A Guideline for Compound Selection for Use with Various Fluids and Chemicals

Note: The information contained in these tables was derived from several sources and is to be used as a general guide only Compounds suitable for any specification application rests solely by the end user. Dixon Sanitary assumes no responsibility. All effect ratings assume static conditions at ambient temperatures.

A - satisfactory **B** - fair **C** - severe effect; except for some static applications **D** - unsatisfactory **E** - insufficient information

FLUID	Buna	EPDM	Viton®	Teflon®	Silicone
Acetaldehyde	D	A	D	A	B
Acetamide	A	A	B	A	B
Acetic Acid, 30%	B	A	B	A	A
Acetone	D	A	D	A	C
Acetophenone	D	A	D	A	D
Acetyl Chloride	D	D	A	A	C
Acetylene	A	A	A	A	B
Acrylonitrile	D	D	C	A	D
Adipic Acid	A	A	E	E	E
Ammonia Gas (cold)	A	A	D	A	A
Ammonium Choride (aq)	A	A	A	A	E
Ammonium Hydroxide (conc.)	D	A	B	A	A
Ammonium Nitrate (aq)	A	A	E	A	E
Ammonium Nitrite (aq)	A	A	E	E	B
Ammonium Phospate (aq)	A	A	E	A	A
Ammonium Sulfate (aq)	A	A	D	A	E
Amyl Acetate (Banana Oil)	D	A	D	A	D
Amyl Alcohol	B	A	B	A	D
Amyl Borate	A	D	A	A	E
Arsenic Acid	A	A	A	E	A
Arsenic Trichloride (aq)	A	C	E	E	E
Barium Chloride (aq)	A	A	A	A	A
Barium Hydroxide (aq)	A	A	A	A	A
Barium Sulfate (aq)	A	A	A	A	A
Barium Sulfide (aq)	A	A	A	A	A
Benzaldehyde	D	A	D	A	B
Benzene	D	D	A	A	D
Benzoic Acid	C	C	A	A	C
Benzoyl Chloride	D	D	A	A	E
Benzyl Alcohol	D	A	A	A	B
Benzyl Chloride	D	D	A	A	D
Boric Acid	A	A	A	A	A
Brine	A	A	A	A	A
Bromine, Anhydrous	D	D	A	E	D
Bromine Water	D	B	A	E	D
Butadiene	D	C	A	A	D
Butane	A	D	A	A	D
Butyl Acetate	D	C	D	E	D
Butyl Acetyl Ricinoleate	C	A	A	E	E

FLUID	Buna	EPDM	Viton®	Teflon®	Silicone
Butyl Alcohol	A	B	A	A	B
Butyl Amine	C	B	D	E	D
Butyl Benzoate	D	B	A	E	E
Butyl Carbitol	D	A	A	A	D
Butyl Cellosoive	D	A	D	A	E
Butyl Oleate	D	B	A	E	E
Butyl Stearate	B	C	A	E	E
Butylene	B	D	A	E	D
Butyraldehyde	D	B	D	E	D
Carbolic Acid (Phenol)	D	B	A	A	D
Carbon Bisulfide	C	D	A	E	D
Carbon Dioxide	A	B	A	E	B
Carbonic Acid	B	A	A	E	A
Carbon Monoxide	A	A	A	A	A
Carbon Tetrachloride	C	D	A	A	D
Castor Oil	A	B	A	A	A
Cellosoive Acetate	D	B	D	A	D
China Wood Oil (Tung Oil)	A	C	A	A	D
Chlorine (wet)	D	C	A	A	D
Chlorine Dioxide	D	C	A	A	E
Chloroacetic Acid	D	A	D	A	E
Chloroacetone	D	A	D	E	D
Chlorobenzene	D	D	A	E	D
Chlorobromomethane	D	B	A	E	D
Chloroform	D	D	A	A	D
Chlorotoluene	D	D	A	E	D
Chrome Plating Solutions	D	C	A	A	C
Chromic Acid	D	B	A	A	B
Cod Liver Oil	A	A	A	A	B
Copper Acetate (aq)	B	A	D	E	D
Copper Chloride (aq)	A	A	A	A	A
Copper Cyanide (aq)	A	A	A	A	A
Copper Sulfate (aq)	A	A	A	A	A
Creosote (coal tar)	A	D	A	A	D
Cresylic Acid	D	D	A	E	D
Cyclohexane	A	D	A	A	D
Cyclohexanol	C	C	A	E	D
Cyclohexanone	D	B	D	E	D
Denatured Alcohol	A	A	A	A	A

