

## COMPTEURS LIQUID CONTROLS

## LIQUID CONTROLS METERS

Système de mesure volumétrique avec seulement 3 pièces en rotation apportant à tous les compteurs Liquid Controls les avantages suivants :

- Aucun contact métal sur métal ;
- Précision continue avec une perte de charge minimale ;
- Sécurité et longévité ;
- Construction et entretien simple.



Compteurs volumétriques pour propane, butane, NH<sub>3</sub>, fréons, butadiène, buthylène, éthane, méthane, pentane, propylène, isobutane, isopentane, triméthylène, etc.

Positive displacement liquid measuring principale :

- No metal to metal contact withing measuring chamber ;
- Low pressure loss ;
- Precision machined parts produce accuracy and are interchangeable.

Meters for propane, butane, NH<sub>3</sub>, freons, butadiene, buthylene, ethane, methane, pentane, propylene, isobutane, isopentane, trimethylene.

REFERENCE NUMBER	PRESION MAXI DE SERVICE MAX PRESSURE	Ø	DEBIT MAXI m3/h MAXI FLOW	CONSTRUCTION CORPS/BODY
MA4	25 BAR	1"	6,8	ALUMINIUM
MA5	25 BAR	1"1/2	13,8	
MA7	25 BAR	2"	22,6	
MA15	25 BAR	3" X 2"	45	
MSA15	21 BAR	BRIDE/FLANGE 3"	45	ACIER STEEL
MSA30	21 BAR	BRIDE/FLANGE 3"	80	
MSA75	21 BAR	BRIDE/FLANGE 4"	158	
MSA120	21 BAR	BRIDE/FLANGE 6"	226	

### Equipements périphériques :

Filtre, dégazeur, imprimeur de tickets, soupape différentielle, émetteur d'impulsions, compensateur automatique de température, prédéterminateur, vanne de prédétermination.

### Réglage (ajusteur) :

Le système de réglage est un ensemble mécanique placé entre l'élément de mesure et l'indicateur. Une erreur peut être corrigée par un simple ajustement micrométrique sur une plage de 5% (par unité de 0,02%, 0,1% ou 1%).

### Accesories :

Strainer, vapor eliminator, différentiel valve, temperature volume compensator, printer, preset counter, preset valve.

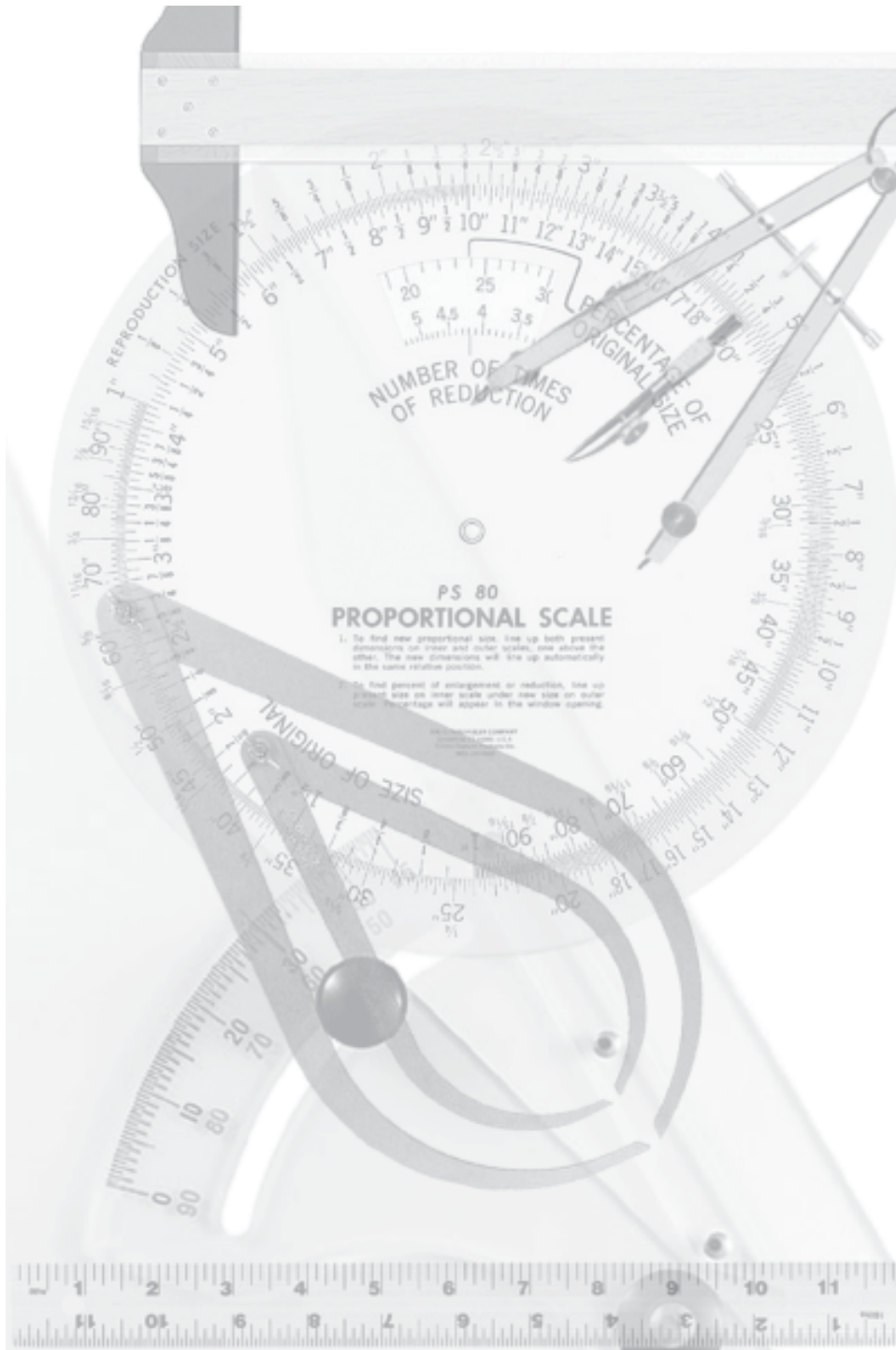
### Adjuster :

The micrometer adjuster provides a simple mean of calibration. Linear non cyclical and infinitely variable over a 5% range, the adjuster is graduated in divisions of 1%, 0,1% and 0,02% fir precise control.



# Meters & Accessories

**LIQUID  
CONTROLS**  
A Unit of IDEX Corporation



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The LC Meter consists of a housing in which three rotors turn in synchronized relationship within three cylindrical bores with no metal-to-metal contact within the meter element. Each rotor is supported on either end by a bearing plate through which the rotor shafts protrude.

The bladed displacement rotors, alternately move through the two half-cylinder bores of the meter element, while the single blocking rotor rotates within its bore in such a way as to produce a continuous capillary seal between the unmetered, upstream product and the metered, downstream product.

At one end of each rotor shaft is a timing gear. The blocking rotor gear, having twice the number of teeth of each of the displacement rotor gears, rotates at half the RPM of the displacement rotors.

Throughout the meter element the mating surfaces are either flat surfaces or cylindrical faces and sections that are most accurately machined. No oscillating or

reciprocating motion within the device permits extremely close and consistent tolerances within the LC Meter.

Because the dynamic force exerted by the product flowing through the meter is at right angles to the faces of the displacement rotors, and because the meter is designed so that the rotor shafts are always in a horizontal plane, *there is no axial thrust*. Therefore, the rotors automatically seek the center of the stream between the two bearing plates thereby eliminating wear between the ends of the rotors and the bearing plates.

The oversize design of the sleeve bearings, as well as the specially selected materials from which they are made, assure maximum throughput before bearing replacement is required.

As a result the LC Meter provides unequalled accuracy, long operating life and exceptional dependability.

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## Accuracy / Performance

**Superior Accuracy at constant flow:** *With all other conditions being constant*, the LC Meter is capable of 0.05% or better in repeatability over entire flow range.

**Accuracy over the widest range of flow:** The LC Meter has a most ideal *combination of minimum seal or slippage area with lowest pressure differential across this seal*. This results in superior accuracy over a wide range of flow rates.

**Sustained accuracy over time:** No wear from metal-metal contact within the measuring chamber . . . means *no wear* . . . no wear means no increase in clearances . . . no increase in clearances means no increase in slippage . . . and *no increase in slippage means no deterioration in accuracy*.

**Accuracy over a pressure range:** Because of the LC Meter's unique dual-case design, the bearing surfaces of the meter element are internally and externally subjected to the same system pressure. Therefore, *the meter element cannot be stretched or distorted*, causing changes in seal area that would adversely affect accuracy.

**Accuracy over a temperature range:** Due to the *common coefficients of expansion of the critical parts* of the LC Meter element, products can be metered accurately from -40°F (-40° C) to +160°F (+71° C). Rapid thermal shock (temperature changes in excess of 40°F) should be avoided.

**Accuracy over a viscosity range:** Due to the minimum area in shear and the smooth flowing characteristics of the LC Meter the standard LC design has accurately metered product from 30 SSU (1 centipoise) to 1,500,000 SSU (325,000 centipoise).

### Repeatability:

Mech. registration: capable of 0.05% of reading over entire range  
Elect. registration: capable of 0.03% of reading over entire range

### Linearity:

#### Over 5:1 range

Mech. registration: capable of  $\pm 0.125\%$  or better from max. nom. flow rate  
Elect. registration: capable of  $\pm 0.10\%$  or better from max. nom. flow rate

#### Over 10:1 range

Mech. registration: capable of  $\pm 0.22\%$  or better from max. nom. flow rate  
Elect. registration: capable of  $\pm 0.10\%$  or better from max. nom. flow rate

#### Over 40:1 range

Mech. registration: capable of  $\pm 0.5\%$  or better for max. nom. flow rate  
Elect. registration: capable of  $\pm 0.15\%$  or better from max. nom. flow rate

Note: Stated accuracy obtainable when all variables remain constant. Reading/measurements reflect a minimum of one minute of flow at selected rate(s). All accuracy statements based on metering safety solvent (aliphatic hydrocarbon), approximate viscosity 1 CPS. On higher viscosity products, the average deviation in accuracy will be less.

**Regulatory:** Meets NIST and other international weights & measures accuracy requirements. Meets performance requirements of USA Military Specifications.

# Meter Models

## Liquid Controls PD Meters

METER MODELS		Listed in order of Maximum Nominal Flow Rates. Consult LC PD Product Overview # 100-10 for product application and material class recommendations. Maximum Non-Shock Working Pressure (PSI) ratings are based on products at temperatures below 160°F (71°C). See page 7 for working pressure vs. temperature data.									
Maximum Nominal Flow Rate		Standard Flange Size*	Primary Material	Material Classes Available	150 PSI	275 PSI	300 PSI	350 PSI	740 PSI	1,480 PSI	
GPM	L/min				10.3 BAR	19 BAR	21 BAR	24 BAR	51 BAR	102 BAR	
					1034 kPa	1896 kPa	2068 kPa	2413 kPa	5102 kPa	10204 kPa	
30	113	1 1/2"	Aluminum	10				MA-4+			
60	227	1 1/2" 2" Optional	Aluminum Stainless Steel	1, 2, 3, 4, 10, 14, 16, & 30 8	M-5 M-5	M-5**		MA-5+			
100	380	2" 1 1/2" Optional 2" 2"	Aluminum Stainless Steel Cast Iron Brass Steel	1, 2, 3, 4, 10, 14, 15, & 16 8 7, 27, & 37 20 1, 2, 7, 10, 14, 16 & 37	M-7 M-7 M-7 M-7 MS-7	M-7** M-7** M-7**		MA-7+			
150	550	2"	Aluminum	1 & 2	M-10	M-10**					
200	757	3" 3" 3"	Aluminum Steel Stainless Steel	1, 2, 3, 4, 10, 14, 15, & 16 1, 2, 10, 14 & 16 8	M-15 MS-15	M-15** MSAA-15*** MSAA-15***	MSA-15	MA-15+	MSB-15	MSC-15	
300	1,136	3"	Aluminum	1, 2	M-25	M-25**					
350	1,325	4" 3" Optional 3" 3" 3"	Aluminum Cast Iron Steel Stainless Steel	1, 2, 3, 4, 14, 15 & 16 7, 27, 37 & 47 1, 2, 10, 14 & 16 8	M-30 M-30 MS-30		MSAA-30*** MSAA-30***	MSA-30	MSB-30	MSC-30	
450	1,700	4" 3"	Aluminum Steel	1 & 2 1 & 2	M-40 MS-40						
600	2,271	4" 6" Optional	Aluminum	1, 2, 3, 14 & 15	M-60	M-60**					
700	2,650	4"	Steel	1, 2, 10 & 14	MS-75	MSAA-75***	MSA-75		MSB-75	MSC-75	
800	3,000	6" 4" Optional									
1,000	3,785	6" 6"	Steel Stainless Steel	1, 2, 10 & 14 8	MS-120	MSAA-120*** MSAA-120***	MSA-120		MSB-120	MSC-120	

\* Flanges: All standard M-Series meters are supplied with choice of threaded NPT and BSPT companion flanges, or slip-on weld companion flanges.

MA-Series meters are supplied with threaded NPT companion flanges.

All MS-Series steel case meters are supplied standard with ANSI flanged connections; DIN optional.

Reducing flanges are available for all steel case meters.

\*\* 275 PSI working pressure available for meter only.

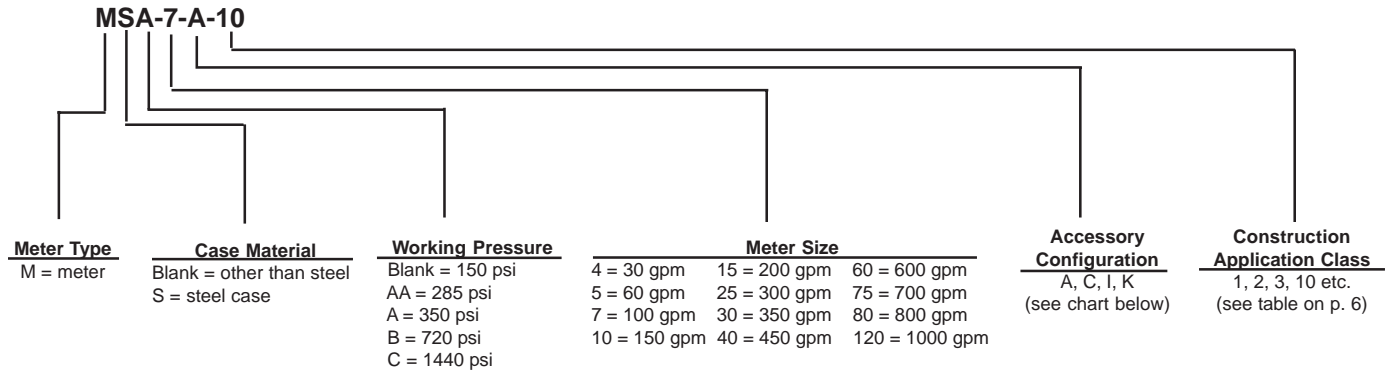
\*\*\*285 PSI, 19.7 BAR, 1965 kPa for MSAA-15, 30, 75 & 120 meters.

+ MA-Series meters are all UL Listed for LPG.

^ M-80 meter capable of momentary overload operation at 125% of maximum rated capacity in either direction (applies to Class 2 meters only, on jet fuel only). 125% overload operation (1,000 GPM) requires 6" ANSI or 6" Victaulic connections.

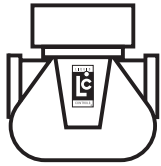
# Model Numbering System

## Model number coding description



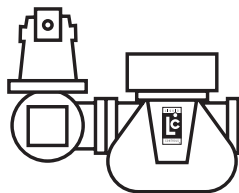
## Standard accessory configurations A, C, I, K

M / MA - 7 - A  
A = Meter with counter



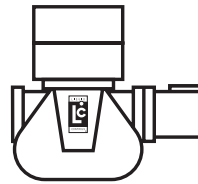
Optional Accessories:  
Printer, Strainer

M / MA - 7 - C  
C = Meter with counter, strainer  
and air eliminator



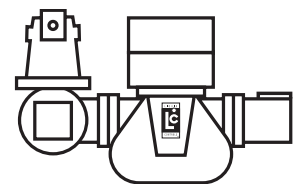
Optional Accessories:  
Printer

M / MA - 7 - I  
I = Meter with counter, preset  
counter and preset valve



Optional Accessories:  
Printer, Strainer

M / MA - 7 - K  
K = Meter with counter, preset  
counter and preset valve, strainer  
and air eliminator



Optional Accessories:  
Printer

## Mounting arrangements

LC meters may be mounted in a variety of configurations, as shown below. Do not position the meter on its side, i.e., with cover plate face down or up.



**Note:** regardless of meter mounting configurations, accessories such as the air/vapor eliminator must always be mounted in a vertical orientation to permit proper operation of the float-actuated apparatus.

# Class Descriptions (Applications)

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## Class 1

For metering refined petroleum products such as leaded and unleaded gasoline, fuel oils, diesel fuel, kerosene, ethylene glycol, (antifreeze), and propylene glycol at rated capacity. Also used on motor oils, crop oils and rotogravure ink at reduced rates of flow.

## Class 2

For metering aviation gasolines and jet fuels when meter is installed downstream of the filter/separator. Non-ferrous construction ... meters may be operated at rated capacity.

## Class 3

For metering a wide variety of products such as liquid sugars, corn syrup, corn sweeteners, dextrose, fructose, sucrose, maltose, lactose, corn oil, soy bean oil, cotton seed oil, coconut oil, and shortening's etc. Rate of flow is based on viscosity to pressure loss relationship.

## Class 4

For metering treated waters (deionized, demineralized, and potable), and certain solvents where no red metals are allowed. Meters may be operated at rated capacity, except for continuous duty service. NOTE: substitute for former class 6 and 17 applications. Anodized aluminum and stainless steel construction.

## Class 7

For metering chlorinated solvents such as: perchloroethylene, trichloroethylene, trichloroethane, and methylene chloride. Also used for general solvent service. Meters may be operated at rated capacity, except for continuous duty service. All ferrous construction.

## Class 8

For metering acid pH liquids such as: nitric, phosphoric, and glacial acetic acids, amines, citric (fruit juices) and vinegars. All 316 stainless steel construction. Operation at up to 80% of maximum rated capacity is recommended.

## Class 10

For metering liquified petroleum gas (LPG) including butane, isobutane, pentane, ethane, freons, and propane. NOTE: materials of construction (including seals) are UL approved for propane, modifications to materials of construction may be required for other liquids listed, including commercial grade NH<sub>3</sub>.

## Class 14

For metering crude oil (LACT and NOD). Also for heated and/or viscous liquids including animal fats, resins, #6 oil and non-abrasive asphalt emulsions. Rate of flow based on viscosity to pressure loss relationship. NOTE: Substitute for former class 5 applications.

## Class 15

For metering oil or water base latex products, polyester resins, and adhesives (neutral pH). Also available for metering herbicides and nitrogen fertilizer solutions (requires viton and teflon seals). Operation at 80% of rated capacity or less is recommended. Shear sensitive liquids must be operated at 1/3 of rated capacity or less.

## Class 16

For general solvent metering service such as: methanol, toluene, xylene, naphtha, acetone, MEK, MIBK, and alcohols including ethanol (also 200-proof alcohol). Meters may be operated at rated capacity, except for continuous duty service. Class 7 meters should be used if the application involves the use of chlorinated solvents.

## Class 20

For batch process water meter service. Not intended for use with deionized or demineralized water. May be used for solvents and other liquids compatible with brass. Meters may be operated at rated capacity. Not intended for continuous duty service. All brass construction with 300 series stainless steel trim.

## Class 27

For metering alkaline pH latex products and adhesives, and some clear liquid fertilizers (10-34-0). Operation at lower than rated capacity is recommended. Shear sensitive liquids must be operated at 1/3 of rated capacity or less. All ferrous construction.

## Class 30

For metering herbicides such as Aatrex, Atrazine, Bicep, Bladex, Dual, Lasso, Lasso ME, Treflan, Sutan, Sutazine, and Eradicane (requires teflon seals). Operation at up to 80% of maximum rated capacity is recommended. Available in M-5 meter only. Use class 15 in all other meter sizes.

## Class 37

For metering sodium hydroxide (caustic) solutions, high sulfur crude oil (LACT and NOD), and other alkaline pH liquids including non-abrasive asphalt emulsions, liquid feed (molasses) supplements, and some resins. Construction suitable for heated and/or viscous liquids. Rate of flow based on viscosity to pressure loss relationship. All ferrous construction.

## Class 47

For metering mildly abrasive liquids, all ferrous construction. Consult Customer Service at the factory for all applications.

# Factors Affecting Meter Materials and Meter Ratings

## 1. Temperature

Temperature is an important application parameter that may have the following effects on meter performance:

- An increase in product temperature may increase the corrosion rate of meter materials.
- Product temperature may determine seal materials.
- Maximum system temperature may affect (decrease) the pressure rating of the meter.

Refer to the information below to assess the effects of temperature on meter materials and ratings.

