

UNEP-CI PROJECT (2017-2019)

National Cleaner Production Centre,
66/1,
Dewala Road,
Nugegoda.



Inventory Tables for Life Cycle Inventory (LCI) Analysis – Dairy (UHT Milk & Sterilized Milk) Process.

Year 2015 - 2017

Factory Details

Name :
Address :
GPS Location : Latitude Longitude
Tel. No. :
District :

Contact Person's Details

Name :
Designation :
Tel. No. :
Email Address :

Field Assistant's Details

Name :
Tel. No. :
Email Address :

.....

Field Assistant's Signature

.....

Visited Date

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1) PLANT LAYOUT

*Plant layout of factory should be included here. Sample plant layout has been provided in **Appendix** section.*

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2) PROCESS FLOW DIAGRAM

*Machine wise process flow diagram should be included here. Sample process flow diagram has been provided in **Appendix** section.*

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3) PRELIMINARY INFORMATION

- 1) How many permanent, contract and daily paid employees attached to the factory?
.....
.....
- 2) How the Raw milk being collected for the factory? Own farm Bought outside
- 3) What are the different types of product categories manufactured in this factory and its percentages? (ex: Curd, yoghurt)
Ex: Processed milk 80.....%
.....
.....
.....
- 4) What are the different types of packaging materials used in the factory?
.....
- 5) Are there any other electricity generation methods used in the factory in addition to national grid supply?
 Generator (Fuel Type)
 Solar energy CEB Grid Connected
 Other energy CEB Grid Connected
- 6) How many suppliers & Collection Centers available to get raw milk?
.....
.....
- 7) What are the fuel types use to generate Steam/hot water?
 Biomass (Specify) Fuel (Specify)
- 8) What are the sources of water supply?
 Water board supply Deep well River Other (Specify).....
- 9) What are the average (a.) daily, (b.) monthly, and (c.) yearly production of the factory?
(a.) (b.) (c.)
- 10) What percentage of milk reduction is expected from tube/ machines washing? %
- 11) What is the technology used in waste water plant treatment plant?
.....
- 12) Are there any technical, social and environmental problems currently face by the factory?
.....
.....

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4.1) TRANSPORT INFORMATION – MILK COLLECTION SOURCE

Farm/ Collection Centre/collector route	Source Index	Location	Source Type			Distance to factory (km)
			Own	Collector	Bought	
Ex: xxxx Farm	CR1	xxx, xxxxxxxxxxxx, Agarapathana	√			8

√ Extendable

HINTS:

- Source (Farm/Collection Centre/collection route) to Destination (Factory) should be taken based on route direction not aerial distance.
- Google map on area or vehicle meter reading can be used to measure the distance.
- Own indexing syntax can be used to prepare the list.

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4.2) TRANSPORT INFORMATION – MILK TRANSPORTING BOWSERS/VEHICLE DETAILS

Time Duration : 1 Week

Vehicle Type	Brand Name	Vehicle Model	Vehicle No.	Load Capacity	Fuel Type	Ownership of Vehicle`		
						Own	Hired	Other
<i>Ex: Bowser</i>	<i>TATA</i>	<i>Xxxxxx</i>	<i>62-3085</i>	<i>2.5 Cubes</i>	<i>Diesel</i>			

√ Extendable

HINTS:

- Details of all vehicles which are arrived to factory during 1 week should be recorded.
- Ownership of the vehicle should be concerned according to the factory perspective.
- Own indexing syntax can be used to prepare the list.

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5.1) TRANSPORT INFORMATION – RESOURCE COLLECTION SOURCE

Resource	Collection Point	Source Index	Location	Distance (km)
Ex:Biomass – wood Logs	xxxxxx	BM1	xxx, xxxxxxxx, Kitulgala	40 km

√ Extendable

HINTS:

- Consider fuel types (ex: biomass, diesel) and packaging materials (ex: wooden boxes, foil paper bags) for
- Source (Farm/ Collector route/ Collection Centre) to Destination (Factory) should be taken based on route direction not aerial distance.
- Google map on area or vehicle meter reading can be used to measure the distance.
- Own indexing syntax can be used to prepare the list.
- If one resource is transported from different locations include all sources under such resource category.