FLUID	Buna	EPDM	Viton®	Teflon®	Silicone
Detergent Solutions	A	A	A	A	A
Diacetone Alcohol	D	A	D	A	B
Dibenzyl Ether	D	B	D	A	E
Dibenzyl Sebecate	D	B	B	E	C
Dibromoethyl Benzene (Alkazene)	D	D	B	E	D
Dibutyl Amine	D	C	D	E	C
Dibutyl Ether	D	C	C	E	D
Dibutyl Phthalate	D	B	C	A	B
Dibutyl Sebecate	D	B	B	E	B
O-Dichlorobenzene	D	D	A	E	D
Dichloro-Isopropyl Ether	D	C	C	E	D
Diethylamine	B	B	D	A	B
Diethyl Benzene	D	D	A	E	D
Diethyl Ether	D	D	D	E	D
Diethylene Glycol	A	A	A	E	B
Diethyl Sebecate	B	B	B	E	B
Diisobutylene	B	D	A	E	D
Diisopropyl Benzene	D	D	A	E	E
Diisopropyl Ketone	D	A	D	E	D
Diisopropylidence Acetone	D	C	D	E	D
Dimethyl Aniline (Xylidine)	C	B	D	E	D
Dimethyl Ether (Methyl Ether)	A	D	A	E	A
Dimethyl Formamide	B	B	D	E	B
Dimethyl Phthalate	D	B	B	E	E
Dinitrotoluene	D	D	D	E	D
Dioctyl Phthalate	C	B	B	E	C
Dioctyl Sebecate	D	B	B	E	C
Dioxane	D	B	D	E	D
Dioxolane	D	B	D	E	D
Dipentene	A	D	A	E	D
Diphenyl (Phenylbenzene)	D	D	A	E	D
Diphenyl Oxides	D	D	A	E	C
Dowtherm Oil	D	D	A	A	C
Ethane	A	D	A	A	D
Ethanolamine	B	B	D	E	B
Ethyl Acetate	D	B	D	E	B
Ethyl Acetoacetate	D	B	D	E	B
Ethyl Acrylate	D	B	D	E	B
Ethyl Alcohol	A	A	C	A	A
Ethyl Benzene	D	D	A	A	D
Ethyl Benzoate	D	A	A	A	D
Ethyl Cellosoive	D	B	D	E	D
Ethyl Cellulose	B	B	D	A	C
Ethyl Chloride	A	C	A	A	D
Ethyl Chlorocarbonate	D	B	A	A	D
Ethyl Chloroformate	D	B	D	E	D

FLUID	Buna	EPDM	Viton®	Teflon®	Silicone
Ethyl Ether	C	C	D	A	D
Ethyl Pentachlorobenzene	D	D	A	A	D
Ethylene	A	B	A	A	E
Ethylene Chloride	D	C	B	E	D
Ethylene Diamine	A	A	D	E	A
Ethylene Dichloride	D	C	A	A	D
Ethylene Glycol	A	A	A	A	A
Fluoroboric Acid	A	A	E	E	E
Freon 11	B	D	A	A	D
Freon 12	A	B	B	A	D
Freon 22	D	A	D	A	D
Fumaric Acid	A	B	A	E	B
Gallic Acid	B	B	A	A	E
Gasoline	B	D	A	A	D
Glucose	A	A	A	A	A
Glycerin	A	A	A	A	A
Hexane	A	D	A	A	D
Hexyl Alcohol	A	C	A	A	B
Hydrazine	B	A	D	A	C
Hydrobromic Acid	D	A	A	E	D
Hydrocyanic Acid	B	A	A	A	C
Hydrofluoric Acid (conc.) cold	D	C	A	A	D
Hydrofluosilicic Acid	B	B	A	E	D
Hydrogen Gas	A	A	A	A	C
Hydrogen Peroxide (90%)	D	B	B	E	B
Hydrogen Sulfide (wet) cold	D	A	D	E	C
Hydroquinone	C	B	B	A	E
Iodoform	E	D	E	E	E
Isobutyl Alcohol	B	A	A	A	A
Isooctane	A	D	A	E	D
Isopropyl Acetate	D	B	D	A	D
Isopropyl Alcohol	B	A	A	A	A
Isopropyl Chloride	D	D	A	A	D
Isopropyl Ether	B	D	D	A	D
Kerosene	A	D	A	A	D
Lacquers	D	D	D	A	D
Lactic Acid (cold)	A	A	A	A	A
Lead Acetate (aq)	B	A	D	E	D
Lead Nitrite (aq)	A	A	E	E	B
Lime Bleach	A	A	A	E	B
Linoleic Acid	B	D	B	A	B
Maleic Acid	D	B	A	A	E
Malic Acid	A	B	A	E	B
Methane	A	D	B	A	D
Methyl Acetate	D	A	D	A	D
Methyl Acrylate	D	B	D	A	D

