

## Process Equipment List

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

These facilities include the:

- \* 1: Kilo Lab. (2 lines)
- \* 2: Mini Plant. (2 lines)
- \* 3: Pilot Plant.
- \* 4: Small Manufacturing Unit(SMU).
- \* 5: Large Production Facility (Bay 1).
- \* 6: Large Production Facility (Bay 2).
- \* 7: Large Production Facility (Bay 3).
- \* 8: Mini Bay
- \* 9: Kilo Lab 2
- \* 10: Early Stage plant 2
- \* 11: Peptide plant
- \* 12: Solid phase peptide synthesis plant (SPPS)

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 either Buchior Tycon. Centrifuges are all Heinkel inverting basket. Dryers are Krauss Maffe, conical with agitation.

**More specific information on plant operations is contained in Specialized Facility Capabilities in General.**

## 1: Kilo Lab

Volume	Material	Comments
<b>Reactors (Operating Range of -50°C to +120°C)</b>		
* 50L	Glass and G/L Steel	With Distillation Column
* 50L	Glass and G/L Steel	
* 25L	Glass and G/L Steel	With Distillation Column
* 25L	Glass and G/L Steel	
* 30 L	Hastelloy C	
* 16 L	Glass and G/L Steel	
* 16 L	Glass and G/L Steel	
* 20 L	SS 316L	

### 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 <sup>2</sup>	SS316L
* Vacuum Tray Dryer 0.24m <sup>2</sup>	SS316L

### 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°C is available.

## 2: Mini Plant

Volume	Material	Comments
<b>Reactors ( Operating Range of -50<sup>o</sup> C to +120<sup>o</sup> C )</b>		
* 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
* 420LX2		SS316L
* 150L	Hastelloy	Hydrogenator
<b>Receiver</b>		
* 120 L		G/L Steel
* 120 L	G/L Steel	
* 120 L	G/L Steel	
* 120 L		G/L Steel
<b>Finishing/Drying Equipment</b>		
* 120 L	G/LSteel	Crystallizer
* 120 L	G/LSteel	Crystallizer
* 20 L		SS 316 L Pressure Filter
* 20 L		SS 316 L Pressure Filter <sub>2</sub>
* Vacuum Tray Dryer		SS 316 L 2.64m <sub>2</sub>
* Vacuum Tray Dryer		SS 316 L 2.64m <sub>2</sub>
* Vacuum Tray Dryer		SS 316 L 2.64m <sub>2</sub>

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 glove boxes.

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

Two heat transfer fluid unit using thermal oil as the heating media is connected to two 420 L SS 316 reactors capable of operating at temperatures up to 160°C.

### 3: Pilot Plant

Volume	Material	Comments
<b>Reactors (Operating Range of -20<sup>o</sup> C to +150<sup>o</sup> C for all)</b>		
* 1200 L	G/L Steel	
* 1200 L	G/L Steel	
* 800 L	G/L Steel	
* 1200L	SS 316L (-80 <sup>o</sup> 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
* 800L	SS 316 L
* 200L	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	
* Vacuum Tray Dryer x 2	SS 316 L	2.64m <sup>2</sup>

#### Miscellaneous Support Equipment

* Centrifuge	Hastelloy Cladding Steel	42"
* Niagara Horizontal Plate Filter	Hastelloy	18"
* Niagara Horizontal Plate Filter	SS316 L	18"

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

- \* SS:1X200L,3X4000L; G/LSteel:2X800L,1X400L,1X4000L
- \* FRP:1X200L,1X20000L

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: Small Manufacturing Unit (SMU)

Volume	Material	Comments
<b>Reactors (Operating Range of -15 °C to +150 °C for all)</b>		
* 1136 L (300 gal)	SS 316 L	
* 1136 L (300 gal)	SS 316 L (-80 °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	With Distillation Column

#### Material Charging Equipment

* 379 L (100 gal)	Hastelloy
* 189 L(50 gal)	SS 316 L
* 757 L (200 gal)	SS 316 L

#### Finishing/Drying Equipment

* 1136L(300gal)	G/L Steel	Crystallizer
* Heinkel Centrifuge	Hastelloy	450mm
* 420 L Krauss Maffei Agitated Conical Drier	Hastelloy	
* FitzmillD6A Mill	SS316 L	
* Hosokawa Stott Packaging System	SS 316 L	
* Vacuum Tray Dryer x2	SS 316 L	2.04 m <sup>2</sup>

