STANDARD Pump, Inc.

DRUM PUMP CHEMICAL RESISTANCE GUIDE & APPLICATION WORKSHEET

CRG020716

STANDARD Pump Inc.

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The information in this Chemical Resistance Guide is to be used only as a general guide for proper Drum Pump selection. No warranty is implied or is any guarantee provided. Corrosion rates may vary considerably due to concentration, temperature and the presence of abrasives. Impurities as well as other trace elements commonly found in industrial chemicals may also affect chemical resistance. When compatibility is inconclusive, field testing is highly recommended.

Always consult with a factory certified safety engineer if you have any questions regarding proper pump selection. All testing was conducted at 72° F (22° C) unless stated otherwise.

R = Recommended
M = Minor to moderate, should be field tested
X = Not recommended
– = No data
Ex = Flammable or explosive

WARNING: Flammable and/or combustible liquids are highlighted in yellow. Only use Explosion Proof motors, suitable metallic pump tubes, discharge hose and nozzles when pumping flammable and/or combustible liquids. The container and pump must be properly grounded and bonded (with the use of ground wire kits) to prevent static discharge and sparking, which could cause electric shock, fire or an explosion. Consult Standard Pump's Operating Instructions for proper grounding and bonding procedures. Always operate the pump in accordance with federal and local safety regulations.

CHEMICAL	POLYPROPYLENE HIGH TEMP (PHT) MAX 175°F (80°C)	POLYPROPYLENE MAX 130°F (55°C)	POLYPROPYLENE STAINLESS SHAFT MAX 130°F (55°C)	PVDF (KYNAR®) MAX 175°F (80°C)	STAINLESS STEEL 316 MAX 175°F (80°C)	CPVC MAX 175°F (80°C)	ALUMINUM MAX 175°F (80°C)
Acetaldehyde Ex	X	X	X	X	R	X	X
Acetamide	R	R	R	R	R	–	X
Acetate Solvents Ex	X	X	X	X	R	X	–
Acetic Acid (10%–50%)	R	R	R	R	R	M	X
Acetic Acid (80%)	R	R	R	R	R	M	X
Acetic Acid (100%) Ex	X	X	X	X	R	X	X
Acetic Anhydride Ex	X	X	X	X	R	X	X
Acetone Ex	X	X	X	X	R	X	X
Acetyl Chloride Ex	X	X	X	X	–	X	X
Acetylene Ex	X	X	X	X	R	X	X
Alcohols Ex	X	X	X	X	R	X	X
Aluminum Chloride	R	R	X	R	X	R	X
Aluminum Fluoride	R	R	X	R	X	R	–
Aluminum Hydroxide	R	R	R	R	R	X	–
Aluminum Nitrate (concentrated)	R	R	R	R	R	R	X
Aluminum Potassium Sulfate	R	R	R	R	R	M	–
Aluminum Sulfate (concentrated)	R	R	R	R	R	R	X
Amines	–	–	–	–	R	X	–
Ammonia, Aqueous	R	R	R	R	R	X	X
Ammonia, (concentrated)	R	R	R	R	R	X	X
Ammonium Bifluoride	70°F R 21°C	70°F R 21°C	70°F R 21°C	R	R	R	–
Ammonium Carbonate	R	R	R	R	R	R	R
Ammonium Chloride	R	R	X	R	X	R	X
Ammonium Fluoride (10% – 25%)	R	R	X	R	X	R	X
Ammonium Hydroxide	R	R	R	R	R	X	X
Ammonium Nitrate (concentrated)	R	R	R	R	R	R	X
Ammonium Nitrite	70°F R 21°C	70°F R 21°C	–	–	–	–	–
Ammonium Oxalate	R	R	R	–	R	–	–
Ammonium Persulfate	R	R	R	R	R	R	–
Ammonium Phosphate, Dibasic	R	R	R	R	R	R	–
Ammonium Phosphate, Monobasic	R	R	R	R	R	R	–
Ammonium Phosphate, Tribasic	R	R	R	R	R	R	–
Ammonium Sulfate (concentrated)	R	R	R	R	R	R	X

