

## Liquid Data And Material Compatibility Guide

A Guide for Blackmer  
Positive Displacement  
Sliding Vane Pumps.



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- Plastics & Synthetics
- Soaps, Cleaners & Cosmetics
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- Grain & Vegetable Oils
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  - Specialty Gasses
- Marine/Barge Fueling  
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# BLACKMER LIQUID DATA AND MATERIAL COMPATIBILITY GUIDE

This bulletin is intended as a guide for the proper selection of Blackmer positive displacement rotary-vane pumps for use in specific fluid transfer applications. For detailed information and specifications of the pump types listed within the bulletin, please refer to the Blackmer Product Bulletins described in the chart below.

Bulletin 30 contains a list of commonly transferred liquids and their compatibility with the materials of construction available in Blackmer Pumps. The information provided on the various liquids was compiled from several different sources of corrosion data and fluid characteristics. The information is presumed to be accurate, however, Blackmer/A Dover Company, assumes no liability for its accuracy or suitability. A qualified expert should be consulted for specific compatibility of materials and limitations.

All selections of Blackmer pump types listed in the bulletin are based upon specific conditions of temperature, viscosity, vapor pressure, concentration, etc. Assumptions should not be made as to the suitability of the pump type at other conditions. The material compatibilities listed do not necessarily imply that a certain pump material is suitable for service on the liquid being pumped. Factors such as temperature, viscosity, abrasiveness and lubricity should also be considered. Limitations for pump components are given on the following page, and are also described in the Blackmer Material Spec Sheets for individual pump models.

## MATERIAL SPECIFICATIONS

The Material Specification Chart on the following page provides technical data on the various materials of construction available for Blackmer pumps. Models are available in cast iron, ductile iron, cast steel or 316 stainless steel construction. A wide selection of internal components are also available for specific application requirements.

**Note:** Not all of the materials shown in the chart are available for all pump models. Please refer to the individual Blackmer Material Spec Sheets for material options available on specific models.

## WARNING

Several liquids covered in the following tables have been noted as being extremely flammable, toxic or corrosive, and can be hazardous if mishandled or misused. Improper handling or usage can result in severe damage to equipment or property and/or serious personal injury or death. Special care should be given when handling these liquids, and warning given to end users as to the risks involved.

## BASIC PUMP TYPES

The data tables within this bulletin list general Blackmer pump types that are commonly applied with the various liquids shown. A letter "Key" appears in the "Pump Type" column which

refers to one or more of the basic pump types available, and described in the following chart. Alternate pump selections can often be used for the same liquid application.

PUMP TYPE KEY	PUMP CONSTRUCTION	FLUID CHARACTERISTICS FOR PROPER APPLICATION	ALTERNATE PUMP SELECTIONS
X	External Ball Bearings with Blackmer Mechanical Seals. XL Model same as X Type Pump with Replaceable Liner.	Clean, lubricating or non-lubricating, low to medium viscosity, non-abrasive fluids.	GX, XL, HXL, MLX
XRL	Same as XL Type Pump, Fitted with Reduced Capacity Liner.	Same as X above	XRLF
XLF	Same as XL Type Pump, Fitted with an Integral Bracket for Direct Flange Mounting to a NEMA C-Face Motor.	Same as X above	XL
NP	Internal Sleeve Bearings with Shaft Packing (Std) or Commercial Mechanical Seal.	Lubricating, low to high viscosity fluids. Wide temperature range.	MLN
SNP	316 Stainless Steel, Internal Sleeve Bearings with Shaft Packing (Std) or Commercial Mechanical Seal.	Clean, corrosive or non-corrosive, non-abrasive fluids.	SNPJ (Jacketed)
MVP	Magnetically-Coupled Vane Pump.	Clean, non-corrosive, low to medium viscosity fluids.	
SMVP	316 Stainless Steel, Magnetically-Coupled Vane Pump.	Clean, corrosive or non-corrosive, low to medium viscosity fluids.	
XLW	External Ball Bearings, Hardened Liner, Wear Resistant Construction with Mechanical Seals.	Abrasive, non-lubricating, low to medium viscosity fluids.	MLX with Wear Resistant Options
ML	Modular Hub Design with Liner MLX: X Type Construction MLN: NP Type Construction	Same as X or XLW above Same as NP above	X, XL NP(J)
LGL	Liquefied Gas Pump with Replaceable Liner, External Bearings and Mechanical Seals.	Liquefied petroleum gases compatible with ductile iron construction and UL approval.	LG, LGLD, TLGLF
CRL	Carbon Dioxide (CO <sub>2</sub> ) Refrigeration Pump with Replaceable Liner, External Bearings and Mechanical Seals.	Liquid CO <sub>2</sub> compatible with ductile iron construction.	TCRL
SGL	Special Gas Pump with Replaceable Liner, External Bearings and Mechanical Seals.	Liquefied gasses other than Propane, Anhydrous Ammonia and Liquid CO <sub>2</sub> .	

## METRIC CONVERSION FACTORS

To convert from . . .	To . . .	Multiply by
Seconds Saybolt Universal (SSU).	Centistokes (cSt)	See Tables*
Pounds Per Square Inch (psi).	Bar.	.06897
U.S.Gallons Per Minute (U.S.GPM)	Liters Per Minute (lpm).	3.785
Fahrenheit (°F)...	Celsius (°C)...	(°F - 32) x .56

\* See Viscosity Tables - Blackmer Hydraulic Data Bulletin 33.  
Note: For additional conversion data, refer to Blackmer Hydraulic Data Bull. 33.

# MATERIAL SPECIFICATIONS

H P O U M P I N G	MATERIAL	STANDARD	PHYSICAL & MECHANICAL PROPERTIES	TYPICAL USAGE
	Cast Iron	ASTM A48 Class 40 ASTM A48 Class 30	Minimum Tensile - 40,000 psi (275,600 kPa) Minimum Tensile - 30,000 psi (206,800 kPa)	Basic iron materials for general purpose applications.
	Ductile Iron	ASTM A536 Grade 60-40-18	Minimum Tensile - 60,000 psi (413,400 kPa) Minimum Yield - 40,000 (275,600 kPa) Minimum Elongation - 18%	Thermal shock resistant ductile irons. A recognized alternative for cast steel in the refinery and chemical industries.
		ASTM A536 Grade 65-40-12	Minimum Tensile - 65,000 psi (448,100 kPa) Minimum Yield - 45,000 (310,250 kPa) Minimum Elongation - 12%	
	316 Stainless Steel	ASTM A743 CF-8M	Minimum Tensile - 70,000 psi (482,300 kPa) Minimum Yield - 30,000 psi (206,700 kPa) Minimum Elongation - 30%	A stainless steel grade widely used in chemical, pharmaceutical and food process industries.
Cast Steel	ASTM A216	Minimum Tensile - 90,000 psi (620,100 kPa) Minimum Yield - 60,000 psi (413,400 kPa) Minimum Elongation - 22%	A low alloy cast carbon steel for hydrocarbons, petrochemical and general refinery service.	

V A N E S	MATERIAL	COMPOSITION	SIZE	MAX. TEMP.	VISCOSITY RANGE	TYPICAL USAGE
	Duravane®	Ryton®/PTFE/Glass	STD	240°F (115°C)	0 - 20,000 SSU (4,250 cSt)	An economical, general purpose, self-lubricating vane with a wide chemical compatibility range.
	Laminate	Melamine Formaldehyde Resin/Fiber	STD EC	240°F (115°C) 400°F (204°C)	0 - 20,000 SSU (4,250 cSt) 0 - 40,000 SSU (8,500 cSt)	Excellent vane where added strength/wear resistance is required. Self-lubricating, abrasion resistant.
	Maxvane	Composite Resin	STD	240°F (115°C)	0 - 30,000 SSU (6,480 cSt)	A multipurpose vane which provides excellent performance on a wide variety of applications.
	Bronze	ASTM B30-54-3A	EC	500°F (260°C)	500-500,000 SSU (105-108,000 cSt)	Use for viscous fluids and elevated temperature applications.
	Iron	Cast Iron ASTM A48 Minimum Class 25	EC	500°F (260°C)	500-500,000 SSU (105-108,000 cSt)	An economical vane for viscous fluids and elevated temperature applications.
	Hardened Iron	Heat Treated Cast Iron	EC	500°F (260°C)	500-500,000 SSU (105-108,000 cSt)	A wear resistant vane for abrasive applications.
	Carbon	Impregnated Carbon	STD	500°F (260°C)	0 - 20,000 SSU (4,250 cSt)	A chemically inert vane suitable for a wide range of fluids and temperature capabilities. <b>NOTE:</b> 100 psi (689 kPa) maximum differential pressure. Carbon vanes will not tolerate cavitation or discharge spikes (Hydraulic Shock).

STD - Full size Vanes EC - Extra-Clearance Vanes / Reduced Length

O - R I N G S	MATERIAL	COMPOSITION	USEFUL TEMPERATURE RANGE	TYPICAL USAGE
	FKM	Fluorocarbon	- 15°F to 400°F (5°C to 204°C)	Offers wide chemical and temperature compatibility. Good for acids, aromatic and chlorinated solvents, halogenated hydrocarbons/most petroleum products.
	PTFE	Tetrafluoroethylene 1) Seal Ring – PTFE with SS Spring 2) O-Rings - PTFE - Encapsulated Silicon	0°F to 500°F (-17.8°C to 260°C)	Impervious to most fluids, except for certain halogens. Excellent for use with ketones or mixed blend solvents.
			- 50°F to 500°F (-45°C to 260°C)	
	Buna-N	Nitrile	- 30°F to 240°F (-34°C to 115°C)	Widely used elastomer in seal industry. For general purpose sealing. Excellent on petroleum products and most aliphatic solvents.
Neoprene	Chloroprene	- 30°F to 300°F (-34°C to 148°C)	Primarily refrigeration ammonia/freon applications.	

