

Plant Description of GEA Filtration HTS Plant

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HIGH TEMPERATRE UNIT PROCESS PRE-TREATMENT AND PROCESS

Pre-treatment

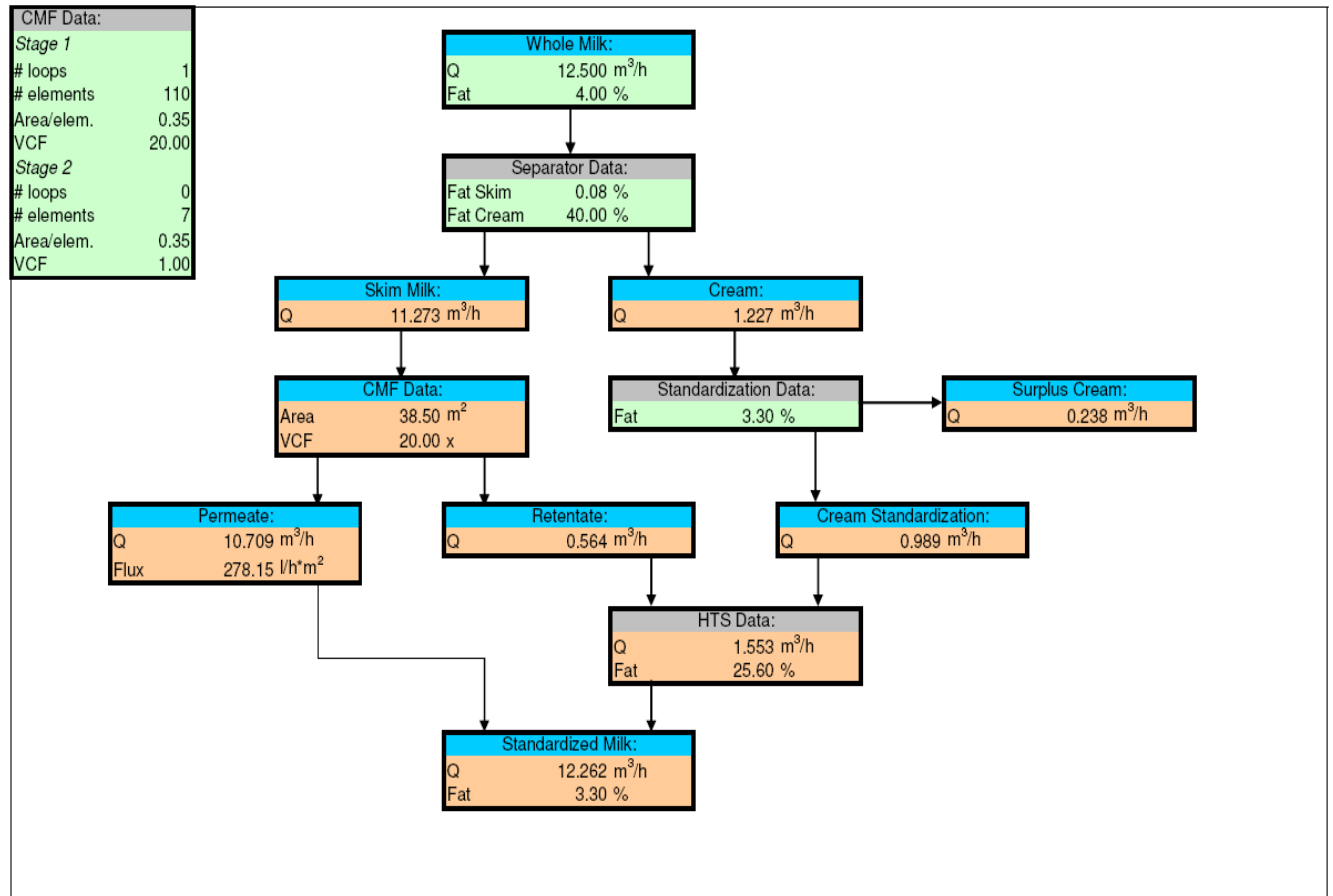
Cream from normal fresh cows skim milk, pH 6.6 – 6.8 and titrated acidity of 16 – 18 and retentate directly from the Ceramic Microfiltration Unit.

- Avoid introduction of air
- The whole milk must not prior to this pretreatment, have been exposed to any kind of heat treatment such as thermization or pasteurization, as well, the milk must not have been exposed to homogenization.
- The cream must not contain unnatural substances such as defoaming agents etc.
- Fat separation at 52-54 °C.
- Cream separated to 40% fat (Reference Röse-Gottlieb).
- Free from air.

