Section 4:Process Equipment List

The detailed lists of process equipment for the facilities used in production at ScinoPharm are attached. These facilities include the:

* 4-1: Kilo Lab I.
* 4-2: Kilo Lab II
* 4-3: Mini Bay .
* 4-4: Peptide Purification Plant.
* 4-5: Early Stage Plant(ESP) I
* 4-6: Early Stage Plant(ESP) II
* 4-7: Mini Plant.
* 4-8: Pilot Plant.
* 4-9: Small Manufacturing Unit (SMU).
* 4-10: Large Production Facility (Bay 1).
* 4-11: Large Production Facility (Bay 2).
* 4-12: Large Production Facility (Bay 3).

Each of these provides separate rooms for reactors, material charging, and drying /finishing equipment.

All plant areas are designed to be highly configurable to allow multi-purpose batch operations. G/L steel equipment is Buchi ,Tycon,Pfaudleler or De Dietrich. Centrifuges are all Heinkel inverting basket. Dryers are Krauss Maffe, conical with agitation.

More specific information on plant operations is contained in section 5 and 17-20.

4-1:Kilo Lab I

Volume	Material	Comments
Reactors (Operating Range of - 50^{o} C to +120^{o} C)		
* 50 L	Glass and G/L Steel	With Distillation Column
* 50 L	Glass and G/L Steel	
* 25 L	Glass and G/L Steel	With Distillation Column
* 25 L	Glass and G/L Steel	
* 30 L	Hastelloy C	
* 30 L	Hastelloy C	
* 16 L	Glass and G/L Steel	
* 16 L	Glass and G/L Steel	
Material Charging Equipment		
* 40 L	SS 316 L	Four Each
* 4 L	SS 316 L	Three Each
* 10 L	SS 316 L	Two Each
* 20 L	SS 316 L	Two Each
Finishing/ Drying Equipment		
* 10L Pressure Filter	SS 316 L	
* 10L Pressure Filter	SS 316 L	
* 10L Pressure Filter	Hastelloy	
* Vacuum Tray Dryer 0.24m^2	SS 316 L	
* Vacuum Tray Dryer 0.24m^2	SS 316 L	

Miscellaneous Support Equipment for use as receivers storage, and feed vessels

* 2 X 50 L Glass Rotary Evaporators
* 14 X 20 L Glass, 4 X 114 L SS 316 L, 2X80 L SS316L

Reactors are located in four separate hooded suites. All material handling including product filtration and drying are conducted in glove boxes. Cryogenic cooling to -80^{o}C is available.

4-2:Kilo Lab II

Volume	Material	Comments
Reactors (Operating Range of - 90^{o} C to +200^{o} C)		
* 30 L	Glass and G/L Steel	
* 15 L	Glass and G/L Steel	
* 200L	SS316 L	
Material Charging Equipment		
* 20 L	Glass	Two Each
Finishing/ Drying Equipment		
* 10L Pressure Filter	SS316 L	
* Vacuum Tray Dryer 0.24m^{2}	SS 316 L	
Preparative Columm Chromotagraphy		
* Varian DAC Columm(30 cm)		
* Varian DAC Columm(50 cm)		
Miscellaneous Support Equipment for use as receivers storage, and feed vessels		
* 2 X 50 L	Glass Rotary Evaporators	
* 7 X 200 L	Glass SS 316 L	
* 11 X 10~50 L	Glass SS 316 L	
* 2 X 600 L	Glass SS 316 L	

4-3:Mini Bay

Volume	Material	Comments
Reactors (Operating Range of - 29^{o} C to +200^{o} C)		
* 50 L X 2	G/L Steel	
* 100 L X 4	G/L Steel	
* 50 L X 1	SS316 L	
* 80 L X 1	SS316 L	
* 400 L X 1	G/L Steel	
* 400 L X 1	SS316 L	
Finishing/ Drying Equipment		
* 30L Pressure Filter X 4	SS316 L	
* Vacuum Tray Dryer	SS 316 L X 2	~10 Kg/batch
Miscellaneous Support Equipment for use as receivers storage, and feed vessels		
4 X 100 L	Glass SS 316 L, 2 X 200 L	

