AquaChek®

MOISTURE CONTROL FILTER TECHNOLOGY FOR COMPRESSED AIR SYSTEM APPLICATIONS

TECHNICAL SUPPORT MANUAL
FOR AQUACHEK® POLYMER TECHNOLOGY
COMPRESSED AIR MOISTURE CONTROL
FILTER PRODUCTS

AquaChek®
POLYMER TECHNOLOGY
AIR DRYING FILTER

AquaChek®

FILTER TECHNOLOGY FOR COMPRESSED AIR SYSTEM MOISTURE CONTROL APPLICATIONS

Removal of water is a major concern in compressed air applications and there are a wide variety of solutions to meet this need. AquaChek® offers super absorbing polymer media technology to meet the need for water removal in a wide variety of compressed air applications. And, the AquaChek® solution requires little specialized equipment to be installed.

Providing you with a sound understanding of the issues surrounding moisture removal from the air will give you a strong appreciation of why the AquaChek solution is the best and only solution worth considering. We have prepared the following information to help you understand AquaChek products in a manner that will allow you to effectively apply the AquaChek™ solution to a wide array of compressed air moisture removal applications.

HUMIDITY IS THE KEY

When air is compressed relative humidity will increase, in turn creating a free water problem. Free water, or water droplet formation begins at 70% relative humidity. Water is the number one cause of deterioration in air tools and equipment.

Reduction of relative humidity to below 70%, at the point compressed air is to be used, is the purpose of any water removal system. If free water gets to the final use point, all previous reduction becomes void and equipment will continue to deteriorate. Dry air increases equipment tool life, reducing costly repair and down time, more than compensating for the variable operating cost of the drying technology.

All air-drying technologies are sized according to CFM. For basic calculations of CFM, multiply the horsepower of the compressor times 4, i.e.: A 10-horse compressor should produce 40CFM. Any air drying system must be installed to match the manufacturers specified CFM rating for the pneumatic equipment.

EXISTING AIR SOLUTIONS

Two main solutions for removing moisture from compressed air are prevalent today; refrigerant air dryers and desiccants. Each solution has its own points to consider, which need to be independently reviewed before an informed decision can be made regarding their use.

REFRIGERANT AIR DRYERS

Refrigerant Air dryers, which operate on a mechanical/temperature separation process, still allow some water vapor to pass through, which will then re-condense down line as the air temperature/pressure changes.

Refrigerant dryers work by chilling air to the point condensation occurs and then passing it through mechanical separator technology. The goal, in this example, is to reach a low enough dew point to drop adequate moisture out of the air stream to achieve relative humidity levels below seventy percent throughout the system. After the air passes out of the chiller, mechanical separation cannot drop vaporized water out of the air stream. As temperature/pressure changes down line, the remaining water vapor can then re-condense in the system.

Refrigerant Dryers

- Mechanical/Separation
- Allows Re-condensation

To remove all moisture from the air, free and vaporized, the ambient air temperature must be dropped to approximately minus thirty-five degrees Fahrenheit. Refrigerant air dryers manufactured today chill air to approximately plus thirty-five degrees Fahrenheit. The problem that arises is; as air leaves the dryer, any water vapor remaining will concentrate and bring the relative humidity to the point of potential condensation.

DESICCANT DRYERS

Desiccant type dryers based on clays, silica's and other materials have a low pick up ratio, thus requiring a high frequency of desiccant change out. Desiccants can be dried and reused, but pick up efficiency drops each time they are reused. Capital & variable operating cost in drying and reusing desiccants generally offset or exceed any cost savings achieved.

The most popular desiccant in use today is Silica. Silica based drying systems commonly employ a dual-swing tower system, with one tower on-line, providing eighty- five percent of the system capacity and the other tower drying at all times, using the remaining fifteen percent. This equates to a reduction of fifteen percent of any systems rated capacity.

Desiccant Dryers

- Volume Filling Process
- Hold 1/3 Their Weight
- High Change Out Rate

Silicas become passive when exposed to oil and particulate. Multi-stage pre-filtration is required for them to remain effective. Standard configurations may or may not include an intercooler but will include: a mechanical separator, an oil coalescer and particulate filtration, in front of the desiccant towers.