5.2) TRANSPORT INFORMATION – RESOURCE TRANSPORTING VEHICLE DETAILS

Resource	Vehicle Type	Vehicle Model	Vehicle Reg. no.	Load Capacity	Load Allocation	Fuel Type	Ownership of Vehicle`		
							Own	Hired	Other
Ex:Diesel	Bowser	xxxxxx	DB1	13200L	80 %	Diesel			√

√ Extendable

HINTS:

- Most commonly transported vehicle should be considered for particular resource transportation
- Ownership of the vehicle should be concerned according to the factory perspective.
- Own indexing syntax can be used to prepare the list.

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6.1) MILK INPUT INFORMATION (DAILY BASIS)

Time Duration : October, November, December of 2017

Selected Month :

Daily Milk Collection											
Day	Farm/ Collector route/ Collection Centre										Total
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
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√ Extendable for other months

HINTS:

- Refer "Collection records" available in the factory which is used to record production flow data

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6.2) MILK INPUT INFORMATION (MONTHLY BASIS)

Time Duration : Year 2017

Monthly Milk Collection											
Month	Farm/ Collector route/ Collection Centre										Total
January											
February											
March											
April											
May											
June											
July											
August											
September											
October											
November											
December											

6.3) MILK INPUT INFORMATION (YEARLY BASIS)

Time Duration : 3 Years

Yearly Milk Collection											
Year	Farm/ Collector route/ Collection Centre										Total
2015											
2016											
2017											

HINTS:

- Refer "Milk collection records" available in any milk factory which is used to record the production flow data

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7.1) BIOMASS CONSUMPTION INFORMATION (DAILY BASIS) [IF AVAILABLE ONLY]

Time Duration : One week

Day	Daily Biomass Consumption – Week.....							
	Wood Logs		Wood Chips		Saw Dust		Other biomass	
	Cu. Yards	Rs.	kg	Rs.	kg	Rs.		Rs.
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
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7.2) BIOMASS CONSUMPTION INFORMATION (MONTHLY BASIS)

Time Duration : Year 2017

Month	Monthly Biomass Consumption - 2017							
	Wood Logs		Wood Chips		Saw Dust		Other biomass	
	Cu. Yards	Rs.	kg	Rs.	Kg	Rs.		Rs.
January								
February								
March								
April								
May								
June								
July								
August								
September								
October								
November								
December								

7.3) BIOMASS CONSUMPTION INFORMATION (YEARLY BASIS)

Time Duration : 3 Years

Year	Yearly Biomass Consumption							
	Wood Logs		Wood Chips		Saw Dust		Other biomass	
	yard ³	Rs.	kg	Rs.	kg	Rs.		Rs.
2015								
2016								
2017								

Wood specification used in factory

- Rubber
 Off-cuts
 Other (Specify)

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7.4) PETROLEUM FUEL CONSUMPTION INFORMATION (MONTHLY BASIS)

Time Duration : Year 2017

Month	Monthly Petroleum Fuel Consumption - 2017							
	Diesel		LP Gas		Furnace Oil		Other Fuels	
	L	Rs.	kg	Rs.	L	Rs.		Rs.
January								
February								
March								
April								
May								
June								
July								
August								
September								
October								
November								
December								

7.5) PETROLEUM FUEL CONSUMPTION INFORMATION (YEARLY BASIS)

Time Duration : 3 Years

Year	Yearly Petroleum Fuel Consumption							
	Diesel		LP Gas		Furnace Oil		Other Fuels	
	L	Rs.	kg	Rs.	L	L	Rs.	L
2015								
2016								
2017								

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7.6) WATER CONSUMPTION INFORMATION (MONTHLY BASIS)

Time Duration : Year 2017

Month	Consumption	
	L	Rs.
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		

Purpose of water consumption records?