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Ammonium Sulfide (10%)	R	R	R	R	R	–	X
Ammonium Thiocyanate	–	–	–	R	–	–	–
Ammonium Thiosulfate	–	–	–	R	R	–	–
Amyl Acetate Ex	X	X	X	X	R	X	–
Amyl Chloride Ex	X	X	X	X	R	X	–
Aniline (concentrated)	X	X	X	X	R	X	X
Aniline Dyes	–	–	–	–	M	–	–
Aniline Hydrochloride	–	–	–	–	X	X	–
Anisole	–	–	–	–	R	–	–
Aqua Regia (80%)	X	X	X	–	X	X	–
Arsenic Acid (10%)	R	R	R	R	R	R	X
Barium Carbonate	R	R	R	R	R	R	–
Barium Chloride (25%)	R	R	X	R	X	R	X
Barium Hydroxide (concentrated)	R	R	R	R	R	R	X
Barium Nitrate Ex	X	X	X	X	R	X	–
Barium Sulfate	R	R	R	R	R	R	–
Barium Sulfide	R	R	R	R	R	R	–
Benzaldehyde (concentrated)	X	X	X	X	R	X	R
Benzene (concentrated) Ex	X	X	X	X	R	X	X
Benzene Sulfonic acid	–	–	–	75°F R 24°C	M	X	–
Benzoic Acid (10%)	R	R	R	R	R	R	R
Bismuth Carbonate	R	R	–	R	–	–	–
Boric Acid (concentrated)	R	R	R	R	R	R	X
Brine Acid	–	–	–	R	–	–	–
Bromic Acid (10%)	X	X	X	X	–	X	–
Bromine Liquid (concentrated)	X	X	X	X	X	X	X
Bromine Water	–	–	–	R	M	70°F R 21°C	–
Butane Ex	X	X	X	X	R	X	X
Butyl Acetate Ex	X	X	X	X	M	X	X
Butyl Phenol (concentrated)	R	R	R	R	R	–	X
Butylene Ex	X	X	X	X	R	X	X
Butyric Acid (concentrated)	R	R	R	R	R	X	X
Calcium Bisulfide	R	R	M	R	M	–	–
Calcium Bisulfite	R	R	M	R	M	R	–
Calcium Chlorate (10%)	R	R	R	R	R	–	X
Calcium Chloride (concentrated)	R	R	R	R	R	R	X
Calcium Hydroxide	R	R	R	R	R	R	–
Calcium Hypochlorite (10%)	R	R	X	R	X	R	X

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Calcium Nitrate (50%)	R	R	R	R	R	R	R
Calcium Sulfate	R	R	R	R	R	R	–
Calcium Sulfite	R	R	M	–	M	–	–
Carbon Disulfide Ex	X	X	X	X	R	X	–
Carbonic Acid	R	R	R	R	R	R	X
Carbon Tetrachloride (concentrated)	X	X	X	R	R	X	X
Cellosolve®	R	R	M	R	M	X	–
Cetyl Alcohol Ex	X	X	X	X	R	X	–
Chlorine Liquid (concentrated)	X	X	X	R	X	R	X
Chloroacetic Acid (98%)	R	R	X	R	X	X	X
Chlorobenzene Ex	X	X	X	X	R	X	–
Chlorobenzyl Chloride	–	–	–	125°F R 52°C	–	X	–
Chloroform (100%)	X	X	X	R	R	X	X
Chlorosulfonic Acid (concentrated)	X	X	X	X	X	X	X
Chromic Acid (30%)	X	X	X	R	X	140°F R 60°C	X
Chromic Acid (50%)	R	R	X	R	X	70°F R 21°C	X
Citric Acid (50%)	R	R	R	R	R	R	X
Citric Oils	R	R	R	–	R	–	–
Copper Chloride	X	X	X	X	X	X	X
Copper Cyanide	R	R	R	R	R	R	–
Copper Nitrate (25%)	R	R	R	R	R	R	X
Copper Sulfate (concentrated)	R	R	R	R	R	R	X
Cresylic Acid	–	–	–	150°F R 66°C	R	X	–
Cyclohexane Ex	X	X	X	X	R	X	–
Cyclohexanol Ex	X	X	X	X	M	X	–
Cyclohexanone (concentrated) Ex	X	X	X	X	M	X	–
Diacetone Alcohol Ex	X	X	X	X	R	X	–
Dichloro–Ethylene Ex	X	X	X	X	R	X	–
Diesel Fuels Ex	X	X	X	X	R	X	R
Diethyl Ether (concentrated) Ex	X	X	X	X	R	X	–
Diisobutylene Ex	X	X	X	X	M	X	–
Dimethyl Formamide	X	X	X	X	R	X	X
Dioctyl Phthalate	–	–	–	–	R	–	–
Epichlorohydrine Ex	X	X	X	X	R	X	–
Ethanolamine Ex	X	X	X	X	R	X	–
Ether Ex	X	X	X	X	R	X	X
Ethyl Acetate Ex	X	X	X	X	R	X	X
Ethyl Chloride Ex	X	X	X	X	R	X	X
Ethyl Ether Ex	X	X	X	X	R	X	–