Because Silicas work like a sponge they are very susceptible to 'blinding off.' When Silicas 'blind off' the porous volume of a desiccant becomes plugged by oils or particulate they come in contact with.

Any solution available today to dry air will never capture one hundred percent of moisture in it. The only means of achieving such complete removal of moisture is freezing the air to approximately minus thirty-five degrees Fahrenheit. To prevent free water from reaching the point of use all air dryers should have a primary/secondary capture system and a means of identifying when the system requires maintenance.

MEMBRANE AIR DRYERS

Membrane Air Dryers are the latest technology to come on the market. In membrane dryers, water vapor in the compressed air supply is blocked by hollow fibers of the membrane. Some dry air is then passed through the filter to sweep out the water vapor laden air. Membranes are also very susceptible to 'blinding off' like desiccants and are expensive to replace.

COALESCING FILTERS

Coalescing Filters or water traps are a static unit that spins the air, condensing water into droplets allowing free water to collect in the bottom of the unit.

MOLECULAR SIEVE

Molecular Sieve units are similar to coalescing filters in that they are a static unit but contain metal, usually aluminum, similar to a coarse steel wool pad to aid in the condensing of the water molecules into free water through added surface area. They also have a drain in the bottom.

COTTON WOUND FILTERS

Cotton Wound filters are a simple static unit that uses cotton thread wound like a small ball of string. The cotton is used as a particulate filter as well as for blocking water. These types of filters have very low water holding capacity and when full will reduce or stop airflow.

THE AQUACHEK® SOLUTION

Polymer technology offers a revolutionary new solution to the removal of moisture, both free and evaporate, from compressed air systems. Polymers employed in AquaChek® filters not only outperform existing technologies but do so decisively.

The AquaChek® Advantage

- Removes Free Water
- Captures 50 Times Its Weight

In simple terms, what the data shows is that at humidity levels in the 40% to 60% range our product will perform as well as others using silica or clay technology. The AquaChek® polymer will pick up over 50 times its own weight in water.

THE POLYMER EDGE

The key to the AquaChek® advantage is our state of the art polymer. As the water molecule comes in contact with the AquaChek® polymer, the two react. The polymer opens up from its coiled position and then encapsulates each water molecule, changing the water from a liquid into a semi-solid. At this point the polymer forms a molecular bond with the water.

The Polymer Edge

- Forms Molecular bond to Water

THE PARTICULATE BONUS

Though particle filtration is a lesser issue in compressed air applications, as compared to fuel and hydraulics, AquaChek®filters also provide protection from dirt entering shop equipment through the compressed air system.

As with all filter technology, particulate filtration efficiency is based on the micron rating of the filter. The micron rating is a numerical value established to tell you a filter's efficiency in removing particulate at specific micron sizes.

Particle Filtration

- 0.5 Micron Rating

Our filters, recommended for use in air, have a .5 nominal micron rating. In addition to superior water holding and encapsulating ability, the filters can be matched to any CFM requirement at a reasonable cost. AquaChek® filters can easily be installed, in series or parallel, as your shop needs change.

THE NEED FOR PRIMARY/SECONDARY FILTRATION

Although different moisture removal technologies remove varying levels of water from air, one thing is consistent among all solutions. Unless you literally freeze the air a small amount of vaporized water will pass through any filtration system into the compressed air system.

Once water vapor has passed into a compressed air system it will accumulate and when temperature changes occur it will condense. This is the single most important reason why primary/secondary filtration is needed in compressed air systems.

DETERMINING CFM REQUIREMENTS

Selecting the right primary/secondary filtration system for your needs depends on the specific CFM capacity of your system. Determining CFM is relatively easy. To calculate the CFM of any system multiply the horsepower of the compressor times 4, i.e.: A 10-horse compressor should produce 40CFM. Any air drying system must be installed to match the manufacturers specified CFM rating for the pneumatic equipment.