



Lab Scale Plant

The lab scale unit designed by SIPEPL is a universal plant of nominal capacity 10 kgs-70 kgs suitable for the manufacture of various specialty fats to help you with research and development of Specialty fats on different taste and textures sought by the growing demand of the market.

The Lab Scale model will comprise of two Sinitators and two Crystallizers. A wide range of capacity from 10 kgs/hr to 70 kgs/hr is made possible with the help of variable frequency drives on which the Sinitators operate on and the automatic control of the Digital Scroll Freon R404 Compressor Unit that can automatically be set from 10%-100% capacity depending on the rate of production. The Lab Scale model is a skid mounted equipment complete with two batching tanks mounted on Load cells to create batches, high pressure piston pump, MFC controlled nitrogen dosing unit, homogenizing valve and resting tube enabling the customer to make all Specialty Fats possible. The Lab Scale Plant shall be completely automatic, operated from a HMI with data logging of important parameters that can be passed on once taken up for production.





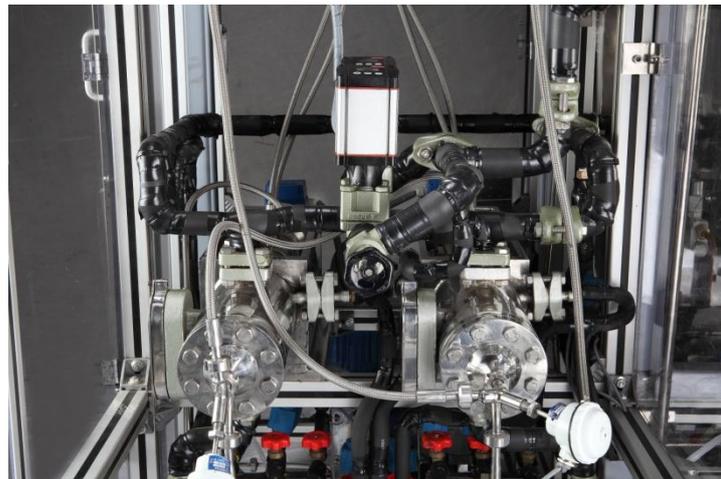
Sinitator™ (SSHE) – Qty 2 nos

The Sinitators™ are Refrigerant flooded Scraped Surface Heat Exchanger (SSHE) in which the emulsion is shock chilled when it passes through the annular space between the rotor shaft and the chilling tube. The Sinitator™ mainly comprises of a weldment, a chilling tube and a rotor shaft with scraper blades. The chilling tube length for a Pilot Plant will be 200mm providing a cooling surface area of 28275 mm² per chilling tube.

These High Pressure Tubular Chilling Tubes are made of hard chromed carbon steel with corrugated outer surface and designed to ensure effective heat transfer between the cooling media and the product. All other parts of the Sinitator™ that come in contact with the product are made of AISI 316 and the non-contact parts are made of AISI 304.

The Knife System comprising of **Bulldog** type Delrin blades on the rotor shafts are pressed against the chilling tubes by centrifugal force ensuring consistent scraping. The gear driven rotor shafts are attempored with water with a combination of a built-in Rotary Joint and water heater system with temperature control and indication considerably reducing down time. The knife system is driven by low noise level gearboxes.

The Sinitators™ are assembled with mechanical seals with sliding parts in Tungsten Carbide. The seals are designed for 80 Bar.



The Freon R404A Refrigeration System Cooling Circuit for Sinitators™ shall be complete with automated liquid line and Suction Line with motorized valves for suction pressure control.