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Ethyl Acetate Ex	X	X	X	X	R	X	–
Ethyl Chloride Ex	X	X	X	X	R	X	–
Ethyl Ether Ex	X	X	X	X	R	X	–
Ethylene Chloride Ex	X	X	X	X	R	X	–
Ethylene Dichloride Ex	X	X	X	X	R	X	–
Ethylene Glycol	R	R	R	R	R	M	R
Ethylene Oxide Ex	X	X	X	X	R	X	–
Fatty Acids (100%)	R	R	R	R	R	R	X
Ferric Chloride (50%)	R	R	X	R	X	R	X
Ferric Nitrate	R	R	R	R	R	R	–
Ferric Sulfate (20%)	–	–	–	–	–	–	–
Ferrous Chloride (50%)	R	R	X	R	X	R	X
Ferrous Sulfate (20%)	R	R	R	R	R	R	X
Fluoboric Acid	R	R	M	140°F R 60°C	M	140°F R 60°C	–
Fluosilicic Acid	R	R	–	M	–	140°F R 60°C	–
Formaldehyde (40%) Ex	X	X	X	X	R	X	–
Formic Acid (concentrated) Ex	X	X	X	X	R	X	–
Furfural	X	X	X	X	R	X	R
Gallic Acid (50%)	R	R	R	R	R	M	R
Glue P. V. A.	M	M	M	R	R	R	–
Glycerin	R	R	R	R	R	R	R
Glycolic Acid (37%)	R	R	R	R	R	R	X
Glycolic Acid (70%)	R	R	X	R	X	R	X
Glycols	R	R	R	R	R	R	R
Heptane Ex	X	X	X	X	R	X	–
Hexane Ex	X	X	X	X	R	X	–
Hydrobromic Acid (10% – 48%)	X	X	X	X	X	X	X
Hydrochloric Acid (10% – 100%)	R	R	X	R	X	R	X
Hydrofluoric Acid (40% – 70%)	R	R	X	R	X	X	–
Hydrofluosilicic Acid (32%)	R	R	X	R	X	R	X
Hydrogen Fluoride	R	R	R	–	R	–	–
Hydrogen Peroxide (3% – 30%)	R	R	R	R	R	70°F R 21°C	R
Hydrogen Peroxide (90%) Ex	X	X	X	R	R	X	R
Hydrogen Sulfide Ex	X	X	X	X	R	X	–
Hypochlorous Acid	–	–	–	R	X	R	–

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Iodine	M	M	X	150°F R 66°C	X	X	X
Isopropyl Ether (Ex)	X	X	X	X	R	X	X
Jet Fuel (JP3, JP4, JP5) (Ex)	X	X	X	X	R	X	X
Lacquer Solvents (Ex)	X	X	X	X	R	X	X
Lactic Acid (90%)	R	R	R	R	R	70°F R 21°C	X
Lead Acetate (concentrated)	R	R	R	R	R	R	X
Lead Sulfamate	R	R	–	–	–	–	–
Ligroin (Ex)	X	X	X	X	R	X	X
Magnesium Carbonate	R	R	R	R	R	R	X
Magnesium Chloride (concentrated)	R	R	X	R	X	R	X
Magnesium Hydroxide	R	R	R	R	R	R	–
Magnesium Sulfate (concentrated)	R	R	R	R	R	R	R
Maleic Acid (concentrated)	R	R	R	R	R	R	R
Mercuric Chloride	R	R	X	R	X	R	–
Mercuric Cyanide (concentrated)	R	R	R	R	R	R	X
Methyl Acetone (Ex)	X	X	X	X	R	X	X
Methyl Chloride	X	X	X	R	R	X	–
Methyl Ethyl Ketone (Ex)	X	X	X	X	R	X	X
Methyl Isobutyl Ketone (Ex)	X	X	X	X	R	X	X
Methylene Chloride	X	X	X	X	R	X	X
Monoethanolamine (Ex)	X	X	X	X	R	X	–
Muriatic Acid (10% – 100%)	R	R	X	R	X	R	X
Naptha (Ex)	X	X	X	X	R	X	–
Napthalene (Ex)	X	X	X	X	M	X	–
Nickel Chloride (20%)	R	R	X	R	X	R	X
Nickel Sulfate (10%)	R	R	R	R	R	R	X
Nitric Acid (10%)	R	R	R	R	R	R	X
Nitric Acid (30%)	X	X	X	R	R	140°F R 60°C	X
Nitric Acid, (concentrated)	X	X	X	R	R	X	X
Nitric Acid (red fuming)	X	X	X	X	R	X	X
Nitrobenzene (concentrated)	X	X	X	X	R	X	R
Oleic Acid (concentrated)	X	X	X	R	R	M	R
Oleum	X	X	X	R	R	X	X
Oxalic Acid (concentrated)	R	R	X	R	X	R	X
Palmitic Acid	M	M	M	R	R	R	–
Perchloric Acid (70%)	X	X	X	R	X	R	X
Perchloroethylene (concentrated)	X	X	X	R	R	X	X
Petrolatum	–	–	–	R	R	R	–

