

#### **4. General System Design Data Stream #5 (Powder Coating)**

##### Reference Documents:

- Drawing-Journey System Layout LFO1 Revision F, dated 10/31/11
- Drawing – Journey Product Hanging Arrangement Drawing HSO1, Revision F, dated 11/2/11

##### Production Data:

- System Operation: 8.0 hours per shift, two (2) shifts per day, 240 days per year
- Design Line Speed: 30 FPM
- Design Production: 36,000 lbs per hour incl. hanger
- Product Envelope: 2'-6" long (with travel) x 2'-6" wide x 6'-2" high
- Conveyor Speed: 30 FPM (Variable 25 to 35)
- Product Centers: 4'-0"

##### Utility Data:

- Electrical: 480v 3ph 60Hz standard NEMA components; TEFC premium efficiency motors
- Natural Gas: 5 PSIG max.; 1,000 BTU/ cubic feet
- Compressed Air: 85 PSIG
- Water: 40-70°F; 65 PSIG required at system
- General Building Air Make-Up: To be provided by customer

##### Site Data: Location Memphis, TN

- Design Outside Temperature: 110°F (max.) and -10°F (min.)
- Design Inside Temperature: 100°F (max.) and 60°F (min.)
- Plant Elevation: 423 ft.

**4.1. Spray Pretreatment System; Eight (8) Stage**

- 4.1.1. Eight (8) Stage Surface Preparation Machine
- 4.1.2. Line parameters based on Electrolux process specifications
- 4.1.3. Dimensions: Eight (8) Stage 240'-6" long x 5'-10" wide x 11'-2" high housing; 3'-3" high tanks
- 4.1.4. All tanks have sloped bottoms and are provided with overflow, drain, hinged lids with extended handles on the pump well, level controls, quick fill and make-up piping
- 4.1.5. The floor mounted tanks will be covered with stainless steel removable lids to allow for complete access to the interior for cleaning.
- 4.1.6. Spray housing constructed of welded steel sheet; fixed drainboards, silhouettes and conveyor guard provided; See Data Table "D" for materials of construction
- 4.1.7. Elevated housing design with tanks located on factory floor; housing elevated to allow for complete access to the tanks and allow walking access under the housing.
- 4.1.8. Lighting will be provided under the elevated housing (fluorescent T5)
- 4.1.9. Spray housing to be preassembled in sections if possible
- 4.1.10. Six (6) stainless steel access doors each with duplex receptacle; access platform with stairs
- 4.1.11. Ceiling mounted laminated glass panel complete with externally mounted fluorescent light provided, nine (9) provided
- 4.1.12. Drainboards will be sloped and adequately reinforced with structural members to minimize buckling and subsequent areas of standing water
- 4.1.13. At each stage will be one (1) stainless steel return flume provided to return the solution from the elevated housing to the floor level tanks below. Flume termination point will extend below the liquid level. Flume opening in drain board to be protected by removable non-skid fiberglass grating for safety.
- 4.1.14. Conveyor guard will be furnished the full length of each spray stage, extending 1'-0" into the drain areas to aid in protecting the conveyor chain and trolleys from direct spray impingement. Materials will be consistent with the housing.
- 4.1.15. Vertical top pull out pumps. Stainless steel double disc check valve and butterfly valve will be provided at each pump discharge.
- 4.1.16. All pumps protected by double removable screens

- 4.1.17. Stages #1 & #2 will be provided with a removable sludge dam for each screen assembly. Dams are provided with extended handles and placed in a separate track than the screen.
- 4.1.18. Redundant pumps
- 4.1.19. Each stream spray zone will be provided with a dedicated pump. A second , redundant pump will be provided, piped in so PLC will control all pumps and actuated valves.
- 4.1.20. Discharge piping will be provided with check valves to prevent backflow through the non operating pump
- 4.1.21. Logic will be provided within the PLC to alternate pump operation.
- 4.1.22. Pressure transducers will be provided in the lines after the header feeding each stream to monitor for reduced pressure and automatically switch pumps.
- 4.1.23. Heated stages will be provided with a plate and frame heat exchanger fed from the solution piping
- 4.1.24. Heat exchanger piping will be provided with pressure transducers to monitor for reduced pressure
- 4.1.25. One (1) hoist rail complete with support steel, trolley and manual chain hoist (1 ton) will be provided for removal of the pumps. Rails will run the entire length of the machine.
- 4.1.26. Plate and frame heat exchangers with type 304 stainless steel plates and appropriate gaskets
- 4.1.27. Stages #1, #2 & #4 heated, heat exchangers and pumps sized for common pump size.
- 4.1.28. Same plate size for each unit for easier maintainability
- 4.1.29. 304 stainless steel bag filter provided prior to heat exchangers, sized for full flow
- 4.1.30. Temperature control via P.I.D. loop within the PLC, operating three-way water mix valves at heat exchangers. Temperature monitoring in PLC system.
- 4.1.31. Pressure gauges for pressure drop across filter and across heat exchanger will be provided.
- 4.1.32. Top fed riser configuration; piping materials subject to approval by customer's chemical supplier; see Data Table "D" for stage piping materials of construction
- 4.1.33. Manual adjustment of spray pressure on all stages
- 4.1.34. Spray risers equipped with quick disconnects at headers and threaded caps at riser ends; riser spacing of 18"