#### Miscellaneous Support Equipment

* Centrifuge	Hastelloy Cladding Steel	42"
* Niagara Horizontal Plate Filter	SS 316 L	18"
* Plate filter	SS 316 L	2 X 2.5 m <sup>2</sup>

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

- \* 1x400L, 1X600L, 3X3785 L((1000 gal)
- \* G/L Steel: 1 X 379 L (100 gal), 2 X 757 L (200 gal), 1 X 3785 L(1000 gal) (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.

## 5: Large Production Facility-Bay 1

Volume	Material	Comments
<b>Reactors (Operating Range of -20° C to +150° C for all)</b>		
* 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
* 5678 L (1500 gal)	G/L Steel	
* 3785L (15000 gal)	G/L Steel	

### Material Charging Equipment

* 379 L (100 gal)	Hastelloy
* 379 L (100 gal)	SS 316 L
* 1893 L (200 gal)	SS 316 L

### Finishing/Drying Equipment

* 7570L(2000gal)	G/L Steel	Crystallizer
* Heinkel Centrifuge	SS 316 L	600mm
* 1000 L Krauss Maffei Agitated Conical Drier	SS 316 L	
* FitzmillD6A Mill	SS 316 L	
* Hosokawa Stott Packaging System	SS 316 L	
* Filter Dryer	SS 316 L	0.5 m <sup>2</sup>

### Miscellaneous Support Equipment

* Plate filter	SS 316 L	5 m <sup>2</sup>
----------------	----------	------------------

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

- \* ss: 3x18925 L((5000 gal)
- \* G/L Steel: 1 X 1136 L (300 gal), 2 X 1893 L (500 gal), 1 X 18925 L (1000 gal) (5000 gal)
- \* FRP: 1 X 45000 L (For waster 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.

## 6: Large Production Facility-Bay 2

Volume	Material	Comments
<b>Reactors (Operating Range of -20 °C to +150 °C for all)</b>		
* 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
<b>Material Charging Equipment</b>		
* 1893 L (500 gal)	SS 316 L	Hastelloy
	Hastelloy	
* 1893 L (500 gal)	SS 316 L	
* 2839 L (750 gal)	SS 316 L	
<b>Finishing/Drying Equipment</b>		
* 7570L(2000gal)	G/L Steel	Crystallizer
* Heinkel Centrifuge	Hastelloy	600mm
* 1500 L Krauss Maffei		
Agitated Conical Drier	Hastelloy	
* FitzmillD6A Mill	SS 316 L	
* Hosokawa Stott		
Packaging System	SS 316 L	
<b>Miscellaneous Support Equipment</b>		
* Plate filter	SS 316 L	5 m <sup>2</sup>
* Plate filter	Hastelloy	2.5 m <sup>2</sup>
* LPLC Column (10 Kg/ cm <sup>2</sup> )	SS 316 L	120 L, 8L/min
* LPLC Column (20 Kg/ cm <sup>2</sup> )	SS 316 L	300 L, 500 L/min

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

- \* SS 3x18925 L (5000 gal)
- \* G/L Steel: 3X 1896 L (500 gal), 2 X 1893 L (5000 gal).
- \* FRP: 1 X 45000 L (For waster 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.

## 7: Large Production Facility-Bay 3

Volume	Material	Comments
<b>Reactors (Operating Range of -20<sup>o</sup> C to +150<sup>o</sup> C for all)</b>		
* 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
<b>Material Charging Equipment</b>		
* 1893 L (500 gal)	Hastelloy	
* 1893 L (500 gal)	SS 316 L	
* 3785 L (1000 gal)	SS 316 L	
<b>Finishing/Drying Equipment</b>		
* 7570 L (2000 gal)	G/L Steel	Crystallizer
* Heinkle Centrifuge	SS 316 L	600 mm
* 2000 L Krauss Maffei Agitated Conical Drier	SS 316 L	
* Hosokawa StottPackaging System	SS 316 L	
<b>Miscellaneous Support Equipment</b>		
* Plate Filter	SS 316 L	5 m <sup>2</sup>
<b>Miscellaneous Support Equipment for Use as Receivers, Storage, or Feed Vessels</b>		
* 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.

