



## Ammonia Service

Ammonia is a colorless gas that has a bevy of uses in industry such as a compound used for the production of fertilizers and as a refrigerant. There are a few states and compounds of Ammonia that are common including liquid Ammonia, Anhydrous Ammonia, and Ammonium Hydroxide. Although it has many uses, Ammonia is intrinsically dangerous because it is flammable and can cause severe irritation if the user is exposed. Careful selection of materials of construction is required to sustain a stable Ammonia system.

### Vented Ball

Ammonia has a high coefficient of thermal expansion. A pressure vs. temperature graph for Anhydrous Ammonia is shown on the next page. A-T Controls provides a means of relieving this pressure by venting the ball in the upstream direction. This limits the valve to one direction flow and an arrow on the valve shows which direction the valve should be installed. **A vented, upstream ball is required for floating ball valves in liquid Ammonia service.**

### Cleaning and Lubrication

The reactivity of Ammonia makes removal of materials that can react with Ammonia such as oils, greases, combustible materials, and others imperative. Compatible greases are required for the construction of the valves. **A-T Controls thoroughly cleans all valve parts and lubricates the O-ring with a compatible lubricant. The valves are vacuum packed with desiccant and marked as cleaned for Ammonia service.**

### Standard Material

Please consult A-T Controls for material selection for your application. These parameters are guidelines, and customers are responsible for materials of construction and lubricants being compatible with their Ammonia application:

**Auxiliary Stem Seal:** Graphite, PTFE

**Body:** Carbon Steel (acceptable with most anhydrous Ammonia applications), ASTM A351 Grade CF8M

**Seats:** EPDM, PTFE, 50/50 STFE, RTFE, TFM™-1600 (recommended for cold temperature applications)

**Trim:** 316 SS (standard), 304 SS

**Note: Viton® O-rings should be changed to EPDM**

### Valve Packages (Others available)

**Series 77-** Sizes 1/2"-4", Cavity Filled and Non-Cavity Filled, ISO 5211 Mounting Pad, 800/1000 WOG (by size), 316L Body and Stem, Full Port, Sanitary Clamp Ends or Tube OD Ends

### Literature Download

**Series FD9-** 150#, 300#, 600# Direct Mount Split Body Flanged Ball Valve, Firesafe, 316SST or WCB, multiple sizes available

Literature Downloads:

[FD9-150#](#)

[FD9-300#](#)

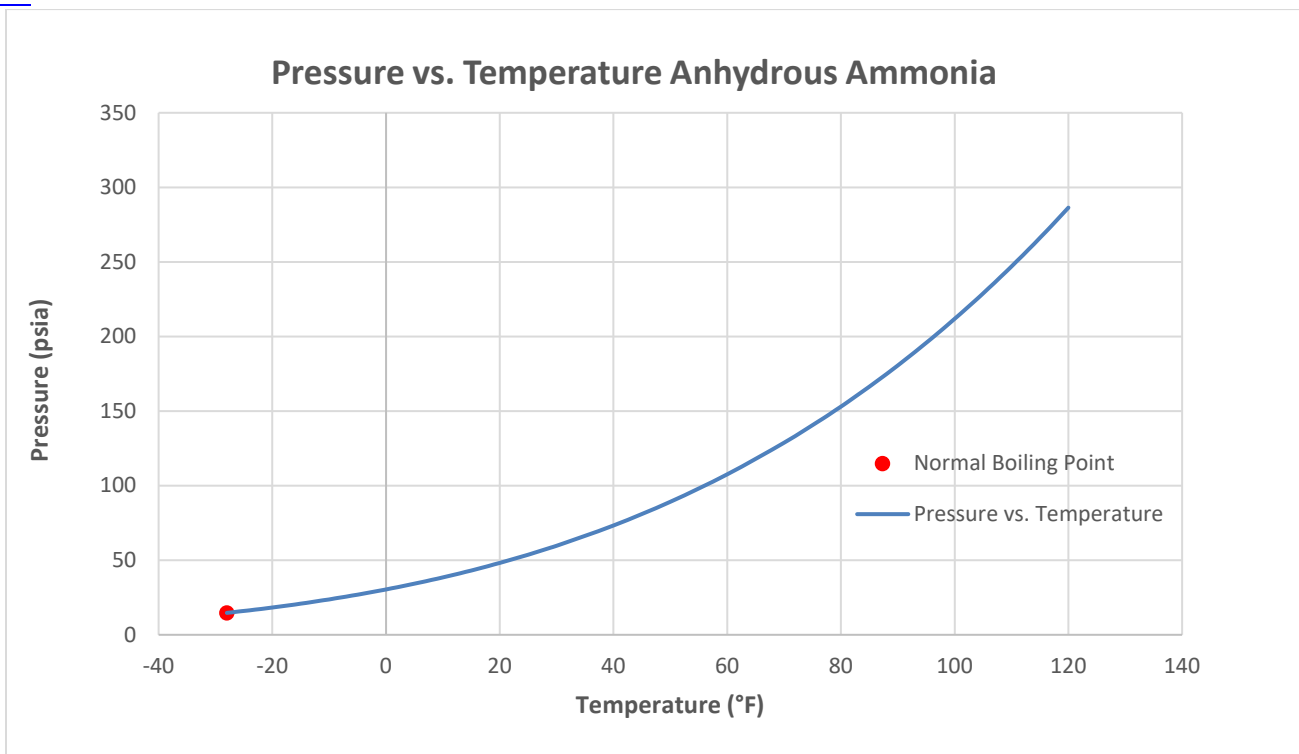
[FD9-600#](#)