INFORMATION COMPILED FROM NEWMAN GASKETS WEBSITE, WWW.NEWMANGASKET.COM

FLUID	Buna	EPDM	Viton®	Teflon®	Silicone
Methylacrylic Acid	D	B	D	E	D
Methyl Alcohol	A	A	D	A	A
Methyl Bromide	B	D	A	A	E
Methyl Butyl Ketone	D	A	D	A	C
Methyl Cellosoive	C	B	D	A	D
Methyl Chloride	D	C	B	A	D
Methyl Cyclopentane	D	D	B	E	D
Methylene Chloride	D	C	B	E	D
Methyl Ether	A	D	A	A	A
Methyl Ethyl Ketone	D	A	D	A	D
Methyl Isobutyl Ketone	D	B	D	A	D
Methyl Methacrylate	D	C	D	A	D
Milk	A	A	A	A	A
Mineral Oil	A	C	A	C	B
Monoethanol Amine	D	A	D	E	B
Monomethyl Ether	A	D	A	E	A
Monovinyl Acetylene	A	A	A	A	B
Mustard Gas	E	A	E	E	A
Naphthalenic Acid	B	D	A	A	D
Natural Gas	A	D	A	A	A
Nickel Acetate (aq)	B	A	D	E	D
Nickel Chloride (aq)	A	A	A	A	A
Nickel Sulfate (aq)	A	A	A	A	A
Nitric Acid (dilute)	D	B	A	A	B
Nitrobenzene (Ligroin)	A	D	A	A	D
Nitroethane	D	B	D	A	D
Nitrogen Tetroxide	D	C	D	A	D
Octachlorotoluene	D	D	A	E	D
Octadecane	A	D	A	E	D
N-Octane	B	D	A	A	D
Octyl Alcohol	B	C	A	A	B
Oleic Acid	C	D	B	A	D
Oxalic Acid	B	A	A	E	B
Oxygen - Cold	B	A	A	A	A
Ozone	D	A	A	E	A
Palmitic Acid	A	B	A	E	D
Perchloric Acid	D	B	A	E	D
Phenyl Ethyl Ether	D	D	D	E	D
Phosphoric Acid - 20%	B	A	A	E	B
Phosphorus Trichloride	D	A	A	A	E
Piperidine	D	A	D	E	D
Polyvinyl Acetate Emulsion	E	A	E	E	E
Potassium Acetate (aq)	B	A	D	E	D
Potassium Chloride (aq)	A	A	A	A	A
Potassium Cyanide (aq)	A	A	A	A	A
Potassium Nitrate (aq)	A	A	A	A	A

FLUID	Buna	EPDM	Viton®	Teflon®	Silicone
i-Propyl Acetate	D	B	D	E	D
Propyl Nitrate	D	B	D	E	D
Propylene	D	D	A	A	D
Pyridine	D	B	D	E	D
Salicylic Acid	B	A	A	E	E
Silicone Oils	A	A	A	A	C
Soap Solutions	A	A	A	A	A
Sodium Acetate (aq)	B	A	D	E	D
Sodium Bicarbonate (aq) (baking soda)	A	A	A	A	A
Sodium Borate (aq)	A	A	A	A	A
Sodium Chloride (aq)	A	A	A	A	A
Sodium Hydroxide (aq)	B	A	B	A	B
Sodium Nitrate (aq)	B	A	E	E	D
Sodium Peroxide (aq)	B	A	A	E	D
Soybean Oil	A	C	A	A	A
Steam, under 300°F	D	A	D	A	C
Stearic Acid	B	B	E	A	B
Stoddard Solvent	A	D	A	A	D
Sulfur Chloride (aq)	C	D	A	B	C
Sulfuric Acid (dilute)	C	B	A	E	D
Sulfurous Acid	B	B	A	A	D
Tannic Acid	A	A	A	A	B
Tartaric Acid	A	B	A	A	A
Tetrachloroethylene	D	D	A	A	D
Toluene	D	D	A	A	D
Triethanol Amine	B	A	D	A	E
Trioctyl Phosphate	D	A	B	E	C
Tung Oil (China Wood Oil)	A	C	A	A	D
Turpentine	A	D	A	A	D
Vegetable Oils	A	C	A	A	B
Vinegar	B	A	A	A	A
Whiskey, Wines	A	A	A	A	A
White Pine Oil	B	D	A	E	D
Zinc Chloride (aq)	A	A	A	A	A

INFORMATION COMPILED FROM NEWMAN GASKETS WEBSITE, WWW.NEWMANGASKET.COM

S.T.A.M.P.E.D.

Questions to Ask

S	Size
T	Temperature
A	Application
M	Media
P	Pressure
E	Ends
D	Dixon Sanitary

Measurement Information

Measures of Pressure

1 Pound Per Square Inch = 144 Pounds Per Square Foot = 0.068 Atmosphere = 2.042 Inches of Mercury at 68°F =27.7 Inches of Water at 62°F = 2.31 Feet of Water at 68°F.

1 Atmosphere = 30 Inches of Mercury at 62°F = 14.7 Pounds Per Square Inch = 2116.3 Pounds Per Square Foot = 33.95 Feet of Water at 68°F.

1 Foot of Water at 68°F = 62.355 Pounds Per Square Foot = 0.433 Pounds Per Square Inch.

1 Inch of Mercury at 68°F = 1.132 Feet of Water = 13.58 Inches of Water = 0.491 Pounds Per Square Inch.

Column of Water 12 Inches High, 1 Inch in Diameter = .341 Pounds

Length Conversion Constants

Millimeters x .039370 = Inches
Meters x 39.370 = Inches
Meters x 3.2808 = Feet
Meters x 1.09361 = Yards
Kilometers x 3,280.8 = Feet
Kilometers x .62137 = Statute Mile
Kilometers x .53959 = Nautical Miles

Inches x 25.4 = Millimeters
Inches x .0254 = Meters
Feet x .30480 = Meters
Yards x .91440 = Meters
Feet x .0003048 = Kilometers
Statute Miles x 1.60935 = Kilometers
Nautical Miles x 1.85325 = Kilometers

Mass Conversion Constants

Grams x .03527 = Ounces (Avd.)
Grams x .033818 = Fluid Ounces (Water)
Kilograms x 35.27 = Ounces (Avd.)
Kilograms x 2.20462 = Pounds (Avd.)