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M S E A H L A N F I A C C E L S	MATERIAL	TYPICAL USAGE
	Cast Iron (CI)	A general purpose, economical stationary face for non-corrosive applications.
	Steel (S)	A general purpose stationary face for non-corrosive applications, for use over a wide speed range, also designed to handle higher pressures.
	Ni-Resist (NR)	General purpose stationary face with good corrosion resistant properties.
	Stainless Steel (SS)	For corrosive service.
	Silicon Carbide (SC)	Heavy-duty material for severe applications, abrasives, high pressures and/or continuous duty.
	Carbon (C)	General purpose rotating face for both lubricating and non-lubricating applications. Maximum viscosity limit of 20,000 SSU (4,250 cSt).
	Bronze (BZ)	A rotating face designed for high viscosity applications. Minimum viscosity limit of 500 SSU (105 cSt).
Hardened Steel (HS)	A rotating face designed for abrasive service.	

ROTOR & SHAFT	Full size	Maximum viscosity 20,000 SSU (4,250 cSt). Maximum Temperature to 300°F (148°C).
	Extra-Clearance	For Viscosities above 20,000 SSU (4,250 cSt) - Consult Material Spec Sheets. Maximum Temperature to 500°F (260°C).

Liquid	Pump Type	MATERIAL COMPATIBILITY														Specific Gravity	Viscosity SSU at 70°F	Vapor Pressure PSI at 100°F	Notes		
		VANES					SEAL FACES					ELASTOMERS									
		Duravane®	Laminate	Maxvane	Iron	Bronze	Iron	Bronze	Carbon	Steel	Stainless	Silicon Carbide	Buna-N	FKM	Neoprene					PTFE	
Acetaldehyde, 100%	X MVP	A	A	A	A	A	A	A	A	A	A	C	D	C	A	.78	30	26	Corrosive if < 100%.		
Acetamide	X MVP	A		A	B	A	B	A	A	B	A	A	A	C	A	A	1.16				
Acetic Acid, 5-30% *	SNP	A		A	D	D	D	D	A	D	A	A	B	B	A	A	1.05	30	1	Melts @ 62 °F, Strong Irritant.	
Acetic Acid, 50%	SNP	A		D	D	D	D	D	A	D	A	A	D	B	D	A	1.06				
Acetic Acid, 80-90%	SNP	A		D	D	D	D	D	A	D	A	A	C	B	C	A	1.07				
Acetic Acid, Glacial	SNP	A		D	D	C	D	C	A	D	A	A	B	D	D	A	1.05	30	1	99.4-100% Pure.	
Acetic Anhydride *	SNP	A		D	D	B	D	B	A	D	A	A	D	D	A	A	1.09	30	0.3		
Acetone *	X	A	A	A	A	A	A	A	A	A	A	A	D	D	C	A	.80	30	7	Use PTFE or EPR O-Rings.	
Acetophenone	X MVP	A	A	A	A	A	A	A	A	A	A	A	D	D	D	A	1.03	32	<1	Use PTFE or EPR O-Rings.	
Acetyl Chloride, Dry	SNP	A		D	A	D	A	D		A	A	A	D	A	D	A	1.11			Very Corrosive if Water Present. Boils at 125 F.	
Acetylene	NO PUMP	A	A	A	A	C	A	C	A	A	A	A	A	A	A	A		Gas	Very High	Explosive, Do Not Pressurize into Liquid Form.	
Acrylic Acid (Acrylic Resin) *	SNP SMVP	B		A	B		B		A	A	A	A	D	D	D	A	1.05	40	0.2	Melts @ 54 °F, Consult Factory on Seal-less application. Thermal Sensitive.	
Acrylonitrile *	X MVP	A		A	A	D	A	D	B	A	A	A	D	C	D	A	.80			Thermal Sensitive, Seal-less, Consult Factory	
Alum Solution (Alum Sulfate)	W	SNP		A	D	B	D	B	A	D	B	A	B	A	A	A	1.62	30			
Aluminum Acetate	W	SNP			A	D	B	D	B		D	A	A	B	D	B	A				
Aluminum Chloride	NO PUMP	A	A	A	D	D	D	D	A	D	D	A	A	A	A	A	2.44			Strong Irritant, Violent Reaction with Water.	
Aluminum Flouride	NO PUMP	A		A	C	C	C	C	A	C	C	A	A	A	A	A	2.88			Strong Irritant.	
Aluminum Hydroxide	X	A		A	B	B	B	B	A	B	A	A	A	A	A	A	2.42	Solid		Insoluble in Water, Determine Solvent. Special Attention to Sealing.	
Aluminum Nitrate	SNP				C	D		D			D	B	A	A	A	A		Solid		Determine Solvent, Strong Oxidizer.	
Ammonia, Refrigeration		A	C	D	A	C	A	C	A	A	A	A	B	D	A	A		30		System Design Important. Maximum Speed 420 rpm. Consult Factory.	
Ammonia, Anhydrous	LGL	A	C	D	A	C	A	C	A	A	A	A	B	D	A	A	.70	30	212	System Design Important.	
Ammonia, Aqueous to 25% (Ammonium Hydroxide)	X MVP	A	B	D	A	D	A	D	A	A	A	A	B	C	A	A	.99	30		Extremely Irritating. Buna-N suitable if Low Concentration. Special Attention to Sealing.	
Ammonium Bicarbonate	W	X NP			A	B	D	B	D	A	B	A	A	A	D	C	A	1.59	50		Decomposes @ 100 °F. Use SS Stationary Seat in XS Pump.
Ammonium Bifluoride	NO PUMP				A	B	D	B	D		B	A	A	A	D	C	A	1.21	Solid		Decomposes with Heat.
Ammonium Carbonate	W	X			A	A	B	D	B	D	A	B	A	A	D	A	A				Forms Ammonia & CO2 in Water.
Ammonium Chloride, 10%	SNP	A			A	C	C	C	C	A	D	A	A	A	A	A	A	1.05	50		Corrosive to 316 if Over 15%.
Ammonium Nitrate	W	SNP			A		C	C	D	C	D	A	A	A	A	A	A	1.73			Solid is Explosive.
Ammonium Persulfate	W	SNP					D	D	D	D	A	D	A	A	D	C	A	1.98		1	Decomposes with Heat. Avoid Contact with Solvents/Greases.

**Key:** A=Excellent B=Satisfactory C=Doubtful D=Attacked

\*=Top 80 chemicals produced in the U.S.A. W=Water Solution \*\*Maximum speed should be one-half of the maximum rated pump speed.

**CAUTION:** Above ratings are for chemical compatibility only. Other factors such as viscosity, pump speed, temperature, pressure, duty-cycle, particle concentration, etc. must be considered when applying a pump or option. Refer to pages two and three of this directory, or to the individual pump performance curves for operating limits.