- Process Only Process + General Purpose

7.7) WATER CONSUMPTION INFORMATION (YEARLY BASIS)

Time Duration : 3 Years

Year	Consumption	
	L	Rs.
2015		
2016		
2017		

If water pumps are used to pump the water to the overhead tank,

Measurement	Unit	Amount
Volume of water tank	L	
Capacity of the water pump	hp	
Time taken to fill the tank	min	
How often water tank is turned on?	times/month	

Water sources used in the factory

- Water board supply
 Deep well
 River
 Water stream
 Other

What is the average water consumption for general purpose?%

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8.1) ELECTRICITY BILL INFORMATION (MONTHLY BASIS)

Time Duration : Year 2017

Monthly Electricity Bill Information – Year 2017					Generator		Other Electricity
Month	Consumption (kWh)				kVA	Units	
	Peak	Day	Off-Peak	Total		(kWh)	(L)
January							
February							
March							
April							
May							
June							
July							
August							
September							
October							
November							
December							

Scope of electricity consumption records,

- Process Only Process + General Purpose

8.2) ELECTRICITY BILL INFORMATION (YEARLY BASIS)

Time Duration : 3 Years

Yearly Electricity Bill Information					Generator		Other Electricity
Year	Consumption (kWh)				kVA	Units	
	Peak	Day	Off-Peak	Total		(kWh)	(L)
2015							
2016							
2017							

Electricity sources using in factory

- National Grid
 Generator
 Hydro Power
 Solar Energy
 Wind Power
 Other (Specify)

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8.3) SECTION WISE ELECTRICITY METER READING INFORMATION (DAILY BASIS)

*** If sub electricity meters are available

Time Duration : October, November, December of 2017

Selected Month :

Day	Daily Section wise electricity consumption (kWh)								
	Unloading & cooling	Primary Mixing	Secondary Mixing	Storage Plant	UHT plant	Sterilized Plant	Chillers	Packaging	Other
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

√ Extendable for other months

HINTS:

- Please check the scope of electricity meters and list the machines which are categorized under the meter
- Include total electricity consumption not categorized in Unloading, Mixing Plant 1, Mixing Plant 2, Storage Plant, UHT plant, Sterilized Plant, Boilers, Chillers, and Packaging.
- For example, refer the sample machine list given in the **Appendix section**.

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8.4 SECTION WISE ELECTRICITY METER READING INFORMATION (MONTHLY BASIS)

*** If sub electricity meters are available

Time Duration : Year 2017

Month	Monthly Section wise electricity consumption (kWh)								
	Unloading & Cooling	Primary Mixing	Secondary Mixing	Storage Plant	UHT plant	Sterilized Plant	Chillers	Packaging	Other
January									
February									
March									
April									
May									
June									
July									
August									
September									
October									
November									
December									

8.5 SECTION WISE ELECTRICITY METER READING INFORMATION (YEARLY BASIS)

*** If sub electricity meters are available

Time Duration : 3 Years

Year	Yearly Section wise electricity consumption (kWh)								
	Unloading & Cooling	Primary Mixing	Secondary Mixing	Storage Plant	UHT plant	Sterilized Plant	Chillers	Packaging	Other
2015									
2016									
2017									

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9.1 PRODUCTION DATA INFORMATION (DAILY BASIS)

Time Duration : October, November, December of 2017

Selected Month :

Daily production data					
Day	Unloaded Milk (L)	Produced UHT Milk		Produced Sterilized Milk	
		Flavored	Non-Flavored	Flavored	Non-Flavored
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					

√ Extendable for other months

HINTS:

- Refer "Production record book" available in any Milk factory which is used to record the production flow data

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9.2 PRODUCTION DATA INFORMATION (MONTHLY BASIS)

Time Duration : 1 Year

Monthly Production data					
Month	Unloaded Milk (L)	Produced UHT Milk (l)		Produced Sterilized Milk(l)	
		Flavored	Non-Flavored	Flavored	Non-Flavored
January					
February					
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					