Ounces (Avd.) x 28.35 = Grams
Fluid Ounces (Water) x 29.57 = Grams
Ounces (Avd.) x .02835 = Kilograms
Pounds (Avd.) x .45359 = Kilograms

Trademarks

Pyrex® is a registered trademark of Corning Glass.

Teflon® is a registered trademark of E.I. duPont Nemours and Company.

Tri-Clamp® is a registered trademark of Tri-Clover, Inc.

Viton® is a registered trademark of DuPont Dow Elastomers.

Water Data and Formulas (no losses included)

Water Level (inches)	Gallons per Minute Discharge for a Given Nominal Pipe Diameter (inches)				
	5	6	8	10	12
5	163	---	---	---	---
6	195	285	---	---	---
7	228	334	580	---	---
8	260	380	665		---
9	293	430	750		1660
10	326	476	830		1850
11	360	525	915		2020
12	390	570			2220
13	425	620			2400
14	456	670			2590
15	490	710			2780
16	520	760			2960
17	550	810			3140
18	590	860			3330
19	620	910			3500
20	650	950			3700
21	685				3890
22	720				4060
23	750				4250
24	---				4440

1 gallon water = 231 cubic inches = 8.333 pounds

1 pound of water = 27.7 cubic inches

1 cubic foot water = 7.5 gallons = 62.5 pounds (salt water weighs approximately 64.3 pounds per cubic foot)

Pounds per square inch at bottom of a column of water = height of column in feet x .434

1 miner's inch = 9 to 12 gallons per minute

Horsepower to Raise Water

If pumping liquid other than water, multiply the gallons per minute below by the liquids specific gravity

$$\text{Horsepower} = \frac{\text{gallons per minute x total head in feet}}{3960}$$

Gallons Per Minute through a Pipe

GPM = .0408 x pipe diameter (inches^2) x water velocity (feet/minute)

Weight of Water in a Pipe

Pounds water = pipe length (feet) x pipe diameter (inches^2) x .34

S

Metal Chemistry

Element	C	Mn	P	S	Si	Cr	Ni	Mo
304 [1]	0.08	2.00	0.045	0.030	1.00	18.0-20.0	8.0-10.0	
316L [1]	0.03	2.00	0.045	0.030	1.00	16.0-18.0	10.0-14.0	2.0-3.0
316L BPE [2]	0.03	2.00	0.045	0.05 - 0.17	1.00	16.0-18.0	10.0-14.0	2.0-3.0
CF-8 [3]	0.08	1.50	0.04	0.04	2.00	18.0-21.0	8.0-11.0	
CF-8M [3]	0.08	1.50	0.04	0.04	2.00	18.0-21.0	9.0-12.0	2.0-3.0

[1] AISI specifications for wrought material
[2] ASME BPE 2002
[3] ASTM A743
- Percentages are maximums unless a range is specified

Finish Information

Finish Specifications

Process	RA micro inch	RA micron	ISO designation
150 grit	30 - 35	0.75 - 0.875	N6
150 grit + Electropolish	12 - 20	0.3 - 0.5	
180 grit	20 - 25	0.5 - 0.625	
180 grit + Electropolish	10 - 16	0.25 - 0.4	
240 grit	15 - 20	0.375 - 0.5	N5
240 grit + Electropolish	8 - 12	0.2 - 0.3	
320 grit	8 - 12	0.2 - 0.3	N4
320 grit + Electropolish	6 - 12	0.15 - 0.3	

- Additional improvements to the surface finish require buffing and further electropolishing. The effect of electro polishing is to improve the existing surface by approximately 50%.
- Microinch = 2.54×10^{-8} m
  Micron = 1.0×10^{-6} m

Finish Designations for Tubing and Fittings

Finish Number	Finish Conditions
1	Mill Finish (bright annealed, pickled, sand blast or tumbled)
3	Polished 180 grit inside diameter (ID) only
5	Polished 150 grit outside diameter (OD) only
7	Polished 180 grit outside/inside diameter (OD/ID)
3A	Polished 150 grit outside (OD), 180 grit inside diameter (ID)

- 180 grit = 25Ra microinch = 0.5Ra micron (minimum)

3-A marking

Note: Bradford™ tubing meets 3A Sanitary Standards for Polished Metal Tubing for Milk and Milk products 33-01.