4-4:Peptide Purification Plant

Volume	Material	Comments
Reactors (Operating Range of - 60^{o} C to +200^{o} C)		
* 50 L	SS316 L	
Finishing/ Drying Equipment		
* Freeze Dryer 0.9 m^2	SS316 L	
* Preparative Columm Chromotagraphy Novasep Dac column (HPLC, 20 cm)		
Miscellaneous Support Equipment for use as receivers storage, and feed vessels		
2 X 50 L	Glass Rotary Evaporators	
6 X 200L	SS 316L	

4-5:Early Stage Plant (ESP I)

Volume	Material	Comments
Reactors (Operating Range of - 60^{o} C to +200^{o} C)		
* 30 L X 4	Glass	
* 50 L	G/L Steel	
* 50 L	Hastelloy C	
Finishing/ Drying Equipment		
* 10L Pressure Filter X 2	S316L	
* 20L Pressure Filter X 1	S316L	
* 10L Pressure Filter X 2	Hastelloy	
* Vacuum Tray Dryer SS 316 L X 2 : ~7 kg/batch		
Miscellaneous Support Equipment for use as receivers storage, and feed vessels		
8 X 50 L	Glass Rotary Evaporators	
8 X 20 L SS 316L, 1X130 L S316L, 1X80 L S316L		

4-6:Early Stage Plant (ESP II)

Volume	Material	Comments
Reactors (Operating Range of - 29^{o} C to +200^{o} C)		
* 250 L	G/L Steel	
* 400 L	G/L Steel	
Material Charging Equipment		
* 75 L	G/L Steel	
* 50 L	G/L Steel	
* 120 L	G/L Steel	
* 180 L	G/L Steel	
Finishing/ Drying Equipment		
* 80L Pressure Filter	S316L	
* Filter Dryer (0.2 m^2)	S316L	
* Vacuum Tray Dryer SS 316 L : ~15 kg/batch		
Miscellaneous Support Equipment for use as receivers storage, and feed vessels		
1X 200 L S316L, 1X300 L S316L		

4-7:Mini Plant

Volume	Material	Comments
Reactors (Operating Range of -50^{o}C to +120^{o}C)		
* 80 L	Hastelloy	
* 80 L	G/L Steel	
* 120 L	G/L Steel	With Distillation Column
* 80 L	Hastelloy	
* 120 L	G/L Steel	With Distillation Column
* 200 L	G/L Steel	
* 420 L	SS 316 L	
Receiver		
* 120 L	G/L Steel	
* 120 L	G/L Steel	
* 120 L	G/L Steel	
* 120 L	G/L Steel	
Finishing/Drying Equipment		
* 120 L	G/L Steel	Crystallizer
* 120 L	G/L Steel	Crystallizer
* 20 L	SS 316 L	Pressure Filter
* 20 L	SS 316 L	Pressure Filter
* Vacuum Tray Dryer	SS 316 L	2.64m^{2}
* Vacuum Tray Dryer	SS 316 L	2.64m^{2}

Two fluid precision controlled heat transfer systems are available for connection to any reactor for specific reaction control or for use as a crystallizer.

All material handling including product filtration and drying are isolated in gloveboxes.

One set of cryogenic facilities is connected to an 80-L Hastelloy C276 reactor capable of operating temperatures as low as minus 80°C.

One heat transfer fluid unit using hot oil as the heating media is connected to a 120-L G/L reactor capable of operating at temperatures up to 200°C.

4-8:Pilot Plant

Volume	Material	Comments
Reactors (Operating Range of - 20^{o}C to +150^{o}C for all)		
* 1200 L	G/L Steel	
* 1200 L	G/L Steel	
* 800 L	G/L Steel	
* 1200 L	SS 316 L (**-80^{0} C**)	Hydrogenation Reactor
* 1200 L	SS 316 L	
* 2000 L	G/L Steel	With Distillation Column
* 800 L	G/L Steel	With Distillation Column
Material Charging Equipment		
* 400 L	Hastelloy C	
* 800 L	SS 316 L	
* 200 L	SS 316 L	
Finishing/ Drying Equipment		
* 800 L	G/L Steel	Crystallizer
* Heinkel Centrifuge	Hastelloy	450 mm
* 420 L Krauss Maffei Agitated Conical Dryer	Hastelloy	
* Hosokawa Stott Laminar Flow Packaging System	SS 316 L	
Miscellaneous Support Equipment		
* Centrifuge	Hastelloy Cladding Steel	42"
* 3-in-1 Filter Dryer (0.8 m^2)	SS316L	
* Niagara Horizontal Plate Filter	Hastelloy	18"
* Niagara Horizontal Plate Filter	SS316L	18"
* Aurora Filter	HALAR Lined Steel	26" (0.34 m^2 of filtration area)