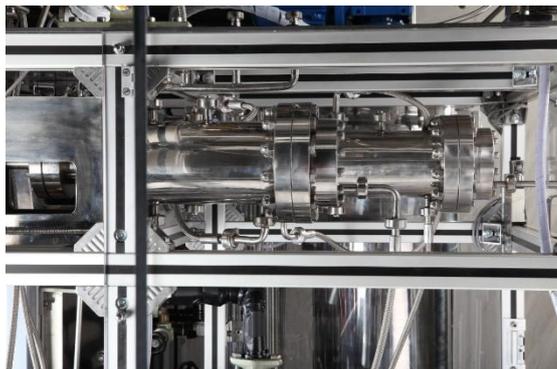




Sinitator™ Specifications	
Configuration	Ø45 X 0.2 m - 2 Nos
Design Pressure	80 kg / cms ²
Refrigerant	Freon R404A
No. of Refrigerant Circuits	2
Chilling Tube Diameter and Length	Ø 45 mm, 0.2 m long
Surface Area for Heat Transfer per Tube	28274 mm ²
Refrigeration Controls	Inbuilt
Motors	S1 - 0.37 kW, S2 - 0.7 kW
Speed Reduction	Gear & VFD
Rotor RPM	300-600 Variable
Speed Variation	Through VFD
Annular Space	S1 - 7 mm, S2 - 8 mm
No. of Rows of Scrapers	2
No. of Scraping Blades per Tube / Material	6 nos / Delrin
Rotary Joint	Assembled
Mechanical Seal	Single Spring - 120 kg / cms ²
PT 100 Sensors	At all Inputs and Outputs
End Connection	Ø 8 X Ø 12 mm
MOC: Contact Parts: SS 316L, Non Contact Parts: SS 304, Inner Tube: CS	

Crystallizer (Pin Rotor)

The Crystallizers designed for the above capacity are pin rotors of capacity 1.75L litres and 3.5 litres respectively. The Crystallizers (Pin Rotors) are designed for a retention time of one and half minute and three minute respectively. The 3.5 Litre crystallizer, however shall comprise of two 1.75L Crystallizers cascaded to form a single unit. The cascaded crystallizer gives the flexibility to either use a single or both the crystallizers depending on the product run. Both Crystallizers are provided with a motor, gearbox assembly suitable to operate at approximately 300 rpm. However, variable frequency drives connected to the motors shall enable speed control between 0-300 rpm as desired.





The Crystallizer shall be an assembly of a rotor shaft and the body weldment with pins intermittently welded on both the rotor as well as the body and provided with a heating jacket with a provision to circulate temperature controlled water in the heating jacket when in operation.

The Crystallizers are assembled with mechanical seals with Sliding parts in Tungsten Carbide. The seals are designed for 80 Bar. Generally the pressure does not go beyond 50-60 bar for the products mentioned under nominal capacities. Test Certificates for the Pressure tests will be provided.

Crystallizer Skid Specifications	
Configuration	1.75 ltrs and 3.5 ltrs (1.75 X 2 Nos, Cascaded)
Design Pressure	120 kg / cms ²
No. of Rows of Pins on Body	1
Diameter of Pins on Body	12 mm
No. of Rows of Pins on Shaft	2
Diameter of Pins on Shaft	12 mm
Motors	C1 - 0.37 kW, C2 - 0.55 kW
Speed Reduction	Gear
Rotor RPM	0-300
Speed Variation	Variable Speed
PT 100 Sensors	At all Inputs and Outputs
Motor RPM	1440
End Connection	Ø 8 X Ø 12 mm
MOC: Contact Parts: SS 316L, Non Contact Parts: SS 304	

Resting Tube

The resting tube for the Lab Scale Plant shall be a set of four of jacketed modular tubes of SS316 construction of **1.75 ltr capacities** each. The Resting Tube shall be designed for a total resting time of six minutes with all four tubes in place; however resting times of 1.5 min, 3 min and 4.5 min can also be achieved by using 1, 2 and 3 tubes in place of 4 respectively as these tubes are interconnected by flanges between modules. The resting tube shall also be provided with **sieve plates** which may be inserted in any slot between the four tubes. The total area of the holes shall be 5 -10% of the inner diameter of the resting tube to accommodate the production of different products using the same tube.

One end of the resting tube shall have a reducer with flange end connection at one end to connect to the resting tube and DIN connection to the other which may be connected to any of the Sinitators™ or Crystallizers using a suitable set of piping. The other end of the resting tube shall have a circular-to-rectangular transition piece to collect the final product.