### Product temperature range for seals

Seal Material	Temp. Range
Buna-N	-65°F to +250°F
Viton®-A	-20°F to +400°F
Teflon® (P.T.F.E)	-450°F to +500°F
Kalrez	+5°F to +500°F
Buna-N cork (gasket)	-30°F to +450°F
Neoprene rubber	-65°F to +300°F
Silicone rubber	-80°F to +450°F

### Meter pressure rating at elevated temperatures

#### M-Series (M5, M7, & M10: Aluminum only)

Product Temp.	Pressure* ■
150°F	350 psi
200°F	275 psi
250°F	250 psi
300°F	150 psi

#### M-Series (M15 and above)

Product Temp.	Pressure*
150°F	150 psi
200°F	100 psi
250°F	75 psi
300°F	50 psi

#### M-Series (M5 & M7: Cast Iron or Stainless Steel)

Product Temp.	Pressure*
150°F	150 psi
200°F	100 psi
250°F	75 psi
300°F	50 psi

#### MA-Series

Product Temp.	Pressure*
150°F	350 psi
200°F	275 psi
250°F	250 psi
300°F	150 psi

#### MS-Series

Product Temp.	Pressure*
150°F	140 psi
200°F	130 psi
250°F	120 psi
300°F	115 psi
400°F	100 psi

#### MSA-Series

Product Temp.	Pressure*
150°F	280 psi
200°F	260 psi
250°F	245 psi
300°F	230 psi
400°F	215 psi

#### MSAA-Series

Product Temp.	Pressure*
150°F	255 psi
200°F	240 psi
250°F	225 psi
300°F	210 psi
400°F	180 psi

For MSB and MSC Series meters, consult the factory.

## 2. Product lubricity

A large factor in selecting bearing materials is the lubricity of the product. Examples of low lubricity products include LPG, gasoline, and water. Consult factory for details.

Viton® and Teflon® are registered trademarks of DuPont Corp.

\* Maximum Non-Shock Working Pressure

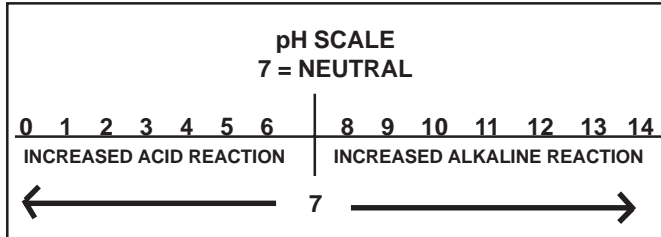
■ M-Series meters are nameplated at 150 psi non-shock working pressure, and should not be applied beyond ratings without factory approval.



# Factors Affecting Meter Materials and Meter Ratings

## 3. pH - Hydrogen-Ion concentration

An excellent indicator of the corrosivity of a solution is its pH factor. A pH scale is derived from the hydrogen-ion concentration and is a measure of the relative acidity or alkalinity of a solution. See table below.



It is difficult to generalize about the resistance of metals to corrosion in liquids of various pH levels, due to numerous factors such as:

- The actual chemical makeup of the solution (which ions are present).
- Whether or not oxygen is present.
- Whether or not concentration cells may form, etc.

However, the following metals have generally been found to be resistant in the ranges indicated:

<u>Material</u>	<u>pH</u>
Aluminum	5 - 8
Cast Iron	5.5 - 11
Treated cast iron	3.5 - 8
Ni-Resist	5.5 - 14
Stainless steel	0 - 14

This chart is intended as a general guide only, and should not be interpreted as specific meter application data. In some instances operation outside these ranges may be possible but the factory should be consulted before proceeding.

Due to varying degrees of concentration, temperature, etc., we reserve the right to make an evaluation before final recommendations are given or orders are accepted.

## 4. Galvanic corrosion

Similar metals are compatible; dissimilar metals are not. When dissimilar metals contact in the presence of an electrolyte, a galvanic action occurs which causes one of the metals to corrode at a much faster than normal rate, while the other corrodes more slowly, if at all. The rate, location and extent of the corrosion depends on three factors:

- the difference in electrical potentials
- the conductivity of the corroding medium
- the relative sizes of the contacting areas.

The avoidance of dissimilar metals and/or the use of a sacrificial anode will reduce galvanic corrosion.

### Galvanic series

Anodic or active

### Metal

Magnesium  
Zinc  
Aluminum  
Cadmium  
Steel, Cast Iron  
Brasses  
Copper  
Bronzes  
Monel  
Nickel  
Stainless steel

Cathodic or Noble

## 5. Concentration

The increase or decrease in concentration of some products will increase corrosion rates.

## 6. Abrasives

Abrasives are erosive. They are a factor in selecting meter construction materials. Class 47 meters are generally recommended. Consult factory for details.

## 7. Products that air harden, temperature harden, crystallize, etc.

Appropriate meter protective measures must be taken to ensure the product remains in a liquid state at all times or is properly flushed during idle periods with a medium compatible with meter materials of construction.

## 8. Liquefied gases

Knowledge of operating pressure and temperature is essential in supplying a meter with the correct pressure rating.

## 9. Inhibitors

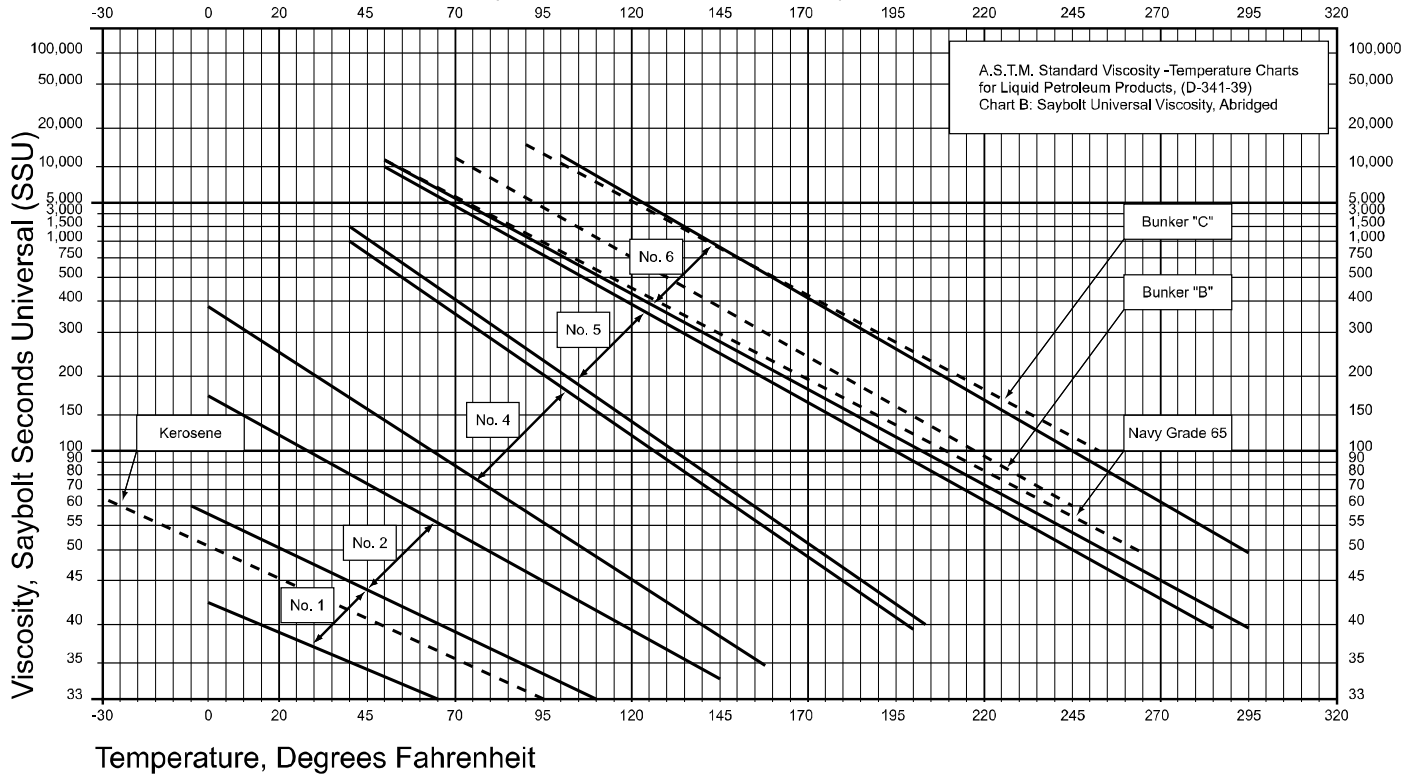
Many products which are considered normally corrosive can be rendered partially or fully noncorrosive by the addition of inhibitors. Obtaining this information will be very useful in selecting meter materials.

Viscosity is the property of a fluid that is a measure of its resistance to flow. Consideration of viscosity over the temperature range of meter operation is important in determining maximum meter flow rate, pressure loss, and

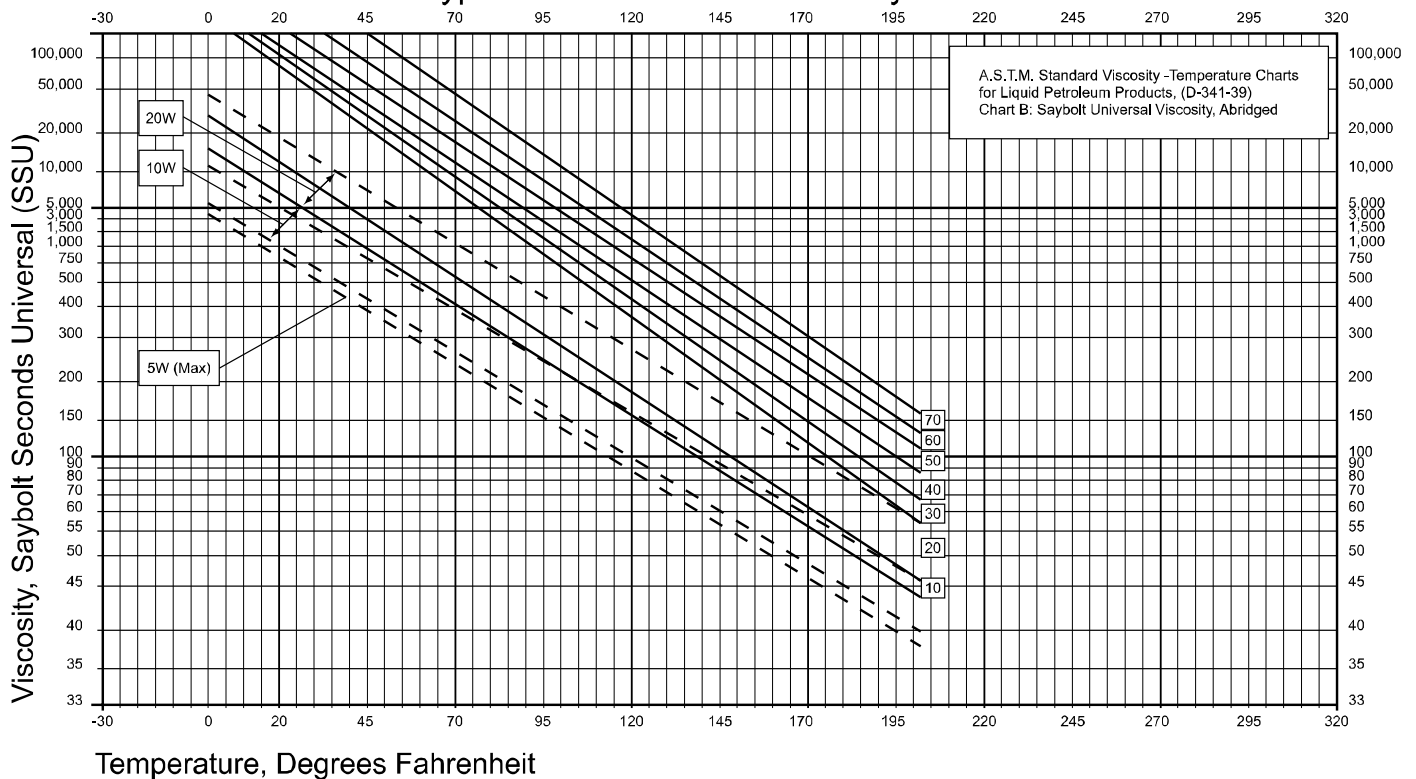
bearing material selection.

The tables below provide viscosity vs. temperature data for selected petroleum products.

## Typical Fuel Oil Viscosity Limits



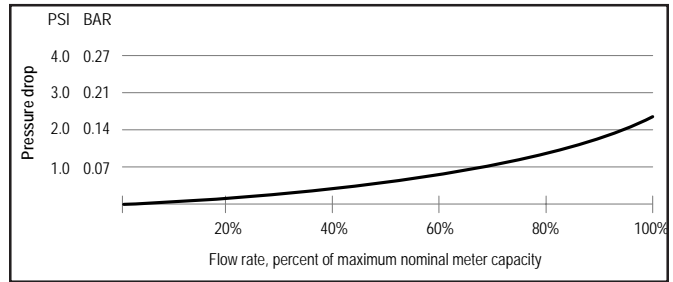
## Typical SAE Grade Oil Viscosity Limits



# Pressure Loss vs. Viscosity

When metering a liquid, the pressure loss through the meter will increase as viscosity increases. The pressure loss data shown in the graph to the right is based on metering Stoddard solvent with viscosity of approximately 30 SSU (1 centistoke).

**Average meter pressure drop vs. flow rate for M60 Meter.**



# Calculating Pressure Loss on Higher Viscosity Liquids

A Conversion Factor graph may be used to determine the pressure drop on higher viscosity products.

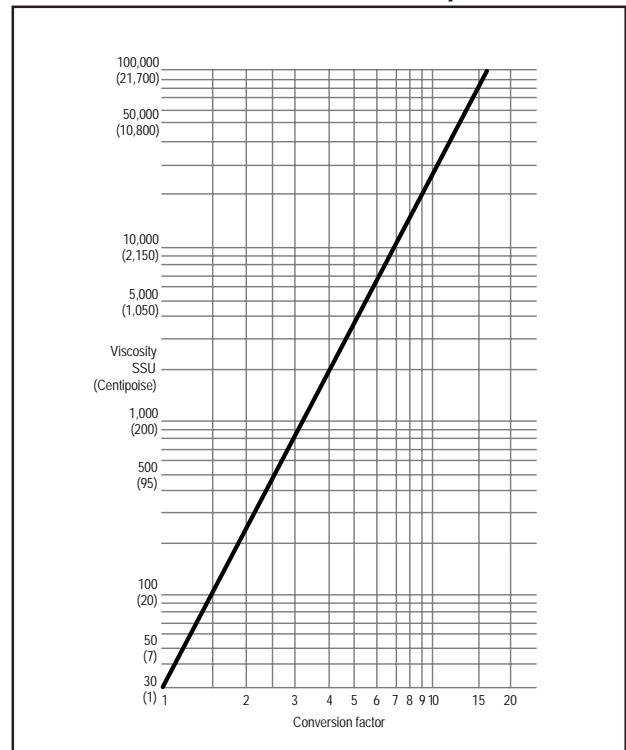
The Conversion Factor graph for determining pressure loss as viscosity increases is approximate only. However, the data is acceptable when preparing specifications for most metering systems. The pressure loss through a strainer or faucet valve will be approximately the same as the pressure loss through the equivalent size meter.

## How to use Conversion Factor Graph to determine Pressure Loss vs. viscosity

The graph (Average Meter Pressure Drop vs. Flow Rate) is based on the use of an LC Meter on safety solvent with a viscosity of 30 SSU. To determine the pressure drop of a liquid with a higher viscosity, multiply the pressure drop as indicated for safety solvent (at whatever % of flow rate is involved) by the conversion factor that applies from graph to the right.

For example: If the meter is to be operated at 100% of capacity, the pressure drop for safety solvent would be 2.3 psi. If the liquid to be metered has a viscosity of 1,000 SSU the conversion factor would be 3.2 (approximate) and the pressure loss would be calculated as  $2.3 \text{ psi} \times 3.2$  or 7.36 psi.

**Conversion Factor Graph**

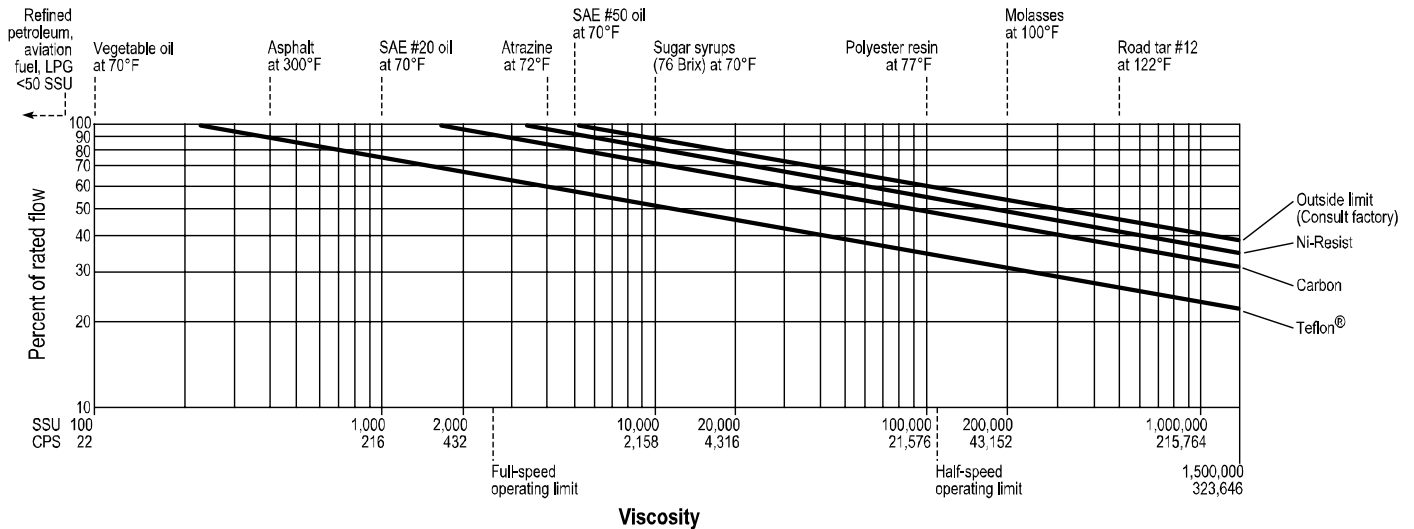


# Maximum Flow Rate vs. Viscosity

## Meter Flow Rate Limit (% of Rated Flow Vs. Viscosity)

Use the chart below to determine maximum meter flow rate relative to meter bearing material and product viscosity. First, determine the percent of rated capacity at which the meter will be required to operate. Second, determine product viscosity at system operating temperature. Third, plot the point on the chart, below, where the two lines intersect. Fourth, identify the meter bearing material from the Meter Materials of Construction tables starting on page 13 and locate the corresponding slope on the chart below.

If the plotted point is above the bearing material slope, you are outside the allowable pressure loss for the specified meter and bearing. You should either choose a larger meter, reduce flow rate or consider alternative bearing materials.



# Kinematic Viscosity Conversion Chart

Kinematic Viscosity Conversion Chart								
Centistoke	SSU		Centistoke	SSU		Centistoke	SSU	
	Saybolt			Saybolt			Saybolt	
	Seconds Universal			Seconds Universal			Seconds Universal	
1	31	240	1200	1300	6100	7500	35000	
2	34	260	1280	1400	6480	8000	37000	
4	38	280	1380	1500	7000	8500	29500	
7	47	300	1475	1600	7500	9000	41000	
10	60	320	1530	1700	8000	9500	43000	
15	80	340	1630	1800	8500	10000	46500	
20	100	360	1730	1900	9000	15000	69400	
25	150	380	1850	2000	9400	20000	92500	
30	160	400	1950	2100	9850	30000	13860	
40	210	420	2050	2200	10300	40000	185000	
50	260	440	2160	2300	10750	50000	231000	
60	320	460	2270	2400	11200	60000	277500	
70	370	480	2380	2500	11600	70000	323500	
80	430	500	2480	3000	14500	80000	370000	
90	480	550	2660	2500	16500	90000	415500	
100	530	600	2900	4000	18500	100000	462000	
120	580	700	3380	4500	21000	125000	587000	
140	690	800	3880	5000	23500	150000	694000	
160	790	900	4300	5500	26000	175000	810000	
180	900	1000	4600	6000	28000	200000	925000	
200	1000	1100	5200	6500	30000			
220	1100	1200	5620	7000	32500			

## Viscosity of Common Liquids

Liquid	Viscosity		Temp	
	SSU	CentiStokes	°F	°C
Corn Oil	135	28.7	130	54.4
Cotton Seed Oil	176	37.9	100	37.8
Crankcase Oil - SAE 10W	5000-10000	1100-2200	0	-17.8
Crankcase Oil - SAE 20W	10000-40000	2200-8800	0	-17.8
Crankcase Oils - SAE 20	240-400	51.9-86.6	100	37.8
Crankcase Oils - SAE 40	580-950	125-206.6	100	37.8
Crankcase Oils - SAE 60	1600-2300	352-507	100	37.8
Crude Oils	40-783	4.28-169.5	60	15.6
Fuel oil # 1	34-40	2.39-4.28	70	21.1
Fuel oil # 2	36-50	3.0-7.4	70	21.1
Fuel oil # 3	35-45	2.69-5.84	70	21.1
Fuel oil # 5	50-125	7.4-26.4	70	21.1
Fuel oil # 6	175-780	37.5-172	160	71.1
Gasoline		0.88	60	15.6
Glycerine (100%)	2,950	648	68.6	20.3
Jet Fuel	52	7.9	-30	-34.4
Kerosene	35	2.71	68	20
Linseed oil	143	30.5	100	37.8
Turpentine	1425	86.5-95.2	100	37.8
Water, distilled	31	1.00	68	20

# METER MATERIALS OF CONSTRUCTION - PD METERS & ACCESSORIES

\*Elements listed are standard for class. Options are application specific.  
 \*\*Buna, Viton, or Teflon/Kalrez seals optional where compatible.