Miscellaneous Support Equipment for Use as Receivers, Storage, or Feed Vessels

* SS: 1X 200 L, 3 X 4000 L; G/L Steel: 2 X 800 L, 1X 400 L, 1 X 4000 L
* FRP: 1 X 200 L, 1 X 20000 L

Three fluid precision controlled heat transfer systems are available: one set is for connection to any reactor for specific reaction control and other two are dedicated to the crystallizer and dryer.

4-9:Small Manufacturing Unit (SMU)

Volume	Material	Comments
Reactors (Operating Range of - 15^{O}C to +150^{O}C for all)		
* 1136 L (300 gal)	SS 316 L	
* 1136 L (300 gal)	SS 316 L (**-80^{0}C**)	
* 757 L (200 gal)	G/L Steel	
* 757 L (200 gal)	G/L Steel	With Distillation Column
* 1136 L (300 gal)	G/L Steel	
* 1893 L (500 gal)	G/L Steel	
* 2893 L (750 gal)	G/L Steel (**200^{0}C**)	With Distillation Column
Material Charging Equipment		
* 379 L (100 gal)	Hastelloy(**-80^{0}C**)	
* 189 L (50 gal)	SS 316 L	
* 757 L (200 gal)	SS 316 L	
Finishing/ Drying Equipment		
* 1136 L (300 gal)	G/L Steel	Crystallizer
* Heinkel Centrifuge	Hastelloy	450mm
* 420 L Krauss Maffei Agitated Conical Dryer	Hastelloy	
* Hosokawa StottPackaging System	SS316 L	
Miscellaneous Support Equipment		
* Basket Centrifuge	Hastelloy Cladding Steel	42"
* Niagara Horizontal Plate Filter	SS316 L	18"
* Plate filter	SS316L	2 X 2.5m^2

Miscellaneous Support Equipment for use as receivers, storage, and feed vessels

* 1 X 400 L, 1 X 600 L, 3 X 3785 L(1000 gal)
* G/L Steel: 1 X 379 L(100 gal), 2 X 757 L(200 gal), 1 X 3785 L(1000 gal)

Three fluid precision controlled heat transfer systems are available: one set is for connection to any reactor for specific reaction control and other two are dedicated to the crystallizer and dryer.

4-10:Large Production Facility-Bay 1

Volume	Material	Comments
Reactors (Operating Range of - 20° C to +150°C for all)		
* 2839 L (750 gal)	G/L Steel	
* 2839 L (750 gal)	G/L Steel	With Distillation Column
* 3785 L (1000 gal)	G/L Steel	With Distillation Column
* 5678 L (1500 gal)	G/L Steel	
* 1893 L (500 gal)	SS 316 L	
* 3785 L (1000 gal)	SS 316 L	With Distillation Column
Material Charging Equipment		
* 379 L (100 gal)	Hastelloy	
* 379 L (100 gal)	SS 316 L	
* 1893 L (500 gal)	SS 316 L	
Finishing/ Drying Equipment		
* 3785 L (1000 gal)	G/L Steel	Crystallizer
* Heinkle Centrifuge	SS316 L	600mm
* 1000L Krauss Maffei Agitated Conical Dryer		SS 316 L
* Fitzmill D6A Mill		SS 316 L
* Hosokawa Stott Packaging System		SS 316 L
Miscellaneous Support Equipment		
* Plate filter	SS316L	$5m^2$

Miscellaneous Support Equipment for Use as Receivers, Storage, or Feed Vessels

* SS: 3X18925 L (5000 gal)"
* G/L Steel: 1X 1136 L (300 gal), 2 X1893 L (500 gal), 2X18925 L(5000 gal)
* FRP: 1X45000 L (for waste water)

Three fluid precision controlled heat transfer systems are available: one set is for connection to any reactor for specific reaction control and other two are dedicated to the crystallizer and dryer.

