TRAVAINI PUMPS USA INC.
DYNASEAL™ VACUUM PUMP SYSTEM SPECIFICATION

The system shall be a self contained, closed loop, air cooled, liquid-ring vacuum pump system. (Water cooling will be optional) The system must be capable of operating in moist or wet inlet conditions and have the ability to pass soft solids without serious damage to the pump. The system should have a maximum running noise level of 85 dBA at 3 feet distance. No enclosure shall be required to dampen sound or hamper maintenance or access to equipment. For this reason, the vacuum pump should have a maximum rotor speed of 1800 rpm. The vacuum system must be able to operate continuously at ambient temperatures up to 110°F without overheating. The system shall be engineered and built by the pump supplier and will carry a minimum pump warranty of 2 years.
System design must be equal in all aspects to the DynaSeal design manufactured by Travail Pumps.

VACUUM PUMP DESIGN:
The vacuum pump(s) shall be of the liquid ring type manufactured in cast Iron, with ductile Iron Impeller(s) and stainless steel shaft. Shaft seals shall be carbon face mechanical seals, with Viton elastomers. Packed glands or stuffing box designs are not acceptable. Only pumps with flat port plate design are to be considered. No internal bearings, cones or gears shall be used. The pump shall have a minimum inlet capacity of ___ ACFM at an Inlet vacuum of ____inches Hg. and a max. vacuum capability of -inches Hg. The pump must be able to operate below 15~ Hg for an extended period of time without any operational problems. To avoid misalignment in the field, the pump must be of the monoblock flange mounted design, to fit a standard NEMA design C~f1ange motor. (This feature is available up to 25 HP)

FLUID SEPARATOR RESERVOIR:
The separator reservoir shall be an integral design of sufficient capacity and shall include mechanical baffles for proper air / oil separation, complete with an internally mounted two stage coalescing separator element, adequately sized to allow a maximum initial pressure drop of 1 psig and insure a 99.9% oil recovery *I* separation. The reservoir shall have a removable top cover and include a pressure indicator to show the condition of the separator element and an oil level and temperature gauge showing reservoir oil revel and system operating temperature. An oil scavenger line with adjustable orifice & sight glass must be provided and properly connected. ASME coded reservoirs are not acceptable, as the separator tank is designed for free venting to discharge to atmosphere and coded vessels require periodic Inspection and regulation.
The separator/reservoir must be overt1ead mounted to ensure positive 011 flow without the use of a pump.

The oil return line to the vacuum pump shall include a filter/strainer to separate any solids or impurities carried over into the system. Spin on oil filters are not acceptable as they clog up to quickly and may be considered hazardous waste. The filter/strainer must be fitted with isolation valve and cleanable replaceable screen. A solenoid valve of zero pressure differential shall be provided to control oil flow from the oil reservoir

TEMPERATURE CONTROL:
1) An oil temperature control valve shall be fitted in the oil supply line, which shall automatically control the system operating temperature at a predetermined level. Water cooled units shall include a thermostatic valve mounted in the cooling water outlet of the heat exchanger to maintain operating temperature and save water.

SAFETY DEVICES:
The vacuum pump shall include a high temperature shut-down switch to protect the pump against high temperature operation or in case of an interruption of the seal fluid supply.

SEAL FLUID:
The system shall be supplied with one full charge of TR1 001-22 long life seal fluid, designed for liquid ring vacuum pumps for 8,000 to 10,000 hours operation under normal operating conditions.

SUCTION LINE COMPONENTS:
An inlet check valve designed for vacuum service with soft seat and minimal restriction shall be provided. A vacuum gauge with a minimum of 2.5" dial, fluid filled, must be provided.

SYSTEM PIPING & ASSEMBLY:
All system components shall be mounted on a fabricated steel base frame designed to provide sufficient support to all major system components and include interconnecting piping. Schedule 40 steel pipe shall be used for discharge piping and all oil lines. Hoses or plastic piping are not acceptable except for suction lines.

ELECTRIC MOTOR (S):
Motors up to 25 hp must be of a standard NEMA C-Flange design suitable for continuous operation. Motor size -hp, -Volt, 3 phase, 60 HZ, TEFC enclosure. Acceptable manufacturers are Reliance or Baldor.
Hi-Efficiency motors are optional and must meet a minimum efficiency of % at full load.

ELECTRICAL CONTROL PANEL: Installed and wired on skid. The panel shall be U.L. listed and include the following: -Suitable for operation at- Volt /3 ph /60 Hz -IEC design full voltage magnetic starters complete with 3 phase overload protection, manual reset and adjustable overloads 110 Volt control circuit transformer with fused primary and secondary. Stop/start buttons -Running lights -Hour meter -Terminal strip -for external connections -Mounted in NEMA 12 enclosure

Duplex units shall include H.O.A. switches, automatic alternation and frequent start protection. Vacuum switches pre-wired and mounted.

Vacuum switches will be set for pump one, on @ -"Hg, off @ -" Hg. Pump two, on @-"Hg, off @-"Hg
Frequent start protection shall be a minimum of 10 minutes run time.

CONTROL PANEL OPTIONS:
-Fused disconnect switches with lockable handle safety door. -Circuit breaker(s).
-Audio/visual alarm with silence button for lag pump operation (low vacuum).

OPTIONAL ACCESSORIES:
I) A Low oil level switch shall be fitted in the oil reservoir, which will shut down the system in case of a sudden oil loss. An optional audible alarm, shall be fitted to the control panel which is activated during the above condition.

2) The suction line shall be fitted with a vacuum relief valve properly sized and set to open at -" Hg.

3) Supply Vacuum receiver tank ASME coded with a pressure rating of at least 125 PSIG. Receiver tanks can be used to add capacity to the vacuum piping system in order to reduce frequent cycling of a pump operating on a vacuum switch, or as a doll out tank to help prevent carry-over of solids, and liquids into the pump. Tank size __gallons and of the (vertical/ horizontal), design. Hot dipped galvanized tanks shall be provided for corrosion resistance when specified.

OPTIONAL:
Piping must meet NFPA 99 revision #- for vacuum receiver by-passing and draining of vessels while maintaining vacuum.

4) Supply an Inlet filter with replaceable polyester element and foam pre-filter for wet environments, installed on the pump suction properly sized to limit pressure drops and frequent changing.

5) Inlet isolation valves and flexible connectors shall be provided on each pump