9.3 PRODUCTION DATA INFORMATION (YEARLY BASIS)

Duration : 3 Years

Yearly Production data					
Year	Unloaded Milk (L)	Produced UHT Milk (l)		Produced Sterilized Milk (l)	
		Flavored	Non-Flavored	Flavored	Non-Flavored
2015					
2016					
2017					

HINTS:

- Refer "Production record book" available in any milk factory which is used to record the production flow data

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10) TECHNICAL INFORMATION OF THE MACHINERIES

Section	Machine Index	Machine Name	No of Machines	Rated Power (HP or kW)	Production Rate (L/h)
Unloading	1	Pump	1	3Hp	xxxxxx
		Cooler			
		Silo			
Mixing		Cooler			
		Pasteurization			
		Homogenizer			
		Separator			
		Agitator			
Mixing Plant 2		Pasteurization			
		Mixing machine			
		Hoppers			
		Storage tanks			
		Silo			
		Agitator			
Storage Plant		UHT milk Stock tank			
		Sterilized storage tank			
		Homogenizer			
		Pasteurization			
UHT plant		UHT Machine			
		Filing & Sealing machine			
Sterilized Plant		Filler machine			
		Tower machine			
		Bottle washer			

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Boiler plant					
Waste water treatment plant					
Air compressor plant					
Cleaning Plant					
Cooling Plant					

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11.1) PRIMERY STORAGE: WORKING HOURS RELATED INFORMATION (BATCH BASIS)

Time Duration: One week

#	Parameter	Unit	Silo #		Silo #		Silo #		Silo #	
			Date	Time	Date	Time	Date	Time	Date	Time
	Start Time	Date/h:min								
	End Time	Date/h:min								
	Unload Amount	kg/batch								
	Start Time	Date/h:min								
	End Time	Date/h:min								
	Unload Amount	kg/batch								
	Start Time	Date/h:min								
	End Time	Date/h:min								
	Unload Amount	kg/batch								
	Start Time	Date/h:min								
	End Time	Date/h:min								
	Unload Amount	kg/batch								
	Start Time	Date/h:min								
	End Time	Date/h:min								
	Unload Amount	kg/batch								
	Start Time	Date/h:min								
	End Time	Date/h:min								
	Unload Amount	kg/batch								
	Start Time	Date/h:min								
	End Time	Date/h:min								
	Unload Amount	kg/batch								
	Start Time	Date/h:min								
	End Time	Date/h:min								
	Unload Amount	kg/batch								
	Start Time	Date/h:min								
	End Time	Date/h:min								
	Unload Amount	kg/batch								
	Start Time	Date/h:min								
	End Time	Date/h:min								
	Unload Amount	kg/batch								

√ Extendable for rest of batches

HINTS:

- Take the start time just with switching on the motor after loading a batch to a silo.
- Take the end time just with the switching off the motor before unloading a batch from a silo
- Information should be recorded for each trough for each batches continuously during data collection period
- “#” notation represents the batch number

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11.2) SECTION WISE WORKING HOURS RELATED INFORMATION (MONTHLY BASIS)

Time Duration: 1 Year

Month	Monthly Section Wise Total Working Hours (2017)							
	Unloading & cooling	Primary Mixing	Secondary Mixing	Storage Plant	UHT plant	Sterilized Plant	Chillers	Packaging
January								
February								
March								
April								
May								
June								
July								
August								
September								
October								
November								
December								

11.3) SECTION WISE WORKING HOURS RELATED INFORMATION (YEARLY BASIS)

Time Duration: 3 Years

Year	Yearly Section Wise Total Working Hours							
	Unloading & cooling	Primary Mixing	Secondary Mixing	Storage Plant	UHT plant	Sterilized Plant	Chillers	Packaging
2015								
2016								
2017								

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12.1.1) BOILER PROCESS DATA (DAILY BASIS)

Boiler type: Capacity: Fuel Used:

Time Duration: October, November, December of 2017

Month:

Day	Working hours	Inputs			Outputs
		Fuel (L)	Biomass (kg)	Water (L)	Ash (kg)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					

√ Extendable for other months

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12.1.2) BOILER PROCESS DATA (MONTHLY BASIS)