Liquid	Pump Type	MATERIAL COMPATIBILITY														Specific Gravity	Viscosity SSU at 70°F	Vapor Pressure PSI at 100°F	Notes		
		VANES					SEAL FACES					ELASTOMERS									
		Duravane®	Laminate	Maxvane	Iron	Bronze	Iron	Bronze	Carbon	Steel	Stainless	Silicon Carbide	Buna-N	FKM	Neoprene					PTFE	
Ammonium Phosphate	W	SNP			A	C	B	C	B	A	C	A	A	A	C	A	A	1.62	50	1	
Ammonium Sulfate	W	SNP	A		A	C	C	C	C	A	C	B	A	A	D	A	A	1.77			
Amyl Acetate		X	A		B	A	A	A	A	A	A	A	A	D	D	D	A	.88	30	1	Use PTFE Only.
Amyl Alcohol		X	A	A	A	A	A	A	A	A	A	A	A	B	B	B	A	.82	40		
Amyl Chloride		X			A	A	A	A	A	A	B	A	A	D	B	D	A	.88			Fire Risk
Aniline (Aniline Oil)	*	X NP MVP	A			A	D	A	D	A	A	A	A	D	C	D	A	1.02	40	5	Use PTFE or EPR O-Rings.
Arsenic Acid		SNP SMVP	A		A	D	B	D	B	A	D	B	A	A	A	A	A	2.00	50		Highly Toxic. Seal-less, Consult Factory.
Asphalt		ML NP	A		A	A	A	A	A	A	A	A	A	B	A	B	A		1,000-20,000		Normally Pumped at 250-350 °F. Can be Viscous/Abrasive, Run Slow**, EC Vanes Needed.
Asphalt Emulsion (Soap Base)		ML NP	A		A	A	A	A	A	A	A	A	A	B	A	C	A	1.00+	200-7,000	1	Can be Viscous/Abrasive, Run Slow**, EC Vanes Needed.
Asphalt Emulsion (Acid Base)		SNP	A		C	C		C		A	C	A	A					1.00+	200-7,000		Can be Viscous/Abrasive, Run Slow**, EC Vanes Needed.
ASTM Oils # 1 & 2		X	A	A	A	A	A	A	A	A	A	A	A	A	A	B	A	.90			
ASTM Oils # 3 & 4		X	A	A	A	A	A	A	A	A	A	A	A	B	A	D	A	.90			
Barium Carbonate		NP	A		A	A	B	A	B	A	A	B	A	A	A	B	A	4.28	Solid		Melts @ 345 °F, Solid Soluble in Acids.
Barium Chloride (Max. 20% Solution)		X NP	A		A	B	B	B	B	A	B	A	A	A	A	A	A	3.10	50		
Barium Hydroxide	W	SNP	A		C	B	D	B	D	A	B	A	A	A	A	A	A	1.66	50		Special Attention to Sealing.
Barium Nitrate		X NP			C	B	C	B	C	A	B	B	A	A	A	A	A	3.24	50		Run Slow.**
Barium Sulfide		X NP	A		A	B	D	B	D	A	A	B	A	A	A	A	A	4.25			Run Slow.**
Beer, Beer Wort		SNP	A		A	D	A	D	A	A	D	A	A	A	A	A	A	1.00	32	2	
Beet Juice or Pulp		SNP	A		A	B	C	B	C	A	B	A	A	A	A	A	A				
Benzaldehyde		X MVP	D	A	B	A	D	A	D	A	A	A	A	D	D	D	A	1.05	40		Use PTFE or EPR O-Rings.
Benzene	*	XS MVP	A	A	A	B	A	B	A	A	B	A	A	D	A	D	A	.88	50	3	
Benzene Sulfonic Acid		SNP SMVP	A		A	A	C	A	C	A	A	A	A	D	A	B	A		Solid		Corrosive if not 100%, Melts @ 151 °F, Irritant.
Benzoic Acid	*	SNP		C	A	D	B	D	B	A	D	B	A	D	A	D	A	1.27	Solid		Melts @ 250 °F.
Benzophenone		X NP			A	B	B	B	B	A	B	B	A		A		A		Solid		Melts @ 118 °F, Insoluble in Water.
Benzyl Alcohol		X	A		A	A	B	A	B	A	A	A	A	D	A	B	A	1.04		Low	
Benzyl Benzoate		X			A	B	B	B	B	A	B	B	A	D	A	D	A	1.12		Low	Use FKM Option for X Pump.
Benzyl Chloride, 100%		SNP	A		A	A	B	A	B	A	A	B	A	D	A	D	A	1.10		Low	Corrosive if not 100%.
Biodiesel (B100)		X NP	A	A		A	D	A	D	A	A	A	A	B	A		A	0.88	40		Viscosity at 105°F (40°C) Cloud Point 26 to 53°F(-3 to 12°C)
Blood		SNP			A	C	A	C	A	A	C	A	A	A	B		A				Possible Lumps.

**Key:** A=Excellent B=Satisfactory C=Doubtful D=Attacked

\*=Top 80 chemicals produced in the U.S.A. W=Water Solution \*\*Maximum speed should be one-half of the maximum rated pump speed.

**CAUTION:** Above ratings are for chemical compatibility only. Other factors such as viscosity, pump speed, temperature, pressure, duty-cycle, particle concentration, etc. must be considered when applying a pump or option. Refer to pages two and three of this directory, or to the individual pump performance curves for operating limits.

Liquid	W	Pump Type	MATERIAL COMPATIBILITY														Specific Gravity	Viscosity SSU at 70 °F	Vapor Pressure PSI at 100 °F	Notes	
			VANES					SEAL FACES					ELASTOMERS								
			Duravane®	Laminate	Maxvane	Iron	Bronze	Iron	Bronze	Carbon	Steel	Stainless	Silicon Carbide	Buna-N	FKM	Neoprene					PTFE
Borax		SNP SMVP	A	C	A	C	B	C	B	A	C	A	A	A	B	D	A	1.73	50		Toxic.
Boric Acid		SNP SMVP	A		A	D	B	D	B	A	C	A	A	A	A	A	A	1.43	40		
Bromine	*	NO PUMP	D		D	D	D	D	D	D	D	D	A	D	A	D	A	3.11		7	Extremely Toxic.
Bromine Trifluoride		SNP SMVP			B		B	B	B	A	B	B	A	D	D	D		2.49		Low	Melts @ 48 °F. Seal-less, Consult Factory.
Bromobenzene, Dry		SNP SMVP			B	B	B	B	B	A	B	A	A	D	A	D	A	1.50		Low	
Butadiene	*	SGL	B		A	A	A	A	A	A	A	A	A	D	A	D	A	.62	50	36	Sufficient NPSHA Required.
Butane		LGL	A		A	A	A	A	A	A	A	A	A	A	A	A	A	.60	30	55	Sufficient NPSHA Required.
Butene (1-Butene)	*	SGL	A		A	A	A	A	A	A	A	A	A	A	A	D	A	.60	30		
Butyl Acetate		X	A		B	A	A	A	A	A	A	A	A	D	D	D	A	.88	30	0.5	Use PTFE or EPR O-Rings.
Butyl Acrylate		X	A		B			B		A	A	A	A	D	D	D	A	.90	50		PTFE O-Rings only. Polymerizes with heat.
Butyl Alcohol	*	X	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	.81	30	0.3	
Butyl Amine		X	B			A	A	A	A	A	A	A	A	C	D	D	A	.74	30	1.6 @68°F	Use PTFE or EPR O-Rings. Boils @ 170 °F.
Butyl Benzoate		NP			B	B	B	B	B	A	B	B	A	D	A	D	A	1.00		Low	Freezes @ -7 °F.
Butyl Butyrate		X			B	A	A	A	A	A	A	A	A	D	A	D	A	.87		Low	
Butyl Cellosolve		X NP			A	A	A	A	A	A	A	A	A	C	D	C	A	.90	50		Use PTFE or EPR O-Rings.
Butylene (Butene)		SGL	A		A	A	A	A	A	A	A	A	A	B	A	C	A	.60			
Butyl Stearate		X			A	B	B	B	B	A	B	B	A	B	A	D	A	.86		Low	Melts @ 66 °F, Iron May Color Product.
Butyraldehyde		X	A		A	A	A	A	A	A	A	A	A	D	D	D	A	.80	30	3.8	Use PTFE or EPR O-Rings.
Butyric Acid		SNP	A		A	D	B	D	B	A	D	B	A	D	B	D	B	.96	30		
Calcium Acetate	W	SNP			A	C	B	C	B	A	B	B	A	B	D	B	A			1	
Calcium Bisulfite		SNP	A		A	D	C	D	C	A	D	B	A	B	B	B	A	1.06	50		
Calcium Chloride	*	SNP NP	A		A	B	A	B	A	A	B	B	A	A	A	A	A	2.15	50		Use SNP if PH<7
Calcium Hydroxide (0 - 20%)	W	SNP NP	B	B	B	B	B	B	B	A	B	B	A	A	A	A	A	2.34		1	Use EC Laminate or Iron Vanes, Check Viscosity. Special Attention to Sealing.
Calcium Hypochlorite	*	NO PUMP	D		A	C	D	D	C	A	D	C	A	B	A	B	A		50		No Suitable Pump Construction.
Calcium Nitrate		X NP	A		B	B	C	B	C	A	B	B	A	A	A	A	A	1.82			
Calcium Phosphate		NP			A	B	B	B	B	A	B	B	A	A	A	B	A		Solid		Determine Solvent.
Calcium Sulfide	W	NP	A		A	B	D	B	D	A	B	B	A	A	A	A	A	2.80		1	
Cane Sugar Liquids		NP			A	A	A	A	A	A	A	A	A	A	A	A	A		MAX 5,000		
Carbon Black Slurry		XLW	A	A	A	A	A	A	A	A	A	A	A	D	A	D	A	1.8			Solvent Based. Abrasive, Run Slow.
Carbon Dioxide		CRL	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	1.10		320 @ 0°F	System Design Critical, Pump at 0 to -30 °F Only.

