

Piping for Compressed Breathing Air Systems

The best source of information is CSA standard B51. However, various sources refer to copper, stainless steel and anodized aluminium as the materials of choice because the material should be non-corrosive (not rust in the line over time).

Here is a table that describes the preferred materials for compressed air systems.

<i>ITEM</i>	<i>BEST MATERIAL</i> → <i>WORST MATERIAL</i>
Piping & Fittings	Stainless Steel → Conductive Polymer → Nylon → Polyester → Vinyl → Polyethylene → Copper → PTFE → Aluminum → Black Iron
Seal Type	Welded → SS Compression → Rubber O-Ring Compression → Threaded
Sealant Type	Welded → SS Ferrule → Polymer O-Ring → PTFE Tape → Putty
Valving	Particle Free SS → SS Shut-Off → Ball Valve w/ Conductive Polymer Seal → Ball Valve w/ Rubber Seal → Valve w/ Rubber Seal

*This chart relates primarily to particles, but has some applicability to water and oil.

The information is provided by a lab that specializes in testing compressed air samples. The recommendations are based on laser-particle counter and general industrial experience.

Piping materials

Common piping materials used in a compressed air system include copper, aluminum, stainless steel and carbon steel. Compressed air piping systems that are 2" or smaller utilize copper, aluminum or stainless steel. Pipe and fitting connections are typically threaded. Piping systems that are 4" or larger utilize carbon or stainless steel with flanged pipe and fittings.

Note: Plastic piping may be used on compressed air systems, however caution must be used since many plastic materials are not compatible with all **compressor lubricants**. Ultraviolet light (sun light) may also reduce the useful service life of some plastic materials. Installation must follow the manufacturer's instructions.

It is always better to oversize the compressed air piping system you choose to install. This reduces pressure drop, which will pay for itself, and it allows for expansion of the system.

Corrosion-resistant piping should be used with any compressed air piping system using oil-free compressors. A non-lubricated system will experience corrosion from the moisture in the warm air, contaminating products and control systems, if this type of piping is not used.

The specific wording on piping from the CSA standard is provided below.

Excerpts from CSA CBA Z180.1-13

A.9 Fittings and piping

Note: For further information see CSA B51 and ASME B31.1.

A.9.1

All valves, fittings, and piping shall be thoroughly cleaned and dried to remove all contaminants before assembly into a compressed breathing air pipeline system.

Note: See [Clause A.14](#) for details on cleaning.

A.9.2

All valves, fittings, and pipelines shall be properly sized to ensure that there is no restriction to the airflow required by all end users at the air service outlets. In order not to restrict airflow, care should be taken to avoid using more than one size of pipe, and an attempt should be made to limit the number of bends in the air pipeline distribution system.

A.9.3

All permanently installed pipelines shall be fabricated from corrosion-resistant materials that are compatible with the environment where the pipelines are installed.

A.9.4

All valves and fittings shall be compatible with the piping material.

A.9.5

All compressed breathing air piping systems shall be installed by qualified personnel and adequately supported, secured, and tested in accordance with the applicable standards and building code requirements.

A.9.6

All compressed breathing air pipeline systems shall be clearly identified for “Breathing Air Use Only”. Consideration should be given to colour coding, with matching colour codes on the equipment to be connected as a method of identification (e.g., green for safety equipment).