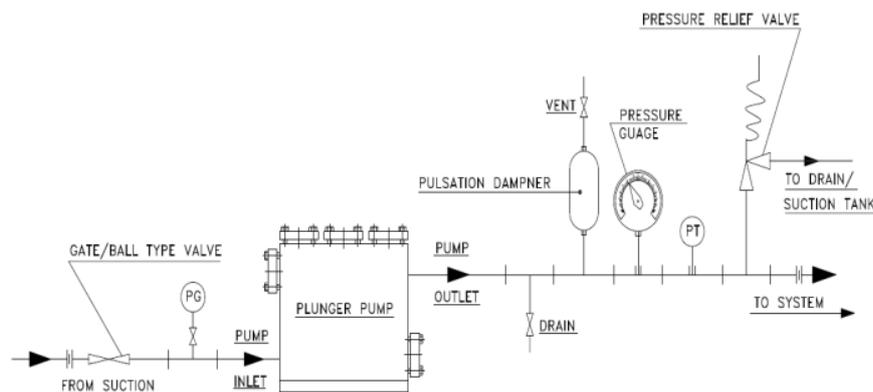


All the circular segments of the Resting Tube shall be jacketed for circulation of water at a controlled temperature during production.



Triplex Plunger Type Reciprocating Pump

The cooling of the emulsion in the SSEs and the reduced cross sectional flow in the Resting Tube causes the pressure to rise to the extent of 60 Bar for certain products. A high pressure positive displacement pump will thereby be required for the manufacture of Specialty Fats.





Plunger Pump Specifications	
Pressure	80 kg / cms ²
Pump type	Horizontal single acting reciprocating plunger type pump
Model	TP - 20
Max. Capacity	75 kgs / hr
Plunger Diameter	12 mm
Pump Speed	200 spm
Stroke length	20 mm
Recommended motor	0.75 kW inclusive of separate fan
Motor RPM	1440
Speed reduction	Gear
Speed Variation	Through Variable Frequency Drive
Pressure Transmitter	Broil Tech make (Italy)
Analog Pressure Gauge	1 No
Safety Relief Valve	1 No
Liquid end material of construction – Stainless steel 316 quality	

In addition, the Pilot Plant shall be complete with Premix and Water Phase Tanks, hot water circulation tanks and accessories, complete refrigeration system comprising of a Digital Scroll Compressor, Homogenizing Valve and Nitrogen Dosing System required to produce Aerated Shortenings. The Pilot Plant shall be PLC Controlled with options of HMI or SCADA for logging and monitoring parameters.





BOM for Lab Scale Plant

Sl No	Description	Qty
PROCESSING		
1	Sinitator™ Dia 45 X 0.2M (SSHE)	2 NOS
2	Crystallizer 1.75L Capacity (Pin Rotor)	1 NO
3	Cascaded Crystallizer 3.5L Capacity (1.75L X 2) Capacity (Pin Rotor)	1 NO
4	Resting Tube (1.75L Capacity X 4 Tubes + 1 NO of Circular to Rectangular Piece)	1 SET
	- 1.75L Capacity Jacketed Tubes - 4 NOS	
	- Circular to Rectangular Transition Piece - 1 NO	
	- Sieve Plates - 2 NOS	
	- Conical Piece - 1 NO	
5	High Pressure Plunger Pump	1 NO
6	Oil Feed Pump	2 NOS
7	Hot Water Circulation System for Sinitator Shafts, Crystallizer Jackets and Resting Tube	1 SET
8	Nitrogen Dozing System	1 NO
9	Homogenizing Valve	1 NO
BATCHING		
1	Valves and Fittings	3 NOS
2	Premix Tank - 50L Capacity	1 SET
	- Agitator Assembly	
	- Load Cell with Indicator	
	- Low Level Switch with Alarm	
	- Limped Coils	
	- Actuator Valves for Hot/Cold Water Circulation	
	- Hoses	
3	Water Phase Tank - 40L Capacity	1 SET
	- Agitator Assembly	
	- Load Cell with Indicator	
	- Low Level Switch with Alarm	
	- Limped Coils	
	- Actuator Valves for Hot/Cold Water Circulation	
4	Duplex Filter	1 SET
UTILITIES		
1	Refrigeration System	1 NO
2	Hot Water Tank and Accessories for Complete Plant	1 NO
AUTOMATION		
1	Control Panel for Automation	1 NO
2	PLC & HMI System	1 NO