**Series F8R/F88-** Sizes 1/4"-2-1/2", Full Port and Regular Port 1500/2000 WOG (by size), 316 SST or Carbon Steel Body, Threaded, Socket Weld, or Butt Weld

**Series AS-** Sizes 2" – 24" (2" – 12" in stock), 150# Flange or Wafer Style PFA lined butterfly valve, ISO 5211 Actuator Mounting Pad, -20°F – 355°F temperature rating, 150 psig pressure rating.





# A-T Controls, Inc.

JOHN BROOKS COMPANY  
1-877-624-5757  
[www.johnbrooks.ca/a-t-controls-triac-valves/](http://www.johnbrooks.ca/a-t-controls-triac-valves/)

Author: CMB No.: DI00028  
Date Created: 8/31/2018  
Date Modified: 08/01/2019

## Butadiene Service

A polymer is a series of repeated units, called monomers, linked together. A monomer is a single molecule that can be bonded to another molecule of the same composition. Polymerization is the process in which monomers join forming a polymer. Typically, polymers can be resistant to chemicals, thermal insulators, and can have varying degrees of strength. A common polymer used in manufacturing is butadiene. Butadiene is a colorless gas (sometimes condensed into a liquid) that is primarily used as a monomer to produce many different types of polymers and copolymers and as a chemical intermediate in the production of industrial chemicals.

### Popcorning

Butadiene monomer (like other monomers) can polymerize quickly and aggressively in small areas. Because of this, the porosity and permeability of a material should be considered to avoid "popcorning." "Popcorning" occurs when there is void space in a material for monomers/polymers to become trapped and polymerization takes place. This can lead to a valve lockup, and destruction of soft goods in the valve. A material proven to prevent "popcorning" is TFM™-1600. TFM™-1600 has lower porosity and permeability than normal virgin PTFE and filled PTFE compounds. TFM™-1600 is used in monomer/polymer applications because of its improved properties over PTFE and filled PTFE.

### Standard Material

**NOTE:** Please consult A-T Controls for material selection for your application. These parameters are guidelines, and customers are responsible for materials of construction and lubricants being compatible with their Polymer application.

**Packing:** Graphite or TFM™-1600

**O-ring:** FKM or FFKM (depending on temperature)

**Stem Seal:** TFM™-1600

**Body:** ASTM A351 Grade CF8M, ASTM A351 Grade CF3M

**Seats:** TFM™-1600

**Trim:** 316 SST

**Note:** A-T Controls recommends using TFM™-1600 seats over PTFE due to "popcorning."

### Valve Packages (Others available)

**Series FD9-** 150#, 300#, 600# Direct Mount Split Body Flanged Ball Valve, Firesafe, 316SST or WCB, multiple sizes available.

