusion Based – A relatively low concentration of milk is pumped through a nozzle into a high pressured steam chamber. It has got a large surface contact area. Both low viscosity and high viscosity liquid products are suitable for this method.

Indirect Heating System – PHE [Plate Heat Exchanger]



Figure: Indirect Heating System – PHE [Plant Heat Exchanger]

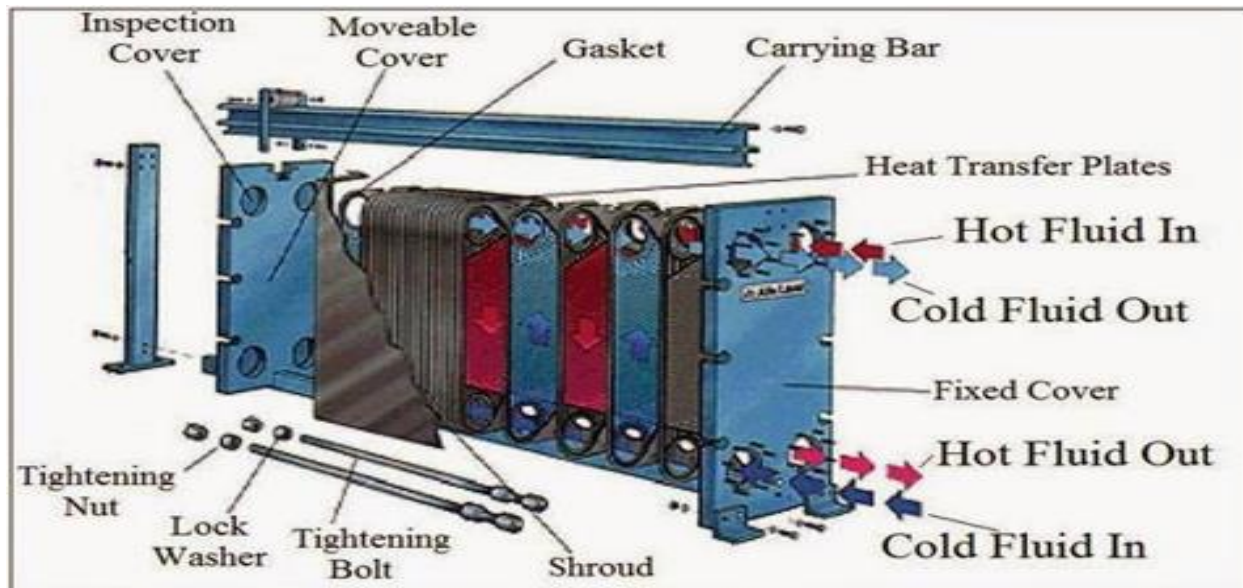


Figure: Indirect Heating System – PHE [Plant Heat Exchanger]

Application of PHE [Plate Heat Exchanger]:

- Pasteurization of Milk, Cream
- Pasteurization of Juice
- Pasteurization of Synthetic Drinks
- Pasteurization of Lachchi Drinks
- Glycol Cooler
- Batch Heating and Cooling
- Water Heater etc.

Indirect Heating System – THE [Tubular Heat Exchanger]

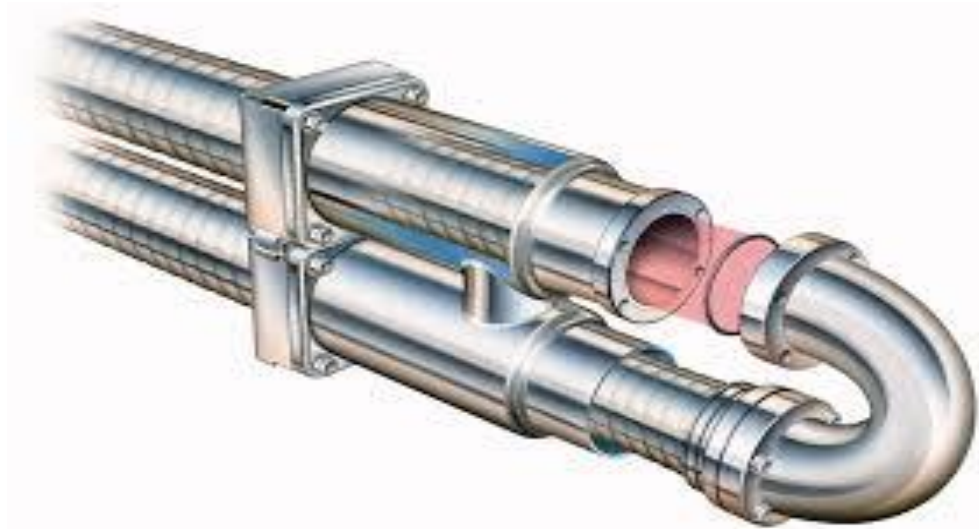


Figure: Indirect Heating System – THE [Tubular Heat Exchanger]



Figure: Indirect Heating System – THE [Tubular Heat Exchanger]

Application of THE [Tubular Heat Exchanger]:

- UHT treatment of Milk
- UHT treatment of Chocolate Milk, Mango Milk
- Pasteurization of Juice
- Pasteurization of Lachchi Drinks
- Pharmaceuticals application etc.