Time Duration: 1 Year

Month	Working hours	Inputs			Outputs
		Fuel (L)	Biomass (Kg)	Water (L)	Ash (Kg)
January					
February					
March					
April					
May					
June					
July					
August					
September					
October					
November					
December					

12.1.3) BOILER PROCESS DATA (YEARLY BASIS)

Time Duration: 3 Years

Year	Working hours	Inputs			Outputs
		Fuel (L)	Biomass (Kg)	Water (L)	Ash (kg)
2015					
2016					
2017					

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12.2.1) WASTEWATER TREATMENT DATA INFORMATION (DAILYBASIS)

Time Duration: October, November, December of 2017

Month:

Daily consumptions at Wastewater (WW) treatment plant				
Day	Chemicals used (kg or liters)	Waste water treated (L)	Total amount reused (L)	Sludge amount (kg)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

√ Extendable for other months

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12.2.2) WASTEWATER TREATMENT DATA INFORMATION (MONTHLY BASIS)

Time Duration: 1 Year

Monthly consumptions at Wastewater (WW) treatment plant				
Month	Chemicals used (kg or liters)	Waste water treated (L)	Total amount reused (L)	Sludge amount (kg)
January				
February				
March				
April				
May				
June				
July				
August				
September				
October				
November				
December				

12.2.3) WASTEWATER TREATMENT DATA INFORMATION (YEARLY BASIS)

Time Duration: 3 Years

Yearly consumptions at Wastewater (WW) treatment plant				
Year	Chemical amount	Reused water Amount (L)	Treated WW amount (L)	Sludge amount (Kg)
2015				
2016				
2017				

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12.3.1) AIR COMPRESSOR DATA / INFORMATION (DAILY BASIS)

Model: Capacity:

Time Duration: October, November, December of 2017

Month:

Air compressor/s Section	
Day	Working hours (hrs.)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	

√ Extendable for other months

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12.3.2) AIR COMPRESSOR DATA / INFORMATION (MONTHLY BASIS)

Time Duration: 1 Year

<i>Air compressor/s Section</i>	
Month	Working hours (hrs.)
January	
February	
March	
April	
May	
June	
July	
August	
September	
October	
November	
December	

12.3.3) AIR COMPRESSOR/S DATA INFORMATION (YEARLY BASIS)

Time Duration: 3 Years

<i>Air compressor/s Section</i>	
Year	Working hours (hrs.)
2015	
2016	
2017	

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12.4.1) CLEANING PLANT DATA / INFORMATION (DAILY BASIS)

Tank Capacity: No. of Tanks:

Time Duration: October, November, December of 2017

Month:

Cleaning Plant (CIP Unit)		
Day	Chemical used (kg or L)	Working hours (hrs.)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		

√ Extensible for other months

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12.4.2) CLEANING PLANT DATA/ INFORMATION (MONTHLY BASIS)

Time Duration: 1 Year

Cleaning Plant (CIP Unit)		
Month	Chemical used (kg or L)	Working hours (hrs.)
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		

12.4.3) CLEANING PLANT DATA INFORMATION (YEARLY BASIS)

Time Duration: 3 Years

Cleaning Plant (CIP Unit)		
Year	Chemical used (kg or L)	Working hours (hrs.)
2015		
2016		
2017		

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12.5.1) REFRIGERATION SYSTEM INFORMATION (TECHNICAL)

Plant No.	Refrigerant used	A SHRAE Number	No of plants	Plant Capacity	Recharging frequency (months/period)	Refrigerant refilled amount (kg/period)

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
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12.5.2) REFRIGERANT/CHILLING PLANT WORKING INFORMATION (DAILY BASIS)

Time Duration: October, November, December of 2017

Month:

Refrigeration unit						
Day	Plant 1		Plant 2		Plant 3	
	Chilling Amount (L)	Working hrs.	Chilling Amount (L)	Working hrs.	Chilling Amount (L)	Working hrs.
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
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30						

 Extendable for other months

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12.5.3) REFRIGERANT WORKING INFORMATION (MONTHLY BASIS)