- 4.1.35. Nozzles are “zip tip” polypropylene snap-on adjustable ball assemblies
- 4.1.36. Counterflow system for water conservation where applicable; Stage #8 to #7, #7 to #6 on demand, #7 to #5 on demand or conductivity, #5 to #4 on demand, #3 to #2 on demand, #2 to #1 on demand
- 4.1.37. Stage # 1 will be equipped with a Smartskim #CF-VIT Crossflow oil separator with Crossflow plate pack and floating skimmer. Fed by a dedicated air diaphragm pump
- 4.1.38. Entrance and exit exhaust fans, two (2) provided; 5,680 CFM with 1.5 HP motor; axial type with stainless steel airstream components; exit drip shield; aluminized spiral exhaust stack.
- 4.1.39. Safety shower/eyewash station; one (1) provided

**4.2. Powered Exit Blow-Off System**

- 4.2.1. Blow-off system provided. 2'-0" drain section between pretreat exit and entry to 10'-0" long blow-off section
- 4.2.2. Side housing walls and drain pan; similar construction to pretreatment housing all welded construction; open top design
- 4.2.3. External support steel structure for housing and conveyor loading
- 4.2.4. Twelve (12) air cannons; distribution plenum with interconnecting ducting; One (1) high pressure fan unit, per stream; 25 HP, VFD controlled; direct drive; (manufactured by Air Force 1 Systems)
- 4.2.5. Fan units located in sound control enclosure; enclosure has filtered air intake and discharge mufflers; Stainless steel drip pans will be provided from the pretreat exit to dry-off oven entry
- 4.2.6. Data Table "D" follows:

SURFACE PREPARATION MACHINE DESIGN DATA													
Stg Nr	Solution	Time Sec	Temp °F	# Riser	# Noz	Type of Nozzles	Noz Pres psig	Gpm Noz	Pump Cap Gpm	Tdh (Feet)	Hp	Approx Tank Cap Gals	Operating Btu/hr Input
1	Preclean	30	140	11	176	KQV 5050	20	3.5	616	128	40	1,851	1,847,300
2	Clean	60	140	21	336	KQV 5050	20	3.5	1176	127	60	3,375	999,300
3	Rinse	30	Amb.	11	176	KQV 5050	15	3.1	546	60	20	1,515	n/a
4	Fe Phosphate	60	140	21	336	KQHC 28	15	3.5	1176	116	60	3,375	999,300
5	Rinse	30	Amb.	11	176	KQV 5050	15	3.1	546	60	20	1,515	n/a
6	Rinse	30	Amb.	11	176	KQV 5050	15	3.1	546	60	20	1,515	n/a
7	Recirc RO rinse	12	Amb.	5	80	KQV 5050	15	3.1	248	60	7.5	715	n/a
8	fresh RO	3	FRO	2	20	KQV 1210F	15	0.6	12	56		-	n/a
9													
10													

SURFACE PREPARATION MACHINE CONSTRUCTION MATERIALS								
Stg Nr	Solution	Pump Material	Tank Material	Housing Material	Drainboard Material	Riser Piping Material	External Piping Material	
1	Preclean	SS Wetted	3/16" 304SS	14 Ga 304SS	12 Ga 304SS	CPVC	304SS	
2	Clean	SS Wetted	3/16" 304SS	14 Ga 304SS	12 Ga 304SS	CPVC	304SS	
3	Rinse	SS Wetted	3/16" 304SS	14 Ga 304SS	12 Ga 304SS	CPVC	304SS	
4	Fe Phosphate	SS Wetted	3/16" 304SS	14 Ga 304SS	12 Ga 304SS	CPVC	304SS	
5	Rinse	SS Wetted	3/16" 304SS	14 Ga 304SS	12 Ga 304SS	CPVC	304SS	
6	Rinse	SS Wetted	3/16" 304SS	14 Ga 304SS	12 Ga 304SS	CPVC	304SS	
7	Recirc RO rinse	SS Wetted	3/16" 304SS	14 Ga 304SS	12 Ga 304SS	CPVC	304SS	
8	fresh RO			14 Ga 304SS	12 Ga 304SS	PVC	PVC	
9								
10								