



Primary Process Equipment

2000 GL	2000 gallon Pfaudler glasteel jacketed reactor rated at 90psi/FV. Variable frequency drive agitator, 200 ft ² Graphilor condenser.
1500 GL	1500 gal Pfaudler glasteel jacketed reactor rated at 100 psi/FV. Variable frequency drive agitator, 160 ft ² Karbate Condenser. Also with all glass overhead condensers.
1500 GL	1500 gallon Pfaudler glasteel jacketed reactor rated at 100 psi/FV, configured as a receiver.
1000 GL	1000 gal Pfaudler glasteel jacketed receiver rated at 100 psi/FV.
1500 SS	1500 gal 316 SS jacketed reactor rated 100 psi/FV, variable frequency drive agitator, 134ft ² condenser.
1000 SS	1000 gal 316 SS jacketed reactor rated at 100 psi/FV, VFD agitator, 86 ft ² condenser. Also with 6" diameter, 10ft packed column (1" DE-2 protruded packing), 34ft ² condenser and aftercooler, and 65 gallon product receiver.
500 C-22	500 gal Pfaudler Hastelloy C-22 reactor pressure rated at 150 psig/FV with variable frequency drive and 170 ft ² shell and tube Hastelloy C-22 condenser.
500 GL	500 gal glass lined steel processing vessel, 25 psi rated, agitated w/ VFD, jacketed with 45ft ² monolithic carbon block condenser.
50 GL	50 gal, glass lined steel, 25 psi rated agitated reactor with 15ft ² HE6 glass condenser. Also convertible for use as chlorinator.
30 GL Column	4" diameter column with 8 ft. of ceramic packing on 30 gal reboiler with 5ft ² condenser with automatic reflux splitter.
50 GL	50 gal, glass lined steel, 25 psi rated agitated reactor with 15ft ² HE6 glass condenser. Also convertible for use as chlorinator.
30 GL Column	4" diameter column with 8 ft. of ceramic packing on 30 gal reboiler with 5ft ² condenser with automatic reflux splitter.
WFE-2	14.13ft ² A. F. Smith 316 SS Wiped Film Evaporator.
WFE-3	14.2ft ² Pfaudler 316 SS Wiped Film Evaporator.(Back-up, not installed)
LUWA	1.4ft ² LUWA 316 SS Pilot Thin Film Evaporator.
50 GL	50 gal glasteel agitated evaporator.
Fume Scrubber	Countercurrent packed column fume scrubber – FRP & Polypropylene. (Capacity: 4000 CFM, 4ft Diameter, 15ft packed section, 700 gal reservoir)
Isolation Room	8' x 12' with direct vent to fume scrubber.
Packaging Hood	Bench top fume hood for toxic materials packaging.
Isolation Rooms	12.3ft ³ Patterson 316 SS Double Cone dryer/blender. 52ft ³ GEMCO Hastelloy C-276 double cone rotary dryer/blender. (Three separate suites. Each suite has its own once through HEPA filtered system to furnish conditioned air.)



Portable Equipment

100 – 160 Gallon	Glasteel and 316 SS receivers.
25 Br₂	25 gal glass lined steel bromine transfer egg.
Column	18" Diameter x 9 ft long, 150 psi rated, chromatographic column.
Sparkler Filters	33-D-17 (jacketed), 18-D-8; 18-S-23; 18-S-15 (jacketed), 316 SS Sparkler Filter Presses.
Nutsche Filters	4 x 33" diameter 316 SS Nutsche (jacketed) Pressure Filters (14 ft ³ solids capacity).
Mill	D-6 Fitzmill.
Homogenizer	25 h.p. Gaulin Homogenizer.
Centrifuge	24", Hastelloy C-276 Top unloading Tolhurst Centrifuge.
Dust Collector	Donaldson Torit, Model 84CAB.
Scales	5,000 lb. Electronic platform scales.
Dryer	60 ft ³ Stokes and pilot tray dryer.

Miscellaneous Process Equipment

Heat Exchangers	16ft ² ; Hastelloy C-276 Single Pass Shell & Tube Condenser.
Heat Exchangers	Variety of 316 SS shell and tube single pass heat exchangers for special set-ups.
Vacuum Pumps	Various Stokes Vacuum Pumps. (Capacity 150 CFM)
Pumps	Various 316 SS Centrifugal and Diaphragm Transfer Pumps.
200 SS	200 gal 316 SS processing unit, 220 psi rated, agitated, 180 psi rated jacket.
200 GL	200 gal, glass lined steel processing vessel, 25 psi rated, agitated and jacketed.
150 SS	150 gal, 316 SS processing vessel, 50 psi rated, 200 psi rated jacket, agitated, 25ft ² 316 SS condenser.
375 Plastic	375 gal polyethylene eductor scrubber system.