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Phenol (90%)	X	X	X	X	R	X	R
Phosphoric Acid (30%)	R	R	R	R	R	R	X
Phosphoric Acid (50%)	R	R	R	R	R	R	X
Phosphoric Acid (95%)	X	X	X	R	R	R	X
Plating Solutions, Chrome 40	R	R	R	R	R	R	–
Plating Solutions, Copper	R	R	R	R	R	R	–
Plating Solutions, Gold	R	R	R	–	R	–	–
Plating Solutions, Iron	R	R	R	R	R	R	–
Plating Solutions, Lead	R	R	–	R	–	R	–
Plating Solutions, Nickel	R	R	–	R	–	R	–
Plating Solutions, Silver	R	R	R	R	R	R	–
Plating Solutions, Tin	R	R	R	R	R	R	–
Plating Solutions, Zinc	R	R	R	R	R	R	–
Potassium Bicarbonate	R	R	M	R	M	R	–
Potassium Bromide (concentrated)	R	R	R	R	R	R	X
Potassium Carbonate (concentrated)	R	R	X	R	X	R	X
Potassium Chlorate (50%)	R	R	R	R	R	R	R
Potassium Chloride (concentrated)	R	R	X	R	X	R	X
Potassium Chromate (40%)	R	R	R	R	R	R	R
Potassium Dichromate (40%)	R	R	R	R	R	R	X
Potassium Hydroxide (60%)	R	R	R	R	R	R	X
Potassium Nitrate (24%)	R	R	R	R	R	R	R
Potassium Permanganate (18%)	R	R	R	R	R	R	R
Potassium Sulfate (10%)	R	R	R	R	R	R	R
Propionic Acid (concentrated) Ex	X	X	X	X	R	X	X
Silicone Oil	R	R	R	R	R	R	R
Silver Nitrate (8%)	R	R	R	R	R	R	X
Soap Solutions	R	R	R	R	R	R	X
Sodium Acetate (10%)	R	R	R	R	R	R	X
Sodium Bicarbonate (10%)	R	R	R	R	R	R	R
Sodium Bisulfate	R	R	R	R	R	R	–
Sodium Bisulfite	R	R	R	R	R	R	–
Sodium Borate	–	–	–	R	M	R	–
Sodium Bromide	R	R	R	R	R	120°F R 48°C	–
Sodium Carbonate (25%)	R	R	R	R	R	R	X
Sodium Chlorate (25%)	R	R	R	R	R	R	X
Sodium Chloride (20%)	R	R	X	R	X	R	X

