2 Design criteria 50,000 tons per year

2.1 Site conditions

2.1.1 Factory location

Factory located country:	Estonia
Factory address	Unknown
Elevation of about above sea level	Average 50 m

2.1.2 Ambient temperature and relative humidity

Monthly average temperature between	-9/+22°C
Relative humidity approx..	80%
Hottest period	June - August
Maximum and minimum observed tempera-tures	-20/+35°C
Coldest period	December - February

2.1.3 Rainfall

25 years recurrence period and 15 minutes rainfall duration	NA
25 years recurrence period and 24 hours rainfall duration	NA

2.1.4 Seismic zone

Ground acceleration	Non
Standard	NA

2.1.5 Other site conditions to be considered.

Na

2.2 Electrical design criteria

2.2.1 Electrical standard

The electrical design shall be minimum CE Marked and follow the local regulations and standards.

2.2.2 Power supply

Main supply voltage	3x 400 volt
Single phase supply:	230 VAC
Control supply voltage	24 VDC
Frequency:	50Hz, ±0.2 %
Process controls	NA
Plant control	NA
Process power consumption estimate	2-3 MW

2.2.3 Motors

0.75 – 375 kW	IE3 GP
Other sizes & 8-poled	IE2
Motors with variable speed drive	IE3

2.2.4 Frequency converters

0.75 - 75 kW	IP20
90 - 710 kW	IP21

2.3 Media specification

2.3.1 Compressed air

Quality	Free of water
Operation pressure	Min. 6 bar(g)
Quantity	NA
Estimate compressed air consumption	Approx. 9,000 – 14,000 nl/min

2.3.2 Instrument air

Quality (for filter pulsing)	Dry
Operation pressure	Min. 6 bar(g)
Quantity	NA

2.3.3 Process Water

Temperature	(Client information)
Minimum	(Client information)
Maximum	(Client information)
Pressure	(Client information)
Hardness, max	(Client information)
pH	(Client information)
Chlorine	(Client information)
Sulphate SO4	(Client information)
Total dissolved solids	(Client information)
Total suspended solids	(Client information)
Process water consumption estimate	Up to 1,000 liter/h

2.3.4 Process Steam

Steam pressure	10 bar (g) (Design Boiler pressure 13 bar)
Steam temperature	Super heating to +10 ºC
Water softener	Depends on water quality.
Consumers	Process and heating of process
Condensate	Partly returned to boiler system
Process steam consumption estimate	Up to 1,500 liter/h

2.3.5 Nature Gas

Gas pressure	Dryer 250 - 350 mbar Boiler 1,000 – 4,000 mbar
Caloric value	12 kW / m^3 (To be confirmed by client)
Process gas consumption estimate	180 m^3/h

2.3.6 Wastewater system (Sewer System)

Process wastewater to sewer system	1.5 m^3/h at peak.
Description of wastewater	Wastewater can contain: - Organic oils - Organic meal products - Steam condensate

2.1 Environmental requirements

2.3.7 Noise

SUPPLIER makes a list of noise from machine equipment to client who will clarify with the local authorities.

Inside	Xxx dB (A)
Outside	Xxx dB (A)

The client has the responsibility to consult with local authorities and get the approval. The client has the responsibility to make the noise assessment and inform the supplier in due time about any additional requirements for noise protection both inside and outside the factory buildings.

2.3.8 Emission

Emission from filter/cyclones to the environment

Emission source	Air volume	Temperature	Dust emission
Intake filter	30,000 m³/h	20°C	< 20 mg/m³
Hammer mill filter	8,000 m³/h	35°C	< 50 mg/m³
Flash off air from ex-truder	5,500 m³/h	70°C	Cyclone
Dryer	32,000 m³/h	65°C	Cyclone
Product cooler	27,000 m³/h	40°C	Cyclone

2.3.9 Odor Emission

It must be investigated by the client what the local requirements odor emission limits are in Estonia and hereafter a suitable system for cleaning can be included.

An odor reduction system for the exhaust air can be a Biofilter, scrubber or oxidizer.

Local requirements to odor levels to be defined by the client.

Source	Exhaust vol-ume	Temp.	Rel H.	Odor Conc.	Odor Conc.	Odor Emiss.	Odor Emiss.	Odor Emiss.	Odor Emiss.
Specification	m³/h	°C	%	OU/m³	OU/m³	OU/h	OU/h	OU/sec	OU/sec
				Min	Max	Min	Max	Min	Max
Intake filter	30.000	10 - 30	30 - 70	2.000	5.000	60.000.000	150.000.000	16.667	41.667
Hammer mill filter	8.000	25 - 45	10 - 50	4.000	10.000	32.000.000	80.000.000	8.889	22.222
Flash-off air from ex-truder	5.500	60 - 90	70 - 100	40.000	100.000	220.000.000	550.000.000	61.111	152.778
Dryer exhaust	32.000	60 - 80	40 - 70	15.000	50.000	480.000.000	1.600.000.000	133.333	444.444
Product cooler	27.000	30 - 50	10 - 50	5.000	30.000	135.000.000	810.000.000	37.500	225.000
Total	102.500					927.000.000	3.190.000.000	257.500	886.111

3.1 Safety requirements

2.3.10 Dust Explosion

Where there by experience is ATEX classification of the equipment the equipment supplies must quote according to the experience zone classification and ATEX directive 94/9/EC.

Final classification is the responsibility of the Client and local authorities.

If the ATEX classification shows that any extra work or modification to electrical or mechanical equipment is required, the cost will be by Client account.

2.3.11 Fire Protection

Fire risk assessment is in the scope of the Client.