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Liquid	Pump Type	MATERIAL COMPATIBILITY														Specific Gravity	Viscosity SSU at 70°F	Vapor Pressure PSI at 100°F	Notes
		VANES					SEAL FACES					ELASTOMERS							
		Duravane®	Laminate	Maxvane	Iron	Bronze	Iron	Bronze	Carbon	Steel	Stainless	Silicon Carbide	Buna-N	FKM	Neoprene				
Carbon Disulfide	X MVP	A	A	A	A	A	A	A	A	A	A	D	A	D	A	1.26	30	11	
Carbon Monoxide	NO PUMP	A		A	A	A	A	A	A	A	A	A	A	A	A	.97			Very Toxic and Flammable.
Carbon Tetrachloride *	X MVP	B	A	A	B	A	B	A	A	C	A	A	B	A	D	1.59	30	1	Corrosive with Water. Use SS or SC Stationary Seat. No Aluminum.
Carbonic Acid	SNP			A	D	D	D	D	A	D	A	A	B	A	A	2.44	30		
Castor Oil	X NP	A	A	A	B	A	B	A	A	B	A	A	A	A	A	.96	5,000		
Cathodic Resin	ML NP MVP	A		A	B	B	B	B	A	A	A	A	C	A		1.2	100		Avoid Air Contact and Heat. Use Double Seal or Sealless.
Catsup (Ketchup)	SNP			A	D	C	D	C	A	C	A	A	A	A	C	1.11	2,500 @145°F		Check Viscosity.
Caustic Soda, 0-25% (Cold) *	X MVP SMVP	B	C	D	B	B	B	B	B	B	A	A	B	B	B	1.53	150		Use SS or SC Stationary Seat. If using stainless above 150°F then Consult Factory. Special Attention to Sealing.
Caustic Soda, 26-50% (Cold) *	X MVP SMVP	B	C	D	B	B	B	B	B	B	A	A	B	B	B	1.53	150		Use SS or SC Stationary Seat. If using stainless above 150°F then Consult Factory. Special Attention to Sealing.
Chlordane	X NP MVP			D	B	B	B	B	A	B	B	A	B	A	C	1.67	600 @130°F		Usually Pumped with Solvent. Seal-less, Consult Factory
Chloric Acid	NO PUMP			D	D	D	D	D	A	D	D	A	D		D				Toxic, Strong Oxidizer.
Chlorine, Dry Only *	NO PUMP	D	C	D	A	B	A	B	A	A	A	A	D	B	B	1.47	30	155	No Suitable Vane Material. Corrosive if Water Present.
Chloroacetic Acid	NO PUMP	A			D	D	D	D	A	D	D	A	D	D	D	1.58			No Suitable Pump Construction.
Chloroacetone	SNP				B	B	B	B	A	C	B	A	D	D	D	1.16		Low	Boils @ 246 °F.
Chlorobenzene, Dry	X MVP	A		A	B	C	B	C	A	B	C	A	D	A	D	1.10	30		Seal-less, Consult Factory.
Chlorobromomethane, Dry	X MVP				B	B	B	B	A	B	B	A	D	B	D	1.93			Boils @ 153 °F, Volatile, Use SS or SC Stationary Seat. No Aluminum. Seal-less, Consult Factory.
Chloroform, Dry *	MVP SMVP	C	A		A	A	A	A	A	A	A	A	D	A	D	1.49	30		Corrosive if Water Present. Known Carcinogen.
Chlorosulfonic Acids	NO PUMP	D		D	D	D	D	D	D	D	B	A	D	D	D	1.77			Extremely Toxic.
Chocolate	ML NP SNP	A	A	A	B	C	B	C	A	B	A	A	A	A	A		50,000- 100,000	0	Shear Sensitive. Run Slow. Maximum speed 155 rpm/125 rpm or less recommended.
Cholesterol	NP	A		A	B	B	B	B	A	B	B	A	A	A	A	1.07			
Chromic Acid	NO PUMP	A	D	D	C	D	C	D	D	C	D	A	D	A	D	2.82			Extremely Toxic.
Citric Acid (Citric Oils) *	SNP	A		A	D	C	D	C	A	D	A	A	A	A	A	1.54	50	1	
Clorox, Bleach	SNP	A		A	D	D	D	D	A	D	A	A	B	A	B		50		
Cocoa Nut Oil	X NP	A	A	A	A	A	A	A	A	A	A	A	A	A	C	.86			
Copper Nitrate	SNP SMVP	A			D	D	D	D	A	D	B	A	A	A	A	2.17	50	1	Seal-less, Consult Factory.

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Liquid	Pump Type	MATERIAL COMPATIBILITY														Specific Gravity	Viscosity SSU at 70 °F	Vapor Pressure PSI at 100 °F	Notes			
		VANES					SEAL FACES					ELASTOMERS										
		Duravane®	Laminate	Maxvane	Iron	Bronze	Iron	Bronze	Carbon	Steel	Stainless	Silicon Carbide	Buna-N	FKM	Neoprene					PTFE		
Copper Sulfate	SNP SMVP	A	A	A	D	B	D	B	A	D	B	A	A	A	A	A	A	A	2.28	50		Strong Irritant. Seal-less, Consult Factory.
Corn Oil	X NP	A	A	A	A	C	A	C	A	A	A	A	A	A	C	A		.92	500			
Cottonseed Oil	X NP	A	A	A	A	A	A	A	A	A	A	A	A	C	A		.92	375				
Cresol	SNP SMVP	A		A	C	A	C	A	A	C	A	A	D	A	D	A		1.04	100		Toxic, Burns Skin.	
Cresylic Acid	SNP SMVP			A	C	C	C	C	A	C	A	A	D	A	D	A		100			Burns Skin.	
Crude Oils	XLW NP	A	A	A	B	A	B	A	A	B	A	A	B	A	D	A		.80-1.00	Varies		Check Viscosity & Abrasiveness.	
Cumene	* X MVP			A	B	B	B	B	A	B	B	A	D	A	D	A		.86			Seal-less, Consult Factory.	
Cyclohexane	* X	A		A	B	B	B	B	A	B	B	A	A	A	C	A		.78	50			
Cyclohexanol	X MVP	A		A	A	A	A	A	A	A	A	A	A	A	B	A		.94		Low	Toxic.	
Decyl Alcohol (N-Decyl Alcohol)	*	A		A	A	A	A	A	A	A	A	A				A		.83	30	0		
Diacetone Alcohol	X	A		A	A	A	A	A	A	A	A	A	D	D	B	A		.94	35	Low		
Dibenzyl Ether	X			A	B	B	B	B	A	B	B	A	D	D	D	A		1.04		Low	Use PTFE or EPR O-Rings.	
Dibutyl Amine	NP MVP			B	A	D	A	D	A	A	A	A	D	D	D	B		.76	30	0	Mechanical Seals Not Acceptable.	
Dichlorobenzene, Ortho	X MVP			A	B	B	B	B	A	B	B	A	D	A	D	B		1.25	30	0	Use SS or SC Stationary Seat. Seal-less, Consult Factory.	
Diesel Fuel	X	A	A	A	A	A	A	A	A	A	A	A	B	A	A	A		.90	30-100	0		
Diesel Fuel (Low Sulphur – LSD)	X	A	A	A	A	A	A	A	A	A	A	A	B	A	A	A		.90	30-100	0	Maximum 500 PPM	
Diesel Fuel (Ultra Low Sulphur - ULSD)	X	A	A	A	A	A	A	A	A	A	A	A	B	A	A	A		.90	30-100	0	Maximum 15 PPM. Lower sulphur content = Lower fluid lubricity.	
Diethanolamine	X MVP	A		A	A	A	A	A	A	A	A	A	B	D	B	A		1.09	Solid	0	Melts @ 82 °F. Check Viscosity.	
Diethylene Glycol	X NP	A		A	A	A	A	A	A	A	A	A	A	A	A	A		1.12	150	0	PTFE mechanical seals not recommended.	
Diisobutylene	X	A		A	B		B		A			A	B	A	D	A		.72				
Dimethylamine (DMA)	SGL	B			B	A	B	A	A	B	A	A	B	D	C	A		.68	30	45	Boils @ 44 °F.	
Dimethyl Ether (DME)	SGL	A							A	A											Consult Factory.	
Dimethyl Formamide	X SNP SMVP	A	A	D	A	A	A	A	A	A	A	A	B	D	C	A		.95		Low	Boils @ 307 °F, Use SNP if, <90% Concentration.	
Dioctyl Phthalate	X	A		B	A	A	A	A	A	A	A	A	D	B	D	A		.99	320	Low		
Dioxane	MVP	A			A	A	A	A	A	A	A	A	D	D	D	A		1.04		2	Toxic, Carcinogen, 200 °F Max.	
Dipentene	X	A		A	A	A	A	A	A	A	A	A	B	A	D	A		.85				
Diphenyl Oxide	X	A		A	A	A	A	A	A	A	A	A	D	A	D	A					Melts @ 189 °F.	
Epichlorohydrin	* MVP	A			A	A	A	A	A	A	A	A	D	D	D	A		1.18		Low	Extremely Toxic.	
Ethane	NO PUMP	A		A	A	A	A	A	A	A	A	A	A	A	B	A		.45		Very High	Extremely Flammable.	