## M-5 & P Meters

Class Element* Application	Housing	Bearing	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Drive Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges & Elbows (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator	Standard Valve
1	356 Alum Anodized	Ni-Resist II	518 Alum Hardcoat Anodized	518 Alum Anodized or Hardcoat Anodized	316 SS Hardchrome or Alum Hardcoat Anodized	Sintered Iron	Sintered Iron	Sintered Iron/ 316 SS or none	300 Series Stainless Steel	360 Alum Anodized	Buna-N UL Approved	Standard	356 Alum Andz 316 SS	Buna-N	40 Mesh 304 SS	356 Alum Viton	356 Alum Viton
L1106 Refined petroleum products.																	
2	356 Alum Anodized	Ni-Resist II	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	17.4 pH SS	17.4 pH SS	316 SS or none	300 Series Stainless Steel	360 Alum Anodized	Buna-N UL Approved	Standard	356 Alum Andz 316 SS	Buna-N	40 Mesh 304 SS	356 Alum Anodized Viton	356 Alum Viton
L1117 Aviation gasoline.																	
3	356 Alum Anodized	Ni-Resist II	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	17.4 pH SS	17.4 pH SS	316 SS or none	300 Series Stainless Steel	360 Alum Anodized	Buna-N UL Approved	Standard	356 Alum Andz 316 SS	Buna-N	40 Mesh 304 SS	356 Alum Anodized Viton	356 Alum Viton
L1131 For liquid sweeteners & vegetable oils.																	
4	356 Alum Anodized	Hardcoat Alum/Carbon	518 Alum Red Anodized	518 Alum Red Anodized	316 SS Hardchrome	17.4 pH SS	17.4 pH SS	316 SS or none	300 Series Stainless Steel	360 Alum Anodized	Buna-N UL Approved	Standard	356 Alum Andz 316 SS	Buna-N	40 Mesh 304 SS	356 Alum Anodized Viton	356 Alum Viton
L1247 For treated waters.																	
8	316 SS	316 SS /Carbon Option /Teflon	316 SS "Red"	316 SS "Red"	316 SS Hardchrome	316 SS	316 SS	316 SS	316 SS	316 SS	Teflon	Standard	316 SS Teflon	316 SS	40 Mesh 316 SS	316 SS Teflon	316 SS Teflon
L1490 For acidic pH liquids.																	
14	356 Alum Anodized	Ni-Resist II	518 Alum Red Anodized	518 Alum Red Anodized	316 SS Hardchrome	Sintered Iron	Sintered Iron	Sintered Iron/ 316 SS or none	300 Series Stainless Steel	360 Alum Anodized	Viton	Standard Option	356 Alum Andz 316 SS	Viton	20 Mesh 304 SS	356 Alum Viton	356 Alum Viton
L1151 For crude oils, heated or viscous products or both.																	
16	356 Alum Anodized	Ni-Resist II /Carbon	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Sintered Iron	Sintered Iron	Sintered Iron/ 316 SS or none	300 Series Stainless Steel	360 Alum Anodized	Buna-N UL Approved	Standard	356 Alum Andz 316 SS	Buna-N	40 Mesh 304 SS	356 Alum Viton	356 Alum Viton
L1617 For general solvent service (not chlorinated).																	
30	356 Alum Anodized	Hardcoat Alum/Carbon	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	17.4 pH SS	17.4 pH SS	316 SS or none	300 Series Stainless Steel	360 Alum Anodized	Viton	Standard	356 Alum Andz 316 SS	Buna-N	40 Mesh 304 SS	356 Alum Anodized Viton	356 Alum Viton
L1230 Herbicides & nitrogen solutions.																	

## M-7 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals** (if required)	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Basket Strainer (if required)	Standard Air Eliminator (if required)	Standard Valve (if required)
1 L2102 Refined petroleum products.	356 Alum Anodized	Ni-Resist II	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Sintered Iron	Sintered Iron	300 Series Stainless Steel	360 Alum Anodized	Buna-N UL Approved	Standard	356 Alum Andz Buna-N 2" NPT	356 Alum Buna-N	40 Mesh 304 SS	356 Alum Viton	356 Alum Viton Teflon
2 L2122 Aviation gasoline.	356 Alum Anodized	Ni-Resist II	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Ni-Resist II	Ni-Resist II	300 Series Stainless Steel	360 Alum Anodized	Buna-N UL Approved	Standard	356 Alum Andz Buna-N 2" NPT	356 Alum Anodized Buna-N	40 Mesh 304 SS	356 Alum Anodized Viton	356 Alum Viton
3 L2133 For liquid sweeteners & vegetable oils.	356 Alum Anodized	Ni-Resist II	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Ni-Resist II	Ni-Resist II	300 Series Stainless Steel	360 Alum Anodized	Buna-N UL Approved	Standard	356 Alum Andz Buna-N 2" NPT	356 Alum Buna-N	40 Mesh 304 SS	356 Alum Anodized Viton	356 Alum Viton Option high visc.
4 L2242 For treated waters.	356 Alum Anodized	Hardcoat Alum/Carbon	518 Alum Red Anodized	518 Alum Red Anodized	316 SS Hardchrome	416 SS	17.4 pH SS	300 Series Stainless Steel	360 Alum Anodized	Buna-N UL Approved	Standard	356 Alum Andz Buna-N 2" NPT	356 Alum Anodized Buna-N	40 Mesh 304 SS	356 Alum Anodized Viton	356 Alum Viton
7 L2360 Chlorinated solvents & alkaline pH liquids.	Cast Iron	Ni-Resist II /Carbon	Cast Iron	Cast Iron	316 SS Hardchrome	Sintered Iron	Sintered Iron	300 Series Stainless Steel	Cast Iron	Viton	Standard	Cast Iron Viton 2" NPT	Cast Iron Viton	40 Mesh 316 SS	Cast Iron Viton	Cast Iron Viton
8 L2491 For acidic pH liquids.	316 SS	316 SS w/Carbon Option w/Teflon	316 SS "Red"	316 SS "Red"	316 SS Hardchrome	316 SS	316 SS Armoly coated	316 SS	316 SS	Teflon	Standard	316 SS Teflon 2" NPT	316 SS Teflon	40 Mesh 316 SS	316 SS Teflon Kairrez	316 SS Teflon
14 L2143 For crude oils, heated or viscous products or both.	356 Alum Anodized	Ni-Resist II	518 Alum Red Anodized	518 Alum Red Anodized	316 SS Hardchrome	Sintered Iron	Sintered Iron	300 Series Stainless Steel	360 Alum Anodized	Viton	Standard Option HI Temp	356 Alum Andz Viton 2" NPT	356 Alum Viton	20 Mesh 304 SS	356 Alum Viton	356 Alum Viton
15 L2302 For oil & water based latex & adhesives.	356 Alum Anodized	Hardcoat Alum/Teflon	518 Alum Red Anodized	518 Alum Red Anodized	316 SS Hardchrome	416 SS	17.4 pH SS	300 Series Stainless Steel	360 Alum Anodized	Buna-N UL Approved	Standard	356 Alum Andz Buna-N 2" NPT	356 Alum Anodized Buna-N	40 Mesh 304 SS	356 Alum Anodized Viton	356 Alum Viton

## M-7 Meters . . . Continued

16	356 Alum Anodized	Ni-Resist II /Carbon	518 Alum Hardcoat Anodized	518 Alum Hardchrome	Sintered Iron	Sintered Iron	316 SS Hardchrome	316 SS Hardchrome	300 Series Stainless Steel	360 Alum Anodized	UL Approved	Buna-N	Standard	356 Alum Andz	Buna-N	304 SS	40 Mesh	356 Alum	356 Alum			
	For general solvent service not chlorinated).																					
20	Brass	Brass /Carbon	Brass "Red"	Brass "Red"	Brass	Delrin	316 SS Hardchrome	316 SS Hardchrome	Brass & 300 Series Stainless Steel	Brass	UL Approved	Buna-N	Standard	Brass	Buna-N	316 SS	40 Mesh	Brass	Not available	356 Alum		
	For general water.																					
27	Cast Iron	Ni-Resist II /Teflon	Cast Iron "Red"	Cast Iron "Red"	Sintered Iron	Sintered Iron	316 SS Hardchrome	316 SS Hardchrome	300 Series Stainless Steel	Cast Iron	Viton	Viton	Standard	Cast Iron	Viton	40 Mesh	316 SS	Cast Iron	Cast Iron	356 Alum	356 Alum	
	For herbicides & some liquid fertilizers.																					
37	Cast Iron	Ni-Resist II	Cast Iron "Red"	Cast Iron "Red"	Sintered Iron	Sintered Iron	316 SS Hardchrome	316 SS Hardchrome	300 Series Stainless Steel	Cast Iron	Viton	Viton	Standard	Cast Iron	Viton	40 Mesh	316 SS	Cast Iron	Cast Iron	356 Alum	356 Alum	
	High Sulphur crude oil.																					

## M-10 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Basket (if required)	Standard Air Eliminator (if required)	Standard Valve (if required)
1	356 Alum Anodized	Ni-Resist II /Carbon	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Sintered Iron	Sintered Iron	300 Series Stainless Steel	360 Alum Anodized	Buna-N	Standard	356 Alum Andz	356 Alum	40 Mesh	356 Alum	356 Alum
	Refined petroleum products.															
2	356 Alum Anodized	Ni-Resist II /Carbon	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Ni-Resist II Armoloy coated	416 SS Armoloy coated	300 Series Stainless Steel	360 Alum Anodized	Buna-N	Standard	356 Alum Andz	356 Alum	40 Mesh	356 Alum	356 Alum
	Aviation gasolines.															

## M-15 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Basket (if required)	Standard Air Eliminator (if required)	Standard Valve (if required)
1	356 Alum Anodized	Ni-Resist II	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Nodular Iron Armoloy coated	Nodular Iron Armoloy coated	300 Series Stainless Steel	360 Alum Anodized	Buna-N	Standard	Cast Iron	356 Alum	40 Mesh	356 Alum	356 Alum
	Refined petroleum products.															



## M-15 Meters . . . Continued

2	356 Alum Anodized	Ni-Resist II	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Ni-Resist II	416 SS Armoloy coated	300 Series Stainless Steel	360 Alum Anodized	Buna-N UL Approved	Standard	Cast Iron Buna-N 3" NPT	356 Alum Anodized Viton	40 Mesh 304 SS	356 Alum Anodized Viton	356 Alum Anodized Viton
3	356 Alum Anodized	Ni-Resist II	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Ni-Resist II	416 SS Armoloy coated	300 Series Stainless Steel	360 Alum Anodized	Buna-N UL Approved	Standard	356 Alum Andz Buna-N 3" NPT	356 Alum Anodized Viton Option high visc.	40 Mesh 304 SS	356 Alum Anodized Viton	356 Alum Anodized Viton
4	356 Alum Anodized	Hardcoat Alum/Carbon	518 Alum Red Anodized	518 Alum Red Anodized	316 SS Hardchrome	Option 316 SS	316 SS Armoloy coated	300 Series Stainless Steel	360 Alum Anodized	Buna-N UL Approved	Standard	356 Alum Andz Buna-N 3" NPT	356 Alum Anodized Viton	40 Mesh 304 SS	356 Alum Anodized Viton	356 Alum Anodized Viton
14	356 Alum Anodized	Ni-Resist II	518 Alum Red Anodized	518 Alum Red Anodized	316 SS Hardchrome	Nodular Iron Armoloy coated	Nodular Iron Armoloy coated	300 Series Stainless Steel	360 Alum Anodized	Viton	Standard Option HI Temp	Cast Iron Buna-N 3" NPT	356 Alum Anodized Viton	20 Mesh 304 SS	356 Alum Anodized Viton	356 Alum Anodized Viton
15	356 Alum Anodized	Hardcoat Alum/Teflon	518 Alum Red Anodized	518 Alum Red Anodized	316 SS Hardchrome	316 SS	316 SS Armoloy coated	300 Series Stainless Steel	360 Alum Anodized	Buna-N UL Approved	Standard	356 Alum Andz Buna-N 3" NPT	356 Alum Anodized Viton	40 Mesh 304 SS	356 Alum Anodized Viton	356 Alum Anodized Viton
16	356 Alum Anodized	Ni-Resist II /Carbon	518 Alum Hardcoat Anodized	518 Alum Hardcoat Anodized	316 SS Hardchrome	Nodular Iron Armoloy coated	Nodular Iron Armoloy coated	300 Series Stainless Steel	360 Alum Anodized	Buna-N UL Approved	Standard	Cast Iron Buna-N 3" NPT	356 Alum Anodized Viton	40 Mesh 304 SS	356 Alum Anodized Viton	356 Alum Anodized Viton

## M-25 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator (if required)	Standard Valve (if required)
1	356 Alum Anodized	Ni-Resist II /Carbon	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Ni-Resist II	416 SS Armoloy coated	300 Series Stainless Steel	360 Alum Anodized	Buna-N UL Approved	Standard	Cast Iron Buna-N 3" NPT	356 Alum Anodized Viton	40 Mesh 304 SS	356 Alum Anodized Viton	356 Alum Anodized Viton
L3255 Refined petroleum products.																
2	356 Alum Anodized	Ni-Resist II /Carbon	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Ni-Resist II	416 SS Armoloy coated	300 Series Stainless Steel	356 Alum Anodized	Buna-N UL Approved	Standard	356 Alum Andz Buna-N 3" NPT	356 Alum Anodized Viton	40 Mesh 304 SS	356 Alum Anodized Viton	356 Alum Anodized Viton
L3252 Aviation gasoline.																

## M-30 Meters

Class Element*	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator (if required)	Standard Valve (if required)
1	356 Alum Anodized	Ni-Resist II	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Nodular Iron Armoloy coated	Nodular Iron	300 Series Stainless Steel	356 Alum Anodized	Buna-N	Standard	Cast Iron Buna-N 4" NPT	356 Alum Buna-N	40 Mesh 304 SS	356 Alum Viton	356 Alum Viton
2	356 Alum Anodized	Ni-Resist II	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Ni-Resist II Armoloy coated	416 SS	300 Series Stainless Steel	356 Alum Anodized	Buna-N	Standard	356 Alum Andz Buna-N 4" NPT	356 Alum Anodized Buna-N	40 Mesh 304 SS	356 Alum Anodized Viton	356 Alum Viton
3	356 Alum Anodized	Ni-Resist II	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Ni-Resist II Armoloy coated	416 SS	300 Series Stainless Steel	356 Alum Anodized	Buna-N	Standard	356 Alum Andz Buna-N 4" NPT	356 Alum Anodized Buna-N	40 Mesh 304 SS	356 Alum Anodized Viton	356 Alum Viton Option high visc.
4	356 Alum Anodized	Hardcoat Alum/Carbon	356 Alum Red Anodized	356 Alum Red Anodized	316 SS Hardchrome	304 SS	304 SS Armoloy coated	300 Series Stainless Steel	356 Alum Anodized	Buna-N	Standard	356 Alum Andz Buna-N 4" NPT	356 Alum Anodized Buna-N	40 Mesh 304 SS	356 Alum Anodized Viton	356 Alum Anodized Viton
7	Cast Iron	Ni-Resist II /Carbon	Cast Iron	Cast Iron	316 SS Hardchrome	Nodular Iron Armoloy coated	Nodular Iron	300 Series Stainless Steel	Cast Iron	Viton	Standard	3" 125# flat faced ANSI	Steel Viton	40 Mesh 303 SS	Steel Viton	Steel Viton
14	356 Alum Anodized	Ni-Resist II	356 Alum Red Anodized	356 Alum Red Anodized	316 SS Hardchrome	304 SS	304 SS Armoloy coated	300 Series Stainless Steel	356 Alum Anodized	Buna-N	Standard	356 Alum Andz Buna-N 4" NPT	356 Alum Anodized Buna-N	40 Mesh 304 SS	356 Alum Anodized Viton	356 Alum Anodized Viton
15	356 Alum Anodized	Hardcoat Alum/Teflon	356 Alum Red Anodized	356 Alum Red Anodized	316 SS Hardchrome	304 SS	304 SS Armoloy coated	300 Series Stainless Steel	356 Alum Anodized	Buna-N	Standard	356 Alum Andz Buna-N 4" NPT	356 Alum Anodized Buna-N	40 Mesh 304 SS	356 Alum Anodized Viton	356 Alum Anodized Viton
16	356 Alum Anodized	Ni-Resist II /Carbon	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Nodular Iron Armoloy coated	Nodular Iron	300 Series Stainless Steel	356 Alum Anodized	Buna-N	Standard	Cast Iron Buna-N 4" NPT	356 Alum Anodized Buna-N	40 Mesh 304 SS	356 Alum Anodized Viton	356 Alum Anodized Viton

## M-30 Meters . . . Continued

27	Cast Iron	Ni-Resist II /Rulon	Cast Iron "Red"	Cast Iron "Red"	316 SS Hardchrome	Nodular Iron TiN coated	Nodular Iron TiN coated	300 Series Stainless Steel	Cast Iron	Viton	Standard	3" 125# flat faced ANSI	Steel Viton	40 Mesh 303 SS	Steel Viton
herbicides & some liquid fertilizers.															
37	Cast Iron	Ni-Resist II	Cast Iron "Red"	Cast Iron "Red"	316 SS Hardchrome	Nodular Iron Armoly coated	Nodular Iron Armoly coated	300 Series Stainless Steel	Cast Iron	Viton	Standard Option Hi Temp	3" 125# flat faced ANSI	Steel Viton	40 Mesh 303 SS	Steel Viton
High Sulphur crude oil.															
47	Cast Iron	Ni-Resist II /Ceramic	Cast Iron "Red"	Cast Iron "Red"	303 SS /Ceramic	Nodular Iron TiN coated	Nodular Iron TiN coated	300 Series Stainless Steel	Cast Iron	Viton	Standard	3" 125# flat faced ANSI	Not available	Not available	Not available
For mildly abrasive liquids.															

## M-40 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator (if required)	Standard Valve
1	356 Alum Anodized	Ni-Resist II /Carbon	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Nodular Iron Armoly coated	Nodular Iron	300 Series Stainless Steel	356 Alum Anodized	Buna-N	Standard	Cast Iron Buna-N 4" NPT	356 Alum Buna-N	40 Mesh 304 SS	356 Alum Viton	356 Alum Viton
Refined petroleum products.																
2	356 Alum Anodized	Ni-Resist II /Carbon	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Ni-Resist II Armoly coated	416 SS	300 Series Stainless Steel	356 Alum Anodized	Buna-N	Standard	356 Alum Andz Buna-N 4" NPT	356 Alum Anodized Buna-N	40 Mesh 304 SS	356 Alum Anodized Viton	356 Alum Viton
Aviation gasoline.																

## M-60 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges & Elbows	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator	Standard Valve
1	356 Alum Anodized	Cast Iron /Carbon	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Nodular Iron	Nodular Iron	300 Series Stainless Steel	356 Alum Anodized	Buna-N	Standard	Cast Iron Buna-N 4" NPT 4" x 45 deg.	356 Alum Buna-N	40 Mesh 304 SS	356 Alum Viton	356 Alum Viton
Refined petroleum products.																
2	356 Alum Anodized	Ni-Resist II	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Ni-Resist II Armoly coated	416 SS	300 Series Stainless Steel	356 Alum Anodized	Buna-N	Standard	356 Alum Andz Buna-N 4" NPT 4" x 45 deg.	356 Alum Anodized Buna-N	40 Mesh 304 SS	356 Alum Anodized Viton	356 Alum Viton
Aviation gasoline.																
3	356 Alum Anodized	Ni-Resist II	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Ni-Resist II Armoly coated	416 SS	300 Series Stainless Steel	356 Alum Anodized	Buna-N	Standard	356 Alum Andz Buna-N 4" NPT 4" x 45 deg.	356 Alum Anodized Buna-N	40 Mesh 304 SS	356 Alum Anodized Viton	356 Alum Viton
For liquid sweeteners & vegetable oils.																

## M-60 Meters....Continued

14	356 Alum Anodized	Ni-Resist II	356 Alum Red Anodized	356 Alum Red Anodized	316 SS Hardchrome	Nodular Iron	Nodular Iron	300 Series Stainless Steel	356 Alum Anodized	Viton	Standard Option Hi Temp	Cast Iron Buna-N 4" NPT	356 Alum Viton	20 Mesh 304 SS	356 Alum Viton	356 Alum Viton	356 Alum Viton
	For crude oils, heated or viscous products or both.																
15	356 Alum Anodized	Hardcoat Alum/Carbon	356 Alum Red Anodized	356 Alum Red Anodized	316 SS Hardchrome	Ni-Resist II Armoloy coated	416 SS	300 Series Stainless Steel	356 Alum Anodized	Buna-N	Standard	356 Alum Andz	356 Alum Anodized Buna-N	40 Mesh 304 SS	356 Alum Anodized Viton	356 Alum Anodized Viton	356 Alum Anodized Viton
	For oil & water based Latex & adhesives.																

## M-80 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges & Elbows (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Strainer Basket Eliminator (if required)	Standard Air Valve	
2	356 Alum Anodized	Ni-Resist II /Carbon	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Ni-Resist II Armoloy coated	416 SS	300 Series Stainless Steel	356 Alum Anodized	Buna-N	Standard	6" Victaulic	Not available	Not available	Not available	Not available	Not available
	Aviation gasolines.																