**Series F91-** Sizes 1/2" - 6", Regular Port, 150# Unibody Direct Mount Flanged Ball Valve, 316 SST or Carbon Steel Body

**Series F88-** Sizes 1/4" - 4", Full Port 2000/1500/1000 psi WOG (by size), Direct Mounting Pad, Threaded, Socket Weld, or Butt Weld, 316 SST or Carbon Steel Body

**Series F83-** Sizes 1/4" - 2", Full Port 2000/1500 WOG (by size), Threaded, Socket Weld, or Butt Weld, 316 SST or Carbon Steel Body



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Engineer: CMB No.: DI00009  
Date Created: 1/05/2015  
Date Modified: 12/28/2016

## Caustic Service

Caustics are compounds that corrode certain materials that they come in contact with. Two common caustics are Sodium Hydroxide (Caustic Soda) and Potassium Hydroxide (Caustic Potash). These chemicals are dangerous: skin contact may produce severe burns and inhalation could cause damage to the respiratory system. Knowing these facts, careful selection of materials of construction and characteristics of valves is imperative to sustain a safe, stable caustic system.

## Fugitive Emissions

The inherent dangers of caustics may cause applications to require a fugitive emissions requirement. A-T Controls provides a way to control fugitive emissions with a live-loaded pyramidal stem packing system. This system includes a patented 45° pyramidal stem and stem seal with Belleville washer and PTFE stem packing. **These valves are TA-Luft Certified for low emissions.**

## Cleaning and Lubrication

The reactivity of caustics makes removal of materials that can react with caustics such as organic residues and acids imperative. Compatible lubricants are required for the construction of the valves. Water should be removed from the valve to avoid strong exothermic reactions at room temperature.

## Standard Material

Please consult A-T Controls for material selection for your caustic application. These parameters are guidelines, and customers are responsible for materials of construction, preparation of the valves for service, and lubricants being compatible with their caustic application:

**No RTFE or glass filled seals should be used to avoid chemical attack**

**Auxiliary Stem Seal:** Grafoil®, Kalrez® or other FFKM (Viton® susceptible to chemical attack), PTFE, TFM™-1600

**Body:** 316 SST<sup>1</sup>, Carbon Steel<sup>2</sup>

**Seats:** PTFE, TFM™-1600, 50/50 STFE

**Trim:** 316 SST<sup>1</sup>, 304 SST<sup>3,4</sup>

## Valve Packages

**Series D9-** Sizes 1/2"-6", 150# and 300# ANSI, Full Port Design, ISO5211 Actuator Mounting Pad, Anti-Static Device, Traceable Valve. (Viton® O-ring will need to be swapped for compatible material)

**Series 88-** Sizes 1/4"-4", Direct Mounting Pad, Threaded, Socket Weld or Butt Weld (Viton® O-ring will need to be swapped for compatible material)

1. Sodium Hydroxide: Good for most concentrations up to 150 °F. Potassium Hydroxide: Good for all concentrations up to 70°F.
2. Acceptable for Sodium Hydroxide ≤ 50% concentrations and ≤ 120°F
3. Sodium Hydroxide: Good for all concentrations up to 125°F
4. Potassium Hydroxide: Good for all concentrations up to 70 °F, Good up to 70% concentrations at 150°





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Engineer: CMB No.: DI00005  
Date Created: 12/17/2014  
Date Modified: 06/08/2018

## Chlorine Service

Chlorine is highly reactive and toxic in all concentrations. Due to these facts, knowing more about the system that the chlorine will be present in is vital. Chlorine service can be divided into two categories: wet systems (greater than 150 ppm of water) and dry systems (less than 150 ppm of water). Knowing whether the Chlorine system is wet or dry determines what materials of construction will be selected to best perform in the system.

