facility, or clinic, duplicate plans and specifications shall be filed with the Authority Having Jurisdiction. Approval of the plans shall be obtained, prior to issuance of any permit by the Authority Having Jurisdiction.

**1311.2** Plans and specifications shall show the following, in detail:

**1311.2.1** Plot plan of the site, drawn to scale, indicating the location of existing or new cylinder storage areas, property lines, driveways, and existing or proposed buildings.

Manifolds and cylinders located outdoors shall be provided with an enclosure to protect from heat and dust. Such enclosures (wall or fencing and roof) shall be constructed of noncombustible material.

**1311.2.2** Piping layout of the proposed piping system or alteration, including alarms, valves, origin of gases, and user outlets/inlets. The demand and loading of any piping, existing or future, shall also be indicated.

**1311.2.3** Complete specification of materials.

**1311.3** Plans and specifications submitted to the Authority Having Jurisdiction shall clearly indicate the nature and extent of the work proposed and shall show in detail that such work will conform to the provisions of this code.

**1311.4** A record of as-built plans and valve identification records shall remain on the site at all times.

### 1312.0 System Performance.

**1312.1 Required Operating Pressures.** Medical gas and medical vacuum systems shall be capable of delivering service in the pressure ranges listed in Table 13-1.

**1312.2 Minimum Flow Rates.** Medical gas and medical vacuum systems shall be capable of supplying the flow rates listed in Table 13-2.

**1312.3 Minimum Station Outlets/Inlets.** Station outlets and inlets for medical gas and medical vacuum systems shall be provided as listed in Table 13-3.

### 1313.0 Required Pipe Sizing.

**1313.1** Where the maximum demand for each medical gas or vacuum system and the maximum length of piping between the source equipment and the most distant station outlet/inlet do not exceed the values in Table 13-6, the size of pipe of each section of the system shall be determined using Tables 13-4 and 13-6. The size for systems beyond the range of Table 13-6 shall be determined by using the methods set forth in Section 1313.3 of this chapter.

**1313.2** To determine the size of each section of pipe in any system within the range of Table 13-6, proceed as follows:

**1313.2.1** Measure the length of the pipe from the source equipment location to the most remote station inlet/outlet on the system.

**1313.2.2** In Table 13-6, select the column showing that distance, or the next longer distance if the table does not give the exact length.

**1313.2.3** Starting at the most remote outlet/inlet, find in the vertical column just selected the medical gas or vacuum demand for that inlet/outlet. If the exact figure of demand is not shown, choose the next larger figure below in the column.

**1313.2.4** Opposite this demand figure, in the first column at the left in Table 13-6, will be found the correct size of pipe.

**1313.2.5** Using this same vertical column, proceed in a similar manner for each section of pipe serving this inlet/outlet. For each section of pipe, determine the total gas or vacuum demand supplied by the section, using Table 13-4.

**1313.2.6** Size each section of branch piping not previously sized by measuring the distance from the source equipment location to the most remote inlet/outlet in that branch, and follow the procedures of Sections 1313.2.2, 1313.2.3, 1313.2.4, and 1313.2.5.

**Note:** Size branch piping in the order of the distance from the source location, beginning with the most distant outlet not previously sized.

**1313.3** For conditions other than those covered by Section 1313.1 of this section, such as longer runs of greater gas or vacuum demands, the size of each gas or vacuum piping system shall be determined by standard engineering methods acceptable to the Authority Having Jurisdiction, and each system shall be so designed that the total pressure drop or gain between the source equipment and any inlet/outlet shall not exceed the allowable pressures shown in Table 13-1.

### 1314.0 Workmanship.

**1314.1** Design, construction, and workmanship shall be in conformity with accepted engineering practices and shall meet the requirements of this code.

**1314.2** Cracks, holes, or other imperfections in materials shall not be concealed by welding, brazing, or soldering, or by using paint, wax, tar, or other leak-sealing or repair agents.

**1314.3** Burred ends of all tubing shall be deburred using a deburring tool to the full bore of the tube, and all chips shall be removed.