

SECTION 22 62 19 MEDICAL VACUUM PUMPS

PART 1 - GENERAL

1.01 RELATED WORK

- A. Section 22 60 00: Medical Piping and Pipeline Components
- B. Section 22 60 13: Medical Gases Startup and Certification Procedure
- C. Division 26: Electrical
 1. Under Division 26, provide line voltage wiring for vacuum pumps and air compressor.
 2. Under Division 22, provide local and remote wiring to alarm panels in accordance with NFPA 99 and TDSHS and /or AHJ. Provide conductors and raceways as specified in Division 26.

1.02 SUBMITTALS

- A. Submit product data and equipment.

1.03 CODE COMPLIANCE/QUALITY ASSURANCE

- A. Install in compliance with Chapter 4 NFPA 99C as required and enforced by authority having jurisdiction.
- B. Comply with local, state and Federal Code applicable in this jurisdiction.
- C. Employ a competent qualified system mechanic/foreman who has satisfactorily completed at least five other similar installations, for this work.

1.04 COORDINATION

- A. Coordinate layout and location of package pumps and accessories systems for proper spaces and clearances.
- B. Coordinate with other trades to assure timely installation and to avoid conflicts and interference.

PART 2 - PRODUCTS

2.01 QUALIFICATION OF MANUFACTURER

- A. Medical Vacuum Pumps
 1. Beacon Medaes
 2. Allied Health Products Chemetron Division
 3. Patton's Medical Products
 4. Amico
 - a. Manufacturer/supplier shall have had at least five (5) years experience in the manufacture of medical vacuum pumps.
 5. Provide a service organization with staffing during working days common use parts etc., within 50 miles of the facility.

2.02 MEDICAL VACUUM PUMPS (Lubricated Rotary Vacuum)

- A. The duplex medical vacuum system shall be fully compliant with the latest edition of NFPA 99. The package will consist of two oil sealed rotary vane vacuum pumps, a control panel, and a receiver sized for appropriate demand. Each pump shall be connected to a common intake

manifold. The receiver shall be ASME coded and have a three valve bypass system to allow for draining of the receiver without interrupting the vacuum service. A manual drain shall be provided on the receiver. The package shall be completely tested prior to shipment.

- B. Each pump shall be of an oil lubricated, dynamically balanced multi-vane design with heavy duty, aluminum alloy vanes for maximum heat dissipation and extended vane life. The minimum vane warranty shall be 50,000 hours. The oil lubrication system shall be a pressure differential design with full re-circulation and multi-stage exhaust oil separation rated at 99.998% efficiency. The oil cooler shall be a single pass, cross flow type with a dedicated cooling fan. Water vapor condensation in the cylinder shall be prevented by means of an automatic gas ballast valve. Additionally, a non-return valve to prevent oil migration upon shutdown, a back pressure gauge to indicate exhaust oil separator element change, a high discharge temperature switch, oil drain valve, oil sight glass, and flexible connector for each pump shall be included.
- C. The pump shall be direct driven. Torque is transmitted from the motor to the pump through a shaft coupling.
- D. The motor shall be a continuous duty, NEMA rated, C-face, open drip proof, 1800 RPM, with 1.15 service factor suitable for 208V or 230/460V, 60 hertz, 3 phase electrical service.
- E. Each vacuum pump shall have a factory piped intake with integral flex connector, isolation valve, and check valve. Interconnecting piping shall consist of black iron pipe and fittings.
- F. The vacuum receiver shall be ASME Code stamped, and rated for a minimum 150 PSIG design pressure.
- G. The duplex control system shall be NEMA 12 and U.L. labeled. The control system shall provide automatic lead/lag sequencing with circuit breaker disconnects for each vacuum pump with external operators, full voltage motor starters with overload protection, redundant 120V control circuit transformers, visual and audible reserve unit alarm with isolated contacts for remote alarm (Refer to Section 22 60 00 for signals to be provided at the master alarm panel), visual alarms for high discharge temperature shutdown with isolated contacts for remote alarm, hand-off-auto lighted selector switches and runtime hourmeters. A programmable logic controller (PLC) shall control the automatic alternation of both vacuum pumps with provisions for simultaneous operation if required, and automatic activation of reserve unit if required. The control system shall include an automatic minimum run time adjustment to control run time based on demand. A vacuum gauge shall be provided in the control panel.
- H. The warranty for each vacuum pump shall be thirty (30) months from start-up or thirty-six (36) months from date of shipment, whichever comes first.
- I. Pump package shall be equal to Beacon Medaes LVS-XD-LXXX series.

2.03 MEDICAL VACUUM PUMPS (Oil-Less Rotary Vacuum)

- A. The duplex medical vacuum system shall be fully compliant with the latest edition of NFPA 99. The package will consist of two "oil-less" rotary vane vacuum pumps, a control panel and a receiver sized for appropriate demand all mounted on a common base frame. The receiver shall be ASME coded and have a three valve bypass system to allow for draining of the receiver without interrupting the vacuum service. A manual drain shall be provided on the receiver. Each pump and the receiver shall be connected to a common intake manifold. A single point of connection to the intake of the system shall be provided. A single point of connection to the electrical panel of the system shall also be provided. The package shall be completely tested prior to shipment.