### Vented Ball

Chlorine has a high coefficient of thermal expansion. If the Chlorine is trapped in a closed space, large pressures can develop that can be destructive. The vapor pressure of Chlorine transitioning into gas is shown below. A-T Controls provides a means of relieving this pressure by venting the ball in the upstream direction. This limits the valve to one direction flow and an arrow on the valve shows which direction the valve should be installed. **A vented, upstream ball is required for floating ball valves in Chlorine service.**

### Cleaning and Lubrication

The reactivity of Chlorine makes removal of materials that can react with Chlorine such as hydrocarbon residue, alcohols, and other substances imperative. Compatible substances such as an inert polychlorotrifluoroethylene (PCTFE) grease is required for the construction of the valves. **A-T Controls thoroughly cleans all valve parts and lubricates the O-ring with a compatible lubricant. The valves are vacuum packed with desiccant and marked as cleaned for Chlorine Service.**

### Standard Material

Please consult A-T Controls for material selection for your application. These parameters are guidelines, and customers are responsible for materials of construction and lubricants being compatible with their Chlorine application:

**Auxiliary Stem Seal:** Viton®, Grafoil®

**Body:**

*Dry Service:* ASTM A216 Grade WCB, Hastelloy® C-276

*Wet Service:* Hastelloy® C-276

**Seats:** TFM-1600®, RTFE, PTFE, 50/50 STFE

**Trim:**

*Dry Service:* Monel

*Wet Service:* Hastelloy® C-276

(Note: Carbon Steel bolting must be used).

### Valve Packages (*Others Available*)

**Series D9Q (ASTM A216 Grade WCB Body/End Cap, Monel Ball/Stem for Dry Service) or Series 90T (ASTM A494 Grade CW-12MW Body/End Cap, Hastelloy Hastelloy® C-276 Ball/Stem for Wet Service) - Sizes 1/2"-6", Class 150 and Class 300 ANSI (D9 Series only), Full Port Design, ISO 5211 Actuator Mounting Pad, Anti-Static Device, Traceable Valve.**

**Series 88Q (ASTM A216 Grade WCB Body/End Cap, Monel Ball/Stem for Dry Service) or Series 88T (ASTM A494 Grade CW-12MW Body/End Cap, Hastelloy Hastelloy® C-276 Ball/Stem for Wet Service)- Sizes 1/4"-4", Direct Mounting Pad, Threaded, Socket Weld or Butt Weld.**



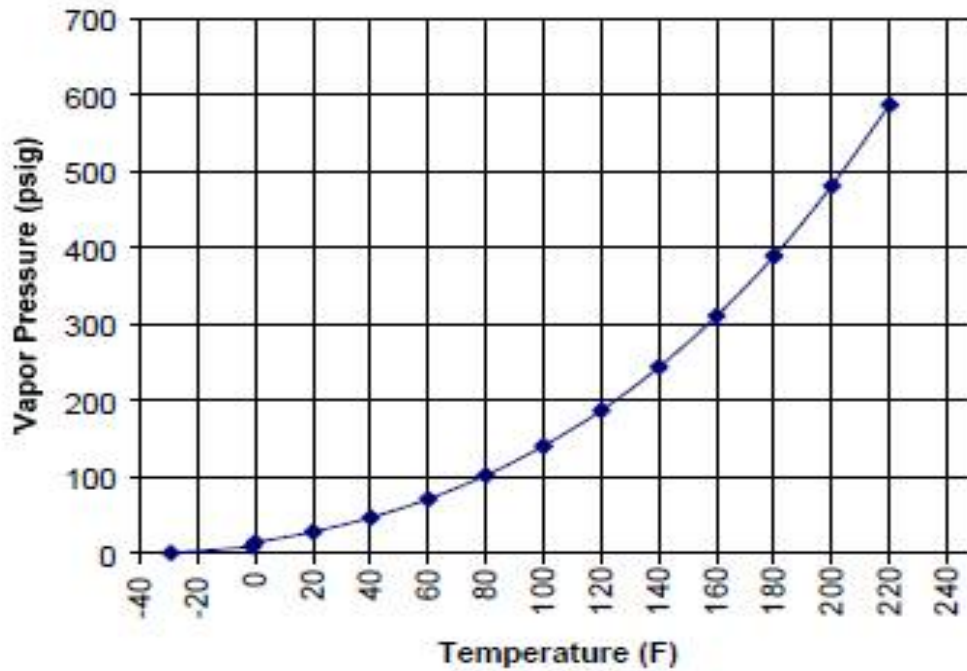
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**Series AS/ASC**- Sizes 2" – 24" (2" – 12" Series ASC in stock), 150# Flange or Wafer Style PFA lined butterfly valve, ISO 5211 Actuator Mounting Pad, -20°F – 355°F temperature rating, 150 psig pressure rating.