Utilities

Nitrogen Storage	3000 gal Cryogenic Nitrogen Storage Tank.
Boilers	1 x 100 h.p., 1 x 25 h.p., Cleaver Brooks Steam Boilers; 150 psi rated.
Chiller	2 x 40 ton Glycol Chiller system (-10°C to -15°C).
Water	400 ton Tower Water System.
Water	DI Water System (Fixed Resin Beds).
Hot Oil	Electric Hot Oil System for Evaporators.
Nitrogen	NIVOX 4010 Membrane Nitrogen System.
Compressor	15 & 30 h.p. reciprocating air compressors.
Cold Storage	10' x 12' 0°C – 5°C cold storage room.



Primary Process Equipment

JR-1	1000 gallon, stainless steel, jacketed reactor rated for 50psig/FV. Fixed speed agitator at 84rpm.
JR-2	1000 gallon, glass lined, jacketed reactor rated for 100psig/FV. Variable frequency drive agitator 90rpm max. 40 sqft, 316 stainless steel, condenser with a receiver.
R-1	750 gallon, glass lined, jacketed reactor rated for 100psig/FV. Fixed speed agitator at 88rpm. 40sqft., 316 stainless steel, condenser with a 300 gallon, glass lined, unjacketed, unagitated receiver.
R-3	500 gallon, glass lined, jacketed reactor rated for 50psig/FV. Fixed speed agitator at 60rpm.
R-4	50 gallon, glass lined, jacketed reactor rated for 150psig/FV. Mechanical variable speed agitator 100rpm max. Condenser with 300gal, stainless steel, unjacketed, unagitated receiver rated for 150psig/FV.
R-6	300 gallon, glass lined, jacketed reactor rated for 15psig/FV. Variable frequency drive agitator 140rpm max. Condenser without receiver. Condenser is shared with R-23.
R-7B	300 gallon, stainless steel, jacketed reactor rated for 60psig/FV. Fixed speed agitator at 60rpm.
R-8	200 gallon, glass lined, jacketed reactor for 25psig/FV. Fixed speed agitator at 115rpm.
R-9	2000 gallon, glass lined, jacketed reactor rated for 100psig/FV. Variable frequency drive agitator 100rpm max. 165sqft condenser with 500 gallon, glass lined, unagitated receiver rated for 25psig/FV.
R-12	30 gallon, stainless steel, jacketed reactor rated for 150psig/FV. Variable frequency drive agitator 70rpm max. 10sqft, 316 stainless steel condenser with 30 gallon, glass lined, unagitated receiver not pressure rated. Condenser and receiver are shared with R-24.
R-18	50 gallon, glass lined, jacketed reactor rated for 25psig/FV. Variable frequency drive agitator 130rpm max.
R-19	3000 liter, stainless steel, jacketed reactor rated for 45psig/-15psig. Fixed speed agitator at 115rpm.
R-20	500 gallon, stainless steel, jacketed reactor rated for 145psig/FV. Fixed speed agitator at 360rpm. 56sqft condenser with 200 gallon, glass lined, unagitated receiver.
R-22	300 liter, portable, stainless steel, jacketed reactor rated for 40psig/FV. Fixed speed agitator at 285rpm.
R-23	2000 liter, stainless steel, jacketed reactor rated for 45psig/FV. Variable frequency drive agitator 360rpm max. Condenser without receiver. Condenser is shared with R-6.
R-24	20 gallon, glass lined, jacketed reactor rated for 30psig/FV. Variable frequency drive agitator 120rpm max. Condenser and receiver are shared with R-12.
R-25	1000 gallon, glass lined, jacketed reactor rated for 100psig/FV. Fixed speed agitator at 60rpm. 100sqft, stainless steel condenser with 1000 gallon, glass lined, unagitated receiver rated for 100psig/FV.
R-26	190 gallon, stainless steel, jacketed reactor not pressure rated. Variable frequency drive 360rpm maximum.
R-27	300 liter, portable, stainless steel, jacketed reactor rated for 40psig/FV. Fixed speed agitator at 285rpm.
R-28	300 liter, portable, stainless steel, jacketed reactor rated for 40psig/FV. Fixed speed agitator at 285rpm.
R-29	300 liter, glass lined, jacketed reactor rated for 29psig pressure. No vacuum rating. Fixed speed agitator at 105rpm. Condenser with 75 gallon, stainless steel, unjacketed, unagitated receiver rated for 25psig/FV.
R-30	200 gallon, stainless steel, jacketed reactor rated for 100psig/FV. Variable frequency drive 239rpm max. Condenser without receiver.
R-31	1000 gallon, stainless steel, jacketed reactor rated for 100psig/FV. Variable frequency drive 67rpm max. Condenser without receiver.
R-32	500 gallon, stainless steel, jacketed reactor rated for 100psig/FV. Variable frequency drive 130rpm max.



