

**GENERAL:**

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1. The purpose of this design guide is to:
  - 1.1. Standardize the types and quality of vacuum air provided that is considered part of the facility systems.
  - 1.2. Standardize both the type of Vacuum Pump used and the installation details to facilitate the operation and maintenance of air compressors.

**DESIGN GUIDELINES:**

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1. Types of Vacuum.
  - 1.1. University facilities may have 2 types of vacuum systems. These are:
    - 1.1.1. Laboratory Vacuum. For general lab use.
    - 1.1.2. Medical Vacuum. Utilized in hospitals and vet facilities
2. The facility vacuum system will provide lab vacuum. If medical vacuum is required, it is the responsibility of the department to provide and maintain this system. All medical vacuum systems shall be separate and independent of the facility system.
3. Sizing.
  - 3.1. Vacuum air sizing shall be based on generally accepted methods, using 1 scfm at 15 IN. Hg, per lab outlet and applying a diversity factor based on the number of probable outlets in use.
  - 3.2. If there are any specific equipment requirements, the requesting department shall provide this information.
4. Locate the vacuum pump at the lowest level in the building.
5. Piping design shall include the following:
  - 5.1. Piping shall be designed similar to a plumbing waste system.
  - 5.2. Avoid "service drops" from the ceiling. Service at lab benches shall feed up from below.
  - 5.3. Slope piping in the direction of flow toward the compressor.
  - 5.4. Avoid places where liquid could be "trapped"
  - 5.5. Provide threaded cleanouts at changes in direction.
  - 5.6. Use long radius ell and wye fittings.
  - 5.7. Use ball valves for branch isolation
  - 5.8. Piping shall have a main line filter BEFORE the line connects to the vacuum pump. Filter shall have isolation valves on either side and a bottom drain.
  - 5.9. Vacuum piping shall connect to the vacuum tank inlet. There shall be a separate connection between the tank and the vacuum pump. V
  - 5.10. Vacuum piping discharge shall be located at the roof level or 20 feet from operable windows, air intakes, sidewalks etc.
6. Operating Pressure. Operating pressure at the vacuum pump shall be 20" Hg.

7. Run time. The vacuum pump shall be selected to provide a 30% run time based on a single compressor running. Duplex compressors shall be selected such that the combined run time shall not exceed 30%.
8. Vacuum Pumps shall be located in accessible locations for maintenance. A minimum 3 ft access space in front of serviceable belts, machine guards, oil reservoirs and electrical components shall be provided. Location shall not expose staff to other hazards such as hot piping, or heights.
9. All equipment shall be provided with a house keeping pad.
10. Vibration isolators shall be provided. Slab on grade may utilize rubber cork pads.
11. Installations on upper level floors should be analyzed for vibration and spring isolators/inertia pads provided if necessary.
12. Provide piping vibration isolators between vacuum pump and fixed piping.
13. Vacuum pumps should be simplex / Duplex, alternating design, as directed by the project manager.
14. Pump design.
  - 14.1. Rotary vane and water liquid ring pumps are not permitted.
  - 14.2. Other than that, we're pretty open to suggestions.
15. Power and Controls. On duplex systems, provide a power circuit for each compressor motor and a separate power circuit for the controls.
16. Submittals should include catalog data, certified sound power ratings, Motor ratings and electrical characteristics plus motor and fan accessories. Shop drawings from the manufacturer detailing dimensions, weights, required clearances, components, and location and size of each field connection for each product specified
17. Close out manuals should include both Installation and Operations and Maintenance Manuals

#### **SPECIFICATION REQUIREMENTS:**

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