### Vapor Pressure of Liquid Chlorine





## Ethylene Oxide Service

Ethylene Oxide is very flammable and explosive. It also is a carcinogen and could cause other major health problems such as nerve damage in low concentrations. Ethylene Oxide is also known to decompose at higher temperatures (842-1040°F) and this decomposition could produce runaway reactions. Although there are inherent dangers that are present for the production and handling of this molecule, Ethylene Oxide is very useful in production of detergents, cosmetics, and the sterilization of surgical equipment. Careful selection of materials of construction and characteristics of valves is imperative to sustain a safe, stable Ethylene Oxide system.

### Vented Ball

Ethylene Oxide has a high coefficient of thermal expansion. If the Ethylene Oxide is trapped in a closed space, large pressures can develop that can be destructive. The vapor pressure of Ethylene Oxide is shown on the next page. A-T Controls provides a means of relieving this pressure in floating ball valves by venting the ball in the upstream direction. This limits the valve to one direction flow and an arrow on the valve shows which direction the valve should be installed. **A vented, upstream ball is required for floating ball valves for Ethylene Oxide service. For bi-directional service, a trunnion mounted ball valve (TS2 or TS3 Series) with SPE (Single Piston Effect) or DPE (Double Piston Effect) with a pressure relief valve must be used.**

### Cleaning and Lubrication

The reactivity of Ethylene Oxide makes removal of materials that can react with Ethylene Oxide such as organic residues and metal oxides imperative. Compatible lubricants are required for the construction of the valves. Water should be removed from the valve to avoid strong exothermic reactions at room temperature.

### Standard Material

Please consult A-T Controls for material selection for your application. These parameters are guidelines, and customers are responsible for materials of construction, preparation of the valves for service, and lubricants being compatible with their Ethylene Oxide application:

**Auxiliary Stem Seal:** Grafoil®, PTFE, FFKM o-ring (Viton® susceptible to chemical attack).

**Body:** 316 SST/CF8M, Carbon Steel, Hastelloy® C-276

**Seats:** TFM-1600® (recommended for low temperature applications), PTFE (Teflon®), RTFE, 50/50 STFE

**Trim:** 316 SST, 304 SST (slight corrosion)

### Valve Packages

**Series D9-** Sizes 1/2" - 6", 150# and 300# ANSI, Full Port Design, ISO5211 Actuator Mounting Pad, Anti-Static Device, Traceable Valve

**Series F88-** Sizes ¼" - 4", Full Port 1500/2000 psi WOG (by size), Direct Mounting Pad, Threaded, Socket Weld, or Butt Weld

**Series TS2 (cast)/TS3 (forged)-** Sizes 2" – 48", Full and Reduced Port, Class 150/300/600, multiple end connections and body materials/trim materials available.