Valve Seat Materials

Butterfly Valve Elastomer Information

Property	EPDM	Silicone	Viton® (FKM)
tensile strength	good-excellent	good	good-excellent
electrical properties	excellent	excellent	good
weather resistance	excellent	excellent	excellent
heat resistance *	excellent (275° F)	excellent (450°F)	excellent (400° F)
cold resistance *	Good-excellent (-55°F)	excellent (-80°F)	good (-20° F)
steam resistance	good	good	excellent
tear resistance	good	good	good
abrasion resistance	good-excllent	good-excellent	good
acid resistance	good-excellent	good	good
petroleum oil	poor	good	excellent
flame resistance	poor	poor	good
vegetable oil	good (most)	good (intermittent)	excellent

* Temperature information is for elastomer only, not in valve application. EPDM or Viton® are recommended for ozone treated water.

Seat Materials for Ball Valves

Code	Designation	Material	Applications
V	virgin PTFE	virgin polytetrafluoroethylene	100% PTFE. Our standard seat material. Ideal for most sanitary services. Specified for applications requiring a low co-efficient of friction. 3A and FDA approved.
G	RTFE	15% glass reinforced tetrafluoroethylene	15% glass filled = 85% PTFE. Slightly higher temperature and pressure rating than PTFE. Specified for applications requiring higher cycle life than PTFE. 3A and FDA approved.
C	25% carbon PTFE	25% carbon reinforced tetrafluoroethylene	25% carbon + 75% PTFE. Specified for higher temperature pressure applications. Ideal for steam and thermal fluid applications. Higher cycle life than RTFE.
S	SS reinforced PTFE	50% stainless steel filled tetrafluoroethylene	50% SS = 50% PTFE. Specified for higher temperature pressure applications in a sanitary process. 3A and FDA approved.
U	UHMW	ultra high molecular weight polyethylene	Specified for its low modulus of abrasion and minimal property degradation when exposed to moderate levels of radiation. Ideal for applications where fluorocarbons are not acceptable. 3A and FDA approved.

Glossary of Terms

3A Symbol for 3A Sanitary Standards Symbol Administrative Council. The 3A Sanitary Standard were created by the dairy industry as a voluntary benchmark for product performance and sanitary safety. The standard, collaboratively developed by a group of processors, suppliers, regulatory officials and sanitation specialists, is accepted by federal, state and local regulatory authorities. Our products have earned the 3A symbol, through third party verification. This assessment makes certain each product conforms in all respects to the published standards. Dixon Sanitary is proud to be a participant in the 3A program.

3A Finish Product surface finish equivalent to 150 grit or better OD, and 180 grit or better ID. A maximum of Ra 32 microinch (0.8 micron) is indicated.

ABS (Acrylicnitrile-butadiene-styrene) a thermoplastic resin with an excellent resistance to acids, bases, salts and some solvents. It is heat resistant to 230° F.

ANSI American National Standards Institute, Inc.

ASME American Society of Mechanical Engineers.

ASTM American Society for Testing and Materials.

Acme Thread A flat grooved helical ridge on a nut or bolt. This typically has a 29° included angle. Used on bevel seat, John Perry fittings and IDF.

Anneal Stress relief of stainless steel, a heat treatment to remove the stresses generated in forming and welding operations. This heat treatment is best done under controlled atmosphere or vacuum to maintain the mill finish. The fittings are not quenched, as in solution annealing; this would reintroduce residual stresses. Done correctly, parts are processed to provide minium residual stresses and full corrosion resistance.

Available NPSH (Net positive suction head) A characteristic of the system and is defined as the energy which is in a liquid at the suction connection of the pump (regardless of the type of pump) over and above that energy in the liquid due to its vapor pressure.

Bright Anneal Annealing in a protective medium to prevent discoloration of the surface.

Bright Annealed Finish A silvery satin surface, approximately the mill finish of stainless steel.

Buna Synthetic rubber, a copolymer of acrylonitrile and butadiene.

Burst Pressure The pressure at which rupture occurs.

Cavitation When the NPSH required by the pump is greater than the NPSH available by the system, cavitation occurs. Vapor is formed and moves along with the stream. These vapor bubbles or “cavities” collapse when they reach regions of higher pressure on their way through the pump cavities are forming in the liquid being pumped. When these cavities form at the suction of the pump several things happen all at once.

- Loss in capacity
- Loss of head (pressure)
- The efficiency drops
- The cavities or bubbles will collapse when they pass into the higher regions of pressure causing noise, vibration, and damage to many of the components

CW Clockwise.

CCW Counter clockwise

Clamp A device used to join mechanical parts, fittings, ensuring a quick leak-proof connection and enabling easy take down.

Glossary of Terms

Cold Flow Continued deformation or movement of rubber or PTFE under stress.

Compression Set The deformation that remains in rubber or PTFE after it has been subjected to and released from stress such as a clamp. The longer the stress is maintained the more definitive the deformation.

DIN Deutches Institut für Normung - German National-standards Organisation.

Double-Acting (DA) Pneumatic Actuator Any pneumatic actuator which uses air to drive the actuator output shaft in both the open and close direction. The air supply is piped to one side of a piston-drive or a diaphragm while the air contained on the opposing side is exhausted.

DN Diameter nominal.

DPDT Double pole-double throw, a switch.

Durometer An instrument for measuring the hardness of rubber by resitance to penetration.

Durometer Hardness A numerical value which indicates the resistance to indentation of the blunt indentor of the durometer.