## MA-4 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Drive Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges & Elbows (if required)	Standard Strainer Basket (if required)	Standard Strainer Basket Eliminator (if required)	Standard Air	
10	356 Alum Anodized	Ni-Resist II /Carbon	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Sintered Iron	Sintered Iron	Sintered Iron/ 316 SS or none	300 Series Stainless Steel	360 Alum Anodized	Buna-N UL Approved	Standard	Nodular Iron UL Buna-N 1-1/2" NPT	356 Alum Anodized Buna-N	200 Mesh 304 SS	356 Alum Anodized Buna-N	356 Alum Anodized
	Liquified petroleum gas.																

## MA-5 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Drive Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges & Elbows (if required)	Standard Strainer Basket (if required)	Standard Strainer Basket Eliminator (if required)	Standard Air	
10	356 Alum Anodized	Ni-Resist II /Carbon	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Sintered Iron	Sintered Iron	Sintered Iron/ 316 SS or none	300 Series Stainless Steel	360 Alum Anodized	Buna-N UL Approved	Standard	Nodular Iron UL Buna-N 1-1/2" NPT	356 Alum Anodized Buna-N	200 Mesh 304 SS	356 Alum Anodized	356 Alum Anodized
	Liquified petroleum gas.																
12	356 Alum Anodized	Ni-Resist II /Carbon	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	17.4 pH SS	17.4 pH SS	316 SS or none	300 Series Stainless Steel	360 Alum Anodized	Buna-N UL Approved	Standard	Nodular Iron UL Buna-N 1-1/2" NPT	356 Alum Anodized	200 Mesh 304 SS	356 Alum Anodized	356 Alum Anodized
	Anhydrous ammonia (NH <sub>3</sub> ).																

## MA-7 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator (if required)	Standard Valve (if required)
10 L2321 Liquefied petroleum gas.	356 Alum Anodized	Ni-Resist II /Carbon	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Sintered Iron	Sintered Iron	300 Series Stainless Steel	360 Alum Anodized	Buna-N UL Approved	Standard	UL Buna-N 2" NPT	356 Alum Anodized Buna-N UL Approved	200 Mesh 304 SS	356 Alum Anodized Buna-N UL Approved	356 Alum Anodized Buna-N
12 L2612 Anhydrous Ammonia (NH3).	356 Alum Anodized	Ni-Resist II /Carbon	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Ni-Resist II	Ni-Resist II	300 Series Stainless Steel	360 Alum Anodized	Buna-N UL Approved	Standard	UL Buna-N 2" NPT	356 Alum Anodized Buna-N UL Approved	200 Mesh 304 SS	356 Alum Anodized EPT EPDM	356 Alum Anodized
14 L2143 Aircraft de-icing fluids (ADF).	356 Alum Anodized	Ni-Resist II	518 Alum Red Anodized	518 Alum Red Anodized	316 SS Hardchrome	Sintered Iron	Sintered Iron	300 Series Stainless Steel	360 Alum Anodized	Buna-N UL Approved	Hi Temp	356 Alum Andz Buna 2" NPT	356 Alum Buna-N UL Approved	20 Mesh 304 SS	356 Alum Anodized Buna-N UL Approved	356 Alum Viton Teflon

## MA-15 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator (if required)	Standard Valve (if required)
10 L3210 Liquefied petroleum gas.	356 Alum Anodized	Ni-Resist II /Carbon	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Nodular Iron Armoly Coated	Nodular Iron	300 Series Stainless Steel	360 Alum Anodized	Buna-N UL Approved	Standard	UL Buna-N 3" NPT	356 Alum Anodized Buna-N UL Approved	200 Mesh 304 SS	356 Alum Anodized Buna-N UL Approved	356 Alum Anodized Buna-N

## MS-7 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator (if required)	Standard Valve (if required)
1 L4115 Refined petroleum products.	356 Alum Anodized	Ni-Resist II	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Sintered Iron	Sintered Iron	300 Series Stainless Steel	Steel	Buna-N	Standard	2" Raised Face Steel ANSI	Steel Buna-N	40 Mesh Steel Cad Plated	Steel Viton	Not Available
2 L4116 Aviation gasoline.	356 Alum Anodized	Ni-Resist II	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Ni-Resist II	Ni-Resist II	300 Series Stainless Steel	Steel Epoxy Coated Inside	Buna-N	Standard	2" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available

## MS-7 Meters....Continued

7	Cast Iron	Ni-Resist II /Carbon	Cast Iron	Cast Iron	316 SS Hardchrome	Sintered Iron	Sintered Iron	300 Series Stainless Steel	Steel	Viton	Standard	2" Raised Face Steel ANSI	Steel Viton	40 Mesh Steel Cad Plated	Steel Viton	Not Available
L4107	Chlorinated solvents & alkaline pH liquids.															
14	356 Alum Anodized	Ni-Resist II	518 Alum Red Anodized	518 Alum Red Anodized	316 SS Hardchrome	Sintered Iron	Sintered Iron	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	2" Raised Face Steel ANSI	Steel Viton	40 Mesh Steel Cad Plated	Steel Viton	Not Available
L4129	For crude oils, heated or viscous products or both															
16	356 Alum Anodized	Ni-Resist II /Carbon	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Sintered Iron	Sintered Iron	300 Series Stainless Steel	Steel	Buna-N	Standard	2" Raised Face Steel ANSI	Steel Viton	40 Mesh Steel Cad Plated	Steel Viton	Not Available
L4126	For general solvent service not chlorinated).															
37	Cast Iron	Ni-Resist II	Cast Iron "Red"	Cast Iron "Red"	316 SS Hardchrome	Sintered Iron	Sintered Iron	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	2" Raised Face Steel ANSI	Steel Viton	40 Mesh Steel Cad Plated	Steel Viton	Not Available
L4109	High Sulphur crude oil.															

## MSAA-7 Meters

Class Element*	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator (if required)	Standard Valve
1	356 Alum Anodized	Ni-Resist II	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Sintered Iron	Sintered Iron	300 Series Stainless Steel	Steel	Buna-N	Standard	2" Raised Face Steel ANSI	Steel Buna-N	40 Mesh Steel Cad Plated	Steel Viton	Not Available
L4115	Refined petroleum products.															
2	356 Alum Anodized	Ni-Resist II	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Ni-Resist II	Ni-Resist II	300 Series Stainless Steel	Steel Epoxy Coated Inside	Buna-N	Standard	2" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available
L4116	Aviation gasoline.															
7	Cast Iron	Ni-Resist II /Carbon	Cast Iron	Cast Iron	316 SS Hardchrome	Sintered Iron	Sintered Iron	300 Series Stainless Steel	Steel	Viton	Standard	2" Raised Face Steel ANSI	Steel Viton	40 Mesh Steel Cad Plated	Steel Viton	Not Available
L4107	Chlorinated solvents & alkaline pH liquids.															
14	356 Alum Anodized	Ni-Resist II	518 Alum Red Anodized	518 Alum Red Anodized	316 SS Hardchrome	Sintered Iron	Sintered Iron	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	2" Raised Face Steel ANSI	Steel Viton	40 Mesh Steel Cad Plated	Steel Viton	Not Available
L4129	For crude oils, heated or viscous products or both.															

## MSAA-7 Meters ... Continued

16	356 Alum Anodized	Ni-Resist II /Carbon	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Sintered Iron	Sintered Iron	Sintered Iron	300 Series Stainless Steel	Steel	Buna-N	Standard	2" Raised Face Steel ANSI	Steel Buna-N	40 Mesh Steel	Steel Viton	Not Available	
For general solvent service not chlorinated).																		
37	Cast Iron	Ni-Resist II	Cast Iron "Red"	Cast Iron "Red"	316 SS Hardchrome	Sintered Iron	Sintered Iron	Sintered Iron	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	2" Raised Face Steel ANSI	Steel Viton	40 Mesh Steel	Steel Viton	Not Available	
High Sulphur crude oil.																		

## MSA-7 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator (if required)	Standard Valve		
1	356 Alum Anodized	Ni-Resist II	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Sintered Iron	Sintered Iron	300 Series Stainless Steel	Steel	Buna-N	Standard	2" Raised Face Steel ANSI	Steel Buna-N	40 Mesh Steel	Steel Viton	Not Available		
Refined petroleum products.																		
7	Cast Iron	Ni-Resist II /Carbon	Cast Iron	Cast Iron	316 SS Hardchrome	Sintered Iron	Sintered Iron	300 Series Stainless Steel	Steel	Viton	Standard	2" Raised Face Steel ANSI	Steel Viton	40 Mesh Steel	Steel Viton	Not Available		
Chlorinated solvents & alkaline pH liquids.																		
8	316 SS	316 SS /Carbon Option /Teflon	316 SS "Red"	316 SS "Red"	316 SS Hardchrome	316 SS	316 SS Armoly Coated	300 Series Stainless Steel	316 SS	Teflon	Standard	2" Raised Face SS ANSI	Not Available	Not Available	Not Available	Not Available		
For acidic pH liquids.																		
10	356 Alum Anodized	Ni-Resist II /Carbon	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Sintered Iron	Sintered Iron	300 Series Stainless Steel	Steel	Buna-N UL Approved	Standard	2" Raised Face Steel ANSI	Steel Buna-N	100 Mesh 304 SS	Steel Viton	Steel Epoxy Coated		
Liquified petroleum gas.																		
14	356 Alum Anodized	Ni-Resist II	518 Alum Red Anodized	518 Alum Red Anodized	316 SS Hardchrome	Sintered Iron	Sintered Iron	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	2" Raised Face Steel ANSI	Steel Viton	40 Mesh Steel	Steel Viton	Not Available		
L4129 For crude oils, heated or viscous products or both.																		
37	Cast Iron	Ni-Resist II	Cast Iron "Red"	Cast Iron "Red"	316 SS Hardchrome	Sintered Iron	Sintered Iron	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	2" Raised Face Steel ANSI	Steel Viton	40 Mesh Steel	Steel Viton	Not Available		
High Sulphur crude oil.																		

## MSB-7 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Journal Rotors	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator (if required)	Standard Valve (if required)
1 L4115 Refined petroleum products.	356 Alum Anodized	Ni-Resist II	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Sintered Iron	Sintered Iron	300 Series Stainless Steel	Steel	Buna-N	Standard	2" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available
14 L4129 For crude oils, heated or viscous products or both.	356 Alum Anodized	Ni-Resist II	518 Alum Red Anodized	518 Alum Red Anodized	316 SS Hardchrome	Sintered Iron	Sintered Iron	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	2" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available
37 L4109 High Sulphur crude oil.	Cast Iron	Ni-Resist II	Cast Iron "Red"	Cast Iron "Red"	316 SS Hardchrome	Sintered Iron	Sintered Iron	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	2" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available

## MSC-7 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Journal Rotors	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator (if required)	Standard Valve (if required)
1 L4115 Refined petroleum products.	356 Alum Anodized	Ni-Resist II	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Sintered Iron	Sintered Iron	300 Series Stainless Steel	Steel	Buna-N	Standard	2" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available
8 L4188 For acidic pH liquids.	316 SS	316 SS /Carbon Option /Teflon	316 SS "Red"	316 SS "Red"	316 SS Hardchrome	316 SS	316 SS Armoloy Coated	300 Series Stainless Steel	316 SS	Teflon	Standard	2" Raised Face SS ANSI	Not Available	Not Available	Not Available	Not Available
14 L4129 For crude oils, heated or viscous products or both.	356 Alum Anodized	Ni-Resist II	518 Alum Red Anodized	518 Alum Red Anodized	316 SS Hardchrome	Sintered Iron	Sintered Iron	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	2" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available
37 L4109 High Sulphur crude oil.	Cast Iron	Ni-Resist II	Cast Iron "Red"	Cast Iron "Red"	316 SS Hardchrome	Sintered Iron	Sintered Iron	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	2" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available



## MS-15 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator (if required)	Standard Valve (if required)
1 L4200 Refined petroleum products.	356 Alum Anodized	Ni-Resist II	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Nodular Iron Armoly coated	Nodular Iron Armoly coated	300 Series Stainless Steel	Steel	Buna-N	Standard	3" Raised Face Steel ANSI	Steel Buna-N	40 Mesh Steel Cad Plated	Steel Viton	Steel Viton
2 L4202 Aviation gasolines.	356 Alum Anodized	Ni-Resist II	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Ni-Resist II	416 SS Armoly coated	300 Series Stainless Steel	Steel Epoxy coated inside	Buna-N	Standard	3" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available
14 L4214 For crude oils, heated or viscous products or both.	356 Alum Anodized	Ni-Resist II	518 Alum Red Anodized	518 Alum Red Anodized	316 SS Hardchrome	Nodular Iron Armoly coated	Nodular Iron Armoly coated	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	3" Raised Face Steel ANSI	Steel Viton	40 Mesh Steel Cad Plated	Steel Viton	Steel Viton
16 L4225 For general solvent service not chlorinated).	356 Alum Anodized	Ni-Resist II /Carbon	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Nodular Iron Armoly coated	Nodular Iron Armoly coated	300 Series Stainless Steel	Steel	Buna-N	Standard	3" Raised Face Steel ANSI	Steel Buna-N	40 Mesh Steel Cad Plated	Steel Viton	Steel Viton

## MSAA-15 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator (if required)	Standard Valve (if required)
1 L4200 Refined petroleum products.	356 Alum Anodized	Ni-Resist II	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Nodular Iron Armoly coated	Nodular Iron Armoly coated	300 Series Stainless Steel	Steel	Buna-N	Standard	3" Raised Face Steel ANSI	Steel Buna-N	40 Mesh Steel Cad Plated	Steel Viton	Steel Viton
2 L4202 Aviation gasolines.	356 Alum Anodized	Ni-Resist II	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Ni-Resist II	416 SS Armoly coated	300 Series Stainless Steel	Steel Epoxy coated inside	Buna-N	Standard	3" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available
8 L4208 For acidic pH liquids.	316 SS	316 SS /Carbon	316 SS "Red"	316 SS "Red"	316 SS Hardchrome	316 SS	316 SS Armoly Coated	300 Series Stainless Steel	316 SS	Teflon	Standard	3" Raised Face SS ANSI	Not Available	Not Available	Not Available	Not Available

## MSAA-15 Meters . . . Continued

14	356 Alum Anodized	Ni-Resist II	518 Alum Red Anodized	518 Alum Red Anodized	316 SS Hardchrome	Nodular Iron Armoloy coated	Nodular Iron	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	3" Raised Face Steel ANSI	Steel Viton	40 Mesh Steel Cad Plated	Steel Viton	Steel Viton
L4214																
For crude oils, heated or viscous products or both.																
16	356 Alum Anodized	Ni-Resist II /Carbon	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Nodular Iron Armoloy coated	Nodular Iron	300 Series Stainless Steel	Steel	Buna-N	Standard	3" Raised Face Steel ANSI	Steel Buna-N	40 Mesh Steel Cad Plated	Steel Viton	Steel Viton
L4225																
For general solvent service not chlorinated).																

## MSA-15 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator (if required)	Standard Valve (if required)
1	356 Alum Anodized	Ni-Resist II	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Nodular Iron Armoloy coated	Nodular Iron	300 Series Stainless Steel	Steel	Buna-N	Standard	3" Raised Face Steel ANSI	Steel Buna-N	40 Mesh Steel Cad Plated	Steel Viton	Steel Viton
L4200																
Refined petroleum products.																
10	356 Alum Anodized	Ni-Resist II /Carbon	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Nodular Iron Armoloy coated	Nodular Iron	300 Series Stainless Steel	Steel	Buna-N	Standard	3" Raised Face Steel ANSI	Steel Buna-N	100 Mesh 304 SS	Steel Viton	Steel Epoxy Coated
L4225										UL Approved						
Liquified petroleum gas.																
14	356 Alum Anodized	Ni-Resist II	518 Alum Red Anodized	518 Alum Red Anodized	316 SS Hardchrome	Nodular Iron Armoloy coated	Nodular Iron	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	3" Raised Face Steel ANSI	Steel Viton	40 Mesh Steel Cad Plated	Steel Viton	Steel Viton
L4214																
For crude oils, heated or viscous products or both.																

## MSB-15 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Basket (if required)	Standard Air Eliminator (if required)	Standard Valve
1 L4200 Refined petroleum products.	356 Alum Anodized	Ni-Resist II	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Nodular Iron Armoloy coated	Nodular Iron Armoloy coated	300 Series Stainless Steel	Steel	Buna-N	Standard	3" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available
14 L4214 For crude oils, heated or viscous products or both.	356 Alum Anodized	Ni-Resist II	518 Alum Red Anodized	518 Alum Red Anodized	316 SS Hardchrome	Nodular Iron Armoloy coated	Nodular Iron Armoloy coated	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	3" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available

## MSC-15 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Basket (if required)	Standard Air Eliminator (if required)	Standard Valve
1 L4200 Refined petroleum products.	356 Alum Anodized	Ni-Resist II	518 Alum Hardcoat Anodized	518 Alum Anodized	316 SS Hardchrome	Nodular Iron Armoloy coated	Nodular Iron Armoloy coated	300 Series Stainless Steel	Steel	Buna-N	Standard	3" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available
14 L4214 For crude oils, heated or viscous products or both.	356 Alum Anodized	Ni-Resist II	518 Alum Red Anodized	518 Alum Red Anodized	316 SS Hardchrome	Nodular Iron Armoloy coated	Nodular Iron Armoloy coated	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	3" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available

## MS-30 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Basket (if required)	Standard Air Eliminator (if required)	Standard Valve
1 L4300 Refined petroleum products.	356 Alum Anodized	Ni-Resist II	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Nodular Iron Armoloy coated	Nodular Iron Armoloy coated	300 Series Stainless Steel	Steel	Buna-N	Standard	3" Raised Face Steel ANSI	Steel Buna-N	40 Mesh Steel	Steel	Steel Viton
2 L4302 Aviation gasoline.	356 Alum Anodized	Ni-Resist II	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Ni-Resist II Armoloy coated	416 SS Armoloy coated	300 Series Stainless Steel	Steel Epoxy Coated Inside	Buna-N	Standard	3" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available

## MS-30 Meters....Continued

7	Cast Iron	Ni-Resist II /Carbon	Cast Iron	Cast Iron	316 SS Hardchrome	Nodular Iron Armoloy coated	Nodular Iron	300 Series Stainless Steel	Steel	Viton	Standard	3" Raised Face Steel ANSI	Steel Viton	40 Mesh Steel	Steel Viton	Steel Viton	
Chlorinated solvents & alkaline pH liquids.																	
14	356 Alum Anodized	Ni-Resist II	356 Alum Red Anodized	356 Alum Red Anodized	316 SS Hardchrome	Nodular Iron Armoloy coated	Nodular Iron	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	3" Raised Face Steel ANSI	Steel Viton	40 Mesh Steel	Steel Viton	Steel Viton	
For crude oils, heated or viscous products or both.																	
16	356 Alum Anodized	Ni-Resist II /Carbon	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Nodular Iron Armoloy coated	Nodular Iron	300 Series Stainless Steel	Steel	Buna-N	Standard	3" Raised Face Steel ANSI	Steel Viton	40 Mesh Steel	Steel Viton	Steel Viton	
For general solvent service not chlorinated).																	
37	Cast Iron	Ni-Resist II	Cast Iron "Red"	Cast Iron "Red"	316 SS Hardchrome	Nodular Iron Armoloy coated	Nodular Iron	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	3" Raised Face Steel ANSI	Steel Viton	40 Mesh Steel	Steel Viton	Steel Viton	
High Sulphur crude oil.																	

## MSEA-30 Meters

Class Element*	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator (if required)	Standard Valve (if required)	
1	356 Alum Anodized	Ni-Resist II	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Nodular Iron Armoloy coated	Nodular Iron	300 Series Stainless Steel	Steel	Buna-N	Standard	3" Raised Face Steel ANSI	Steel	40 Mesh Steel	Steel Viton	Steel Viton	
Refined petroleum products.																	
2	356 Alum Anodized	Ni-Resist II	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Ni-Resist II	416 SS Armoloy coated	300 Series Stainless Steel	Steel Epoxy Coated Inside	Buna-N	Standard	3" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available	
Aviation gasolines.																	
7	Cast Iron	Ni-Resist II /Carbon	Cast Iron	Cast Iron	316 SS Hardchrome	Nodular Iron Armoloy coated	Nodular Iron	300 Series Stainless Steel	Steel	Viton	Standard	3" Raised Face Steel ANSI	Steel Viton	40 Mesh Steel	Steel Viton	Steel Viton	
Chlorinated solvents & alkaline pH liquids.																	
8	316 SS	316 SS /Carbon	316 SS "Red"	316 SS "Red"	316 SS Hardchrome	316 SS	316 SS	300 Series Stainless Steel	316 SS	Teflon	Standard	3" Raised Face SS ANSI	Not Available	Not Available	Not Available	Not Available	
For acidic pH liquids.																	