## 8: Mini Bay

This is a dedicated plant for producing cytotoxic product. The major equipment is list as below:

<b>Volume</b>	<b>Material Operating Temp.</b>	<b>Range</b>
<b>* Reactors</b>		
63 L (X 4)	G/L Steel	- 20 <sup>0</sup> C ~ 200 <sup>0</sup> C
50 L (X 2)	G/L Steel	- 20 <sup>0</sup> C ~ 200 <sup>0</sup> C
80 L (X 1)	SS 316 L	- 60 <sup>0</sup> C ~ 200 <sup>0</sup> C
100 L (X 1)	SS 316 L	- 60 <sup>0</sup> C ~ 200 <sup>0</sup> C
<b>* Extractors</b>		
200 L (X 2)	SS 316 L	- 60 <sup>0</sup> C ~ 200 <sup>0</sup> C
<b>* Finishing/Drying Equipment</b>		
Tray Dryer (X 2)	SS 316 L	
Pressure Filter (X 2)	SS 316 L	

## 9: Kilo Lab 2

This is a dedicated plant for producing GMP product. The major equipment is list as below:

<b>Volume</b>	<b>Material Operating Temp.</b>	<b>Range</b>
<b>* Reactors</b>		
15 L (X 1)	G/L Steel	- 20 <sup>0</sup> C ~ 200 <sup>0</sup> C
30 L (X 1)	G/L Steel	- 20 <sup>0</sup> C ~ 200 <sup>0</sup> C
200 L (X 1)	SS 316 L	- 80 <sup>0</sup> C ~ 230 <sup>0</sup> C
<b>* Extractors</b>		
Rotary Evaporator (X 2)	Glassware	40 <sup>0</sup> C ~ 180 <sup>0</sup> C
<b>* Finishing/Drying Equipment</b>		
Tray Dryer (X 1)	SS 316 L	
Pressure Filter (X 1)	SS 316 L	
<b>* Miscellaneous Support Equipment</b>		
196-L 15-bar LPLC column and pumping skid system		
70-L 30- bar MPLC column and pumping skid system		

## 10: Early Stage Plant 2

This plant is to produce GMP Materials used in early stage project especially in phase1 and phase 2. The major equipment is list as below:

<b>Volume</b>	<b>Material Operating Temp.</b>	<b>Range</b>
<b>* Reactors</b>		
30 L (X 4)	Glassware	- 20 <sup>0</sup> C ~ 200 <sup>0</sup> C
50 L (X 1)	G/L Steel	- 20 <sup>0</sup> C ~ 200 <sup>0</sup> C
50 L (X 1)	Hastelloy	- 80 <sup>0</sup> C ~ 200 <sup>0</sup> C
<b>* Material Charging Equipment</b>		
20 L (X 4)	SS 316 L	
<b>* Finishing/Drying Equipment</b>		
Pressure Filter		
10 L (X 2)	SS 316 L	
10 L (X 1)	Hastelloy	
Tray Dryer (X 2)	SS 316 L	
Filter Dryer (X 1)	SS316 L	

## **11:Peptide Purification Plant**

This plant is designed to purify final peptide products by using Chromotagraphy technology.  
The major equipment includes:

- \* 22-L 70-bar HPLC column and pumping skid system
- \* 38-L 20-BAR MPLC column for salt-exchange
- \* 15-L 0.76 M<sup>2</sup> heat transfer area Lyophilizer

## **12: Solid phase peptide synthesis plant (SPPS)**

This plant is designed to produce crude peptide products by using peptide synthesis technology. The major equipment includes:

### **\* Reactor**

50 L (X 1) G/L Steel - 20<sup>0</sup> C ~ 200<sup>0</sup> C

### **\* Peptide Syntheizer**

20 or 80-L (X 1) Glass

### **Miscellaneous Support Equipment**

- Plate Filter Hastelloy 0.07 m<sup>2</sup>

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

\* SS: 2 X 50 L, 2 X 100 L, 3 X 200 L