Primary Process Equipment (cont.)

R-33	50 gallon, glass lined, jacketed reactor rated for 25psig/FV. Variable frequency drive 130rpm max. Condenser with 200 gallon, unjacketed, unagitated receiver rated for 14.5psig/FV.
R-34	300 gallon, glass lined, jacketed reactor rated for 90psig/ unrated vacuum pressure. Variable frequency drive 60rpm max.
ST-1	300 gallon, carbon steel, jacketed reactor rated for 20psig/FV. No agitation. Condenser with 180 gallon, unjacketed, unagitated receiver.
Unassigned	~50 gallon, stainless steel, jacketed vessel rated at 30psig/FV.

Centrifuges & Filters

C-2	30" x 18", top load/top unload, 316 stainless steel, fixed speed centrifuge (portable)
C-6	48" x 20", top load/top unload, 316 stainless steel, variable speed 850rpm max. centrifuge
C-7	48" x 20", top load/top unload, 316 stainless steel, variable speed centrifuge
C-8	48" x 20", top load/top unload, 316 stainless steel, variable speed centrifuge
C-9	13" x 8" top load/top unload, 316 stainless steel, fixed speed centrifuge
Nutshche Filters	(1) 30" ceramic filter, (1) 18" glass lined filter
Lenticular Filters	One, two, and three module 12" diameter filter housings.

Drying Equipment

TD-1	100cuft, stainless steel, jacketed, double cone tumble dryer
TD-4	0.5cuft, stainless steel, jacketed, double cone tumble dryer
TD-5	20cuft, stainless steel, jacketed, V-cone tumble dryer
TD-6	40cuft, stainless steel, jacketed, V-cone tumble dryer
D-3	32 tray, cast steel body, jacketed tray dryer
D-5	12cuft, 4 tray, cast steel body, jacketed tray dryer rated for 50psig/FV
D-6	42cuft, 7 tray, cast steel body, jacketed tray dryer rated for 50psig/FV
D-7	32cuft, 6 tray, cast steel body, jacketed tray dryer
D-8	15 tray, stainless steel body, jacketed tray dryer
Freezer Dryer	15 tray, stainless steel, freeze dryer



Portable Process Equipment

Dishes	1) 50 gallon and (1) 100 gallon, glass lined, jacketed dishes
Mills	(2) Fitz mills; (1) 1hp and (1) 5hp Hosokawa micro pulverizers
Homogenizers	(1) 3.5hp and (1) 10hp Ika high shear mixers
Mixers	(1) 40 gallon, 15hp, stainless steel, dual paddle, planetary mixer
Dust Collector	(2) Portable dust collectors
Scales	(19) Portable drum scales, (2) Fixed pallet scales.
HEPA Filtered Air Enclosure	(2) 6'x8' portable enclosures
Vacume Pumps	(15) Vacuum pumps spread throughout the plant
Diaphragm Pumps	(~30) ¾" to 2" pumps in various applications throughout the plant

Utilities

Nitrogen	Bulk pharmaceutical grade nitrogen storage tank capable of supplying 120psig. Regulated to 15psig header pressure.
Boilers	100hp York-Shipley and 100hp Clever-Brooks 150psig MAWP. Plant steam header set at 110psig.
Chiller	33hp, 4 compressor, chiller 222MBTU @ 0°F. Ethylene glycol system plumbed only to R-32.
Cooling Water	Well supplied water at ground temperature. No cooling tower.
Purified Water	12gpm USP grade purified water system.
Hot Oil	240kW, electrically heated, water cooled, single temperature zone, oil system 70°F to 450°F. Supplies temperature control for R-30 and R-31.
Compressed Air	15hp & 29.5hp rotary screw air compressors. Plant air header supply set at 120psig.
Cold Storage	10' x 7' freezer set @ -20°C
Backup Generator	Diesel fueled 228Kw generator for R-30 and R-31 systems