## MSAA-30 Meters... Continued

14	356 Alum Anodized	Ni-Resist II	356 Alum Red Anodized	316 SS Hardchrome	Nodular Iron Armoly coated	Nodular Iron	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	3" Raised Face Steel ANSI	Steel Viton	40 Mesh Steel Cad Plated	Steel Viton
L4314	For crude oils, heated or viscous products or both.													
16	356 Alum Anodized	Ni-Resist II /Carbon	356 Alum Hardcoat Anodized	316 SS Hardchrome	Nodular Iron Armoly coated	Nodular Iron	300 Series Stainless Steel	Steel	Buna-N	Standard	3" Raised Face Steel ANSI	Steel Viton	40 Mesh Steel Cad Plated	Steel Viton
L4325	For general solvent service not chlorinated).													
37	Cast Iron	Ni-Resist II	Cast Iron "Red"	316 SS Hardchrome	Nodular Iron Armoly coated	Nodular Iron	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	3" Raised Face Steel ANSI	Steel Viton	40 Mesh Steel Cad Plated	Steel Viton
L4311	High Sulphur crude oil.													

## MSA-30 Meters

Class Element*	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator (if required)	Standard Valve (if required)
1	356 Alum Anodized	Ni-Resist II	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Nodular Iron Armoly coated	Nodular Iron	300 Series Stainless Steel	Steel	Buna-N	Standard	3" Raised Face Steel ANSI	Steel Buna-N	40 Mesh Steel Cad Plated	Steel Viton	Steel Viton
L4300	Refined petroleum products.															
7	Cast Iron	Ni-Resist II /Carbon	Cast Iron	Cast Iron	316 SS Hardchrome	Nodular Iron Armoly coated	Nodular Iron	300 Series Stainless Steel	Steel	Viton	Standard	3" Raised Face Steel ANSI	Steel Viton	40 Mesh Steel Cad Plated	Steel Viton	Steel Viton
L4307	Chlorinated solvents & alkaline pH liquids.															
10	356 Alum Anodized	Ni-Resist II /Carbon	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Nodular Iron Armoly coated	Nodular Iron	300 Series Stainless Steel	Steel	Buna-N	Standard	3" Raised Face Steel ANSI	Steel Buna-N	100 Mesh 304 SS	Steel Viton	Steel Epoxy Coated
L4325	Liquified petroleum gas.															
14	356 Alum Anodized	Ni-Resist II	356 Alum Red Anodized	356 Alum Red Anodized	316 SS Hardchrome	Nodular Iron Armoly coated	Nodular Iron	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	3" Raised Face Steel ANSI	Steel Viton	40 Mesh Steel Cad Plated	Steel Viton	Steel Viton
L4314	For crude oils, heated or viscous products or both.															
37	Cast Iron	Ni-Resist II	Cast Iron "Red"	Cast Iron "Red"	316 SS Hardchrome	Nodular Iron Armoly coated	Nodular Iron	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	3" Raised Face Steel ANSI	Steel Viton	40 Mesh Steel Cad Plated	Steel Viton	Steel Viton
L4311	High Sulphur crude oil.															

## MSB-30 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator (if required)	Standard Valve (if required)
1 L4300 Refined petroleum products.	356 Alum Anodized	Ni-Resist II	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Nodular Iron Armoly coated	Nodular Iron	300 Series Stainless Steel	Steel	Buna-N	Standard	3" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available	Not Available
14 L4314 For crude oils, heated or viscous products or both.	356 Alum Anodized	Ni-Resist II	356 Alum Red Anodized	356 Alum Red Anodized	316 SS Hardchrome	Nodular Iron Armoly coated	Nodular Iron	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	3" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available	Not Available
37 L4311 High Sulphur crude oil.	Cast Iron	Ni-Resist II	Cast Iron "Red"	Cast Iron "Red"	316 SS Hardchrome	Nodular Iron Armoly coated	Nodular Iron	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	3" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available	Not Available

## MSC-30 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator (if required)	Standard Valve (if required)
1 L4300 Refined petroleum products.	356 Alum Anodized	Ni-Resist II	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Nodular Iron Armoly coated	Nodular Iron	300 Series Stainless Steel	Steel	Buna-N	Standard	3" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available	Not Available
14 L4314 For crude oils, heated or viscous products or both.	356 Alum Anodized	Ni-Resist II	356 Alum Red Anodized	356 Alum Red Anodized	316 SS Hardchrome	Nodular Iron Armoly coated	Nodular Iron	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	3" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available	Not Available
37 L4311 High Sulphur crude oil.	Cast Iron	Ni-Resist II	Cast Iron "Red"	Cast Iron "Red"	316 SS Hardchrome	Nodular Iron Armoly coated	Nodular Iron	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	3" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available	Not Available

## MS-40 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator (if required)	Standard Valve
1	356 Alum Anodized	Ni-Resist II /Carbon	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Nodular Iron Armoly coated	Nodular Iron Armoly coated	300 Series Stainless Steel	Steel	Buna-N	Standard	3" Raised Face Steel ANSI	Steel Buna-N	40 Mesh Steel Cad Plated	Steel Viton	Steel Viton
2	356 Alum Anodized	Ni-Resist II /Carbon	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Ni-Resist II Armoly coated	416 SS	300 Series Stainless Steel	Steel Epoxy Coated Inside	Buna-N	Standard	3" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available

Refined petroleum products.

Aviation gasolines.

## MS-75 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator (if required)	Standard Valve
1	356 Alum Anodized	Cast Iron /Carbon	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Nodular Iron	Nodular Iron	300 Series Stainless Steel	Steel	Buna-N	Standard	4" Raised Face Steel ANSI	Steel Buna-N	40 Mesh Steel Cad Plated	Steel Viton	Steel Viton
2	356 Alum Anodized	Ni-Resist II	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Ni-Resist II Armoly coated	416 SS	300 Series Stainless Steel	Steel Epoxy Coated Inside	Buna-N	Standard	4" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available

petroleum products.

Aviation gasolines.

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator (if required)	Standard Valve
14	356 Alum Anodized	Cast Iron /Carbon	356 Alum Red Anodized	356 Alum Red Anodized	316 SS Hardchrome	Nodular Iron	Nodular Iron	300 Series Stainless Steel	Steel	Viton	Standard	4" Raised Face Steel ANSI	Steel Viton	40 Mesh Steel Cad Plated	Steel Viton	Steel Viton

For crude oils, heated or viscous products or both.

For general solvent service not chlorinated).

## MSAA-75 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator (if required)	Standard Valve
1	356 Alum Anodized	Cast Iron /Carbon	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Nodular Iron	Nodular Iron	300 Series Stainless Steel	Steel	Buna-N	Standard	4" Raised Face Steel ANSI	Steel Buna-N	40 Mesh Steel Cad Plated	Steel Viton	Steel Viton

Refined petroleum products

## MSAA-75 Meters...Continued

2	356 Alum Anodized	Ni-Resist II	356 Alum Hardcoat Anodized	316 SS Hardchrome	Ni-Resist II Armloy coated	416 SS	300 Series Stainless Steel	Steel Epoxy Coated Inside	Buna-N	Standard	4" Raised Face Steel ANSI	Not Available	Not Available	Not Available
14	356 Alum Anodized	Cast Iron /Carbon	356 Alum Red Anodized	316 SS Hardchrome	Nodular Iron	Nodular Iron	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	4" Raised Face Steel ANSI	Steel	40 Mesh Steel	Steel Viton
For crude oils, heated or viscous products or both.														
16	356 Alum Anodized	Ni-Resist II /Carbon	356 Alum Hardcoat Anodized	316 SS Hardchrome	Nodular Iron	Nodular Iron	300 Series Stainless Steel	Steel	Buna-N	Standard	4" Raised Face Steel ANSI	Steel	40 Mesh Steel	Steel Viton
For general solvent service not chlorinated).														

## MSA-75 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator (if required)	Standard Valve (if required)
1	356 Alum Anodized	Cast Iron /Carbon	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Nodular Iron	Nodular Iron	300 Series Stainless Steel	Steel	Buna-N	Standard	4" Raised Face Steel ANSI	Steel	40 Mesh Steel	Steel	Steel Viton
Refined petroleum products.																
10	356 Alum Anodized	Ni-Resist II /Carbon	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Nodular Iron	Nodular Iron	300 Series Stainless Steel	Steel	Buna-N	Standard	4" Raised Face Steel ANSI	Steel	100 Mesh 304 SS	Steel	Epoxy Coated
Liquified petroleum gas.																

14	356 Alum Anodized	Cast Iron /Carbon	356 Alum Red Anodized	356 Alum Red Anodized	316 SS Hardchrome	Nodular Iron	Nodular Iron	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	4" Raised Face Steel ANSI	Steel	40 Mesh Steel	Steel	Steel Viton
For crude oils, heated or viscous products or both.																

## MSB-75 Meters

1	356 Alum Anodized	Cast Iron /Carbon	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Nodular Iron	Nodular Iron	300 Series Stainless Steel	Steel	Buna-N	Standard	4" Raised Face Steel ANSI	Steel	40 Mesh Steel	Steel	Steel	Not Available
Refined petroleum products.																	



## MSB-75 Meters... Continued

14	356 Alum Anodized	Cast Iron /Carbon	356 Alum Red Anodized	316 SS Hardchrome	Nodular Iron	Nodular Iron	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	4" Raised Face Steel ANSI	Not Available	Not Available	Not Available
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For crude oils, heated or viscous products or both.

## MSC-75 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator (if required)	Standard Valve (if required)
1	356 Alum Anodized	Cast Iron /Carbon	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Nodular Iron	Nodular Iron	300 Series Stainless Steel	Steel	Buna-N	Standard	4" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available

14	356 Alum Anodized	Cast Iron /Carbon	356 Alum Red Anodized	316 SS Hardchrome	Nodular Iron	Nodular Iron	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	4" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available	Not Available
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For crude oils, heated or viscous products or both.

## MS-120 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator (if required)	Standard Valve (if required)
1	356 Alum Anodized	Cast Iron /Carbon	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Ni-Resist II	410 SS Armoly Coated	300 Series Stainless Steel	Steel	Buna-N	Standard	6" Raised Face Steel ANSI	Steel Buna-N	40 Mesh Steel Cad Plated	Steel Viton	Consult Factory

2	356 Alum Anodized	Ni-Resist II /Carbon	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Ni-Resist II	410 SS Armoly Coated	300 Series Stainless Steel	Steel Epoxy Coated Inside	Buna-N	Standard	6" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available
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For crude oils, heated or viscous products or both.

14	356 Alum Anodized	Cast Iron /Carbon	356 Alum Red Anodized	356 Alum Anodized	316 SS Hardchrome	Ni-Resist II	410 SS Armoly Coated	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	6" Raised Face Steel ANSI	Steel Viton	40 Mesh Steel Cad Plated	Steel Viton	Consult Factory
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## MSAA-120 Meter

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator (if required)	Standard Valve
1 L4800 Refined petroleum products.	356 Alum Anodized	Cast Iron /Carbon	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Ni-Resist II	410 SS Armoly Coated	300 Series Stainless Steel	Steel	Buna-N	Standard	6" Raised Face Steel ANSI	Steel Buna-N	40 Mesh Steel Cad Plated	Steel Viton	Consult Factory
2 L4802 Aviation gasoline.	356 Alum Anodized	Ni-Resist II /Carbon	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Ni-Resist II	410 SS Armoly Coated	300 Series Stainless Steel	Steel Epoxy Coated Inside	Buna-N	Standard	6" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available
8 L4818 For acidic pH liquids.	316 SS	316 SS /Carbon	316 SS "Red"	316 SS "Red"	316 SS Hardchrome	316 SS	316 SS Armoly coated	300 Series Stainless Steel	316 SS	Teflon	Standard	6" Raised Face SS ANSI	Not Available	Not Available	Not Available	Not Available
14 L4814 For crude oils, heated or viscous products or both.	356 Alum Anodized	Cast Iron /Carbon	356 Alum Red Anodized	356 Alum Red Anodized	316 SS Hardchrome	Ni-Resist II	410 SS Armoly Coated	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	6" Raised Face Steel ANSI	Steel Viton	40 Mesh Steel Cad Plated	Steel Viton	Consult Factory

## MSA-120 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator (if required)	Standard Valve
1 L4800 Refined petroleum products.	356 Alum Anodized	Cast Iron /Carbon	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Ni-Resist II	410 SS Armoly Coated	300 Series Stainless Steel	Steel	Buna-N	Standard	6" Raised Face Steel ANSI	Steel Buna-N	40 Mesh Steel Cad Plated	Steel Viton	Consult Factory
10 L4800 Liquefied petroleum gas.	356 Alum Anodized	Cast Iron /Carbon	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Ni-Resist II	410 SS Armoly Coated	300 Series Stainless Steel	Steel	Buna-N UL Approved	Standard	6" Raised Face Steel ANSI	Steel Buna-N	40 Mesh Steel Cad Plated	Steel Viton	Steel Epoxy
14 L4814 For crude oils, heated or viscous products or both.	356 Alum Anodized	Cast Iron /Carbon	356 Alum Red Anodized	356 Alum Red Anodized	316 SS Hardchrome	Ni-Resist II	410 SS Armoly Coated	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	6" Raised Face Steel ANSI	Steel Viton	40 Mesh Steel Cad Plated	Steel Viton	Consult Factory

## MSB-120 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator (if required)	Standard Valve
1 L4860 Refined petroleum products.	356 Alum Anodized	Cast Iron /Carbon	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Ni-Resist II	410 SS Armoloy Coated	300 Series Stainless Steel	Steel	Buna-N	Standard	6" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available
14 L4824 For crude oils, heated or viscous products or both.	356 Alum Anodized	Cast Iron /Carbon	356 Alum Red Anodized	356 Alum Red Anodized	316 SS Hardchrome	Ni-Resist II	410 SS Armoloy Coated	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	6" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available

## MSC-120 Meters

Class Element* Application	Housing	Bearing Plates	Blocking Rotor	Displacement Rotors	Rotor Journals	Blocking Rotor Gear	Displacement Rotor Gears	Internal Hardware	Covers	Seals**	Mechanical Adjuster (if required)	Standard Flanges (if required)	Standard Strainer (if required)	Standard Strainer Basket (if required)	Standard Air Eliminator (if required)	Standard Valve
1 L4860 Refined petroleum products.	356 Alum Anodized	Cast Iron /Carbon	356 Alum Hardcoat Anodized	356 Alum Anodized	316 SS Hardchrome	Ni-Resist II	410 SS Armoloy Coated	300 Series Stainless Steel	Steel	Buna-N	Standard	6" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available
8 L4888 For acidic pH liquids.	316 SS	316 SS /Carbon	316 SS "Red"	316 SS "Red"	316 SS Hardchrome	316 SS	316 SS Armoloy coated	300 Series Stainless Steel	316 SS	Teflon	Standard	6" Raised Face SS ANSI	Not Available	Not Available	Not Available	Not Available
14 L4824 For crude oils, heated or viscous products or both.	356 Alum Anodized	Cast Iron /Carbon	356 Alum Red Anodized	356 Alum Red Anodized	316 SS Hardchrome	Ni-Resist II	410 SS Armoloy Coated	300 Series Stainless Steel	Steel	Viton	Standard Option Hi Temp	6" Raised Face Steel ANSI	Not Available	Not Available	Not Available	Not Available

# Chemical Composition of Metals

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## **A356.0 Aluminum**

Silicon 6.5 - 7.5%  
Manganese .1% Max.  
Iron .2% Max.  
Copper .2% Max.  
Magnesium .25 - .45%  
Zinc .1% Max.  
Titanium .2% Max.  
Others Each .05% Max.  
Others Total .15% Max  
Aluminum - remainder

## **Ni-Resist Type II**

Carbon 3.0%  
Silicon 1.0 to 2.8%  
Manganese 0.80 to 1.3%  
Nickel 18.0 to 22.0%  
Copper 0.50%  
Chromium 1.75 to 3.5%  
Sulfur 0.12%  
Iron - remainder

## **Carbon steel**

Carbon .30%  
Manganese 1.0%  
Phosphorus .05%  
Sulfur .06%  
Silicon .60%  
Iron - remainder

## **Nodular iron**

Carbon 3.5%  
Silicon 2.56%  
Manganese .54%  
Phosphorus .12%  
Sulfur .010%  
Nickel 1.50%  
Magnesium .055%  
Iron - remainder

## **416 Stainless steel**

Carbon .15 Max %  
Manganese 1.25 Max %  
Silicon 1.0 Max %  
Chromium 12.0 - 14.0%  
Phosphorus .04 Max %  
Sulfur .18 - .35%  
Molybdenum .60 Max %  
Iron - remainder

## **304 Stainless steel**

Carbon .08%  
Manganese 2.0%  
Silicon 1.0%  
Chromium 18.0 - 20.0%  
Nickel 8.0 - 11.0%  
Iron - remainder

## **17-4 pH Stainless steel**

Carbon .07 Max %  
Manganese 1.0% Max.  
Silicon 1.0% Max.  
Phosphorus .04% Max.  
Sulfur .03% Max.  
Chromium 15.5 - 17.5%  
Nickel 3.0 - 5.0%  
Copper 3.0 - 5.0%  
Niobium .15 - .45%  
Niobium + Tantalum .15 - .45%  
Iron - remainder

## **Red brass**

Copper 85%  
Tin 5%  
Lead 5%  
Zinc 5%

## **Cast iron class 35**

Carbon 3.10 to 3.30%  
Silicon 2.0 - 2.2%  
Phosphorus .15 - .30%  
Sulfur .08 - .12%  
Manganese .45 - 70%  
Iron - remainder

## **316 Stainless steel**

Carbon .10 Max %  
Manganese 2.0 Max %  
Silicon 1.0 Max %  
Chromium 16.0 - 18.0%  
Nickel 10.0 - 14.0%  
Molybdenum 2.0 - 3.0%  
Iron - remainder

## **18-8 Type 302 Stainless steel**

Carbon .08 - .15%  
Manganese 2.0 Max %  
Silicon 1.0 Max %  
Chromium 17.0 - 19.0%  
Nickel 8.0 - 10.0%  
Iron - remainder

## **360.0 Aluminum**

Silicon 9.0 to 10.0%  
Iron 2% Max.  
Copper .6% Max.  
Manganese .35% Max.  
Magnesium .4 to .6%  
Nickel .5% Max.  
Zinc .5% Max.  
Tin .15% Max.  
Others Total .25% Max.  
Aluminum - remainder

## **Metal treatments to increase corrosion resistance**

### **Anodized aluminum**

An electrochemical process which forms a thin uniform oxide on metal surfaces that increases corrosion resistance.

### **Hardcoat or hard anodized aluminum**

This process is similar to above but produces a harder, thicker oxide film that affords greater abrasion resistance than standard anodizing.

### **Electropolished stainless steel**

Removal of a thin layer of metal by anodic treatment produces a bright passive finish.

### **Passivated stainless steel**

By chemically removing particles of iron imbedded in metal during machining and producing a thin transparent oxide film by use of an oxidizing agent, this increases corrosion resistance.

### **Cadmium plated and dichromated carbon steel**

Electroplated cadmium is treated in an oxidizing agent which is used mainly for rust protection.

### **Hard chrome plated stainless steel**

Electroplated chromium (special process) is used when high wear and corrosion resistance is required.

### **Epoxy coated carbon steel and aluminum**

Epoxy resins are the combination of polyphenols and epichlorhydrin and have a good resistance to acids, alkalis and many solvents.

