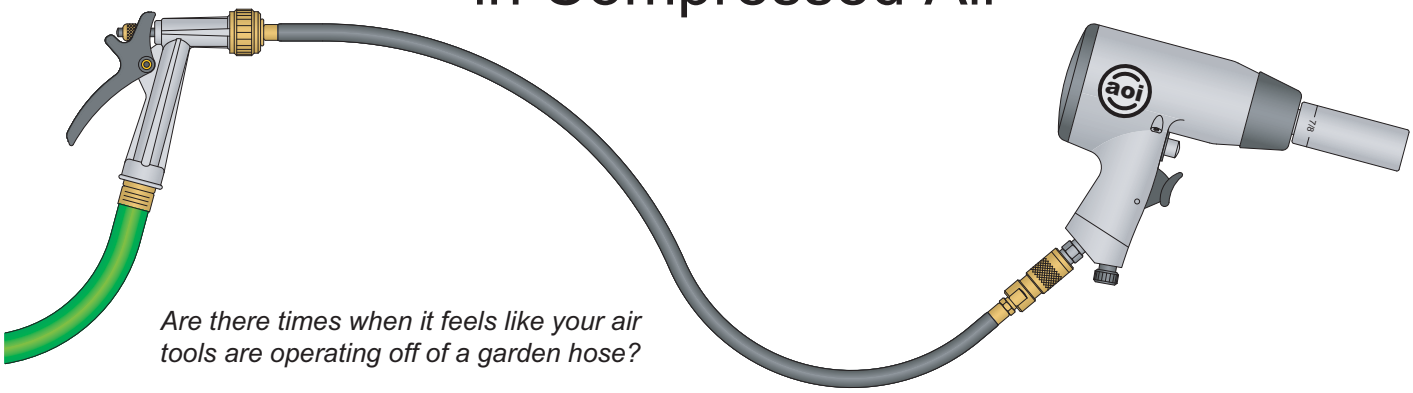
# Technical Bulletin



# The Hidden Costs of Water Contamination in Compressed Air

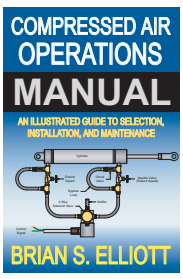



*Are there times when it feels like your air tools are operating off of a garden hose?*

Water contamination is one of the most significant problems to plague compressed air systems. However, it is a problem that is too often neglected. Water condensation, build-up and removal are serious problems within any compressed air system, causing millions of dollars in damage annually to these systems and the equipment they serve. Water can accelerate rusting in the receiver and piping, it will flush out lubricating oils in delicate air tools, gum up seals in valves and cylinders, fog spray painted finishes, clump sandblasting media, build up in automobile tires and reduce the efficiency of the compressor. Air Options dryers are an excellent choice to combat this rather significant problem in general purpose applications.

So how does the water get into the compression system? Water content in air is generally described in % of relative humidity. If the air is at 50% relative humidity, then it has 1/2 of the total water vapor that it can hold at its current temperature. However, it is important to understand that temperature plays a critical role in this arena. The higher the air temperature the higher the air's affinity for water vapor will be. As an example: Air which has a temperature of 50°F and a relative humidity of 100% has a much lower water content than air that has a temperature of 100°F and a relative humidity of 50%. With this in mind, consider what happens when we compress air. The pump draws in air at, say, 75°F and 60% relative humidity. During the compression process the air volume is reduced and its pressure and temperature increase. Pressure has a minimal effect on air's ability to carry water vapor, on the other hand temperature has a profound effect. The compressed, high temperature air is saturated at this point and may be as much as 25% water by volume. As this hot, saturated, compressed air comes in contact with the various components of the system, it starts to cool. As the air cools, its affinity for water vapor lowers and it starts to shed its water content to match its temperature. The water that is shed condenses onto the inside of the tank and pipes. You now have liquid water contaminating the inside of your compression system. In addition to the liquid water that collects in the system, the volume of the compressed air charge that is water vapor, which may be as high as 25%, is also lost. This means that you're only getting 75% of the air that your compressor generates. However, you're still paying for 100% of the utility costs.

Comprehensive information on compressed air systems is provided in the book **"Compressed Air Operations Manual"** by Brian S. Elliott, ISBN: 0-07-147526-5 Published by the McGraw-Hill Book Co.

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