If the assessment shows that any extra work or modification to electrical or mechanical equipment is required, the cost will be by Client account.

3.2 Corrosion protection

2.3.12 Corrosion class

Corrosion classes are defined according to ISO 12944

Indoor	C2
Outdoor	C3

2.3.13 Painting

Machine color	(Client)
Steel structure	(Client)

2.3.14 Galvanizing

Sheets (Z275)	NA
Steel structure	ISO 1461

4.1 Capacity specifications

Product specifications and densities according to Appendix 2

4.2 Raw material intake

Capacity	200 m³/hour mechanical intake for dry bulk trucks. 2 x 40 m³/hour Liquid oil intake for bulk tank truck.
Weighing	1 pc. Weighing Bridge for trucks.

4.3 Raw Material Dosing Silos

Capacity	18 silos of 130 m³ silos 2 pcs. Bigbag intake 1,000 kg bags

4.4 Macro Hopper Scale

Capacity	Batch size maximum 2,000 kg/batch @ 0,5 kg/m³ Design capacity: 12 batches/hour. Static scale accuracy: 0.10% of maximum scale capacity. Maximum dosing capacity for each dosing screw: 50% of maximum scale capacity. Dosing accuracy for dosing screws: max. 0.10% of total scale capacity.

4.5 Pre-mixing

Capacity	4,000 liter bin continuous vertical mixer

4.6 Grinding

Capacity	12 tons per hour post grinding
Moisture	8.0% -> 10.0%
Fat	4.0% -> 10.0%
Particle size into the hammer mill	100% < 4mm
Particle size after grinding	D_{50} < 200 µm Max 2% > 800 µm 100% < 1000 µm
Screen	Ø 1,25 – 1,5 mm (80% under approx. 250 my)

4.7 Micro Dosing/Storage Silos

Silo capacity for micro raw material	8 silos of 1.0 m^3

4.8 Micro Dosing Scales

Capacity	Batch size maximum 50 kg/batch @ 0,5 kg/m^3 Design capacity: 12 batches/hour. Static scale accuracy: 0.10% of maximum scale capacity. Maximum dosing capacity for each dosing screw: 50% of maximum scale capacity. Dosing accuracy for dosing screws: max. 0.10% of total scale capacity.

4.9 Mixing

Capacity	Batch mixer for 16 tons per hour
Batch size	2,000 kg / batch (4,000 liter)
Density	0,40 – 0,65 tons / m^3

4.10 Liquid addition in Mixer

No liquid added in mixer	
Mixer prepared for one liquid addition 0 - 4%	

4.11 Conditioner

Capacity	10 tons per hour dry meal
Type	Dual conditioning
Retention time	Approx 180 sec.
Filling level	Max. 50%

4.12 Liquid addition in Conditioner

Capacity based on dry meal input	Steam 5 -15% Water 5-10% Oil 1-3%
Conditions	Oil and water preferred preheated to approx. 60°C

4.13 Extruder

Capacity	10 ton per hour dry meal
Moisture content exit extruder	22%-28%
Internal fat	<7%
Pellet size (smaller sizes effect the capacity)	ø4mm – ø12 mm
Bulk density (depending on recipe) sinking feed	600 – 660 gram per liter

4.14 Drying

Capacity input dryer	13.5 ton per hour
Moisture content input dryer	Up to 28%
Water evaporation	2,690 kg/h
Moisture content exit dryer	6-8%
Retention time	Approx. 45 minutes

4.15 Sifting before Coater

Capacity	16 tons per hour
Product	ø4 mm - ø12 mm
Density	350 – 600 gram per liter
Screens	To be specified by Supplier

4.16 Coating

Capacity input	10.8 ton per hour
Liquid addition, one step coating	5% - 20% of output dryer
Capacity exit coater	Approx. 13.0 ton per hour

4.17 Cooler

Capacity	13.0 ton per hour
Product density	630 gram per liter
Product temperature input	65°C
Product moisture	Approx. 8%
Product temperature	5°C above incoming air temperature

4.18 Finish Product Silos

Capacity	Storage for 8 hours production
Product density	500 - 630 gram per liter
Volume based of 500 g/l	8 silos each 30 m^3; Total 240 m^3
Product moisture	Approx. 8%
Product temperature	5°C above incoming air temperature

4.19 Sifting before Packing

Capacity	22 ton per hour (packing in two shifts)
Product	ø4 mm - ø12 mm
Density	500 – 630 gram per liter
Screen	To be specified by Supplier

4.2 Packing

Packaging line 1 – Big bags	Semi-automated type
Packing machine type	Vertical
Capacity	22 ton per hour
Bigbag size	500 – 1,000 kg
Bag material	Pre-made bags with 2 hooks
Mounting of bigbag	Manual
Bag closing	Manual
Weighing	Standing on platform or hanging

Packaging line 2 – Small bags	Semi-automated type
Packing machine type	Vertical
Capacity	22 ton per hour
Bigbag size	15 – 25 kg
Bag material	Paper bags with inner lining
Mounting of bags	Manual
Bag closing	Sewing
Weighing	Standing on platform or hanging
Transport to pallet	Belt conveyor
Final wrapping	Automatic wrapping machine

4.3 OPTION: Crumbling before Packing

Capacity	10 ton per hour
Product input	Ø3 - Ø4 mm
Density	500 – 630 gram per liter
Product output	1,250; 1,000; 700; 400 my
Max fraction 3mm, even distributed by 20%	1.2 - 3.0 mm 1.0 - 1.2 mm 0.7 – 1.0 mm 0.4 – 0.7 mm 0.0 – 0.4 mm