# Conversions

## Pressure of water at different heads

Head of water (feet) and equivalent pressure					
Head Feet	Lbs. Per Sq. In.	Head Feet	Lbs. Per Sq. In.	Head Feet	Lbs. Per Sq. In.
1	0.43	60	25.99	200	86.62
2	0.87	70	30.32	225	97.45
3	1.30	80	34.65	250	108.27
4	1.73	90	38.98	275	119.10
5	2.17	100	43.31	300	129.93
6	2.60	110	47.64	325	140.75
7	3.03	120	51.97	350	151.58
8	3.40	130	56.30	400	173.24
9	3.90	140	60.63	500	216.55
10	4.33	150	64.96	600	259.85
20	8.66	160	69.29	700	303.16
30	12.99	170	73.63	800	346.47
40	17.32	180	77.96	900	389.78
50	21.65	190	82.29	1,000	433.09

Pressure and equivalent head of water (feet)					
Lbs. Per Sq. In.	Head Feet	Lbs. Per Sq. In.	Head Feet	Lbs. Per Sq. In.	Head Feet
1	2.31	40	92.36	170	392.52
2	4.62	50	115.45	180	415.61
3	6.93	60	138.54	190	438.9
4	9.24	70	161.63	200	461.78
5	11.54	80	184.72	225	519.51
6	13.85	90	207.81	250	577.24
7	16.61	100	230.9	275	643.03
8	18.47	110	253.98	300	692.69
9	20.78	120	277.07	325	750.41
10	23.09	125	288.62	350	808.13
15	34.63	130	300.16	375	865.89
20	46.18	140	323.25	400	922.58
25	57.72	150	346.43	500	1154.48
30	69.27	160	369.43	1,000	2308.00

### For materials other than water

Pressure in pounds per square inch =  $\frac{\text{Head in feet} \times \text{Specific Gravity}}{2.31}$

## Conversion Factors

### Length

Multiply	→	to get
to get	←	Divide
Inch	2.54	cm
ft	12	inch
ft	0.305	meter
yard	1.094	meter
Angstrom	10	meter

### Flowrate

Multiply	→	to get
to get	←	Divide
cc/min	1	ml/min
cfm (ft <sup>3</sup> /min)	28.31	L/min
cfm (ft <sup>3</sup> /min)	1.699	m <sup>3</sup> /hr
cfh (ft <sup>3</sup> /hr)	472	ml/min
cfh (ft <sup>3</sup> /hr)	0.125	GPM
GPH	63.1	ml/min
GPH	0.134	cfh
GPM	0.227	m <sup>3</sup> /hr
GPM	3.785	L/min
oz/min	29.57	ml/min

### Pressure / Vacuum

Multiply	→	to get
to get	←	Divide
atm	33.9	ft H <sub>2</sub> O
atm	760	mm Hg
atm	1033.2	g/cm <sup>2</sup>
atm	14.7	psi
atm	1.013	bar
atm	101.3	kPa
bar	14.5	psi
bar	0.9869	atm
bar	100	kPa
ft H <sub>2</sub> O	0.4335	psi
ft H <sub>2</sub> O	0.8826	in Hg
in Hg	0.1912	psi
in Hg	25.4	mm Hg
in Hg	3.386	kPa
kPa	0.01	dyne/cm <sup>2</sup>
kPa	0.145	psi
kPa	7.5	mm Hg
psi	0.0703	kg/cm <sup>2</sup>

### Volume

Multiply	→	to get
to get	←	Divide
Cubic cm (cc)	1	ml
oz (fluid)	29.57	ml
cubic ft (ft <sup>3</sup> )	7.48	gal
cubic ft (ft <sup>3</sup> )	0.0283	m <sup>3</sup>
gal	128	oz (fluid)
gal	3.785	liters
gal	0.8333	imp gal
cubic meters	1000	liters

# Conversions

## Flow Rate

1 GPM (gallons per minute)  
 = 3.78 L/min (liters per minute)  
 = 0.83 Imperial GPM  
 = 1.43 barrels per hour  
 = 0.227 m<sup>3</sup>/h (cubic meters per hour)

## Weight

1 pound  
 = 453.5 grams  
 = 0.454 kilograms

## Mesh to Microns

20 Mesh = 840 Microns  
 40 Mesh = 420 Microns  
 80 Mesh = 177 Microns  
 100 Mesh = 149 Microns

## Liquid Volume

1 gallon  
 = 231 cubic inches  
 = 3.7853 liters  
 1 Imperial gallon  
 = 2.77.42 cubic inches  
 = 4.546 liters

1 U.S. Barrel  
 = 31 1/2 gallons water or equivalent  
 = 42 gallons oil

1 British barrel  
 = 36 Imperial gallons

1 pound of water  
 = 27.68 cubic inches  
 = 0.1198 gallons

## Pressure

1 atmosphere  
 = 14.7 psi

1 PSI  
 = 0.07 kg/cm<sup>2</sup>  
 = .069 bar

## Temperature

°C = (°F-32)/1.8  
 °F = (°Cx1.8)+32  
 °K = °C + 273.2  
 °Rankine = °F + 459.67

## To find coefficient of expansion:

Coefficient of expansion =

$$\frac{SG_H - SG_L}{t} \times 1$$

$$SG_{AVE} (\Delta t)$$

SG<sub>H</sub> = Specific Gravity at high temperature

SG<sub>L</sub> = Specific Gravity at low temperature

SG<sub>AVE</sub> = the average or mean specific gravity at high & low temperature

t = Temperature difference (high - low) in °F

## Coefficients of Expansion of Common Liquids

Liquid	COE *		Liquid	COE *	
	Per °F	Per °C		Per °F	Per °C
Acetone	0.0008	0.00144	LPG	0.0017	0.00306
Aviation Fuel	0.0005	0.0009	Lube Oils	0.0004	0.00072
Butane	0.00109	0.00196	MEK	0.00073	0.0013
Diesel Fuel	0.0005	0.0009	Methyl Alcohol	0.00066	0.00119
Ethanol	0.0006	0.00108	Naphtha	0.00072	0.0013
Ethylene Glycol	0.00036	0.00065	NH <sub>3</sub>	0.0013	0.00234
Gasoline	0.0006	0.00108	Propylene Glycol	0.0004	0.00072
Hexane	0.0007	0.00126	Toluene	0.00061	0.0011
JP-4	0.0005	0.0009	Unleaded Gasoline	0.0006	0.00108
Kerosene	0.0005	0.0009	Xylene	0.0006	0.00108

\* COE = Coefficient of Expansion

**Example:** Compute volume change for Liquid Propane Gas (LPG) given a temperature change of 20°F.

LPG coefficient of expansion: 0.0017/°F

(Δt) (COE) (100) = % volume change

(20°F) (0.0017/°F) (100) = 3.4%

A 20°F change in temperature will result in a 3.4% change in volume.

# National Electrical Code (NEC) Ratings

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## Hazardous Classifications:

■ **Class I:** Areas in which flammable gases or vapors may be present in the air in sufficient quantities to be explosive

Group A: Atmospheres containing acetylene

Group B: Atmospheres such as butadiene, ethacrolein, or hydrogen (or gases or vapors equivalent in hazard to hydrogen, such as manufactured gas)

Group C: Atmospheres such as cyclopropane, ethyl ether, ethylene, or gas or vapors of equivalent hazard

Group D: Atmospheres such as acetone, alcohol, ammonia, benzene, benzol, butane, gasoline, hexane, lacquer solvent vapors, naphtha, natural gas, propane, or gas or vapors of equivalent hazard

■ **Class II:** Areas made hazardous by the presence of combustible dust

Group E: Atmospheres containing combustible  
1) metal dusts, regardless of resistivity  
2) dust of similarly hazardous characteristics having a resistivity less than  $100 \text{ k } \Omega\text{-cm}$   
3) electrically conductive dusts

Group F: Atmospheres containing combustible  
1) carbon black, charcoal, or coke dusts having more than 8% total volatile material  
2) dusts so sensitized that they present an explosion hazard, and dusts having a resistivity greater than  $100 \text{ } \Omega\text{-cm}$  but less than or equal to  $1 \times 10^8 \text{ } \Omega\text{-cm}$

Group G: Atmospheres containing combustible  
1) dust having resistivity equal to or greater than  $100 \text{ k } \Omega\text{-cm}$   
2) electrically nonconductive dusts

■ **Class III:** Areas made hazardous by the presence of easily ignitable filings or dust, but which are not likely to be in suspension in the air in quantities that are sufficient to ignite

Division 1: Atmospheres where hazardous concentrations exist continuously, intermittently, or periodically under normal operating conditions

Division 2: Atmospheres where hazardous concentrations exist only in case of accidental rupture or breakdown of equipment

**Explosion-proof:** Enclosures or housings are designed to withstand internal explosions and prevent the spread of fire to the outside.

**Intrinsically-safe:** Systems designed in which electrical energy in the circuits is not present at levels that would ignite a flammable mixture of a gas and air.

# International Protection (IP) Ratings

The IP rating system provides a means of classifying the degrees of protection from solid objects and liquids afforded by electrical equipment and enclosures. The system is recognized in most European countries and is set out in a number of British and European standards.

## First Number

Protection against solid objects

- 0** no special protection provided
- 1** protected against solid objects up to 50 mm
- 5** protected against entry of dust in sufficient quantity to interfere with operation of equipment
- 6** totally protected against entry of dust

## Second number

Protection against liquids

- 0** no special protection provided
- 1** protected against vertically falling drops of water (e.g. condensation)
- 2** protected against direct sprays of water up to 15° from the vertical
- 4** protected against water sprayed from all directions - limited ingress permitted
- 6** protected against strong jets of water - limited ingress permitted
- 7** protected against the effects of immersion between 15 cm and 1m

## NEMA/IEC Enclosure Ratings

NEMA enclosure type no.	NEMA definition	IEC enclosure class
1	General-purpose. Protects against dust, light, and indirect splashing but is not dust-tight; primarily prevents contact with live parts; used indoors and under normal atmospheric conditions.	IP10
2	Drip-tight. Similar to Type 1 but with addition of drip shields; used where condensation may be severe (as in cooling rooms and laundries).	IP11
3 and 3S	Weather-resistant. Protects against weather hazards such as rain and sleet; used outdoors on ship docks, in construction work, and in tunnels and subways.	IP54
3R	Intended for outdoor use. Provides a degree of protection against falling rain and ice formation. Meets rod entry, rain, external icing, and rust-resistance design tests.	IP14
4 and 4X	Watertight (weatherproof). Must exclude at least 65 GPM of water from 1-in. nozzle delivered from a distance not less than 10 ft for 5 min. Used outdoors on ship docks, in dairies, and in breweries.	IP56
5	Dust-tight. Provided with gaskets or equivalent to exclude dust; used in steel mills and cement plants.	IP52
6 and 6P	Submersible. Design depends on specified conditions of pressure and time; submersible in water; used in quarries, mines, and manholes.	IP67
7	Hazardous. For indoor use in Class I, Groups A, B, C, and D environments as defined in the NEC.	-
8	Hazardous. For indoor and outdoor use in locations classified as Class I, Groups A, B, C, and D as defined in the NEC	-
9	Hazardous. For indoor and outdoor use in locations classified as Class II, Groups E, F, or G as defined in the NEC	-
10	MSHA. Meets the requirements of the Mine Safety and Health Administration, 30 CFR Part 18 (1978)	-
11	general-purpose. Protects against the corrosive effects of liquids and gases. Meets drip and corrosion-resistance tests	-
12 and 12K	General-purpose. Intended for indoor use, provides some protection against dust, falling dirt, and dripping noncorrosive liquids. Meets drip, dust, and rust resistance tests.	IP52
13	General-purpose. Primarily used to provide protection against dust, spraying of water, oil, and noncorrosive coolants. Meets oil exclusion and rust resistance design tests.	IP54

**NOTE:** NEMA standards meet or exceed IEC standards; therefore, the conversion does not apply in the opposite direction.



# Corrosion Data

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**NOTE:** The following chart is intended only as a guide to the engineer in the selection of materials for corrosive service. **Liquid Controls cannot accept responsibility for problems arising from the use of this data. We suggest that in critical applications, tests be conducted to verify the ratings.**

No one material can be expected to resist the corrosive action of the wide variety of media found in the complex industries of today. However, experience and research have indicated that certain materials will perform satisfactorily under certain conditions and within certain limits.

The physical properties of a material are affected differently by each corrosive medium and it is sometimes necessary to sacrifice values in one property to gain a maximum value in another property. It is necessary, therefore, that the user decide, based on experience, which property is of prime importance for the application.

Although most of the suggested ratings in the following chart are based on experience, it is strongly recommended that, if any question exists regarding the expected performance of a material in a given application, actual tests be performed to determine the suitability of the materials in questions.

## Explanation of Ratings

A = Excellent

C = Poor

B = Good

D = Do not use

Blank = No Information

NOTE: Ratings are based on media at room temperatures unless otherwise specified.

**When using the table, please remember that in any given case many factors such as solution, concentration, temperature, degree of agitation and presence of impurities may influence the rate of corrosion.**

# Corrosion Data

## Chemicals

	Brass	Carbon Steel	Ductile Iron/Cast Iron	316 Stainless Steel	17-4PH	Alloy 20	Monel	Hastelloy C	Buna N (Nitrile)	Delrin/Lubetal	EPDM/EPR	Viton	Hypalon	Neoprene	Nylon	Grafoil	UHMWPE
Acetaldehyde	C	C	C	A		A	A	A	D	A	B	C	D	D	B	A	D
Acetamine	B	B	B	B				A	A				B	B		A	
Acetate Solvents	B	A	B	A			A	A	D	D		D	D	D		A	
Acetic Acid, aerated	D	D	D	A			A	A	C	D		C		C	B	A	
Acetic Acid, Air Free	B	D	D	A	A	A	A	A	C	D		D		C	B	A	
Acetic Acid, crude	C	C	C	A	A	A	B	A	D	D		D		D	B	A	
Acetic Acid, glacial				D	A			A	D		B	C	C	C	B	A	
Acetic Acid, pure	C	D	D	A	A	A	D	A	D	D		D	A	D	B	A	C
Acetic Acid, 10%	C	C	C	A	A	A	B	A	D	B	B	D	C	C	B	A	A
Acetic Acid, 80%	C	C	C	A	A	A	B	A	D	D	C	D	D	D	B	A	C
Acetic Acid Vapors	D			D	D	B	C	A	D						B	A	
Acetic Anhydride	D	D	D	B	B	B	B	A	D	C	C	D	B	C		A	C
Acetone	A	A	A	A	A	A	A	A	D	A	A	D	D	D	A	A	A
Other Ketones	A	A	A	A	A	A	A	A	D	A	D	D	D	D		A	
Acetyl Chloride	A		D	C			B	A	D	D	D	D	D	D		A	
Acetylene	B	A	A	A	A	A	A	A	B	A	A	A	C	C	A	A	
Acid Fumes	D	D	D	B		B			C	D			C	B		C	
Acrylonite	A	A	C	A		B	A	A	D	D	D	C	D	D	A	A	
Air	A	A	A		A	A	A	A	A	A	A	A	A	A	A	B	A
Alcohol, Amyl	B	B	C	A		B	B	B	C	A	A	B	B	C	A	A	
Alcohol, Butyl	B	B	C	A		A	A	A	B	A	C	A	B	B	A	A	
Alcohol, Diacetone	A	A	A	A		A	B	A	D	A	B	D	C	C	A	A	
Alcohol, Ethyl	B	B	B	B		A	B	A	A	A	A	A	B	B	A	A	A
Alcohols, Fatty	B	B	B	A		A		A	B	A			B	B	A	A	
Alcohol, Isopropyl	B	B	B	B		A	B	B	C	A	A	A	B	B	A	A	
Alcohol, Methyl	B	B	B	A		A	A	A	B	A	A	C	A	A	A	A	
Alcohol, Propyl	A	B	B	A		A	A	A	B	A	A	A	B	B	A	A	
Alumina	A			A				A	A	A	A			A	A	A	
Aluminum Acetate	D		D	A	B	B	C	B	D	D	A	D	D	D		A	A
Aluminum Chloride dry	B	C	D	C		D	B	B	B	A	A	A	B	B	A	A	A
Aluminum Chloride solution				D	C	B	B	A	B	D		A	B	B	A	A	A
Aluminum Fluoride		D	D	C			B	A	A	C	A	A	B	A		A	A
Aluminum Hydroxide	A	D	D	A	B	B	B	B	A	C	A	A		A		A	A
Aluminum Nitrate	D		D	C		B	C	B	B	D	B	D	B	B		B	
Aluminum Oxalate				D		A	B	A									A
Alum (Aluminum Potassium Sulfate)	D		D	B	C	B	C	A	B	D		B	B	B		A	A
Aluminum Sulfate	C	D	D	B	A	B	C	A	A	D	A	A	B	A	A	A	A
Amines	B	B	C	A	A	A	B	B	D	C	C	D	D	D	B	A	
Ammonia, Alum				A		A		A	B	C				B	D	A	
Ammonia, Anhydrous Liquid	D	A	B	A	A	A	B	A	B	D	B	D	B	C	A	A	
Ammonia, Aqueous	D	A	A	A		A	B	B	B	D		A	B	B	B	A	
Ammonia, Gas, hot	D		B	A		A	B	B	C	D	A	D	C	A		A	A
Ammonia Liquor				A		A		B							B	A	
Ammonia Solutions	D	B	B	A		A	B	B	B	D	B	D	D	B	B	A	
Ammonium Acetate	D		B	B		A	B	B	B	D	A	D	D	B		A	
Ammonium Bicarbonate	B	C	B	B		B	B		B	A	A	A	B	A	B	A	A
Ammonium Bromide 5%				B		B	B			A						A	A
Ammonium Carbonate	B	B	B	B		B	B		C	D	A	B	B	A		A	A
Ammonium Chloride	D	D	D	C	C	B	B	B	B	C	A	A	A	A	D	A	A
Ammonium Hydroxide 28%	D	C	C	B	A	A	D	B	B	D	B	A		A	B	A	A

Ratings: A - Excellent   B - Good   C - Poor   D - Do not use   Blank - No information

# Corrosion Data

Chemicals	Brass	Carbon Steel	Ductile Iron/Cast Iron	316 Stainless Steel	17-4PH	Alloy 20	Monel	Hastelloy C	Buna N (Nitrile)	Delrin/Lubetal	EPDM/EPR	Viton	Hypalon	Neoprene	Nylon	Grafoil	UHMWPE
Ammonium Hydroxide Concentrated	D	C	C	B	A	A	C	B	C	D	A	A	A	A		A	A
Ammonium Monosulfate				A		B	B	B		D							A
Ammonium Nitrate	D	D	D	A	A	B	D	B	A	D	A	A	A	A	C	B	A
Ammonium Oxalate 5%				A		A	B			A							A
Ammonium Persulfate	C			A		A	D		D	D	B	B	B	C			A
Ammonium Phosphate	D	D	D	B		B	C		A	C	A	A	A	A	A	A	A
Ammonium Phosphate Di-basic	C	D	D	B		B	C	B	A	A		A		A	A	A	
Ammonium Phosphate Tri-basic	C	D	D	B		B	C	B	A	A		A		A	A	A	
Ammonium Sulfate	C	C	D	B	B	B	B	B	A	B	A	B	B	A	A	A	A
Ammonium Sulfide	D	D	D	B		B	B		A	A	A	D	B	B		A	A
Ammonium Sulfite	C	C	C	A		B	D		B	A	B	A		A		A	
Amyl Acetate	B	C	C	B	A	A	B	A	D	A	B	D	D	D	D	A	A
Amyl Chloride	B		B	A		A	B	B	D	A	D	D	D	C	B	A	D
Aniline	D	C	C	B		A	B	B	D	D	C	C	D	D	B	A	A
Aniline Dyes	C	C	C	A		A	A		C	A	C	B	C	C		A	
Apple Juice	C	D	D	B		A	A		A	A	B	A	B	A		A	
Aqua Regia (Strong Acid)	D	D	D	B		B			D	D	D	D	D	D		D	C
Aromatic Solvents	A	C	B	A		A	B		D	A	D		A	D		A	
Arsenic Acid	D	D	D	B		B	D	B	A	D	B	A	B	A		A	A
Asphalt Emulsion	A	B	B	A		A	A	A	D	A	D	A	D	C	A	A	
Asphalt Liquid	A	B	B	A		A	A	A	C	A	D	A	D	C		A	
Barium Carbonate	B	B	B	B		B	B	A	B	A	A	A	A	A		A	A
Barium Chloride	B	C	C	B	B	C	B		A	A	A	A	B	A		A	A
Barium Cyanide	C		C	B		B	D		B	A	B	B	B	B		A	
Barium Hydrate	D			A		A	B			A						A	
Barium Hydroxide	C	C	B	B	A	A	B		A	A	B	A	B	A	A	A	A
Barium Nitrate				A		A				A				B		B	
Barium Sulfate	C	C	C	A		A	B		A	A	B	A	B	A		A	A
Barium Sulfide	D	C	D	B		B	C		A	A	A	A	B	B	B	A	A
Beer	B	D	D	A	A	A	A		B	A	B	A	C	B	A	A	A
Beet Sugar Liquors	A	B	B	A		A	A		A	A	B	A	C	A	A	A	
Benzaldehyde	A	A	C	A		A	B	B	D	A	A	D	D	D	A	A	D
Benzene (Benzol)	B	B	B	B	B	A	A	B	D	C	D	B	D	D	A	A	D
Benzoic Acid	B	D	D	B	A	B	B	A	C	A	D	B	D	C	D	A	A
Beryllium Sulfate	B		B	B		A	B		B	A	B	B	B	B		A	
Bleaching Powder wet	B			C		B	D	A	D	D	B	B	B	A	D	A	A
Blood (Meat Juices)	B		D	A	A	A	B		B	A	B	B	B	B		A	
Borax (Sodium Borate)	D	C	C	A			A	A	B	A	A	A	B	D		A	A
Bordeaux Mixture				A		A				A						A	
Borax Liquors ,	A	C	C	B		A	A	B		A	A	A	D	C		A	
Boric Acid	C	D	D	B		B	B	A	B	A	B	A	B	B	D	A	A
Brake Fluid	B		B	B	A		B		D	B	B	D	B	C		A	
Brines, saturated	B	D	C	B		B	B	A	A	A	A	A	B	B	C	A	A
Bromine, dry	B	D	D	D		B	A	A	D	D	D	B	D	D	D	B	D
Bunker Oils (Fuel)	B	B	B	A		A	A		B	A		A		B		A	D
Butadiene	C	B	B	A		A	C	B	C	A	c	B	D	C		A	D
Butane	A	B	-B	A		A	B	A	B	A	D	A	A	B	A	A	A
Butter				A		A			B	A			D	B		A	A
Buttermilk	D	D	D	A		A	D		A	A	B	A	D	A		A	B
Butyl Acetate	B		B	B		A	B	B	D	B	D	D	D	D		A	D

