Air Treatment

Air Treatment Technology
Once compressed air is cooled, further drying can be accomplished through the use of a compressed air dryer. There are many types of dryers. Dryers can be typically grouped into two major categories: refrigerant or desiccant. The design, performance and cost of a dryer will depend upon the application.

With a desiccant dryer, water vapor is removed through absorption and adsorption processes. In the event compressed air lines are exposed to temperature below 32°F (or 0°C), the use of desiccant dryer is required to eliminate the hazard of compressed air line freezing.

Refrigerant type air dryers are the most economical compressed air dryers in terms of initial purchase price, cost of installation, and operation. Within a refrigerant air dryer, compressed air is cooled, water vapor is condensed into liquid water where it is mechanically separated and drained from the compressed air system. Refrigerant air dryers are supplied with automatic condensate drains.

Note: An aftercooler and/or dryer can be supplied within a stand-alone air compressor package eliminating the additional field expense of installation (piping and wiring).

A properly sized dryer will prevent liquid water within a compressed air system. All dryers are rated for inlet conditions of 100°F, 100% relative humidity, and 100 psi. Increasing inlet pressure and lowering inlet temperature will improve dryer efficiency.

Once liquid condensate has been removed from the compressed air stream through the effective use of an after cooler and dryer, a compressed air filter is recommended for removal of solid particulates, aerosol mists, and gaseous vapors.

A compressed air filter is designed with a replaceable element that allows contaminants to impinge upon the elements surface area. As the element becomes wetted, filtration efficiency actually improves. As liquids, aerosols and particulates randomly collide on small diameter fibers, the filtration process coalesced invisible contamination into larger droplets that gravitate to the base of the filter housing.

Lastly, liquids are drained from the filter through a drain valve. Compressed air filters are designed for specific applications. A properly sized and positioned compressed air filter eliminates contaminants from passing downstream. An electric drain provides a reliable alternative to float-type, gravity-feed drains that corrode and clog over time. Electric drains can be viewed as a low-cost alternative to manually draining system. Operation of all drains should be checked regularly to avoid costly loss of compressed air.
Air Distribution

The compressed air piping system should be designed to deliver compressed air to the pneumatic application at the appropriate flow and pressure. The air distribution system should incorporate a leak-free piping system sized to minimize air pressure drop from its supply—the compressor and compressed air treatment components—to the point of use. Minimizing the number of 90° elbows will maximize the delivered air pressure. It is estimated each elbow equates to 25’ of additional compressed air piping. Pipe diameter should not be less than the discharge port of your compressor. If multiple compressors are being utilized, pipe diameter should equal the sum of each compressor’s discharge. Avoid straight runs that dead-end. The most efficient design incorporates a “LOOP” that minimizes pressure drop at any one work station.

Different materials can be used for compressed air header; materials include steel, black iron, stainless or anodized aluminum. It is critical that the material being installed has a pressure and temperature rating with an appropriate safety factor to support the compress air pressure requirement. Do not under-size pipe. The cost different between one pipe diameter and the next larger size is minimal. The larger the pipe diameter, the lower the pressure loss will be due to friction. A larger diameter pipe allows for additional compressed air during peak use periods and positions the system for future expansion. The compressed air velocity in the main distribution header should not exceed 30ft/s.

A compressed air drop leg, also referred to as a feeder line, begins with a TEE assembly that directs the compressed air in a vertical path. This unique flow pattern will guard against liquid or particulate contamination passing to a pneumatic process.

Each compressed air drop should include a TEE directing compressed air supply to its specified use. The base of the drop leg incorporates a drain valve. Each drop leg might include an FRL (point-of-use filter, regulator and lubricator).