	Title: YALE OFFICE OF FACILITIES PROCEDURE MANUAL Chapter: 01 - Yale Design Standard Division: Plumbing Standards	Section: 22 62 19 Laboratory Vacuum Piping Specialties
		Date: 08/05/2017
		Author: Office of Facilities
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PART 1 - INTRODUCTION

1.1 This equipment standard applies to Laboratory Vacuum Piping Specialties.

PART 2 - GENERAL DESIGN REQUIREMENTS


- 2.1 Description: Factory-assembled, -wired, -piped, and -tested; electric-motor-driven; air-cooled; continuous-duty vacuum pumps and receivers.
- 2.2 Control Panels: Automatic control station with load control and protection functions. Comply with NEMA ICS 2 and UL 508.
- 2.3 Enclosure: NEMA ICS 6, Type 12 control panel unless otherwise indicated.
- A. Motor Controllers: Full-voltage, combination-magnetic type with under voltage release feature and motor-circuit-protector-type disconnecting means and short-circuit protective device.
 - B. Control Voltage: 120-V ac or less, using integral control power transformer.
 - C. Motor Overload Protection: Overload relay in each phase.
 - D. Starting Devices: Hand-off-automatic selector switch in cover of control panel, plus pilot device for automatic control.
 - E. Automatic control switches to [alternate lead-lag vacuum pumps for duplex] [and] [sequence lead-lag vacuum pumps for multiplex] vacuum pumps.
 - F. Instrumentation: Include vacuum pump inlet and receiver vacuum gages, hour meter, vacuum pump discharge-air and coolant temperature gages, and control transformer.
 - G. Alarm Signal Device: For connection to alarm system to indicate when backup vacuum pump is operating.
- 2.4 Receivers: Steel tank constructed according to ASME Boiler and Pressure Vessel Code, Section VIII, Division 1; bearing appropriate code symbols.
- A. Interior Finish: Corrosion-resistant coating.
 - B. Accessories: Include vacuum relief valve, vacuum gage, and drain.
- 2.5 Mounting Frame: Fabricate base and attachment to pressure vessel with reinforcement strong enough to resist packaged equipment movement during a seismic event when base is anchored to building structure.

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PART 3 - MINIMUM PRODUCT REQUIREMENTS

- 3.1 Provide complete package duplex central vacuum system manufactured by Beacon Medaes Liquid Ring "Camel" Medical Vacuum System, model LPV or LVS; or Elmo Rietschle Liquid Ring Packages L - Series.
- 3.2 The system shall be capable of passing fluids and soft debris through the pumps. No oil or oil filters are required. Each pump shall be coupling driven by a 1750 rpm motor suitable for a 460V-XHP-60Hz power supply with re-circulation and seal water system.
- 3.3 Package shall be factory assembled, piped and wired components as follows:

Liquid Ring Laboratory Vacuum System (Duplex)	
Equipment Tag	SHM-BLDG-LVP-1
Description	Single-stage, continuous duty, direct driven conical liquid-ring vacuum pump with recirculated water seals. Packaged and mounted on structural frame. Factory preassembled, pre-wired and tested for single point field connections.
Performance Conditions	Vacuum Level: 24"Hg (160 Torr). Capable of passing fluids and soft debris without damage to pumps.
Operating Arrangement	Two (2) units with pipe headers and controls for a duplex lead/lag1/ operation with automatic alteration of units for even operating hours between the units. Arranged in skid mounted configuration.
Materials of Construction	Rotor: Bronze. Casing: Cast iron.
Controls and Instrumentation	Packaged control panel in NEMA 12 enclosure with: combination circuit breaker magnetic across-the-line motor starters; thermal, magnetic and short circuit protection; low voltage control transformer with fused secondary; hour meters; pump run lights; power on lights; HOA switches; dual set-point vacuum switches; main disconnect. Vacuum gauge and backpressure gauge on each pump. Vacuum transducer on receiver to control pump operation. Pumps shall operate in a lead/lag cascading sequence with daily rotation of lead pump. Pump minimum run timers shall ensure motors do not exceed NEMA recommended maximum starts per hour. Alarm circuit with dry contacts for customer remote alarm.
Driver	ODP electric motor. 1.15 service factor. Direct drive coupling. 1750 rpm max synchronous speed.
Valves and Connectors	Flexible braided stainless steel connectors. Each pump shall include inlet check and isolation ball valve, water flow control valve, shock-arrestor solenoid valve, strainer, water supply isolation valve, and discharge separator/silencer. Water supply anti-siphon device. Vibration isolators.
Cooling Media	Closed loop seal water. Maximum ¾ GPM water usage when one pump is operating.
Heat Exchanger	Carbon steel counter-flow shell and tube heat exchanger. Sized by vendor.

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Receiver	120 Gallons. Galvanized steel. ASME Boiler and Pressure Vessel Code Section VIII rated and stamped. Vacuum/pressure safety element, bypass piping and valving, manual drain valve and vacuum indicator.
Electrical	460 VAC, 3φ, 60 Hz, single point of field connection.
Rated Duty	Vacuum setting at Receiver Vacuum level at delivery inlet (approx.) 20" Hg System capacity 150 ACFM at 24" Hg Pump split 1/2 each 75 ACFM each at 24" Hg Pump horsepower 3/3 Pump model number (Nash) MHC-130
Start-up & Warranty	Equipment cost shall include start-up service by factory-authorized technician and twelve (12) month minimum warranty agreement for materials and workmanship.
Acceptable Manufacturers	Beacon Medaes Duplex Camel Vacuum System LPV or LVS. Elmo Rietschle Liquid Ring Packages L – Series.
Other	Dedicated exhaust through Penthouse roof.

PART 4 - INSTALLATION REQUIREMENTS:

- 4.1 All equipment and components supplied by the pump manufacturer shall be warranted for a period of two (2) years from date of start-up.

END OF SECTION