Ratings: A - Excellent B - Good C - Poor D - Do not use Blank - No information

# Corrosion Data

## Chemicals

	Brass	Carbon Steel	Ductile Iron/Cast Iron	316 Stainless Steel	17-4PH	Alloy 20	Monel	Hastelloy C	Buna N (Nitrile)	Delrin/Lubetal	EPDM/EPR	Viton	Hypalon	Neoprene	Nylon	Grafoil	UHMWPE
Butylene	A	A	A	A		A	A		D	A	D	D	D	D	A	A	
Butyric Acid	C	D	D	B		B	B	A	C	A	C	C	C	C	D	A	D
Calcium Bisulfite	C	D	D	B		B	D	B	A	D	D	A	B	A		A	
Calcium Carbonate	C	D	D	B		B	B	B	A	A	B	A	B	A	A	A	A
Calcium Chlorate	D		C	B		B	B		B	D	B	B	B	B		B	A
Calcium Chloride	B	C	C	B	B	B	B	A	A	A	B	A	B	A	D	A	A
Calcium Hydroxide	C	C	C	B		B	A	A	A	A	A	A	B	B	A	A	A
Calcium Nitrate				B		B			B	C	B		B	B		B	A
Calcium Phosphate	C		C	B		B			B	B	B	B	B	B		A	A
Calcium Silicate	C		C	B		B			B	A	B	B	B	B		A	
Calcium Sulfate	C	C	C	B	B	B	B	B	A	A	B	A	B	A		A	A
Caliche Liquor		B		A		A			B	A			B	B		A	
Camphor	C		C	B		C	C		B	A	B	B	B	B		A	D
Cane Sugar Liquors	B		B	A		A	B		B	A	B	B	C	B		A	
Carbonated Beverages	B	D	B	B	B	B	C		B	A	B	B	D	B		A	
Carbonated Water	B	B	A	A	B	A	B		A	A	A	A	D	A		A	A
Carbon Bisulfide	C	B	B	B		B	B		D	A	D	A	D	D		A	D
Carbon Dioxide, Dry	A	A	B	A	A	A	A		C	A	B	B	B	B		A	A
Carbolic Acid	D	D	D	B	B	A	B		B	A	B	A	B	B		A	
Carbon Monoxide	A		B	A	A	A	A	A	B	A	B	B	C	D	A		A
Carbon Tetrachloride, dry	C	B	C	A	A	A	A	A	D	A	D	B	D	D	A	A	D
Carbon Tetrachloride, w et	D	D	D	B		B	B	B	D	B	D	B	D	D	A	A	D
Casein	C		C	B		B	C		B	A	B	B	B	B		A	
Caster Oil	A	B	B	A		A	A	A	A	A	B	A	B	B	A	A	A
Caustic Potash				A		A	B		B	D			B	B		A	
Caustic Soda		B	B	A		A	A		C	D	B	B	B			A	
Cellulose Acetate	B		B	B			B	B	D	C	B	D	D	D		A	
China Wood Oil (Tung)	C	C	C	A		A	A	A	A	A	D	A	B	B	A	A	
Chlorinated Solvents	C	C	C	A		A	B		D	A	D	C	D	D		A	
Chlorinated Water				C	D	A	D	D	B	D		A	B	A	D	A	C
Chlorine Gas, dry	C	B	B	B	C	A	A	A	C	D	D	B	C	D	D	A	D
Chlorobenzene, dry	B	B	B	A		A	B	B	D	B	D	A	D	D	A	A	D
Chloroform, dry	B	B	C	A	B	A	A	B	D	A	D	B	D	D	B	A	
Chlorophyll, dry	B		B	B		A	B		B		B	B	B	B		A	
Chlorosulfonic Acid, dry	C	B	B	B		B	B	A	D	D	D	D	D	D	D		D
Chrome Alum	C	B	C	A		A	B		B	B	B	B	B	B	D	A	A
Chromic Acid<50%	D	D	D	C	C	B	C	B	D	D	C	C	B	D	D	A	A
Chromic Acid>50%	D	D	C	C	D	B	D	B	D	D	C	C	B	D	D	A	
Chromium Sulfate	C		D	B		C	B		B	C	B	B	B	B		A	
Cider				A		B	A		A				D			A	A
Citric Acid	C	D	D	B	C	A	B	A	B	A	B	A	A	A	B	A	A
Citrus Juices	B	D	D	B		A	A		A	A		A	D	A		A	
Coca-Cola Syrup				A		A			B	A		B	D	B		A	A
Coconut Oil	B	D	C	B		A	B		A	A	A	A	D	C		A	A
Coffee	A		D	A		A	B		A	A	A	A	C	A		A	A
Coffee Extracts, hot	B	C	C	A		A	A			A					D	A	
Coke Oven Gas	C	B	B	A		A	B		C	D	D	B	C	D	C	A	
Cooking Oil	B	B	B	A		A	A		A	A	D	A	C	B		A	
Copper Acetate	D	D	D	A		A	C	B	C	D	B	D	D	C		A	
Copper Carbonate				A		A				A						A	

Ratings: A - Excellent B - Good C - Poor D - Do not use Blank - No information

# Corrosion Data

## Chemicals

	Brass	Carbon Steel	Ductile Iron/Cast Iron	316 Stainless Steel	17-4PH	Alloy 20	Monel	Hastelloy C	Buna N (Nitrile)	Delrin/Lubetal	EPDM/EPR	Viton	Hypalon	Neoprene	Nylon	Grafoil	UHMWPE
Copper Cyanide	D		D	A		A	C		A	A	B	B	B	A		A	A
Copper Nitrate	D	D	D	B		B	D		A	A	B	A		A		B	A
Copper Sulfate	D	D	D	B	B	B	C	A	A	A	A	A	A	A	A	A	A
Corn Oil	B	C	C	B	B	B	B		A	A	C	A	C	C		A	A
Cottonseed Oil	B	C	C	B	B	B	B		A	A	C	B	C	B		A	A
Cresol				B	B	B			D	D	D	D	D	D		A	D
Creosote Oil	B	B	B	B	B	B	B	B	C	D	D	A	D	D		A	D
Cresylic Acid	C	C	D	B	B	B	B		D	D	D	B	D	D		A	A
Crude Oil, sour	C	B	C	A	A	A	B		A	A	D	A	C	B		A	
Crude Oil, sweet	B	B	B	A	A	A	A		A	A		A		B		A	
Cupric Nitrate				A	A	A	D			D						B	
Cutting Oils, Water Emulsions	A	B	B	A	A	A			A	A		A		B		A	
Cyanide Plating Solution	D		D	B	B	B	D		B	D	B	B	B	B			
Cyclohexane	A	A	A	A	A	A	B	B	C	A	D	A	D	D	A	A	C
Cyclohexanone	B			A	A	A	B	B	D	A				D	A	A	D
Detergents, synthetic	B		B	B	A	A	B		B	A	B	A	B	B		A	A
Dextrin	B		B	B	B	B	B		B	A	B	B	B	B		A	A
Dichloroethane			C	C	B	B	B		D	D	D			D		A	
Dichloroethyl Ether	B		B	B	B	B			D	D	D	D	D	D			
Diesel Oil Fuels	A	A	A	A	A	A	A		A	A	D	A	D	C		A	
Diethylamine	B	A	B	A	A	A	B		B	A	C	D	C	C	B	A	
Diethyl Benzene				B	B	B			D	C	D			D		A	
Diethylene Glycol	B		A	A	A	A	B		A	A	A	B	B	A		A	A
Diethyl Sulfate	B		B	B	B	B	B		C	A	C	B	D	C		A	
Dimethyl Formamide	B		B	A	A	A	B		B	A	D	D	D	D		A	
Dimethyl Phthalate				D					B	C		D	B	B		A	
Dioxane	B		B	B	B	B	B		D	C	C	D	D	D		A	
Dipentane (Pinene)	A		A	A	A	A			B	A	D	B	D	D		A	
Disodium Phosphate				B	B	B	C		B	A		B	B	B		A	A
Dow therm	A	B	B	A	A	A	A		D	A	D	A	D	D	C	A	
Drilling Mud	B	B	B	A	A	A	B		A	A	A	A	B	C		A	
Dry Cleaning Fluids	C	B	B	A	A	A	B		D	A		B		D		A	
Drying Oil	C	C	B	B	B	B	B		A	A				B		A	
Enamel	A			A					B	A	D			B		A	
Epsom Salts (MgSo4)	B	C	C	B	B	B	B		A	A		A	D	A	B	A	
Ethane	B	C	C	B	B	B	B		A	A	D	A		B		A	
Ethers	B	A	B	A	B	B	B		D	C	C	C	D	D		A	D
Ethyl Acetate	C	B	C	B	A	A	B	B	D	C	C	D	D	D	A	A	C
Ethyl Acrylate	B	C	C	A	A	A	B	A	D	B	C	D	D	D	A	A	
Ethyl Benzene				B	A	A		A	C	A	D			D	B	A	
Ethyl Bromide	A		B	B	C	C	B		B	A	B	B	D	B		A	
Ethyl Chloride, dry	B	B	B	A	A	A	B	B	C	A	C	B	D	C	A	A	D
Ethyl Chloride, wet	C	D	D	B	B	B	B	B	C	A	B	B	D	C	A	A	D
Ethylene Chloride				A	A	A	B	B	D	A		D		A		A	
Ethylene Dichloride				B	A	A	B		D	C	D	D	D	D	A	A	D
Ethylene Glycol	B	B	B	B	A	A	B	A	A	A	A	A	B	B	A	A	A
Ethylene Oxide	C	B	B	B	B	B	B	A	D	A	D	D	D	D	D	A	C
Ethyl Ether	B		C	A	A	A	A	B	D	A	D	D	D	D		A	
Ethyl Silicate	B		B	B	B	B	B		B	A	B	B	B	C		A	
Ethyl Sulfate				B	B	B			B	A	C	A		B		A	

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# Corrosion Data

## Chemicals

	Brass	Carbon Steel	Ductile Iron/Cast Iron	316 Stainless Steel	17-4PH	Alloy 20	Monel	Hastelloy C	Buna N (Nitrile)	Delrin/Lubetal	EPDM/EPR	Viton	Hypalon	Neoprene	Nylon	Grafoil	UHMWPE
Fatty Acids	C	D	D	A		A	B	A	B	A	D	A	D	B	A	A	A
Ferric Hydroxide				A		A	A		B	A						A	
Ferric Nitrate	D	D	D	C	B	'A	D	B	A	A	A	A	B	A		B	A
Ferric Sulfate	D	D	D	B	B	A	D		A	A	A	A	A	A	C	A	A
Ferrous Ammonium Citrate				B		B				A						A	A
Ferrous Chloride	B	D	D	D		D	D	D	A	A	A	A	B	A	C	A	A
Ferrous Sulfate	B	D	D	B		B	B	B	A	A	A	A	B	A		A	A
Ferrous Sulfate, Saturated	C	C	C	A		A	B	B	C	A	B	B	B	C		A	
Fertilizer Solutions	C	B	B	B		B	B		B					B		A	
Fish Oils		B	B	A		A	A		A	A	D	A	D	B		A	
Flourine Gas, dry				B		A	A	A									
Flue Gases	B		B	A		A	B		C	C	D	C	B	C		A	
Fluoboric Acid				B		A			A	D			B	B			A
Fluosilicic Acid	B	D	D	B		B	A	B	C	C	C	C	C	C			A
Formaldehyde, cold	A	A	B	A	A	A	A	B	B	A	B	D	C	C	A	A	A
Formaldehyde, hot	B	D	D	C		B	B	B	B	A			B	B		A	A
Formic Acid, cold	B	D	D	B	B	A	B	A	D	D		B	C	B	A	A	A
Formic Acid, hot	B	D	D	B	D	B	B	B	D	D		A		A	D	A	A
Freon Gas, dry	B	B	B	A	A	A	A	B	C	A	C	C	B	C	A	A	
Freon 11, MF, 112, BF	B		C	A		A	B	B	C	A	C	D	B	C	A	A	
Freon 12, 13, 32, 114, 115	A		B	A		A	B	B	B	A	A	D	B	A	A	A	
Freon 21, 31	B		C	A		A	B	B	D	A	D	D		D	A	A	
Freon 22	A		B	A		A		B	D	A	D	D		B	A	A	
Freon 1 13, TF	B		C	A		A	B	B	B	A	C	C		C	A	A	
Freon, wet	D		D	C	B	B	B	B	B	A	B	D	B	B	D	A	
Fruit Juices	B	D	D	A		A	B		A	A	A	A	C	A			A
Fuel Oil	B	B	B	A		A	B		A	A	D	A	C	C		A	D
Fumaric Acid						A			B	A				B			
Furfural	A	A	B	A	B	A	B	B	D	A	C	D	D	C		A	D
Gallic Acid 5%	C	D	D	B		B	B	B	B	A	C	A	C	B	A		A
Gas, Manufactured	B	B	B	B		B	A		A	A		A		A	A	A	
Gas, Natural	B	B	B	A		B	A		A	A	D	A	B	A	A	A	
Gas, Odorizers	A	B	B	B		A	B		B	A		A		B	A	A	
Gasoline, Aviation	A	A	B	A		A	A	A	C	A		A		D	A	A	D
Gasoline, Leaded	A	A	A	A		A	B	A	C	A		A	B	D	A	A	D
Gasoline, Motor	A	A	B	A	A	A	A	A	C	A	D	A	D	D	A	A	D
Gasoline, Refined	B	B	B	A		A	B	A	C	A	D	A	D	C	A	A	D
Gasoline, Sour	B	B	B	A		A	C	A	C	A	D	A	C	D	B	A	D
Gasoline, Unleaded	A	A	B	A		A	A	A	C	A		A	B	D	A	A	D
Gelatin	A	D	D	A		A	B		A	A	A	A	B	A	A	A	A
Glucose	A	B	B	A		A	A	A	A	A	A	A	B	A	A	A	A
Glue	B	A	B	B		A	B	A	A	A	B	A	B	A	A	A	A
Glycerine (Glycerol)	B	C	B	A	A	A	A	A	C	A	A	B	A	D	A	A	A
Glycol Amine	D		B	B	A			D	A	C	D	D	C			A	
Glycol	B	C	B	B		A	B		B	C	A	A	B	A		A	A
Graphite		B	C	B		A	B		B	A	B	B	B	B		A	
Grease	C	A	A	A		A	B		A	A	D	A	D	B		A	
Helium Gas	B		B	A		A	B	A	B	A	B	B	B	B		A	A
Heptane	A	B	B	A		A	B	A	A	A	D	A	B	B		A	C
Hexane	B	B	B	A		A	B	A	A	A	D	A	B	C	A	A	D
Hexanol, Tertiary	A	A	A	A		A	A	A	A	A	D	B	C	C	A	A	A

Ratings: A - Excellent B - Good C - Poor D - Do not use Blank - No information

# Corrosion Data

## Chemicals

	Brass	Carbon Steel	Ductile Iron/Cast Iron	316 Stainless Steel	17-4PH	Alloy 20	Monel	Hastelloy C	Buna N (Nitrile)	Delrin/Lubetal	EPDM/EPR	Viton	Hypalon	Neoprene	Nylon	Grafoil	UHMWPE
Hydraulic Oil, Petroleum Base	B	A	B	A		A	A		A	A	D	A		B		A	
Hydrazine	D		D	B		B	D		C	D	B	D	C	C			
Hydrocyanic Acid	D	D	C	A		A	C	B	B	D	B	A	B	B			A
Hydrofluosilicic Acid	A	D	D	C		B	B		B	A	B	A	B	B		A	
Hydrogen Gas, cold	B	B	B	A		A	A		B	A	B	A	B	B	A	A	A
Hydrogen Gas, hot		B		B		A		A	B	A	B			B		A	A
Hydrogen Peroxide, Concentrated	D	D	D	B		B	D	D	D	D	B	B	B	D	D	/D	C
Hydrogen Peroxide, Dilute	C	D	D	B		B	D	D	A	D	B	A		B	D	C	A
Hydrogen Sulfide, Dry	C	B	B	A	B	B	B	B	C	C	A	A	B	A	D	A	A
Hydrogen Sulfide, Wet	D	C	D	B		B	C	D	C	C	B	A	B	B	D	A	A
Hypo (Sodium Thiosulfate)	C	D	C	B		B	B		A	A	A	A		A		A	
Illuminating Gas	A	A	A	A		A	A		C	A	D	A	D	C		A	
Ink-New sprint	C	D	D	A		A	B		A	A	B	A	B	B	A	A	A
Iodoform	C	B	C	A		A	C			A		A					
Iso-Butane				B		B			B	A	D			D		A	
Iso-Octane	A	A	B	A		A	A		A	A	D	A	B	C		A	
Isopropyl Acetate				B		A			D	A	D			D		A	
Isopropyl Ether	A	A	B	A		A	B	A	C	A	D	D	D	C	A	A	
J P-4 Fuel	A	A	B	A		A	A	A	A	A		A		C	A	A	
J P-5 Fuel	A	A	A	A		A	A	A	B	A		A		C	A	A	
J P-6 Fuel	A	A	A	A		A	A	A	A	A		A		C	A	A	
Kerosene	A	B	B	A		A	A	A	A	A	D	A	D	C	A	A	C
Ketchup	D	D	D	A		A	B		A	A		A	B	A		A	
Ketones	A	A	A	A		A	A		D	A	D	D	D	D		A	
Laquer (and Solvent)	A	C	C	A		A	A		D	A	D	D	D	D		A	
Lactic Acid Concentrated cold	D	D	D	A	D	A	D	A	B	D	B	A	B	A	A	A	A
Lactic Acid Concentrated hot	D	D	D	B	D	A	D	B	C	D	B	B	B	C		A	A
Lactic Acid Dilute cold	D	D	D	A	B	A	C	A	B	D	B	A	B	A		A	A
Lactic Acid Dilute hot	D	D	D	A	D	A	D	B	C	D		D		D		A	A
Lactose	B		C	B		B	B		B	A	B	B	B	C		A	
Lard	B		A	A		A			B	A	C			C		A	A
Lard Oil	B	C	C	B		A	B		A	A	B	A	D	B		A	A
Lead Acetate	C	D	D	B		B	B		A	A	B	B		B		A	A
Lead Sulfate	C		D	B		B	B		B	A	B	B	B	B		A	
Lecithin	C		C	B		B	B		D	A	D	B	D	D			
Linoleic Acid	B	B	B	A		A	B		B	A	D	B	D	B		A	
Linseed Oil	B	A	A	A		A	B		A	A	D	A	B	C		A	A
Lithium Chloride	B		B	B		A	B		B	A	B	B	B	B		A	
LPG	A	B	B	B		B	B		A	A	D	A	D	B		A	
Lubricating Oil Petroleum Base	B	A	A	A		A	B		A	A	D	A	C	B		A	C
Ludox	D		B	B		B	B		B	B	B	B	B	B			
Magnesium Bisulfate	B	B	B	A		A	B		B	A	B	B	B	B		A	
Magnesium Bisulfide	D		D	B		B	B		B	A	B	B	B	B		A	
Magnesium Carbonate	B		B	A		A	B		B	A	B	B	B	B		A	A
Magnesium Chloride	B	C	D	B	C	B	B	A	A	A	A	A	A	A	C	A	A
Magnesium Hydroxide	B	B	B	A	A	A	B	B	A	A	A	A	A	A	D	A	A
Magnesium Hydroxide Hot	D	B	B	A	A	A	A	B	B	A		A	B	B	D	A	A
Magnesium Nitrate				A		A	B		B	A		B	B	A		B	A
Magnesium Sulfate	B	B	B	A	A	A	B	A	A	A	A	A	A	A	A	A	A
Maleic Acid	B	B	C	B		B	B	A	B	A	D	A	D	B		A	A

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# Corrosion Data

Chemicals	Brass	Carbon Steel	Ductile Iron/Cast Iron	316 Stainless Steel	17-4PH	Alloy 20	Monel	Hastelloy C	Buna N (Nitrile)	Delrin/Lubetal	EPDM/EPFR	Viton	Hypalon	Neoprene	Nylon	Grafoil	UHMWPE
Maleic Anhydride	B		B	B		B	B	B	D	C	D	B	D	D		A	
Malic Acid	B	D	D	B		B	B		A	A		A		B		A	
Malt Beverages				A		B	A		A	A	B	A		A		A	
Manganese Carbonate				B		A			B	A						A	
Manganese Sulfate	B		D	A		A	B		B	A	B	B	B	B		A	
Mayonnaise	D	D	D	A		A	B		A	A		A		A		A	
Meat Juices	D			A		A			B	A			B	B		A	A
Melamine Resins			D	C		C			B	A			D	B		A	
Methanol	B		B	A		A	B		B	C	D	B	D	B		A	
Mercuric Chloride	D	D	D	B		B	D	B	A	A	A	A	B	B	C	A	A
Mercuric Cyanide	D	D	D	A		A	C	B	A	A	A	A	B	B		A	A
Mercurous Nitrate	D			A		A	D			A		B	B			B	A
Mercury	D	A	A	A		A	B	B	A	A	A	A	B	A		A	A
Methane	A	B	B	A		A	B	A	A	A		A		B		A	
Methyl Acetate	A	B	B	A		A	B	A	D	B	B	D	D	D	A	A	
Methyl Acetone	A	A	A	A		A	A		D	B	A	D	D	D	A	A	
Methylamine	D	B	B	A		A	C	B	D	A	B	D	D	D	A	A	
Methyl Bromide 100%	C		D	B		A	B		B	A	D	B	D	D		A	D
Methyl Cellosolve	A	B	B	A		A	B	B	C	A	B	D	D	D	B	A	
Methyl Cellulose				A		A		B	D	A				D		A	
Methyl Chloride	B	B	B	A		A	B		D	A	D	B	D	D	A	A	D
Methyl Ethyl Ketone	A	A	A	A		A	A	B	D	A	B	D	D	D	A	A	D
Methylene Chloride	A	B	B	A		A	B	B	D	A	D	C	D	D	A	A	D
Methyl Formate	A	C	C	B		A	B	B	D	A	B	D	B	B		A	
Methyl Isobutyle Ketone				A		A			D	A				D		A	
Milk & Milk Products	B	D	D	A		A	B		A	A	A	A	B	A	A	A	B
Mineral Oils	B	B	B	A		A	A		A	A	D	A	C	B		A	D
Mineral Spirits	B	B	B	B		B	B		A	A		A		C		A	D
Mixed Acids (cold)	D	C	C	B		B	C		D	D	D	B	D	D	C		
Molasses, crude	A	A	A	A		A	A		A	A		A	B	A	A	A	B
Molasses, Edible	A	C	C	A		A	A		A	A		A		A	A	A	B
Molybdic Acid				A		A				A						A	
monochloro Benzene Dry				B		B	B		D	C				D		A	
Morpholine	B		B	A		A	B		D	A	B	D	D	D		A	
Mustard	A	B	B	A		A	A		A	A		A		A		A	
Naptha	B	B	B	B		B	B	A	B	A	D	A	C	C	A	A	D
Napthalene	B	B	B	B		B	B	B	D	A	D	A	D	D	A	A	D
Natural Gas, Sour	B	B	B	A		A	D	A	A	A	D	A	D	A	A	A	A
Nichel Ammonium Sulfate	D	D	D	A		A	C		A	C	B	D	B	B	A	A	
nickel Chloride	D	D	D	B		A	B	A	A	D	B	A	B	A	C	A	A
Nickel Nitrate	D	D	D	B		A	B		A	C	A	A	B	A		B	A
Nickel Sulfate	D	D	D	B		A	B	B	A	C	B	A	B	A	A	A	A
Nicotinic Acid	A	B	C	A		A	A		D	C	D	B	D	D		A	A
Nitric Acid 10%	D	D	D	A	A	A	D		C	D		A		B	D	A	A
Nitric Acid 30%	D	D	D	A	D	A	D		C	D	B	A	D	C	D	B	A
Nitric Acid 80%	D	D	D	C	D	B	D		D	D	D	B	D	D	D	C	D
Nitric Acid 100%	D	D	D	A	D	A	D		D	D	D	B	C	D	D	D	D
Nitric Acid Anhydrous	D	D	C	A	D	A	D		D	D	C	A	D	D	D	D	
Nitrobenzene	D	B	B	A		A	B	B	D	B	C	C	D	D	A	A	D
Nitrogen	A	A	A	A		A	A		A	A	B	A	B	A		A	A