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Liquid	Pump Type	MATERIAL COMPATIBILITY														Specific Gravity	Viscosity SSU at 70 °F	Vapor Pressure PSI at 100 °F	Notes	
		VANES					SEAL FACES					ELASTOMERS								
		Duravane®	Laminate	Maxvane	Iron	Bronze	Iron	Bronze	Carbon	Steel	Stainless	Silicon Carbide	Buna-N	FKM	Neoprene					PTFE
Ethanolamine (MEA) *	X NP	A		A	A	A	A	A	A	A	A	A	B	D	B	A	1.02		0	Melts @ 51 °F.
Ethyl Acetate, Cold	X XL NP	A	A	A	A	A	A	A	A	A	A	A	D	D	D	A	.89	30	3	
Ethyl Acrylate	MVP	A	A	A	A	A	A	A	A	A	A	A	D	D	D	A	0.92		1	Polymerizes Readily. Toxic and Fire Hazard.
Ethyl Alcohol, Ethanol *	X	A	A	A	A	A	A	A	A	A	A	A	A	C	A	A	.79	30	2	
Ethylene *	SGL	A		A	A	A	A	A	A	A	A	A	A	A	C	A	.61		400	Pump Below 40 °F.
Ethylene Chloride	SNP SMVP	A		B	C	A	C	A	A	C	A	A	D	B	D	A	1.26	30	2	Dry Only.
Ethylene Dibromide *	SNP SMVP	A	B	B	C	C	C	C	A	C	B	A	D	A	D	A	2.18		0.5	Dry Only. Seal-less, Consult Factory.
Ethylene Dichloride *	SNP	B		B	C	C	C	C	A	C	B	A	D	A	D	A	1.26	30		
Ethylene Glycol (Anti-Freeze) *	X MVP	A	A	A	B	A	B	A	A	B	A	A	A	A	A	A	1.12	100	0	PTFE Mechanical Seals Not Recommended.
Ethylene Oxide *	SGL	C		A	A	A	A	A	A	A	A	A	D	D	D	A	.88	30	40	Marginal SGL Application if EPR O-Rings Used.
Ethyl Hexanol (2-Ethyl Hexanol) *	X	A		A	A	A	A	A	A	A	A	A	A	A	A	A	.83		0	
Fatty Acids	SNP	A		A	D	B	D	B	A	D	A	A	B	A	B	A	.82-.95	Varies		Maximum 40 psi if Mixed With Air to Avoid Cavitation.
Ferric Nitrate W	SNP	A			D	D	D	D	A	D	B	A	A	A	A	A	1.68		1	
Ferric Sulfate W	SNP	A		A	D	D	D	D	A	D	A	A	A	A	A	A	2.10			
Ferrous Sulfate W	SNP	A		A	D	C	D	C	A	D	B	A	A	A	A	A	1.89	50		
Fertilizer Solutions	X	A			B	D	B	D	A	B	A	A	B	B		A	0.82	50		Keep Pump Flooded or Flushed. Use SS or SC Seals.
Fluoboric Acid W	X SNP	A		A	B	C	B	C	A	B	B	A	A	A	A	A	1.84		Low	
Flourine, Liquid	NO PUMP	D		D	C	A	C	A	A	C	A	A	D	D	D	A	1.10			Boils @ -306 °F.
Fluosilicic Acid	SNP	A		A	D	C	D	C	A	D	B	A	A	A	A	A	1.29	300		
Formaldehyde	SNP SMVP	A	D	A	C	B	C	B	A	C	A	A	C	D	C	A	.82	30		Toxic, Known Carcinogen.
Formic Acid	SNP	B	B	A	D	B	D	B	A	D	A	A	B	C	A	A	1.22	100		Melts @ 47 °F.
Freon® 11	SGL	A		A	A	C	A	C	A	A	A	A	B	B	D	A	1.48	<30	14	
Freon® 12	SGL	A		A	A	D	A	D	A	A	A	A	B	A	A	A	1.31	<30	85	
Freon® 13	SGL	A		A	A		A		A	A	A	A	A	A	A	A	1.30 @-22°F	<30	200 @10°F	
Freon® 14	NO PUMP	A		A	A		A		A	A	A	A	A	A	A	A	132 @-112°F	<30	500 @-40°F	Vapor Pressure too High.
Freon® 21	SGL	A		A	A		A		A	A	A	A	D	D	C	A	1.37	<30	27	
Freon® 22	SGL	A	B	A	A	C	A	C	A	A	A	A	D	D	A	A	1.12	<30	140	
Freon® 31	SGL	A		A	A		A		A	A	A	A	D	D	A	A		<30		Check Vapor Pressure.
Freon® 112	XL SGL	A		A	A		A		A	A	A	A	B	A	B	A	1.63	<30	1.8 @100°F	
Freon® 113	XL SGL	A	A	A	A	B	A	B	A	A	A	A	A	B	A	A	1.57	<30	5.8	

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Liquid	Pump Type	MATERIAL COMPATIBILITY												Specific Gravity	Viscosity SSU at 70 °F	Vapor Pressure PSI at 100 °F	Notes				
		VANES					SEAL FACES					ELASTOMERS									
		Duravane®	Laminate	Maxvane	Iron	Bronze	Iron	Bronze	Carbon	Steel	Stainless	Silicon Carbide	Buna-N					FKM	Neoprene	PTFE	
Freon® 114	SGL	A		A	A		A		A	A	A	A	A	A	A	A	A	1.46	<30	29	
Freon® 114B2	XL SGL	A		A	A		A		A	A	A	A	A	B	B	B	A	2.16	<30	5.8	
Freon® 115	SGL	A		A	A		A		A	A	A	A	A	A	A	A	A	1.29	<30	120	
Freon® 116	SGL	A		A	A		A		A	A	A	A	A	A	A	A	A	1.59 @-100°F	<30	200 @15°F	
Freon®/Refrigerants 123	SGL																				Consult Factory.
Freon®/Refrigerants 124	SGL																				Consult Factory.
Freon®/Refrigerants 125	SGL																				Consult Factory.
Freon®/Refrigerants 134A	SGL	A		A	A		A		A	A	A	A	D	D	B	A	A	1.21	<30	140	
Freon®/Refrigerants 134B	SGL																				Consult Factory.
Freon®/Refrigerants 141B	SGL																				Consult Factory.
Freon®/Refrigerants 142B	SGL																				Consult Factory.
Freon®/Refrigerants 143A	SGL																				Consult Factory.
Freon®/Refrigerants 152A	SGL																				Consult Factory.
Freon® 502	SGL	A		A	A		A		A	A	A	A	B	B	A	A	A	1.22	<30	160	
Freon® TMS, TF	XL SGL	A		A	A	A	A		A	A	A	A	A	B	A	A	A	1.56	<30	6	
Freon® TA	XL SGL	A		A	A		A		A	A	A	A	A	C	A	A	A	1.41	<30	7	
Freon® MF	XL SGL	A		A	A		A		A	A	A	A	B	B	D	A	A		<30		
Fruit Juices	SNP	A		A	D	C	D	C	A	C	A	A	A	A	A	A	A	1.20	100		Some Solids, May be Abrasive.
Fuel Oil #1 - 5	X NP	A	A	A	A	A	A	A	A	A	A	A	A	A	C	A	A	.90	30-2,000	Low	
Fuel Oil # 6 (Bunker C)	NP	A	A	A	A	A	A	A	A	A	A	A	B	A	C	A	A	.90	2,000- 10,000		Check Viscosity, 100,000 @ 45 °F.
Fumaric Acid	W* X SNP			A	A		A		A	A	A	A	A	A	B	A	A	1.63	30	Low	
Furfural	X NP	A		B	B	B	B	B	A	B	B	A	D	D	D	A	A	1.16	50		Use PTFE or EPR O-Rings.
Gallic Acid	SNP	A		A	D	A	D	A	A	D	B	A	B	A	B	A	A	1.69			
Gasoline - No Lead	X	A	A	A	A	A	A	A	A	A	A	A	B	A	C	A	A	.70	30	8-11	Vapor Pressures Vary with Type, Suction Lift Reduced, Especially with No-Lead.
Gasolines	X	A	A	A	A	A	A	A	A	A	A	A	A	A	C	A	A	.70	30	8-11	Vapor Pressures vary with Type, Suction Lift Reduced.
Glucose	NP	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	1.40	50,000		Viscosity Varies.
Glue	NP	A	A	A	A	A	A	A	A	A	A	A	A	B	A	A	A		100,000+		Check Viscosity & Vapor Pressure. Avoid air contact.
Glycerine (Glycerol)	* X NP	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	1.26	5,000		
Glycidol	X NP	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	1.12		Low	
Glycols	X NP	A		A	B	A	B	A	A	B	A	A	A	A	A	A	A	1.11	50-200		Check Specific Type. PTFE Seals not Recommended.

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		VANES					SEAL FACES					ELASTOMERS							
		Duravane®	Laminate	Maxvane	Iron	Bronze	Iron	Bronze	Carbon	Steel	Stainless	Silicon Carbide	Buna-N	FKM	Neoprene				
Grease (Petroleum Base)	NP	A	A	A	A	A	A	A	A	A	A	A	A	C	A		Very Viscous		Good Inlet Conditions Required, Run Slow**.
Heptane	X	A	A	A	A	A	A	A	A	A	A	A	A	A	A	.70	30	2	
Hexane, Dry	XL MVP	A	A	A	A	A	A	A	A	A	A	A	A	B	A	.66	30		
Hexanol	X	A	A	A	A	A	A	A	A	A	A	A	A	B	A	.82		Low	
Honey	NPJ SNPJ	A		A	A	A	A	A	A	A	A	A	A	A	A	1.20	340-7,000 @ 100°F		Avoid air contact.
Hydraulic Oils	X NP	A	A	A	A	A	A	A	A	A	A	A	A	B	A	.90	300-1,000		Synthetic Oils Require FKM.
Hydrazine	SMVP	A			D		D		A	C	A	A	B	D	B	1.00			Toxic, Carcinogen, Severe Fire Risk.
Hydrobromic Acid	NO PUMP	D	D	A	D	D	D	A	D	D	A	D	A	D	A	1.49			Extremely Corrosive.
Hydrochloric Acid *	NO PUMP	C	D	C	D	D	D	A	D	D	A	D	A	D	A	1.19			Extremely Corrosive.
Hydrofluoric Acid	NO PUMP	C	A	C	D	C	D	C	D	D	D	D	A	D	A				Extremely Corrosive.
Hydrogen Peroxide *	NO PUMP	C	B	A	D	D	D	D	D	B	A	B	A	A	A	1.45	30	Low	Carbon Not Compatible. Toxic, Irritant.
Hydrogen Sulfide	SNP SMVP	A	A	A	B	D	B	D	A	B	A	A	D	D	B	1.19	30		Toxic, Strong Irritant.
Ink	ML XLW NP	A		A	B	B	B	B	A	B	B	A	A	A	A	1.0-1.4	500-50,000	Low	Thixotropic, Normally Abrasive, Check Viscosity.
Iodine	NO PUMP	D		D	C	C	C	C	D	C	A	A	B	A	D	4.98			Extremely Toxic, Strong Irritant.
Iron Oxide Slurry	XLW	A	A		A		A		A	A	A	A	D	A			500		Very Abrasive, Run Slow.
Isobutyl Acetate	X	A		B	A	A	A	A	A	A	A	A	D	D		.87		0	Use PTFE or EPR O-Rings.
Isobutyl Alcohol	X	A		A		D		D	A		B	A	B	A	A	.81	30	0	
Isobutane	SGL																		Consult Factory.
Isocyanate (See TDT or MDI)																			See Specific Type. Viscosity varies. Avoid Air Contact.
Isopropyl Acetate	X NP	A		B	A	A	A	A	A	A	A	A	D	D	D	.87	30		Use PTFE or EPR O-Rings.
Isopropyl Alcohol *	X	A		A	A	A	A	A	A	A	A	A	B	A	B	.79	34	Low	
Isopropyl Chloride	X			A	A	A	A	A	A	A	A	A	D	A	D	.86			
Isopropyl Ether	X	A		A	A	A	A	A	A	A	A	A	B	D	C	.72	30		Boils @ 152 °F, Dangerous Fire Risk.
Jet Fuels (JP3,JP4,JP5,JP8,Jet A)	X	A	A	A	A	A	A	A	A	A	A	A	A	A	D	.77	30	2-7	PTFE O-Rings Not Recommended Need Pliability.
Jet Fuels (JP9, JP10, JP11)	X	A	A	A	A	A	A	A	A	A	A	A	C	A	D				Use All FKM Option.
Kerosene	X	A	A	A	B	A	B	A	A	B	B	A	A	A	B	.81	30	2	
Lacquer (Lacquer Solvents)	X NP MVP	A		A	A	A	A	A	A	A	A	A	D	D	D	.95			Check Viscosity. Check Sealing Method.
Lactic Acid, Cold	SNP	A		A	C	B	C	B	A	D	A	A	A	A	A	1.20			Must Use FKM if Hot. Melts @ 65 °F, Check Viscosity.
Lard	NP	A	A	A	A	A	A	A	A	A	A	A	A	A	B	.95	287 @ 120°F		Melts @ 108 °F.