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Sodium Cyanide	R	R	R	R	R	R	–
Sodium Hydroxide (10%)	R	R	R	R	R	R	X
Sodium Hydroxide (30%)	R	R	R	R	R	R	X
Sodium Hydroxide (50%)	R	R	R	R	R	R	X
Sodium Hypochlorite (20%)	X	X	X	R	X	R	X
Sodium Metaphosphate	X	X	X	–	R	–	–
Sodium Nitrate (45%)	R	R	R	R	R	R	R
Sodium Perborate	R	R	X	–	X	–	–
Sodium Phosphate (10%)	R	R	R	R	R	R	R
Sodium Silicate (20%)	R	R	R	R	R	R	X
Sodium Sulfate (50%)	R	R	R	R	R	R	R
Sodium Sulfide (16%)	R	R	R	R	R	R	X
Sodium Thiosulfate (40%)	R	R	R	R	R	R	R
Stannic Chloride	R	R	X	R	X	R	–
Stearic Acid (concentrated)	R	R	R	R	R	M	R
Sulfite Liquors (concentrated)	R	R	R	R	R	–	X
Sulfur Chloride (10%)	X	X	X	R	X	M	X
Sulfur Dioxide	X	X	X	R	R	120°F R 48°C	–
Sulfuric Acid (40%)	R	R	X	R	X	R	X
Sulfuric Acid (80%)	R	R	X	R	X	R	X
Sulfuric Acid (98%)	X	X	X	R	X	R	X
Sulfurous Acid (50%)	R	R	R	R	R	R	X
Tannic Acid (50%)	R	R	R	R	R	R	X
Tartaric Acid (concentrated)	R	R	R	R	R	R	X
Tetrahydrofuran Ex	X	X	X	X	R	X	X
Tetralin (concentrated)	X	X	X	X	R	–	R
Titanium Tetrachloride	–	–	–	150°F R 66°C	M	X	–
Toluene Ex	X	X	X	X	R	X	X
Transformer Oil	X	X	X	X	R	–	R
Trichloroacetic Acid (concentrated)	R	R	X	R	X	–	X
Trichloroethane (concentrated)	X	X	X	R	R	M	X
Trichloroethylene (50%)	X	X	X	R	R	X	X
Tricresyl Phosphate (concentrated)	R	R	R	R	R	X	X
Triethylamine Ex	X	X	X	X	R	X	X
Vinyl Chloride Ex	X	X	X	X	R	X	X
Xylene (xylol) Ex	X	X	X	X	R	X	X
Zinc Hydrosulfite	–	–	–	R	R	–	–

TECHNICAL DATA

Standard Formulas

PRESSURE AND HEAD

$$\text{Pressure (lbs. per sq. in)} = \frac{\text{Head in feet x Specific Gravity}}{2.31} = \text{Head in feet x Specific Gravity x .434}$$

$$\text{Head in feet} = \frac{\text{Head in feet x Specific Gravity}}{\text{Specific Gravity}}$$

TEMPERATURE

(1.8 C °C) + 32	=	°F
.555 (°F - 32)	=	°C
Degrees Kelvin - 273.2	=	Degrees Centigrade

VELOCITY

(1.8 C °C) + 32	=	°F
.555 (°F - 32)	=	°C
Degrees Kelvin - 273.2	=	Degrees Centigrade

CONVERSION TABLE

PRESSURE IN POUNDS PER SQUARE INCH TO FEET OF HEAD

Pounds Pressure	Ft. of Head	Pounds Pressure	Ft. of Head
1	2.31	19	43.9
2	4.62	20	46.2
3	6.93	25	57.7
4	9.24	30	69.3
5	11.6	35	80.8
6	13.9	40	92.4
7	16.2	45	103.9
8	18.5	50	115.5
9	20.8	55	127
10	23.1	60	138.6
11	25.4	65	150.1
12	27.7	70	161.7
13	30	75	173.2
14	32.3	80	184.8
15	34.6	85	196.3
16	37	90	207.9
17	39.3	95	219.4
18	41.6	100	230.9

CONVERSION FACTORS

FLOW

Lbs of Water / Hr x .002	=	Gal Min
Gal / Min x 500	=	Lbs of Water / Hr
Lbs of Fluid / Hr	=	Gal Min
$\frac{\text{Specific Gravity}}{\text{Liters / Min x .264}}$ x .002	=	Gal / Min (US)
GPM x 3.785	=	Liters / Min
Cu Meters / Hr x 4.4	=	Gal / Min (US)
Gal / Min x .227	=	Cu Meters / Hr
Kg of Water / Min x .264	=	Gal / Min (US)
Gal / MIn x 3.8	=	Kg of Water / Min

PRESSURE

Ft of Water x .433	=	PSI
PSI x 2.31	=	Ft of Water
Inches Hg x .491	=	PSI
Inches Hg x 1.133	=	Ft of Water
ATM x 14.7	=	PSI
ATM x 33.9	=	Ft of Water
Kg / Sq cm x 14.22	=	PSI
Meters of Water x 1.42	=	PSI
ATM x 760	=	mm Hg
mm Hg x .039	=	Inches Hg
Bar x 14.5	=	PSI
Newton / Meter^2 x 1	=	Pascal
PSI x 6.9	=	kPa (Kilopascal)
kPa x .145	=	PSI