High Temperature Unit Process

- High Temperature Treatment of a mixture consisting of 40% cream and retentate from the Ceramic Microfiltration Unit.
- Temperature program: 55 – 130 – approx. 55 °C.
- Capacity: from approx. 1553 l/h @ 26% fat
- Time in production: up to 8 hours

FLOW DIAGRAM



MACHINERY SPECIFICATION

*Machinery Specification of one (1) HTS Plant, 1.553 L/h
according to Flow Sheet No. 091270-11001.*

SECTION 1.0 HTS UNIT

Item	Qty.	Description
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1.1 Feed/CIP Section

Consisting of:

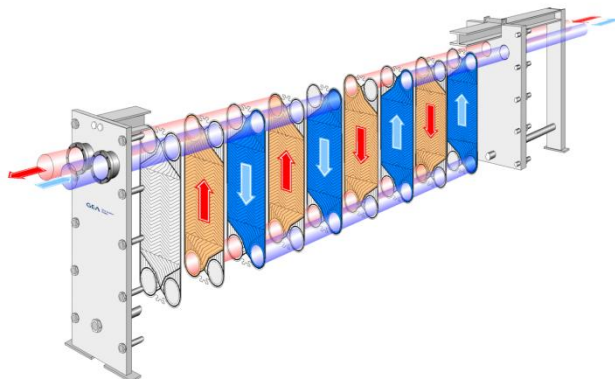
- | | |
|---|---|
| 1 | Balance Tank for CIP. Net volume: 100 l (02.51B20) |
| 1 | Level transmitter (02.51LT60) |
| 1 | Flow regulation valve, CIP Water (02.51VH40) |
| 1 | Product booster and CIP pump, Fristam centrifugal pump, type FPE (02.51PF30) controlled by variable speed drive (02.51SZ30) |
| 1 | Pressure transmitter (02.51PT60) |
| 1 | Product flow transmitter (02.51FT60) |
| 1 | Sample point (02.51VS40) |
| - | Necessary pipes and valves |

1.2 Plate Heat Exchanger Section

Consisting of:

- | | |
|---|--|
| 1 | Plate heat exchanger, GEA Ecoflex VT10, 3 sections (02.51HE20) |
| 1 | Holding cell, stainless steel pipe ^{*)} (02.51HC20) |
| 3 | Temperature transmitters (02.51TT60, 02.52TT60, 02.53TT60) |
| 1 | Pressure transmitter (02.53PT60) |
| 1 | Automatic pressure control valve (02.53GS20) |
| 1 | Sample point (02.53VS40) |
| - | Necessary pipes and valves |

^{*)} Part of the heating process – Not a legal holding cell!



1.3 Hot Water Section

Consisting of:

- 1 Brazed plate heat exchanger (02.75HE20)
- 1 Centrifugal water pump, Grundfos (02.75PR30)
- 1 On/Off valve for steam (02.72VA40)
- 1 Steam control valve (02.72VC60)
- 1 Steam trap (02.75ST40)
- 1 Temperature transmitter (02.75TT70)
- 2 Temperature indicators (02.75TI70, 02.75TI71)
- 3 Pressure indicator (02.75PI70, 02.75PI71, 02.75PI72)
- 1 Water flow indikator (02.75FI70)
- 1 Expansion vessel (02.75EV40)
- 1 Level switch (02.75LS60)
- 1 Safety valve (02.75VS45)
- 2 De-aeration valve (02.75VD40, 02.75VD41)
- Necessary pipes and valves

1.4 Safety Cooler Section

Consisting of:

- 1 Brazed plate heat exchanger (02.75HE21)
- 1 Cooling water control valve (02.71VC60)
- Necessary pipes and valves

1.5 CIP Nozzles

Consisting of:

- 1 CIP nozzle in balance tank
- Lockable access tank cover with safety switch (02.51GS60)
- Necessary pipes and valves.

1.6 GENERAL MECHANICAL

Sanitary seat valves are GEA Tuchenhausen VARIVENT[®] and ECOVENT[®]
Sanitary butterfly valves are GEA Tuchenhausen ECOVENT[®]
Sanitary seat and butterfly valves are with control module and feed back signal.

Process and utility piping are made of AISI 316
Process piping are according to ISO2037 (1" < ϕ < 4")
Process piping are according to DIN11850 (1" > ϕ > 4")
Process piping connections are according to ISO2852 .
Skids are made of rectangular profiles min. AISI 304.

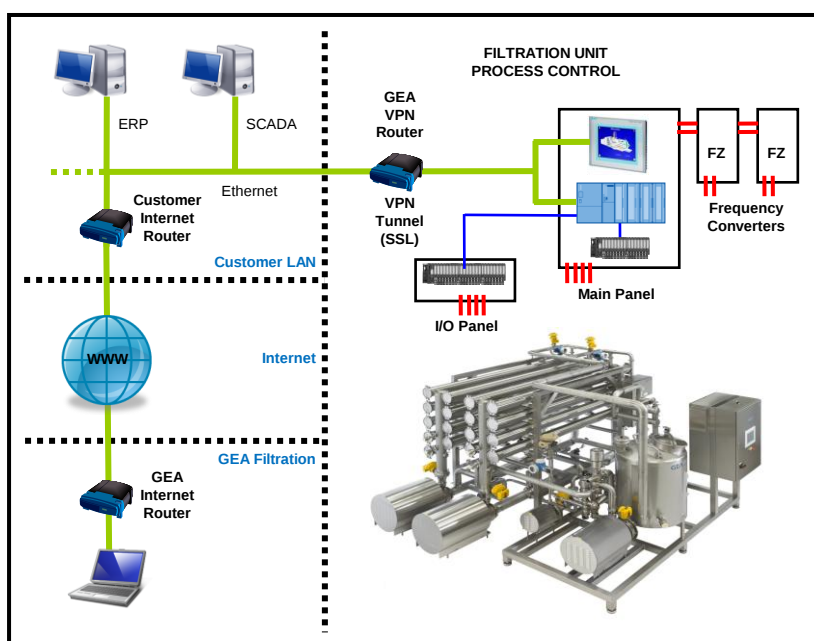
SECTION 2.0 PROCESS CONTROL EQUIPMENT AND ELECTRICAL INSTALLATION

Item	Qty.	Description
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2.1 Process Control Panel incl. MCC and PLC