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Liquid	Pump Type	MATERIAL COMPATIBILITY														Specific Gravity	Viscosity SSU at 70 °F	Vapor Pressure PSI at 100 °F	Notes	
		VANES					SEAL FACES					ELASTOMERS								
		Duravane®	Laminate	Maxvane	Iron	Bronze	Iron	Bronze	Carbon	Steel	Stainless	Silicon Carbide	Buna-N	FKM	Neoprene					PTFE
Lasso (Monsanto Herbicide)	X	A			B	C	B	C	A	B	C	A	C	B	C	A	1.10			Use SS or SC Stationary Seat. Contains Chlorobenzene.
Latex Emulsions		A		A		A	A		A	A	A	A	A	A	C	A		10,000-100,000		Check Viscosity.
Latex Paint	XLW	A		A	B	A	B	A		A	A	A	A	A	C	A		EST. 15,000		Avoid Air Contact. Consult Factory.
Lead Acetate	SNP	A		A	D	C	D	C	A	D	B	A	B	D	B	A	2.50			
Ligroin	X	A		A	A	A	A	A	A	A	A	A	A	A	B	A		30		Volatile, Boils @ 58-275 °F, Dangerous Fire Risk.
Linseed Oil	NP	A	A	A	B	A	B	A	A	B	A	A	A	A	C	A	.93	500-1,000		Hardens if Exposed to Air.
Lime Water (0 - 20%)	SNP NP	B	B	B	B	B	B	B	A	B	B	A	A	A	B	A	2.34		Low	(Calcium Hydroxide) Use E.C. Laminate or Iron Vanes. Check Viscosity.
Liquid Sugar	SNP	A		A	B	A	B	A	A	B	A	A	A	A	B	A	1.35	700-12,000		Keep Pump Flooded and Free of Air.
Lubricating Oils	NP X	A	A	A	A	A	A	A	A	A	A	A	A	A	B	A	.77-.95	200-4,000	Low	Check Viscosity, SAE 40W=50,000 SSU @ 10 °F
Magnesium Chloride	SNP	A		A	C	B	C	B	A	C	B	A	A	A	A	A	2.32			
Magnesium Hydroxide	XLW	A		B	B	B	B	B	A	B	A	A	B	A	B	A	2.36			Can be Very Abrasive. Special Attention to Sealing.
Magnesium Sulfate	NP	A		A	B	A	B	A	A	B	A	A	A	A	A	A	2.65	50		(Epsom Salts).
Maleic Acid	SNP	A			D	B	D	B	A	D	B	A	D	A	D	A	1.59			Melts @ 268 °F.
Maleic Anhydride *	SNP SMVP			A		D		D	A		A	A	D	D	D	A	1.30	Solid	0	Melts @127°F, 36 SSU@158°F. Strong Irritant.
Malic Acid	SNP			A	D	B	D	B	A	D	A	A	A	A	B	A	1.60			Not Same as Maleic Acid, Melts @ 263 °F.
MAPP Gas	SGL	A							A	A				A						Consult Factory.
Mayonnaise	SNP			A	D	D	D	D	A	D	B	A	A	A	D	A	1.00	25,000		
Mercuric Cyanide	MVP			A	B	D	B	D	A	B	B	A	A	A	B	A	4.02		Low	Extremely Toxic. Seal-less, Consult Factory.
Mercury	MVP			A	A	D	A	D	A	A	A	A	A	A	A	A	13.60			Cannot be Lifted, Run Slow**, Toxic.
Methyl Acetate	SNP	A		B	D	A	D	A	A	D	A	A	D	D	B	A	.92			Boils @ 129 °F, High Vapor Pressure, Dangerous Fire Risk.
Methyl Acrylate	MVP	A			B	B	B	B	A	A	A	A	D	D	B	A	0.96		1	Toxic. Fire Risk
Methyl Alcohol (Methanol) *	X MVP	A	A	B	B	A	B	A	A	B	A	A	A	D	A	A	.79	30	2 PSIA @70°F	
Methyl Bromide	MVP			A	A		A		A	A	A	A	B	A	D	A	1.73		45	Irritant.
Methyl Diphenyl -Diisocyanate (MDI) *	MVP	A		A	A		A		A	A	A	A	D	A		A		100		Very Toxic, Strong Irritant, Avoid Air Contact.
Methyl Chloride, Dry	SGL	A		B	B	A	B	A	A	B	A	A	D	A	D	A	.92		116	Corrosive if Water Present.
MEA																				See Ethanolamine.
Methylene Chloride *	X MVP	A	A	D	B	A	B	A	A	B	B	A	D	B	D	A	1.34	30	14	Eye Irritant. Seal-less, Consult Factory.
Methyl Ethyl Ketone (MEK) *	X MVP	A	A	A	B	B	B	B	A	B	B	A	D	D	D	A	.80	30	4	Use PTFE or EPR O-Rings. Seal-less, Consult Factory.
Methyl Isobutyl Ketone (MIBK) *	X MVP	A		A	B	B	B	B	A	B	B	A	D	D	D	A	.80	30	1	Use PTFE or EPR O-Rings, Fire Risk. Seal-less, Consult Factory.

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Liquid	Pump Type	MATERIAL COMPATIBILITY													Specific Gravity	Viscosity SSU at 70 °F	Vapor Pressure PSI at 100 °F	Notes	
		VANES					SEAL FACES					ELASTOMERS							
		Duravane®	Laminate	Maxvane	Iron	Bronze	Iron	Bronze	Carbon	Steel	Stainless	Silicon Carbide	Buna-N	FKM					Neoprene
Methyl Isopropyl Ketone	X MVP			A	A	A	A	A	A	A	A	D	D	D	A	.82			Use PTFE or EPR O-Rings.
Methyl Methacrylate *	MVP	A		B	A	A	A	A	A	B	A	D	D	D	A	.95	30	1.5	Fire Risk. Seal-less, Consult Factory.
Methyl tert-Butyl Ether (MTBE)	X MVP	A	A		A		A	A	A	A	A	C	D	D	A	0.74	30	8	
Milk	SNP	A		A	D	D	D	D	A	D	A	A	A	A	A	1.03	50		
Mineral Oil	X	A	A	A	B	A	B	A	A	B	A	A	A	B	A	Varies	Varies	Varies	
Molasses	HXL NP ML	A	A	A	A	A	A	A	A	A	A	A	A	A	A	1.45	1,000-100,000		Check Viscosity.
Mustard	SNP	A		A	D	D	D	D	A	D	A	A	B	A	A				
Naptha (Petroleum or Coal Tar)	X	A		A	B	A	B	A	A	A	A	B	A	D	A	.60-.97	30		
Naphthalene	NP MVP	A		B	A	A	A	A	A	A	A	D	A	D	A	1.15	Solid		Melts @ 176 °F, Abrasive Crystals When Cool.
Nickel Chloride	SNP	A		A	D	D	D	D	A	D	B	A	A	B	A	3.55			
Nickel Sulfate	SNP	A		A	D	B	D	B	A	D	A	A	A	A	A	2.0-3.7			
Nitric Acid, 0-40%	SNP SMVP	C	D	A	B	D	B	D	A	B	A	A	D	B	D	1.20	50		Use Carbon Vanes. Ambient Temperature Only.
Nitric Acid, 40-60%	SNP SMVP	D	D	D	D	D	D	D	A	D	B	A	D	A	D	1.50	100		Use Carbon Vanes. Seal-less, Consult Factory.
Nitrobenzene	X MVP	B	A	A	A	A	A	A	A	A	A	D	B	D	A	1.20	30	Low	Melts @ 42 °F.
Oleic Acid	SNP	A	D	A	C	A	C	A	A	C	B	A	C	B	D	.90		Low	
Oleum	SMVP	B		D		D	D	B	B	A	D	A	D			1.84			Toxic, Strong Irritant. Seal-less, Consult Factory.
Oxalic Acid, Cold	NO PUMP	A		A	D	A	D	A	A	D	D	A	B	A	B				No Suitable Pump Construction.
Palm Oil	X	A	A	A	A	A	A	A	A	A	A	A	A	A	A	.95	500		
Paraffin Wax	NPJ	A	A	A	A	A	A	A	A	A	A	A	A	A	A	.90	Solid		Melts @ 120-150 °F, Poor Lubricant, Run Slow**
Parathion	SMVP	A						A		A	A	A	A		A	1.26			Very Toxic.
Pentaerythritol *	NP			A	A	A	A	A		A	A				A	1.40		Low	
Pentane	X	A		A	B	B	B	B	A	B	B	A	A	A	B	.63	30	16	
Perchloroethylene, Dry *	X XL MVP	A	A	A	B	B	B	B	A	B	A	A	B	A	D	1.63	30		Moisture Produces HCL, Corrosive. Stainless Steel or Silicon Carbide Stationary Seat Recommended.
Petrolatum (Petroleum Jelly)	NP			A	B	A	B	A	A	B	A	A	A	B	A	.88		0	Melts @ 100-140 °F, Low Viscosity.
Phenol *	X MVP	A	A	D	A	A	A	A	A	B	A	D	A	D	A	1.07			Avoid Air Contact. Melts@110°F, Low viscosity. Seal-less. Consult Factory.
Phosphoric Acid, 0-90%	SNP	B	B	A	D	C	D	C	A	D	C	A	A	A	B	1.83			Marginal Application. Limited Shaft Life.
Phosphoric Acid, 90-100%	NO PUMP	B	B	A	D	A	D	A	A	D	C	A	C	A	C	1.88			No suitable Pump Construction.
Phthalic Anhydride *	NP MVP	A		A	A	A	A	A	A	A	A	B	A	A	A	1.53	Solid		Melts @ 268 °F.