EPDM Ethylene propylene diene monome, a synthetic rubber.

Elastomer Any of various elastic substances resembling rubber.

Electric Actuator An electro-mechanical device used to open and close or modulate a valve. The actuator (which is mounted and coupled to the valve in similar fashion as the pneumatic actuator), operates the valve using an electric motor driving a gear train. While the basic function of the electric actuator is similar to the pneumatic, there are distinct differences in the application and flexibility of the two types, and these differences should be considered to select the proper type.

Electric Failsafe Actuator Electrically driven actuator that contains an internal spring to close the valve on loss of electricity.

Encapsulation The enclosing of material by an encapsulant for protective purposes. In a ball valve the ball is encased in PTFE, preventing the material flowing through the valve from getting behind the ball causing contamination problems.

Fail-Closed Spring return pneumatic actuator is applied to the valve such that the spring will drive the valve to the closed position upon loss of air (may be termed air-to open).

Fail-Open Spring return pneumatic actuator is applied to the valve such that the spring will drive the valve to the open position upon loss of air (may be termed air-to close).

Flow Coefficient (Cv) Cv is defined as the flow rate in U.S. gallons of water (at 60°F) that will pass through the valve in one minute with a differential pressure across the valve of 1 PSI.

Ferrule A bushing used to secure a tube joint. A special bushing designed for welding to the end of tubing. Two ferrules and a gasket make a leak-proof connection when used with the complimentary clamps.

Fitting A small part of an apparatus (may be detachable).

Fluorocarbon Elastomer known as Viton® a registered trademark of DuPont.

Friction loss The part of the total loss that occurs as the fluid flows through straight pipe.

ISO5211 International standard for actuator and valve interface.

IDF International Dairy Federation.

Glossary of Terms

Internal Expansion (IX) A plug (or bullet) is pulled through a stem or a set of blades (fingers) increase the stem I.D. to the plug O.D. or a predetermined setting when using expansion blades (fingers). This forces the stem serrations into the hose tube and the hose cover into the serrations of the ferrule.

Laminar Flow The resistance of flow as a liquid is moved through a pipe due to viscous shear stresses within the liquid and turbulence that occur.

Manual Override Any mechanical device by which an automated valve may be manually operated. On smaller actuators, this may simply be wrench flats on the output shaft of the actuator. Larger actuators may require a more sophisticated system, such as de-clutchable hand wheels, manual gears, jack screws or hydraulic hand pump over-ride.

Maximum-Shut-Off Pressure (Delta-P) The pressure of the media flowing into the valve against which the valve will have to close.

Media The material flowing through the valve.

Modulating Service Proportional positioning of a valve between the open and closed position. Used for flow control processes.

NAMUR International Standard of Interface for actuator accessories connections.

NEMA Rating National electrical code ratings for electrical component enclosures.

NEMA 4 Weather-proof enclosure suitable for indoor/outdoor applications to protect from windblown dust, rain or hose-directed water.

NEMA 4x Offers the same protection as NEMA 4 with the addition of corrosion resistance.

NEMA 6 Enclosure that may be submerged up to six feet for 30 minutes.

NEMA 7 Enclosure for hazardous locations must be capable of withstanding an internal explosion of gases so as not to ignite an external gas-air mixture.

Net Positive Suction Head Amount of energy in the liquid at the pump datum. It must be defined to have a meaning, as either available or required NPSH.

Neoprene Synthetic rubber, chemically and structurally similar to natural rubber.

Nominal Size A dimensional value assigned for the purpose of convenient designation.

On-Off Service When the valve is being used to start or stop flow by being cycled to the full open or full closed position.

Operating Pressure The pressure at which system functions. Also known as working pressure.

Pneumatic Actuator An air operated mechanical device used to open and close or modulate a valve. The actuator, which is mounted to the valve by a bracket and coupled to the stem, is designed to convert air pressure into mechanical force sufficient to operate the valve.

Polish To make smooth and shiny by rubbing. Fittings may be machine polished to 180 grit finish. Polish is ID, OD, or both per customer request.

Polyproylene A lightweight synthetic plastic.

Pressure The force per unit area applied on a surface in a direction perpendicular to that surface.

Glossary of Terms

Pressure Head Must be considered when a pumping system either begins or terminates in a tank which is under some pressure other than atmospheric. The pressure in such a tank must first be converted to feet of liquid. A vacuum in the suction tank or a positive pressure in the discharge tank must be added to the system head, whereas a positive pressure in the suction tank or vacuum in the discharge tank would be subtracted. The following is a handy formula for converting inches of mercury vacuum into feet of liquid.

$$\text{Vacuum, ft of liquid} = \frac{\text{Vacuum, in. of Hg X 1.13}}{\text{Sp. Gr.}}$$

The above forms of head, namely static, friction, velocity, and pressure, are combined to make up the total system head at any particular flow rate.

PSI Pounds per square inch.

PSIG Pounds per square inch gauge.

PTFE Tetrafluoroethylene, DuPont's Teflon®, is a high performance thermo plastic polymer that has excellent dielectric strength, chemical and temperature resistance.