Time Duration: 1 Year

<i>Refrigeration unit</i>						
Month	Plant 1		Plant 2		Plant 3	
	Chilling Amount (L)	Working hrs.	Chilling Amount (L)	Working hrs.	Chilling Amount (L)	Working hrs.
January						
February						
March						
April						
May						
June						
July						
August						
September						
October						
November						
December						

12.5.4) REFRIGERANT WORKING INFORMATION (YEARLY BASIS)

Time Duration: 3 Years

<i>Refrigeration unit</i>						
Month	Plant 1		Plant 2		Plant 3	
	Chilling Amount (L)	Working hrs.	Chilling Amount (L)	Working hrs.	Chilling Amount (L)	Working hrs.
2015						
2016						
2017						

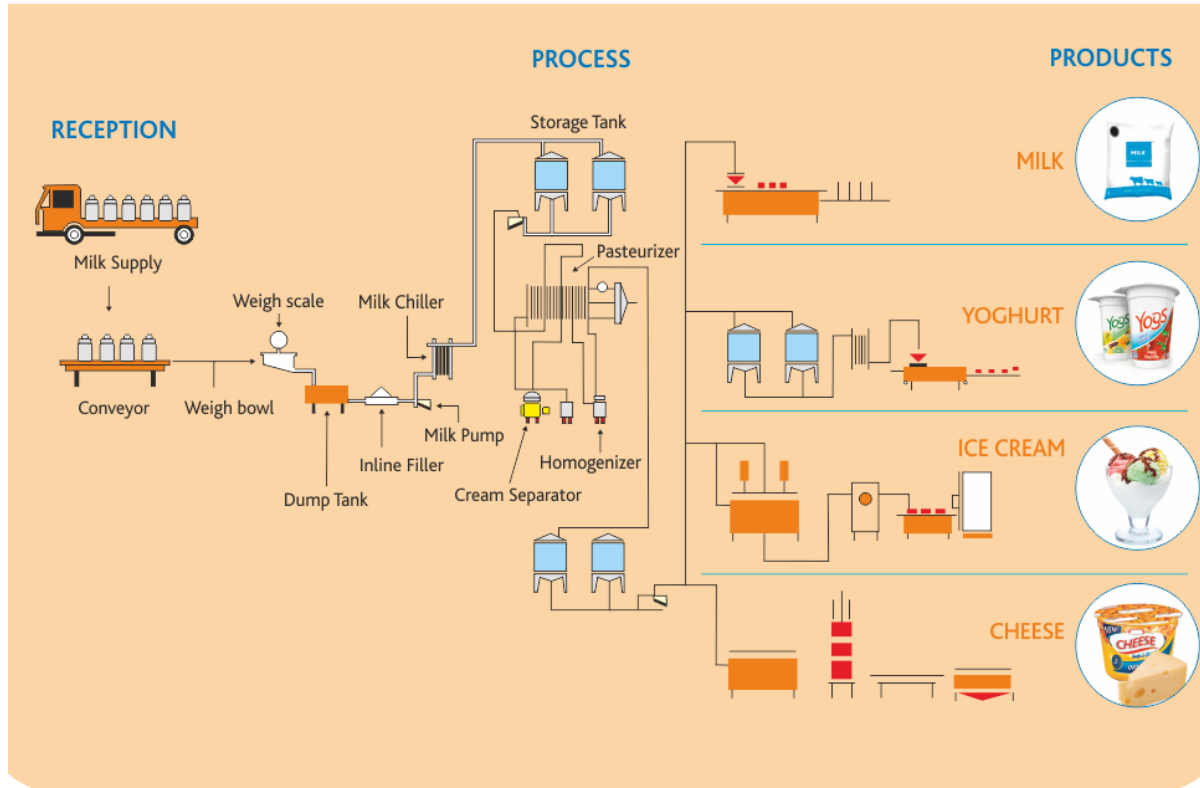
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13) Appendix

Plant Layout

Milk & Dairy Plant Layout: From milk reception to final packing



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Process flow diagram