- B. Each pump shall operate completely dry, and shall be equipped with self-lubricating carbon/graphite vanes. Bearings for the 5 and 7.5 hp shall be permanently lubricated and sealed. No oil shall be permitted in any pump. Each pump shall be completely air-cooled and have absolutely no water requirements. Each pump shall have a 5 micron inlet filter and shall be equipped with a vacuum relief valve, check valve to prevent backflow through off-cycle units, flexible connector, isolation valve, and vibration isolators at each mounting location.
 - C. The pump shall be direct driven. Torque is transmitted from the motor to the pump through a shaft coupling.
 - D. The 5 and 7.5 hp motor shall be a continuous duty, NEMA rated, C-face, open drip proof, 1800 RPM, with 1.15 service factor suitable for 208V or 230/460V, 60 hertz, 3 phase electrical service. The 10 hp motor shall be a continuous duty, NEMA rated, C-face, open drip proof, 1200 RPM, with 1.15 service factor suitable for 208 or 230/460V, 60 hertz, 3 phase electrical service.
 - E. Each vacuum pump shall have a factory piped intake with integral flex connector, isolation valve, and check valve. Interconnecting piping shall consist of black iron pipe and fittings.
 - F. The vacuum receiver shall be ASME Code stamped, and rated for a minimum 150 psig design pressure.
 - G. The duplex control system shall be NEMA 12 and U.L. labeled. The control system shall provide automatic lead/lag sequencing with circuit breaker disconnects for each vacuum pump with external operators, full voltage motor starters with overload protection, redundant 120V control circuit transformers, visual and audible reserve unit alarm with isolated contacts for remote alarm (Refer to Section 22 60 00 for signals to be provided at master alarm panels), hand-off-auto lighted selector switches and runtime hourmeters. A programmable logic controller (PLC) shall control the automatic alternation of both vacuum pumps with provisions for simultaneous operation if required, and automatic activation of reserve unit if required. The control system shall include an automatic minimum run time adjustment to control run time based on demand. A vacuum gauge shall be provided in the control panel.
 - H. The warranty for each vacuum pump shall be thirty (30) months from start-up or thirty-six (36) months from date of shipment, whichever comes first.
 - I. Pump package shall be equal to Beacon Medaes LPV-XD-NXXX series.
- 2.04 MEDICAL VACUUM PUMPS (OIL-LESS ROTARY CLAW -O2 ASSURED)
- A. The duplex medical vacuum system shall be fully compliant with the latest edition of NFPA 99. The package shall consist of two "oil-less" rotary claw vacuum pumps, a control panel, and a receiver sized for appropriate demand all mounted on a common base frame. The receiver shall be ASME coded and have a three-valve bypass system to allow for draining of the receiver without interrupting the vacuum service. A manual drain is provided on the receiver. Each pump and the receiver shall be connected to a common intake manifold. A single point of connection to the intake of the system shall be provided. A single point of connection to the electrical panel of the system shall also be provided. The package shall be completely tested prior to shipment.
 - B. Each pump shall be a direct driven, non-contacting claw type, capable of operating at 27" Hg (sea level) continuous duty for a 5 hp. and 22.5" Hg (sea level) continuous duty for the 7.5, 10 & 15 hp. The pumping chamber shall be oil free. The pump shall be completely air-cooled with no water requirements. The pump shall have an inlet air filter and shall be equipped with a vacuum relief valve, check valve to prevent backflow through off-cycle units, flexible connector, isolation valve, high discharge temperature switch, high inlet vacuum switch, oil drain valve, oil sight glass, and exhaust muffler at each pump location.

- C. The pump shall be direct driven. Torque shall be transmitted from the motor to the pump through a shaft coupling. The claws shall be synchronized by heavy-duty precision timing gears.
- D. The motor shall be a continuous duty, NEMA rated, C-face, TEFC, 3450 RPM, suitable for 208 or 230/460V, 60 hertz, 3-phase electrical service.
- E. Each vacuum pump shall have a factory piped intake with integral flex connector, isolation valve, and check valve. Interconnecting piping shall consist of black iron pipe and fittings.
- F. The vacuum receiver shall be ASME Code stamped, and rated for a minimum 150 PSIG design pressure.
- G. The duplex control system shall be NEMA 12 and U.L. labeled. The control system shall provide automatic lead/lag sequencing, circuit breaker disconnects with external operators for each vacuum pump, full voltage motor starters with overload protection, and redundant 120V control circuit transformers. The control system shall provide visual and audible reserve unit alarm for high discharge temperature and high inlet vacuum shutdowns with isolated contacts for remote alarm, hand-off-auto lighted selector switches and runtime hourmeters. A programmable logic controller (PLC) shall control the automatic alternation of the vacuum pumps with provisions for simultaneous operation along with the automatic activation of reserve unit if required. A vacuum gauge shall be provided in the control panel.
- H. Each vacuum pump shall be capable of operating safely with up to 60% oxygen content in the compression chamber. All parts in contact with the flow stream, gear casing, and bearing surfaces shall be cleaned with oxygen compatible cleaner. The pump shall be assembled and tested in a clean room with dedicated tools. The inlet filter shall be constructed of fiberglass media to insure there is no fuel to ignite in the compression chamber. The lubricant in the gear casing as well as the grease used to lubricate the bearings (10 & 15 hp models only) shall be a special oxygen compatible formula.
- I. The warranty for each vacuum pump shall be thirty (30) months from start-up or thirty-six (36) months from date of shipment, whichever comes first.
- J. Pump package shall be equal to Beacon Medaes LPV-XT-HAXXX.
- K. Furnish required accessories as recommended by manufacturer for a complete installation. Pump manufacturer shall pre-test unit prior to shipping, provide free on-site inspection prior to start-up and maintain a separate service organization.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Coordinate location with vacuum pump with area shown on drawings.
- B. See Section 22 60 00 for requirements of alarming and other system components, and Section 22 60 13 for pump start-up.

END OF SECTION