VOLUME

Lbs of Water x .119	=	Gal
Gal (Brit) x 1.2	=	Gal (US)
Gal x 128	=	Fluid Ounces
Cubic Ft x 7.48	=	Gal
Cubic In x .00433	=	Gal
Gal x 3.785	=	Liters
Liter x .264	=	Gal
Cubic Meters x 264.2	=	Gallons
Cubic Meter x 1000	=	Liter
Liters x 1000	=	Cubic Centimeters
Cubic Centimeters x .0338	=	Fluid Ounces
Fluic Ounces x 29.57	=	Cubic Centimeters

LENGTH

Mils x .001	=	Inches
Meters x 3.281	=	Feet
Centi. x .394	=	Inches
Millimeters x .0394	=	Inches
Microns x .00394	=	Inches

MASS

Mils x .001	=	Inches
Meters x 3.281	=	Feet
Centi. x .394	=	Inches
Millimeters x .0394	=	Inches
Microns x .00394	=	Inches

METRIC PREFIXES

Mega	=	1,000,000
Kilo	=	1,000
Hecto	=	Inches
Deca	=	100
Deci	=	10
Centi	=	.1
Milli	=	.01
Micro	=	000,001

Ronnekrogen 2
DK-3400 Hillerod
www.standard-europe.eu

STANDARD PUMP Europe

Phone: +45 70 23 21 00
Fax: +45 70 23 56 55
info@standard-europe.eu

Contact Name _____ E-mail address: _____

Company Name _____ Telephone: _____

Application Info

Application Worksheet

What type of application is this? ❒ Pure Pump(Sanitary) ❒ Industrial

What type of fluid is the customer pumping? _____ Concentration _____ %

What is the temperature of the fluid? _____Celsius

Is this fluid considered to be flammable? ❒ NO ❒ YES

What is the viscosity/density of liquid being pumped (in centipoises)? _____cps _____kg/l

Are there any solids present? ❒ NO ❒ YES - If so, what size?_____

Total Dynamic Head: Vertical _____ Feet or meter
Horizontal _____ Feet or meter

Elbows? ❒ NO ❒ YES - If so, how many?_____

Valves? ❒ NO ❒ YES - If so, how many?_____

Flow Meters? ❒ NO ❒ YES - If so, how many?_____

Are you interested in metering? ❒ NO ❒ YES - If so, what type?
❒ Totalizer ❒ Batch Control System

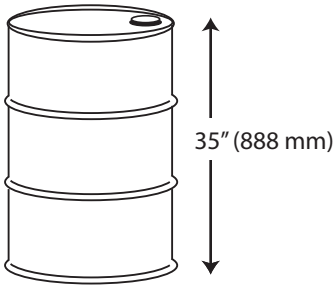
If you are batching how many batches per day? _____ Size per batch? _____

Is this a Continuous Flow or Intermittent duty application? ❒ Continuous ❒ Intermittent

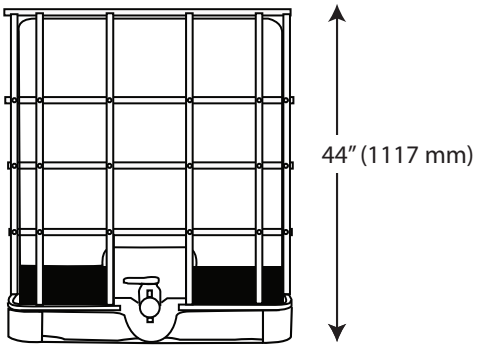
Container Info

What type of container is the customer pumping out of?

❒ 55 (200L) Gallon Drum



❒ Tote Tank



❒ Other

(Please provide required pump immersion length)

_____Millimeters

Does the container have a hygienic bag liner? (Sanitary applications only) ❒ YES ❒ NO

Pump Info

Desired Flow Rate? _____ Gallons Per Minute/Litres Per Minute

Type of motor required? ❒ Air ❒ Electric

Type of motor enclosure? (electric motors only) ❒ Open Drip Proof (IP44) ❒ TEFC (IP54) ❒ Explosion Proof

Is 3A Certification required? (sanitary applications only) ❒ YES ❒ NO