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Liquid	Pump Type	MATERIAL COMPATIBILITY												Specific Gravity	Viscosity SSU at 70 °F	Vapor Pressure PSI at 100 °F	Notes				
		VANES					SEAL FACES					ELASTOMERS									
		Duravane®	Laminate	Maxvane	Iron	Bronze	Iron	Bronze	Carbon	Steel	Stainless	Silicon Carbide	Buna-N					FKM	Neoprene	PTFE	
Plastisol	MVP ML	A			B	A	B	A	A	A	B	A	D	B		A		5,000-20,000		Avoid Air Contact. Temperature Critical. Seal-less, Consult Factory.	
Polyol, Filled	XLW	A	A	A	A		A		A	A	A	A	D	A		A		1,500-100,000		Very Abrasive, Run Slow.	
Polyols, Unfilled	X NP	A	A	A	A		A		A	A	A	A	D	A		A		Varies		Any Polyhydric Alcohol, check Specific Type.	
Polypropylene	*			A	A	A	A	A	A	A	A	A	A	A	A	A		.90	Solid	Thermoplastic.	
Polyvinyl Alcohol (PVA)	*	NP	A		A	A	A	A	A	A	A		A	A		A		1.30	Varies	Very Viscous, Check viscosity.	
Polyvinyl Chloride	NO PUMP																	SOLID		PVC, Synthetic Resin.	
Potassium Bicarbonate	W NP	A		A	B	B	B	B	A	B	A	A	A	A	A	A		2.17		Melts @ 250 °F.	
Potassium Bromide	W SNP SMVP	C		A	D	B	D	B	A	D	B	A	A	A	A	A		2.75		Seal-less, Consult Factory.	
Potassium Carbonate	W NP	A		A	B	C	B	C	A	B	B	A	A	A	A	A		2.43			
Potassium Chlorate	W SNP	A		A	C	B	C	B	A	C	A	A	A	A	A	A		2.34			
Potassium Chloride	W SNP	A		A	C	A	C	A	A	C	A	A	A	A	A	A		1.99			
Potassium Chromate	W NP	A		B	B	B	B	B	A	B	B	A	A	A	A	A		2.73			
Potassium Hydroxide	W SNP	A		A	B	C	B	C	A	B	B	C	B	D	B	A		2.04	6 cp	Special Attention to Sealing.	
Potassium Nitrate	W NP	C		D	B	B	B	B	A	B	B	A	A	A	A	A		2.11		Explosive Risk.	
Potassium Permanganate	W NP	A		A	B	B	B	B	A	B	B	A	B	A	A	A		2.70			
Potassium Sulfate	W SNP	A		A	B	A	B	A	A	B	A	A	A	A	A	A		2.66			
Potassium Sulfide	W SNP	A		A	B	D	B	D	A	C	B	A	A	A	A	A		1.81			
Propane	LGL	A	A	A	A	A	A	A	A	A	A	A	A	A	B	A		.53	30	225	
Propylene, Dichloride	X SNP SMVP	A		B	A	A	A	A	A	A	A	A		A				1.16		2	Use SNP if Water Present.
Propylene	* SGL	A		A	A	A	A	A	A	A	A	A	D	A	D	A		.51	30	227	
Propylene Glycol	* X NP	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A		1.04	300	Low	PTFE Mechanical Seals Not Recommended.
Propylene Oxide	* X MVP	A		A	B	B	B	B	A	A	A	A	D	D	D	A		.83		18	Use PTFE or EPR O-Rings.
Pyridine	X NP	A		B	B	B	B	B	A	B	B	A	D	A	D	A		.98	50	Low	Use FKM O-Rings. Fire Risk.
Pyridine Oil	SNP			B	C	B	C	B	A	C	A	A	D	D	D	A					
Rosin, Rosin Oil	X NP			A	B	B	B	B	A	B	A	A	B	A	D	A		1.08	Wide Range		Fire Risk When Heated. Check Viscosity.
Salicylic Acid	* SNP	A	A	A	C	A	C	A	A	C	A	A	B	A	A	A		1.44			Melts @ 322 °F.
Salt Water (Sea Water)	NO PUMP	A		A	D	B	D	B	A	D	B	A	A	A	B	A		1.03			Corrosive, Non-Lubricity.
Soda Ash (Sodium Carbonate)	* X NP	A		A	A	A	A	A	A	A	A	A	A	A	A	A		1.55	50	Low	
Sodium Acetate	W* X NP	A		C	A	A	A	A	A	A	B	A	B	D	B	A		1.53			
Sodium Bicarbonate	W* X	A	B	A	B	B	B	B	A	B	A	A	A	A	A	A		2.16			

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Liquid	Pump Type	MATERIAL COMPATIBILITY																Specific Gravity	Viscosity SSU at 70 °F	Vapor Pressure PSI at 100 °F	Notes
		VANES					SEAL FACES					ELASTOMERS									
		Duravane®	Laminate	Maxvane	Iron	Bronze	Iron	Bronze	Carbon	Steel	Stainless	Silicon Carbide	Buna-N	FKM	Neoprene	PTFE					
Sodium Bisulfate	W	SNP	A	A	C	C	B	C	B	A	D	B	A	A	A	A	A	2.44			
Sodium Borate	W	X NP	A		C	B	A	B	A	A	B	B	A	A	A	A	A	1.73			
Sodium Chlorate	W*	SNP	A		A	C	A	C	A	A	C	B	A	A	A	A	A	2.49			
Sodium Chloride	W	SNP	A		A	B	B	B	B	A	C	B	A	A	A	A	A	2.17	30		
Sodium Chromate	W	X	A			A	A	A	A	C	A	A	A	A	A	A	A	2.72	60		
Sodium Cyanide	W	X MVP	A		C	A	D	A	D	A	A	A	A	A	A	A	A				Toxic.
Sodium Flouride	W	SNP SMVP			C	B	C	B	C	A	B	A	A	A	A	D	A	2.56			Toxic, Strong Irritant.
Sodium Hydrosulfide	W*	SNP	A	A	C	C	C	C	C	A	C	A	A	D	A	A	A				
Sodium Hydroxide, 0-25% (Caustic Soda - Cold)	*	X MVP	A	B	D	B	B	B	B	A	B	A	B	B	B	B	A	1.53	150		Corrosive if Heated. Use SS or SC Stationary Seat. Special Attention to Sealing.
Sodium Hydroxide, 26-50% (Caustic Soda - Cold)	*	X MVP SNP SMVP	B	C	D	B	B	B	B	A	B	A	B	B	B	B	A	1.53	150		Corrosive if Over 50% Concentration or if Heated. Use SS or SC Stationary Seat. Special Attention to Sealing.
Sodium Hydroxide, 51-80% (Caustic Soda - Cold)	*	SNP SMVP	D	D	D	D	D	D	D	C	D	A	A	B	B	B	A	1.80	200		Limited Vane and Carbon Life. Carbon Vanes Required. Special Attention to Sealing.
Sodium Nitrate	W	X NP	A		A	A	B	A	B	A	A	A	A	B	A	B	A	2.27			
Sodium Peroxide	W	X MVP	A			A	D	A	D	A	A	A	A	B	A	B	A	2.81			Explosion Risk, Strong Oxidizer.
Sodium Silicate	*	NP MVP	A	D	A	A	C	A	C	A	A	A	A	A	A	A	A	1.56	Wide Range		Check Viscosity, Keep Air Out - Will Crystallize.
Sodium Sulfate	*	SNP	A		A	B	B	B	B	A	B	A	A	A	A	A	A	1.46			Melts @ 91 °F, Water Soluble.
Sodium Sulfide	W	X	A		C	B	D	B	D	A	C	C	A	A	A	A	A	1.86			Keep <30% Concentration, and <150 °F.
Sodium Thiosulfate		SNP	A		C	D	D	D	D	A	D	A	A	B	A	A	A	1.73			Melts @ 118 °F.
Sorbitol, 70%		NP	A			A	A	A	A		A	A				A		1.47			Melts @ 200 °F.
Soybean Oil		X NP	A	A	A	A	A	A	A	A	A	A	A	A	A	C	A	.93	350		Unrefined may be Abrasive.
Stannic Chloride		NO PUMP	A		A	D	D	D	D	A	D	D	A	A	A	D	A	2.28		Low	Toxic.
Stannous Chloride			A		A	D	D	D	D		D	B		A	A	A	A	2.71	Solid		Tin Crystals, Soluble in Water.
Starch	W		A		A	C	A	C	A	A	C	A	A	A	A	A	A	1.50	100-100,000		Check Viscosity and Abrasiveness, Consult Factory.
Stoddard Solvent		X	A	A	A	A	A	A	A	A	A	A	A	A	A	B	A	.78	30	3	
Styrene Monomer (Vinyl Benzene)	*	X NP MVP	A		A	A	B	A	B	A	A	A	A	D	B	D	A	.90			
Sulfonic Acids	W	SNP SMVP	A		C	D	B	D	B	B	D	B	A	D	B	B	A	Varies			Some Types O.K. with Iron. Some Types Toxic. Seal-less, Consult Factory.
Sulfur Chloride		NO PUMP			D	D	D	D	D	A	D	D	A	D	A	D	A	1.69			Toxic. Reacts with Water.