Required NPSH A characteristic of the pump design. It is determined by test or computation and is the energy needed to fill a pump on the suction side and overcome the friction and low losses from the suction connection to that point in the pump at which more energy is added. Required NPSH varies with pump design, pump size and operating conditions and is supplied by the pump manufacturer.

Santoprene A thermoplastic elastomer, a rubber-like material that complies to FDA requirements.

Service Temperature The maximum and minimum temperature of the media.

RJT Ring Joint Type.

Silicone Dimethyl silicone, a synthetic rubber.

Sintering Heat process in which powdered metal particles are heated to near melting point, fusing the metal granules together.

SMS Swedish Metric System.

SPDT Single pole double throw switch.

SPST Single pole single throw switch.

Spring-Return (SR) Pneumatic Actuator Any pneumatic actuator which contains a single coil spring or group of coil springs to oppose the movement of a piston or diaphragm. As air moves the piston or diaphragm the spring is compressed. When the air supply is discontinued and exhausted, the spring extends and drives the piston or diaphragm in the opposite direction. This type of actuator is normally used for applications where it is necessary for the valve to move to the open or close position upon loss of air supply, whether by design or by system failure.

Static Discharge Head The vertical distance in feet between the pump centerline and the point of free discharge or the surface of the liquid in the discharge tank.

Static Head The pressure at any point in a liquid can be thought of as being caused by a vertical column of the liquid which, due to its weight, exerts a pressure equal to the pressure at the point in question. The height of this column is called the "static head" and is expressed in terms of feet of liquid.

Glossary of Terms

Stem Torque The force required at the valve stem to open or close the valve against system pressure and service conditions.

Suction Head Exists when the source of supply is above the centerline of the pump. Thus the static suction head is the vertical distance in feet from the centerline of the pump to the free level of the liquid to be pumped.

Suction Lift Exists when the source of supply is below the center line of the pump. Thus the static suction lift is the vertical distance in feet from the center line of the pump to the free level of the liquid to be pumped.

Supply Pressure The plant air supply pressure available to operate a pneumatic actuator (plant air).

Surge Also known as water hammer. A rapid rise or decrease of internal pressure. Surge conditions occur for various reasons, typically, but not limited to: start and stop sequences.

Torque A twisting or turning force. Usually measured in inch pounds (in-lbs) or foot pounds (ft-lbs)/(force through a distance).

Total Dynamic Discharge Head (hd) The static discharge head plus the velocity head at the pump discharge flange plus the total friction head in the discharge line. The total dynamic discharge head, as determined on pump test, is the reading of a gauge at the discharge flange, converted to feet of liquid and corrected to the pump centerline, plus the velocity head at the point of gauge attachment.

Total Dynamic Suction Head (hs) The static suction head plus the velocity head at the pump suction flange minus the total friction head in the suction line. The total dynamic suction head, as determined on pump test, is the reading of the gauge on the suction flange, converted to feet of liquid and corrected to the pump centerline, plus the velocity head at the point of gauge attachment.

Total Dynamic Suction Lift (hs) The static suction lift minus the velocity head at the pump suction flange plus the total friction head in the suction line. The total dynamic suction lift, as determined on pump tests, is the reading of a gauge on the suction flange, converted to feet of liquid and corrected to the pump centerline, minus the velocity head at the point of gauge attachment.

Total Head (H) or Total Dynamic Head The total dynamic discharge head minus the total dynamic suction head or plus the total dynamic suction lift.

TDH = hd + hs (with suction lift)

TDH = hd - hs (with a suction head)

Total Static Head The vertical distance in feet between the free level of the source of supply and the point of free discharge or the free surface of the discharge liquid.

Tube A hollow cylinder especially one that conveys a fluid. For sanitary applications a thin wall is implied.

Tube Fitting A length of tubing formed into a usable shape either welded to an apparatus or welded to ferrules for use in an apparatus.

Tubing A piece or length of tube.

S

Tumble Polish Surface A uniform finish applied by vibratory equipment to stainless steel, varying from matte grey to bright, depending on media used. This process may cause work hardening on the surfaces.

Turbulent Flow Irregular flow that is characterized by tiny whirlpool regions. The velocity of this fluid is definitely not constant at every point.

Velocity Head (hv) The energy of a liquid as a result of its motion at some velocity V. It is the equivalent head in feet through which

Glossary of Terms

the water would have to fall to acquire the same velocity, or in other words, the head necessary to accelerate the water. Velocity head can be calculated from the following formula:

$$H = \frac{V2}{2g}$$

Where g = 32.3 ft/second
V = liquid velocity in feet per second

The velocity head is usually insignificant and can be ignored in most high head systems. However, it can be a large factor and must be considered in low head systems.

WOG Water, Oil, Gas. Pressure rating for valves handling these products. This does not include steam.

Welding Join two (or more) peices of material by applying heat to produce a localized union through fusion across the interface. For sanitary fittings, a ferrule is attached to the ends of a tube fitting by TIG welding without the addition of filler metal. Tube fittings can then be joined with clamps and gaskets to form parts of a system.