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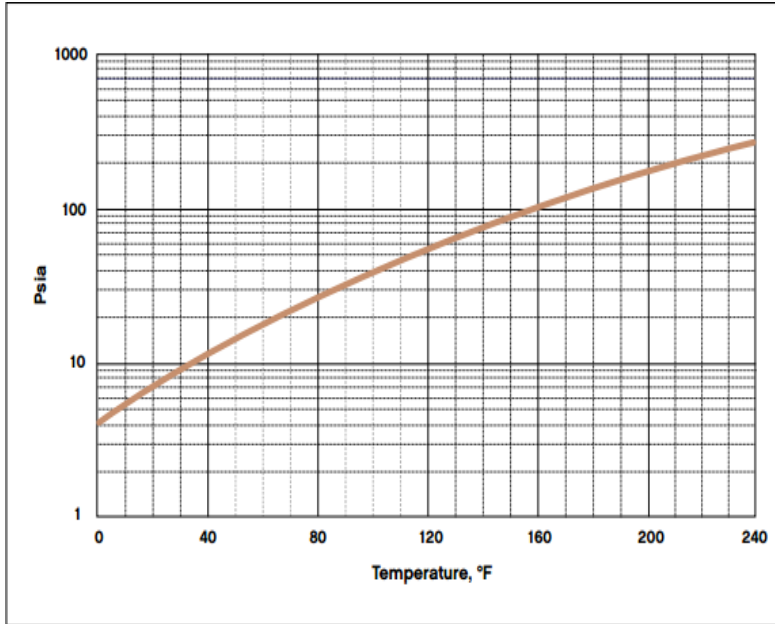
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Engineer: CMB No.: DI00008

Date Created: 1/06/2015

Date Modified: 12/28/2016

## Vapor Pressure vs. Temperature Ethylene Oxide



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Engineer: CMB No.: DI00004

Date Created: 12/05/2014

Date Modified: 12/28/2016

## Hydrogen Peroxide Service

Hydrogen Peroxide is a colorless liquid that can be used for things such as disinfection and bleaching. Handled correctly, Hydrogen Peroxide can be safe. Handled incorrectly, however, it can be explosive and dangerous. A very clean and safe system is required for Hydrogen Peroxide service because of the dangers of this molecule. With this in mind, careful selection of materials of construction and makeup of Hydrogen Peroxide service valves is imperative. It is also important to know whether the system will have diluted concentrations of Hydrogen Peroxide (less than 50%) or higher concentrations (greater than 50%), and the temperature of the application.

### Vented Ball

Hydrogen Peroxide is prone to decomposition into water and oxygen. This decomposition can increase pressure, even sometimes rapidly, in the enclosed cavity of the valve. A table showing the amounts of these decomposition products is shown on the next page. A-T Controls provides a means of relieving this pressure by venting the ball in the upstream direction. This limits the valve to one direction flow and an arrow on the valve shows which direction the valve should be installed. **A vented, upstream ball is required for Hydrogen Peroxide service.**

### Preparation, Cleaning, and Lubrication

Valves used for Hydrogen Peroxide service are required to be passivated according to ASTM A380/A380M and ASTM A967/A967M before going into service. A-T Controls valves meet these requirements. An inert lubricant such as a fluorinated product is required for the construction of the valves. **A-T Controls thoroughly cleans all valve parts and lubricates the O-ring with a compatible lubricant. The valves are vacuum packed with desiccant and marked as cleaned for Hydrogen Peroxide Service.**

### Standard Material

Please consult A-T Controls for material selection for your application. These parameters are guidelines, and customers are responsible for materials of construction and lubricants being compatible with their Hydrogen Peroxide application:

**Auxiliary Stem Seal:** Viton®, Grafoil® (satisfactory for diluted)

**Body:** ASTM A351 Grade CF8M (good for high concentrations), ASTM A351 Grade CF3M

**Seats:** TFM™-1600, RTFE, PTFE, 50/50 STFE, EPDM (low concentrations)

**Trim:** ASTM A351 Grade CF8M, 304 SST

### Valve Packages

**Series D9-** Sizes ½"-6", 150# and 300# ANSI, Full Port Design, ISO5211 Actuator Mounting Pad, Anti-Static Device, Traceable Valve.

**Series 88-** Sizes ¼"-4", Full Port 1500/2000 psi WOG (by size), Direct Mounting Pad, Threaded, Socket Weld, or Butt Weld.