4-11:Large Production Facility-Bay 2

Volume	Material	Comments
Reactors (Operating Range of - 20°C to +150°C for all)		
* 3785 L (1000 gal)	G/L Steel	
* 3785 L (1000 gal)	G/L Steel	With Distillation Column
* 5678 L (1500 gal)	G/L Steel	
* 5678 L (1500 gal)	G/L Steel (**200°C**)	With Distillation Column
* 3785 L (1000 gal)	SS 316 L (**-80°C**)	
* 5678 L (1500 gal)	SS 316 L	With Distillation Column
* 2600 L (684 gal)	Hastelloy	Hydrogenator (22 Bar)
* 6000 L (1580 gal)	Monel (**-80°C**)	
Material Charging Equipment		
* 1893 L (500 gal)	Hastelloy (**-80°C**)	
* 1893 L (500 gal)	SS 316 L	
* 2839 L (750 gal)	SS 316 L	
Finishing/ Drying Equipment		
* 5678 L (1500 gal)	G/L Steel	Crystallizer
* Heinkle Centrifuge	Hastelloy	600mm
* 1500 L Krauss Maffei Agitated Conical Drier	Hastelloy	
* Fitzmill D6A Mill	SS316L	
* Hosokawa Stott Packaging System	SS316L	
Miscellaneous Support Equipment		
* Plate Filter	SS316L	5 m^2
* Plate Filter	Hastelloy	2.5 m^2
* Centrifuge	Hastelloy Cladding Steel	48”
* Cone Dryer	SS316L	2 m^2

Miscellaneous Support Equipment for Use as Receivers, Storage, or Feed Vessels

* SS: 3 X 18925 L(5000 gal)
* G/L Steel: 3 X 1893 L (500 gal), 2X 18925 L(5000 gal)
* FRP: 1 X 45000 L (For waste Water)

Three fluid precision controlled heat transfer systems are available: one set is for connection to any reactor for specific reaction control and other two are dedicated to crystallizer and dryer.

4-12:Large Prodcution Facility-Bay 3

Volume	Material	Comments
Reactors (Operating Range of - 20^{O}Cto +150^{O}C for all)		
* 3785 L (1000 gal)	SS 316 L	
* 5678 L (1500 gal)	SS 316 L	With Distillation Column
* 5678 L (1500 gal)	G/L Steel	
* 7570 L (2000 gal)	G/L Steel	
* 7570 L (2000 gal)	G/L Steel	With Distillation Column
Material Charging Equipment		
* 1893 L (500 gal)	Hastelloy	
* 1893 L (500 gal)	SS 316 L	
* 3785 L (1000 gal)	SS 316 L	
Finishing/Drying Equipment		
* 7570 L (2000 gal)	G/L Steel	Crystallizer
* Heinkle Centrifuge	SS 316 L	600 mm
* 2000 L Krauss Maffei Agitated Conical Dryer	SS 316 L	
* Hosokawa StottPackaging System	SS316 L	
Miscellaneous Support Equipment		
* Plate Filter	SS316 L	5 m^2
Preparative Columm Chromotagraphy		
* Technikrom DAC Columm	(100 cm)	
* Technikrom DAC Columm	(500 cm)	
* GE Healthcare DAC Columm	(300 cm)	

Miscellaneous Support Equipment for Use as Receivers, Storage, or Feed Vessels

* SS: 3 X 18925 L(5000 gal)
* G/L Steel: 2 X 2839 L (750 gal), 1 X 1893 L, 2 X 18925 L(5000 gal)

Three fluid precision controlled heat transfer systems are available: one set is for connection to any reactor for specific reaction control and other two are dedicated to crystallizer and dryer.

4-13:Physical Processing Plant

The purpose of this plant is to process API power, eg. Milling , Drying , Blending , etc.

The major equipment is list as below:

Name	Particle size	Capacity	Material
* Fitz Mill	X 1 100-800 *u*m	100-600 Kg/hour	
* Jet Mill	X 1 <10 *u*m	0.5-50 Kg/hour	
* Tray Dryer	X 4 (Max 200^{0}C)	150 L	SS316 L
* Rotary Cone Mixer	X1	50 L	SS316 L
* Double Cone Dryer	X 1	400 L	HC22