Work (Strain) Hardening An increase in hardness and strength caused by plastic deformation at temperatures below the annealing ranges.

Valve Actuation Questionnaire Checklist

Contact Name: _____ Company Name: _____

Date _____ Phone # _____ Fax # _____ Email _____

Project Name: _____

Butterfly Valves

System Media & Pressure
System Temperature
Quantity Size

Seat Material:

☐ Silicone ☐ EPDM ☐ Viton®

End Connections:

☐ RJT ☐ DIN ☐ IDF ☐ SMS
☐ Clamp ☐ Buttweld ☐ 150 # flg ☐ NPT
☐ BSPT ☐ BSPP

Male/Female configuration if applicable: _____ x _____

Pneumatic Actuation

Operation:

☐ double acting ☐ spring return (fail close)
☐ spring return (fail open)

Rotation: **System Pressure (PSI):**

☐ 90° ☐ 180° ☐ 80 ☐ 60 ☐ other

Type:

☐ rack & pinion ☐ vertical canister
☐ horizontal canister

Material: ☐ aluminum ☐ nickel plated ☐ stainless steel

Positioner:

☐ pneumatic (3-15 PSI) ☐ electro-pneumatic (4-20mA)

Gauges:

☐ 0-30 ☐ 0-160 ☐ 0-160 ☐ 0-160
☐ full set

Feedback:

☐ mechanical ☐ prox
☐ 4-20 mA ☐ 4-20 mA & mech (2)

Limit Switches:

☐ SPDT ☐ SPST ☐ DPDT ☐ mechanical
☐ proximity ☐ 2 position ☐ 3 position (no feedback)
☐ 3 position (feedback) ☐ 4-20mA transmitter
☐ 4-20mA transmitter & mech (2)

Visual Indicator:

☐ flat pointer ☐ dome open/close ☐ dome 3-way L
☐ dome 3-way T ☐ dome 4-way L ☐ dome 4-way T

NEMA rating: ☐ 4/4x ☐ 7/9

Solenoid: ☐ 3 way ☐ 4 way ☐ single coil
☐ dual coil

Voltage: ☐ 12VDC ☐ 24VDC ☐ 24VAC
☐ 110VAC ☐ 220VAC

NEMA rating: ☐ 4/4x ☐ 7/9

Ball Valves

System Media & Pressure
System Temperature
Quantity Size

Type:

☐ 2 way ☐ 3 way T ☐ 3 way L ☐ 4 way double L
☐ 4 way T ☐ 4 way L flow conf.

Construction:

☐ sanitary ☐ industrial

Body Material:

☐ stainless steel ☐ brass

Seat Design:

☐ PTFE ☐ UHMW ☐ 15% glass ☐ 25% carbon
☐ 50% stainless

End Connections:

☐ RJT ☐ DIN ☐ IDF ☐ SMS
☐ Clamp ☐ Buttweld ☐ 150 # flg ☐ NPT
☐ BSPT ☐ BSPP

Male/Female configuration if applicable: _____ x _____

Electric Actuation

Operation:

☐ 2 position ☐ spring return (fail close)
☐ spring return (fail open) ☐ modulating controller board

Board Signal:

☐ 1-5V ☐ 2-10V ☐ 4-20mA

Power Supply:

☐ 12VDC ☐ 24VDC ☐ 24VAC ☐ 110VAC
☐ 220VAC 3 phase ☐ 440VAC 3 phase

NEMA rating: ☐ 4/4x ☐ 7/9

Manual Overide: ☐ Yes ☐ No

Accessories:

☐ 2 extra switches ☐ heater (standard)
☐ potentiometer ☐ current position transmitter
☐ torque switches ☐ local control unit
☐ battery backup

Please attach any additional specifications or information, _____ # of pages.

S

Limited Warranty

Dixon Group Europe Ltd (herein called “Dixon”) warrants the products described herein, and manufactured by Dixon to be free from defects in material and workmanship for a period of one (1) year from date of shipment by Dixon under normal use and service. It’s sole obligation under this warranty being limited to repairing or replacing, as hereinafter provided, at its option any product found to Dixon’s satisfaction to be defective upon examination

by it, provided that such product shall be returned for inspection to Dixon’s factory within three (3) months after discovery of the defect. The repair or replacement of defective products will be made without charge for parts or labour. This warranty shall not apply to: (a) parts or products not manufactured by Dixon, the warranty of such items being limited to the actual warranty extended to Dixon by its supplier; (b) any product that has been subject to abuse, negligence, accident, or misapplication; (c) any product altered or repaired by others than Dixon; and (d)

to normal maintenance services and the replacement of service items (such as washers, gaskets and lubricants) made in connection with such services. To the extent permitted by United Kingdom law, this limited warranty shall extend only to the buyer and any other person reasonably expected to use or consume the goods who is injured in person by any breach of the warranty. No action may be brought against Dixon for an alleged breach of warranty unless such action is instituted within one (1) year from the date the cause of action accrues. This limited warranty shall be construed and enforced to the fullest extent allowable by applicable United Kingdom law.

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Some products and sizes may be discontinued when stock is depleted, or may require a minimum quantity for ordering.

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Notes