**Series 8R:** Sizes ¼"-2-1/2", High Performance 3-Piece Design, Regular Port 1500/2000 psi WOG, Stainless Body, Threaded, Socket Weld, or Butt Weld. Literature



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Engineer: CMB No.: DI00004

Date Created: 12/05/2014

Date Modified: 12/28/2016

H2O2 Weight %	Mole Fraction H2O	Mole Fraction O2	Weight % H2O	Weight % O2
0	1	0	100	0
10	0.973	0.027	95.3	4.7
20	0.945	0.055	90.6	9.4
30	0.915	0.085	85.88	14.12
40	0.884	0.116	81.19	18.81
50	0.852	0.148	76.48	23.52
60	0.819	0.181	71.78	28.22
70	0.784	0.216	67.08	32.92
80	0.747	0.253	62.38	37.62
90	0.708	0.292	55.67	44.33
100	0.666	0.334	52.97	47.03



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Engineer: CMB No.: DI00013

Date Created: 05/28/2015

Date Modified: 02/22/2018

## Oxygen Gas Service

Oxygen is an element that exists as diatomic molecule (O<sub>2</sub>) in most conditions. Although Oxygen is necessary for life, it is very reactive at certain pressures and temperatures. Reactions with Oxygen can be minor like the production of rust, but they can also be major culminating into an explosion. Knowing these facts, careful selection of materials of construction and characteristics of valves is imperative to sustain a safe, stable Oxygen Gas system.

### Anti-Static Device

The inherent dangers of Oxygen require a way to prevent an electro-static spark. A-T Controls provides a way to control electro-static potential with an Anti-Static Device. This Anti-Static device contains a spring and a 316 SST ball to ensure positive grounding. This is provided in two places to ensure grounding between the ball and stem along with stem to body. **An Anti-Static Device is required for Oxygen Gas Service.**

### Cleaning and Lubrication

The reactivity of Oxygen requires the removal of materials that react with Oxygen such as hydrocarbon residue and organic combustible material imperative. These valves must undergo a thorough Oxygen Cleaning procedure per "Work Instruction for TRIAC Degreasing & Oxygen Cleaning Service, Rev. 3" in our Clean Room to ensure the valves can be used for Oxygen Service. A-T Controls is certified by Air Liquide for this cleaning. **A-T Controls thoroughly cleans all valve parts and lubricates the O-ring with a compatible lubricant. The valves are vacuum packed with desiccant and marked as cleaned for Oxygen Gas Service.**

### Standard Material

Please consult A-T Controls for material selection for your Oxygen Gas application. These parameters are guidelines, and customers are responsible for materials of construction, preparation of the valves for service, and lubricants being compatible with their Oxygen Gas application:

**Firesafe valves that are O<sub>2</sub> cleaned use new graphite gaskets/packing from repair kits. Graphite cannot be truly cleaned.**

**Delrin Seats cannot be used for Oxygen Service.**

**Auxiliary Stem Seal:** PTFE (Teflon®), TFM™-1600, Viton®

**Body:** 316 SST<sup>1</sup>, Carbon Steel<sup>2</sup>

**Seats:** PTFE (Teflon®), TFM, RTFE, PCTFE

**Trim:** 316 SST, 304 SST<sup>3</sup>, Monel<sup>4</sup>

1. Good to 100% concentration O<sub>2</sub> to 248°F
2. Good to 100% concentration O<sub>2</sub> to 150°F
3. Good to 100% concentration O<sub>2</sub> to 150°F
4. For high velocity applications. Good to 100% concentration O<sub>2</sub> to 120°F

### Valve Packages (*Others Available*)

**Series D9-** Sizes 1/2"-6", 150# and 300# ANSI, Full Port Design, ISO5211 Actuator Mounting Pad, Anti-Static Device, Traceable Valve.

**Series 88-** Sizes 1/4"-4", Direct Mounting Pad, Threaded, Socket Weld or Butt Weld, Anti-Static Device

**Series 90-** Sizes 1/2"-4", 150# ANSI, Full Port Design, ISO5211 Actuator Mounting Pad, Anti-Static Device, Traceable Valve



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