Consisting of:

- | | |
|---|---|
| 1 | Main Panel in stainless steel according to EN60204-1 and EN60439, skid mounted.
Main switch, necessary power supply and automatic fuses
Emergency stop and reset |
| 1 | Motor Control (included in the Main Panel)
Necessary motor protections and automatic fuses
Soft starter(s) and frequency converter(s)
Depending on motor size, the frequency converters, IP54, can be placed on the rear side of the Main Panel |
| 1 | PLC and HMI (included in the Main Panel)
PLC SIEMENS S7, CPU 315-2PN/DP 256 KB
Integrated ethernet TCP/IP, ISO
TS-adapter type analogue
HMI Siemens MP 277 Touch Panel 10" colour screen Operator Panel
Necessary application software for PLC and HMI
The HMI (Operator Panel) is installed in the front of the Main Panel |
| 1 | I/O panel in stainless steel according to EN60204-1 and EN60439, skid mounted
Necessary digital- and analogue in-/output
Necessary pilot valves
Necessary terminals |



2.2 Electrical Installation

Consisting of:

- 1 Premounted cable work and air tubing for the above mentioned unit process control
- Necessary cable ways for cables and air tubes
- Necessary cables and air tubing
- Necessary air pressure regulators incl. oil- and water separators

TECHNICAL DATA (APPROX. VALUES)

DEMANDS:

Process temperature	°C	50-55
Installed electrical power	kW	78
Power		
Production	kW	61
Preparation and CIP	kW	60
Cooling water (2°C)		
Production	kW	0
Preparation and CIP	kW	42
Steam		
Production	kg/h	0
Preparation and CIP	kg/h	556
Process water	m ³ /h	20
Shaft seal water	m ³ /h	0
Drain capacity	m ³ /h	20
Hold-up volume	Litres	427

CONSUMPTION PER CYCLE:

Production	Hours	Up to 8:00
Preparation and CIP	Hours	Approx. 2:00
Power		
Production	kWh	488
Preparation and CIP	kWh	102
Cooling water (2°C)		
Production	kWh	0
Preparation and CIP	kWh	32
Steam		
Production	kg	0
Preparation and CIP	kg	146
Process water	m ³	6
Shaft seal water	m ³	0
Drain	m ³	6

CLEANING DETERGENTS:

Ultrasil 25	kg	6.4
Nitric acid (62% solution)	kg	2.1

OTHER:

Power supply		3 x 400 V, 50 Hz
Compressed air, 6 bar, oil- and water free		
Approx. required floor space	mm	LxWxH: 3500 x 3500 x 4500

WATER REQUIREMENTS

In order to ensure an optimum cleaning result, water used for CIP or otherwise getting into contact with the HTS Plant must comply with the following specifications:

Substance	Unit	Polymeric RO/NF Membranes	Polymeric UF/MF Membranes	Ceramic UF/MF Membranes
Iron (Fe)	mg/l	< 0.05	< 0.05	< 0.10
Manganese (Mn)	mg/l	< 0.02	< 0.02	< 0.05
Soluble Silica (SiO ₂)	mg/l	< 15.0	< 15.0	< 25.0
Collodial Silica	mg/l	Absent	Absent	Absent
Aluminium (Al)	mg/l	< 0.05	< 0.1	< 0.1
Chlorine – Cl ₂ /HOCl	mg/l	0.0	< 5.0	< 5.0
Organic N ₂ , Kjeldahl	mg/l	< 0.05	< 0.05	< 0.05
Turbidity	NTU	< 1.0	< 1.0	< 1.0
Silt Density Index	SDI	< 3.0	< 3.0	< 1.5
German degree of hardness*)	°dH	< 15.0	< 15.0	< 15.0
Total Plate Count	per 1 ml	< 1,000	< 1,000	< 1,000
Coliforms	per 100 ml	Absent	Absent	Absent

*) 1 German degree of hardness is equal to 10 mg/l CaO or 17.9 mg/l CaCO₃

The CIP water must be prefiltered using a 5–10 micron depth filter with stainless steel housing(s). The piping from the stainless steel filter housing to the filtration unit must be in stainless steel.

Water fulfilling the above specification is generally acceptable provided that formulated detergents are used. Softened water is also acceptable, it must, however, be pointed out that softened water may prolong the time needed for flush and consequently lead to a higher water consumption.

If stored and handled correctly, RO permeate and evaporator condensate may be used as CIP water except for the last flush.