Ratings: A - Excellent B - Good C - Poor D - Do not use Blank - No information



# Corrosion Data

Chemicals	Brass	Carbon Steel	Ductile Iron/Cast Iron	316 Stainless Steel	17-4PH	Alloy 20	Monel	Hastelloy C	Buna N (Nitrile)	Delrin/Lubetal	EPDM/EPR	Viton	Hypalon	Neoprene	Nylon	Grafoil	UHMWPE
Nitrous Acid 10%	D	D	D	B		B	D		C	B		A		A		A	
Nitrous Gases	D	B	C	A		A	D		B	B						A	
Nitrous Oxide	B	B	C	B		B	D	B	B	A		A		B	A	A	
Oils & Fats				A		A			B	A	D				A	A	
Oils, Animal	A	A	A	A		A	B	A	A	A	B	B	C	B	A	A	
Oils, Petroleum Refined	B	A	A	A		A	A	A	A	A	D	A	B	B	A	A	
Oils, Petroleum Sour	C	B	C	A		A	A	A	B	A	D	A	B	B	A	A	
Oils, Water Mixture	A	B	B	A		A		A	A	A		A		B	A	A	
Olaic Acid				B		B	A		D	C		C		D	A	A	
Oleic Acid	B	C	C	B		A	B	B	B	C	D	A	D	C	A	A	C
Oleum	C	B	D	B		B	C	B	D	D	D	C	B	D	D		D
Oleum Spirits	D		D	B		B	D		C	D	D	A	D	D	D		
Olive Oil	C	B	B	A		A	A		A	A	B	A	B	B	A	A	A
Oxalic Acid	B	D	D	B	D	B	B		C	C	B	A	B	B	D	A	A
Oxygen	A	B	B	A	A	A	A	A	B	D	A	A	A	B	D	D	A
Ozone, Dry	A	A	A	A		A	A	A	D	C	A	B	A	D	D		C
Ozone, Wet	B	C	C	A		A	A	A	D	C	B	B	B	D	D		C
Paints & Solvents	A	A	A	A		A	A		D	A	D	B	D	D		A	
Palmitic Acid	B	C	C	B		B	B		B	A	B	A	D	B	D	A	
Palm Oil	B	C	C	B		A	A		B	A	D	A	D	B	A	A	A
Paper Pulp	B		B	A		A	B		B	A	B	B	B	B	A	A	
Paraffin	A	B	B	A		A	A	A	A	A	D	A	B	C	A	A	C
Paraformaldehyde	B	B	B	B		B	B		B	A	D			B		A	
Paraldehyde				B		B			B	A	D			B		A	
Pentane	A	B	B	A		A	B		A	A	D	A		B		A	
Perchloroethylene, dry	C	B	B	A		A	B	B	D	B	D	A	D	D	A	A	
Petrolatum (Vaseline Petroleum Jelly)	B	C	C	B		A	A		A	A		A		B		A	A
Phenol	B	D	D	A	B	A	A	A	D	C	D	B	D	D	D	A	D
Phosphate Ester	D	A	A	A		A	A		D	A	A				A	A	
Phosphoric Acid 10%	D	D	D	D	B	B	D		B	D	B	A	B	A	D	A	A
Phosphoric Acid 50% Cold	D	D	D	B	B	B	C		B	D	B	A	B	B	D	A	A
Phosphoric Acid 50% Hot	D	D	D	D	D	B	C		B	D	B	A	B	B	D	A	A
Phosphoric Acid 85% Cold	D	B	B	A	C	B	A		C	D		B	B	C	D	A	A
Phosphoric Acid 85% Hot	D	C	C	B	D	B			C	D			B	C	D	A	A
Phosphoric Anhydride				A		A			D	B		B		D	D	A	
Phosphorous Trichloride		B	C	A		A			D	D	B	B		D	D	A	A
Phthalic Acid	B	C	C	B		B	A	B	C	B		A		C	A	A	
Phthalic Anhydride	B	C	C	B		B	A	A	C	A		A		C	A	A	A
Picric Acid	G	D	D	B	C	B	D	B	C	D	B	B	B	A	B		A
Pineapple Juice	C	C	C	A		A	A		A	A		A	D	A		A	
Pine Oil	B	B	B	A		A	B		A	A	D	A	D	D		A	D
Pitch (Bitumen)				A		A			C	A	D			C		A	
Polysulfide Liquor	D		B	B		A	B		B	D	B	B	B	B		A	
Polyvinyl Acetate	B		B	B		B	B			A	B		B	C		A	
Polyvinyl Chloride	B		B	B		B	B			A	B		B	C		A	
Potassium Bicarbonate				A		A	B		B	A						A	A
Potassium Bichromate				A		A	A		B	B		B		B		A	
Potassium Bisulfate				A		A	B		B	A		A	C	B		A	
Potassium Bisulfite	C	D	D	B		B	D		A	A	B	A	C	A		A	
Potassium Bromide	C	D	D	A	C	B	B		A	A	B	A	B	A		A	A

Ratings: A - Excellent B - Good C - Poor D - Do not use Blank - No information

# Corrosion Data

## Chemicals

	Brass	Carbon Steel	Ductile Iron/Cast Iron	316 Stainless Steel	17-4PH	Alloy 20	Monel	Hastelloy C	Buna N (Nitrile)	Delrin/Lubetal	EPDM/EPR	Viton	Hypalon	Neoprene	Nylon	Grafoil	UHMWPE
Potassium Carbonate	B	B	B	B	A	B	B		A	A	B	A	B	A		A	A
Potassium Chlorate	B	B	B	B	B	B	C		A	A	B	A		A		C	A
Potassium Chloride	C	C	B	B	B	A	B	B	A	A	A	A	B	A	A	A	A
Potassium Chromate	B		B	B		B	B		B	A	B	B	B	A			A
Potassium Cyanide	D	B	B	B		B	B	B	A	A	A	A	B	A		A	A
Potassium Dichromate	D	C	C	B		A	B		A	A	B	A	B	A			A
Potassium Ferricyanide	D	C	C	A	B	B	B		A	A	B	A		A		A	A
Potassium Ferrocyanide	B	C	C	B		B	A		A	A		A		A		A	A
Potassium Hydroxide Dilute Cold	D	A	A	B	B	B	A		A	D		D	B	B	B	A	A
Potassium Hydroxide to 70% Cold	D	B	B	B	C	B	A		B	D	B	D	B	B	B	A	A
Potassium Hydroxide Dilute Hot	D	B	B	B	C	B	A		B	D				B		A	A
Potassium Hydroxide to 70% Hot	D	A	B	B	D	B	A		C	D	A		A	B		A	A
Potassium Iodide	D	C	C	B	B	B	C		A	A	B	A		A		A	
Potassium Nitrate	B	B	B	B	B	B	B	B	A	A	B	A	B	A		B	A
Potassium Oxalate				A		A				A						A	
Potassium Permanganate	B	B	B	B	B	B	B	B	A	A	B	A	B	A			A
Potassium Phosphate	C		C	B		B	B	B	A	A	A	A	B	A	A	A	
Potassium Phosphate Di-basic	B	A	A	A		A	B	B	A	A	B	A		A	A	A	
Potassium Phosphate Tri-basic		A	A	B		B	B		B		B			B	A	A	
Potassium Sulfate	B	B	C	A	A	A	B		A	A	A	A	B	A	A	A	A
Potassium Sulfide	B	B	B	A		A	C	A	A	A	B	B	B	B	A	A	A
Potassium Sulfite	B	B	B	A		A	C	B	B	A	A	B	B	B	A	A	A
Producer Gas	B	B	B	B	A	B	A		A	A	D	A		B		A	
Propane Gas	A	B	B	B	A	A	B	A	A	A	D	A	B	B	A	A	A
Propyl Bromide	B		B	B		A	B		B	A	B	B	D	B		A	
Propylene Glycol	B	B	B	B		B	B		A	C	B	A	B	A		A	A
Pyridine			B	B		A			D	D		D		D		A	
Pyrogallic Acid	B	B	B	B	B	A	B		A	A		A		A			
Quench Oil	B	B	B	A		A			A	A		A	B	B		A	
Quinine, Sulfate, dry				A	B	A	B		A	A						A	
Resins & Rosins	A	C	C	A	B	A	A		C	A		A		C	A	A	
Resorcinol				B		B										A	A
Road Tar	A	A	A	A		A	A		B	A	D	A	D	C		A	
Roof Pitch	A	A	A	A		A	A		B	A		A		C		A	
Rosin Emulsion	B	C	C	A		A	A		D	A		B		C		A	
R P-1 Fuel	A	A	A	A		A	A		B	A		A		C		A	
Rubber Latex Emulsions	A	B	B	A		A				A		A				A	
Rubber Solvents	A	A	A	A		A	A		D	C		D		C		A	
Salad Oil	B	C	C	B		A	B		A	A	B	A	B	A		A	
Salicylic Acid	C	D	D	A		B	B		A	A	B	A	B	A		A	A
Salt (NaCl)	B	C	C	B		A	A		A	A		A		A		A	A
Salt Brine	B		D	B		B	B		A	A	B	B	D	D	C	A	A
Sauerkraut A rine				B		B				C						A	
Sea Water	C	D	D	B		B	A		A	A	A	A	C	A	C	A	A
Sew age	C	C	D	B	A	B	B		A	B	B	B	B	C		A	A
Shellac	A	A	B	A		A	A		A	A				A		A	
Silicone Fulids	B		B	B		B			B	A		B	B	B		A	C
Silver Bromide				A	C	A	B			D						A	
Silver Cyanide	D		D	A		A	B		B	D		B	B	B		A	
Silver Nitrate	D	D	D	A		A	D		C	A	A	A	B	C		B	A

Ratings: A - Excellent B - Good C - Poor D - Do not use Blank - No information

# Corrosion Data

## Chemicals

	Brass	Carbon Steel	Ductile Iron/Cast Iron	316 Stainless Steel	17-4PH	Alloy 20	Monel	Hastelloy C	Buna N (Nitrile)	Delrin/Lubetal	EPDM/EPR	Viton	Hypalon	Neoprene	Nylon	Grafoil	UHMWPE
Silver Plating Sol.			A		A				D				B				
Soap Solutions (Stearates)	A	A	B	A		A	A		A	A	A	A	B	B		A	
Sodium Acetate	B	C	C	B		B	B	B	B	A	B	A	D	B	A	A	A
Sodium Aluminate	B	C	C	A		B	B	B	A	A	B	A	B	A		A	A
Sodium Benzoate				B		B	B			B						A	A
Sodium Bicarbonate	B	C	C	B		A	B		A	B	A	A	B	A		A	A
Sodium Bichromate				B		B			D	A			B				
Sodium Bisulfate 10%	B	D	D	A		A	B		A	D	B	A	B	A	A	A	A
Sodium Bisulfite 10%	B	D	D	A		B	B	B	A	D	B	A	B	A	A	A	A
Sodium Borate	B	C	C	B		B	B		A	A	B	A	B	A		A	A
Sodium Bromide 10%	B	C	D	B		B	B		A	A	B	A		A		A	A
Sodium Carbonate (Soda Ash)	B	B	B	A		A	B	B	A	A	B	A	B	A	A	A	A
Sodium Chlorate	B	C	C	B		B	C	B	A	A	B	A	B	A		B	A
Sodium Chloride	B	C	C	B		A	A	B	A	A	B	A	B	A	A	A	A
Sodium Chromate	C	B	B	A		B	B		A	A	B	A		A			
Sodium Citrate				B		B			A							A	
Sodium Cyanide	D	B	B	A	B	A	B		A	A	B	A	B	A		A	
Sodium Ferricyanide				A		A	B			A						A	A
Sodium Fluoride	C	D	D	B	B	A	B		A	A	B	A	B	A	C	A	A
Sodium Hydroxide 20% Cold	A	A	A	A	A	B	A		A	D	B	B	B	A	C	A	A
Sodium Hydroxide 20% Hot	A	B	B	A	C	A	A		B	D	B	C	B	B	C	A	A
Sodium Hydroxide 50% Cold	A	A	B	A	B	A	A		A	D	B	C	B	A	C	A	A
Sodium Hydroxide 50% Hot	A	B	B	A	C	A	B		B	D		C	B	B	C	A	A
Sodium Hydroxide 70% Cold	A	A	A	A	B	B	A		B	D	B	C	B	C	C	A	A
Sodium Hydroxide 70% Hot	B	B	B	A	C	B	B		D	D	B	C	B	D	C	A	A
Sodium Hypochlorite (Bleach)	D	D	D	D	D	C	D	A		D		A			B	A	A
Sodium Hyposulfite				B		B	B			A						A	
Sodium Lactate				A		A	B			A						A	
Sodium Metaphosphate	C	B	C	B	B	B		A	A	B	B		B	A		A	
Sodium Metasilicate Cold	B	C	C	A		A	A		B	A		B	B	A	A	A	
Sodium Metasilicate Hot	B	D	D	A		A	A	A		A						A	
Sodium Nitrate	B	B	B	A	B	A	B	B	C	A	B	A	B	B	A		A
Sodium Nitrite				B		B	C	B	C	B	A	B		D	A	B	A
Sodium Perborate	B	B	B	B	B	B	B	B	C	A	A	A	C	B		A	
Sodium Peroxide	D	C	C	B	B	B	B	B	C	A	A	A	B	B		A	
Sodium Phosphate	C	C	C	B	B	B	B	B	B	A	A	A	B	C	A	A	A
Sodium Phosphate Di-basic	C	C	C	B		B	B	B	A	A	A	A		A	A	A	
Sodium Phosphate Tri-basic	C	C	C	B		B	B	B	A	A	A	A		B	A	A	
Sodium Polyphosphate				B		B	B	B		A				B		A	
Sodium Salicylate				A		A				A						A	
Sodium Silicate	B	B	B	B		B	B		A	A	B	A	B	A	D	A	A
Sodium Silicate, hot	C	C	C	B		B	B			A	B				D	A	A
Sodium Sulfate	B	B	B	A	B	A	A		A	A	A	A	A	A		A	A
Sodium Sulfide	D	B	B	B	A	B	B		A	A	B	A	B	A	A	A	A
Sodium Sulfite	C		A	A	A	A	B	B	A	A	B	B	B	A	D	A	A
Sodium Tetraborate			A	A		A			A	A	B			A		A	
Sodium Thiosulfate	C	B	C	B	A	B	B		A	A	A	A	B	A	A	A	
Soybean Oil	B	C	C	A		A	A		A	B	B	A	D	B		A	A
Starch	B	C	C	B		A	A		A	A	C	A	B	A		A	A
Steam (212° F)	A	A	A	A	A	A	B		D	D	B	C	B	D		A	A

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# Corrosion Data

## Chemicals

	Brass	Carbon Steel	Ductile Iron/Cast Iron	316 Stainless Steel	17-4PH	Alloy 20	Monel	Hastelloy C	Buna N (Nitrile)	Delrin/Lubetal	EPDM/EPR	Viton	Hypalon	Neoprene	Nylon	Grafoil	UHMWPE
Stearic Acid	C	C	C	B		B	B	A	A	A	B	A	B	C	A	A	A
Styrene	A	A	B	A		A	B	A	D	A	D	B	D	D	A	A	
Sugar Liquids	A	B	B	A		A	A		A	A	B	A	D	A	A	A	A
Sugar, Syrups & Jam	B		C	A	A	A							D	B		A	A
Sulfate, Black Liquor	C	C	C	B	A	B	B		C	C	B	C	D	B		A	
Sulfate, Green Liquor	C	C	C	B	A	B	B		C	A		C	D	B		A	
Sulfate, White Liquor	C	C	C	B	B	D	C		C	D		C	D	B		A	
Sulfur	D	C	C	B		A	B		D	A	B	B	B	C	C	A	A
Sulfur Chlorides	B	D	D	D		A	B		D	A	C	A	B	D		A	
Sulfur Dioxide, dry	B	B	B	A	A	B	B	A	D	A	A	A	D	D	A	A	A
Sulfur Dioxide, w et	D			A	C	B	A	B	D	D	B		B	D		A	A
Sulfur Hexafluoride	B			A		A				A				B		A	
Sulfur, Molten	D	C	B	B		A	D	B	D	D	B	B	B	C		A	
Sulfur Trioxide	B	B	B	B	B	B	B	B	D	D		B	D	D		D	
Sulfur Trioxide, dry	B	B	B	B	B	B	B	B	D	A	B	A	D	D	A	D	
Sulfuric Acid 0 to 77%	C	D	D	C		B	B		B	D		A	B	B	D	A	B
Sulfuric Acid 100%	C	C	B	A	B	A	D		D	D	C	B	B	D	D	D	D
Sulfurous Acid	D	D	D	B		B	D	B	C	C	C	A	B	C	D	A	A
Tall Oil	B	B	B	B		B	B	A	B	A	D	A	D	B	D	A	
Tannic Acid (Tannin)	B	C	C	B	B	B	B	B	B	A	B	A	B	B	A	A	A
Tanning Liquors				B		B			B	D				D			
Tar & Tar Oils	A	A	A	A	A	A	A		C	A	D	A	D	D		A	
Tartaric Acid	B	D	D	A	A	A	B	B	C	A	B	A	B	B		A	A
Tetraethyl Lead	B	C	C	B		B	A			A						A	
Toluol (Toluene)	A	A	A	A		A	A	A	D	C	D	B	D	D	A	A	D
Tomato Juice	C	C	C	A		A	B		A	A		A	D	A		A	
Transformer Oil	B	A	B	A		A	A		A	A		A		B		A	C
Tributyl Phosphate	A	A	A	A		A	A		D	A	B	D	D	D	A	A	
Trichlorethylene	B	B	C	B	A	B	B	A	D	A	D	B	D	D	A	A	D
Trichloroacetic Acid	B		D	D		B	B	A	C	D		D		D			C
Triethanolamine				B		B	B	A	C	A	B		B	B		A	C
Triethylamine	B			B		B		A	B	C				B			
Trisodium Phosphate				B		B		A	A	A	B	B	A	A		A	A
Tung Oil	B	B	B	A		A	C	A	A	A	D	A	D	B		A	
Turpentine	B	B	B	B	A	B	B	A	B	A	D	A	C	D	A	A	D
Urea	B	C	C	B		B	B	A	C	A	B	D	D	B		A	A
Uric Acid				A		A		A	B							A	
Varnish	A	C	C	A		A	A	A	C	A	D	B	D	B		A	
Vegetable Oils	B	B	B	A		A	B	A	A	A	D	A	B	B		A	
Vinegar	B	D	D	A		A	B	A	D	B	A	D	C	D		A	A
Vinyl Acetate	B		B	B		B	B	A		D	A		B	B	A	A	
Water, Distilled	A	D	D	A	A	A	A	A	C	A	B	A	B	B		A	A
Water, Fresh	A	C	C	A	A	A	A	A	C	A	B	A	A	B	C	A	A
Water, Acid Mine	D	D	D	B	B		D	C	B	A	A	D	C	A		A	A
Waxes	A	A	A	A		A	A	A	A	A	C	A	B	B		A	
Whiskey & Wines	B	D	D	A		A	A	A	B	A	A	A	C	B	A	A	A
Xylene (Xylo), Dry	A	B	B	A		A	A	A	D	A	D	B	D	D	A	A	D
Zinc Bromide	B		D	B		B	B	A	B	A	B	B	B	B		A	
Zinc Hydrosulfite	C	A	B	A		A	B	A	A	A	A	A		A			
Zinc Sulfate	B	D	D	B		A	B	A	A	A	A	A	B	A		A	A

Ratings: A - Excellent B - Good C - Poor D - Do not use Blank - No information



**Backed by our Worldwide reputation for  
Quality, Accuracy and Advanced Design.**



**LIQUID CONTROLS**

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