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		VANES					SEAL FACES					ELASTOMERS								
		Duravane®	Laminate	Maxvane	Iron	Bronze	Iron	Bronze	Carbon	Steel	Stainless	Silicon Carbide	Buna-N	FKM	Neoprene					PTFE
Sulfur Dioxide, SO2	SGL	A	A	A	B	B	B	B	A	A	B	A	D	D	C	A	1.43	30	90	Use PTFE or EPR O-Rings Only. Very Toxic. Very Corrosive if with Water. Consult Factory for SGL pump.
Sulfuric Acid (Cold, Over 95%)	* NP MVP	C	D	D	B	B	B	B	C	B	A	A	D	A	D	A	1.84	150		Keep Pump Full or Clean, Iron Vanes Recommended, Run Slow**.
Sulfuric Acid (Cold 90-95%)	SNP SMVP	B	D	D	C	D	C	D	A	C	B	A	D	A	D	A	1.80	200		Keep Pump Full or Clean. Limited Duravane and Shaft Life. Consult Factory on Seal-less. Run Slow**.
Sulfuric Acid, 20-90%	NO PUMP	A	D	D	D	B	D	B	A	D	D	A	D	A	C	A	1.70			Corrosive.
Sulfuric Acid, 0-20% (Cold)	SNP SMVP	A	D	B	D	B	D	B	B	D	A	A	D	A	C	A	1.50			
Sulfur, Molten Dry Only	NP	A		A	A	D	A	D	A	A	A	A	D	A	C	A	2.00	Solid		Temperature Critical, Melts @ 250°F, Viscosity 50 SSU @ 320°F, 50,000 SSU @ 375 °F, Run Slow**.
Sulfurous Acid	SNP SMVP	A		A	D	D	D	D	A	D	B	A	B	A	B	A	1.03	50		Toxic, Strong Irritant. Seal-less, Consult Factory.
Tallow, Hot	NPJ	A		A	B		B		A	B	A	A	A	A		A	.86	Solid		Melts @ 70-130 °F.
Tannic Acid	w MVP	A		A	A	A	A	A	A	A	A	A	A	A	B	A	1.70		Low	Known Carcinogen.
Tartaric Acid	SNP	A		A	C	A	C	A	A	D	A	A	A	A	B	A	1.76	Solid		Water Soluble.
Tetrachloroethane	X			B	A	A	A	A	A	A	A	A	D	A	D	A	1.59		Low	SS or SC Stationary Seat Preferred.
Titanium Dioxide Slurry	* ML XLW			A	A	A	A	A	A	A	A	A	A	A	A	A				Some Slurries too Abrasive. Use Hardened Parts, Slow Speed.
Toluene	X MVP	A	A	A	A	A	A	A	A	A	A	A	D	A	D	A	.87	30	Low	
Toluene Diisocyanate (TDI)	MVP	A	A		A	A	A	A	A	A	A	A	D	B	D	A	1.22	100-500	1	Avoid Air Contact. Toxic.
Trichloroethane	* X MVP	C	A	B	B	A	B	A	A	A	A	A	D	A	D	A	1.44	30	4	Use SS or SC Stationary Seat. Keep Dry.
Trichloroethylene	X MVP	B		A	B	B	B	B	A	B	A	A	C	A	D	A	1.47	30	3	Boils @ 164 °F, Use SS or SC Stationary Seat, Keep Dry.
Triethanolamine	X MVP	A		A	A	C	A	C	A	A	A	A	C	D	B	A	1.13	30		Melts @ 70 °F. Consult Factory if over 150 °F
Triethylene Glycol	X NP	A		A	A	A	A	A	A	A	A	A	A	A	A	A	1.13	250		PTFE seals not recommended.
Turpentine	X	A		A	A	A	A	A	A	A	A	A	A	A	D	A	.87	50	Low	
Varnish	NP SNP	A		A	C	A	C	A	A	C	A	A	B	A	D	A	.90	1,500+		Check Viscosity.
Vegetable Oil	X NP	A		A	B	B	B	B	A	B	A	A	A	A	D	A	.93	1,000		
Vinyl Acetate	* X MVP	A		B	A	C	A	C	A	A	A	A		D		A	.93	30	4	
Vinyl Chloride	SGL																			Consult Factory.
Water, Clean	SNP	A	B	A	C	A	C	A	A	C	A	A	A	B	B	A	1.00	30		Duravanes Not Recommended due to Non-lubricity, Use EC Laminate Vanes, Run Slow.**
Wine	SNP	A		A	D	D	D	D	A	D	A	A	A	A	A	A	.96	30	1	

**Key:** A=Excellent B=Satisfactory C=Doubtful D=Attacked

\*=Top 80 chemicals produced in the U.S.A. W=Water Solution \*\*Maximum speed should be one-half of the maximum rated pump speed.

**CAUTION:** Above ratings are for chemical compatibility only. Other factors such as viscosity, pump speed, temperature, pressure, duty-cycle, particle concentration, etc. must be considered when applying a pump or option. Refer to pages two and three of this directory, or to the individual pump performance curves for operating limits.

Liquid	Pump Type	MATERIAL COMPATIBILITY													Specific Gravity	Viscosity SSU at 70 °F	Vapor Pressure PSI at 100 °F	Notes			
		VANES					SEAL FACES					ELASTOMERS									
		Duravane®	Laminate	Maxvane	Iron	Bronze	Iron	Bronze	Carbon	Steel	Stainless	Silicon Carbide	Buna-N	FKM					Neoprene	PTFE	
Wollastonite					A		A		A	A			A					1,000-10,000		Very Abrasive. Consult Factory.	
Xylene/Xylol	X MVP	A	A	A	B	A	B	A	A	B	A	A	D	A	D	A		.86	30	Low	
Zinc Chloride	SNP	A	A	A	C	B	C	B	A	C	A	A	A	A	A	A		2.91	Solid		Determine Solvent.
Zinc Hydrosulfite	SNP	A		A	B	D	B	D	A	B	A	A	A	A	A	A				Low	
Zinc Sulfate	*	SNP	A		B	C	C	C	A	C	A	A	A	A	A	A		1.96			

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Every Blackmer Product Comes With A Value-Added Extra:

## Applications Engineering/Technical Support/Customer Care

When it comes to flow solutions, uptime, output, reliability and profitability are critical to every operation's mission. To this end, Blackmer knows that reliable, proven flow technologies are critically important, but we also know that this represents only one part of the overall equation. The other, equally important part involves having trained, knowledgeable and customer-focused staff, which is why we make substantial investments in our people. It is through their collaborative effort with customers that the greatest achievements are realized.



- **Applications Engineers** – experts in peace-of-mind assurance, making sure your equipment is always right for the job
- **Market & Product Specialists** – unparalleled technical knowledge, on-site product training, troubleshooting, installation and product-selection consultation, and total life cycle attention
- **Regional Sales Management** – proven technicians with an “above and beyond” commitment to every customer's mission
- **Customer Care Specialists** – action-oriented specialists committed to making sure every order receives immediate attention, is accurately processed and followed up, and to helping keep your process flowing smoothly

When you put it all together, for mission critical flow solutions, it's easy to see why leading companies around the world have one common demand... **Better Get Blackmer.**

### Total Life Cycle Support

*From the moment of initial contact and equipment selection through every point of the product and application life cycle, Blackmer specializes in helping customers get the maximum value from their flow technology assets by providing total life cycle support.*

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