Indirect Heating System – SSHE [Scraped Surface Heat Exchanger]

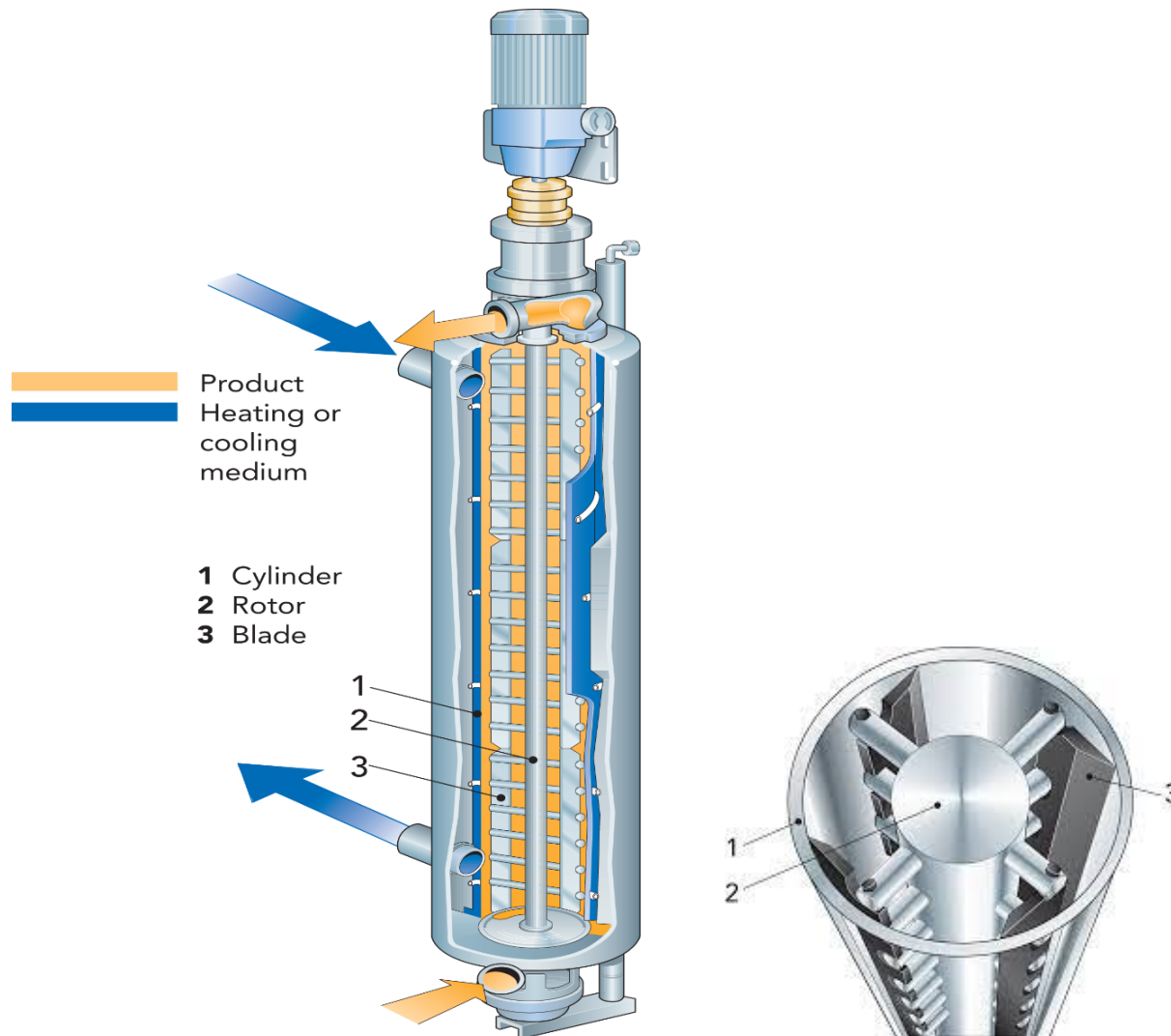


Figure: Indirect Heating System – SSHE [Scraped Surface Heat Exchanger]

Application of SSHE [Scraped Surface Heat Exchanger]:

- In Food Industry [for Heat Transfer, Crystallization and other continuous process]
- In Chemical Industry [for Heat Transfer, Crystallization and other continuous process]
- In Pharmaceutical Industry [for Heat Transfer, Crystallization and other continuous process]
- SSHE specially used for viscous, sticky products which need some degree of crystallization.