TECH TIP #49

THE FIRST THREE RULES OF PLUMBING

Rule #I....Crap always runs down hill.
Rule #2....Payday is on Friday.
Rule #3....Never chew your fingernails.

TECH TIP #50

SPECIFICATIONS - DO'S & DON'TS

We don't know about you, but nothing is more frustrating than vague or incomplete specifications. When we are trying to quote a price from a set of plans, or price a piece of equipment for an institution or contractor , we always read the specs. We have found that the manufacturer usually has a set of "sample specifications" on their product brochure. However, our experience has taught us that "brochure specs" are kind of like buying your specs at a garage sale...they might fit, they might not.

We at Federal Corporation are extremely proficient at generating tight specs, not so tight that they limit the brand of equipment, but tight enough so that the PLAYING FIELD IS LEVELED. DON'T SETTLE FOR LESS THAN WHAT YOUR APPLICATION CALLS FOR! As you have probably seen, there are people out there who don't always have your best interest in mind!!

Reference to a particular brand of product should not be intended to exclude other product offerings, but it should reference a product that will fully satisfy the needs of the application.

ADVANCED TECHTIPS...Again, call us. We will help you with your specifications, visit the jobsite, and supply you with the websites and/or literature that you need to make sure you specify the correct products.

TECH TIP #51

EVERYDAY HELPFUL FACTS AND FORMULAE

Here's a list of general sizing formulae for everyday HVAC sizing calculations.

Pound of steam

1 pound of steam is equal to 970 BTU (or an easy to remember rule of thumb is 1 pound of steam is equal to 1000 BTU.

Water to steam expansion rate

1 pound of water is equal to a 16 oz tall boy (by volume)....when you heat that tall boy hot enough to make steam it expands almost 1700 times its original volume. That same pound of water becomes 67 CASES of tall boys!

Heating water with steam with a steam to water heat exchanger

$$\frac{\text{GPM}}{2} \text{ X Temperature rise X (1.10) = pounds per hour of steam}$$

Heating air with steam coils

$$\frac{\text{CFM}}{800} \text{ X Temperature rise in degrees Fahrenheit = pounds per hour of steam}$$

Natural gas fired boiler efficiency (typical average, standard eff)

80% Gas input x .80 = output

Typical hydronic hot water system design load (most HW systems will use a 20° F temp rise through the boiler or heat exchanger & a 20°F temp drop through hot water coils.)

BTU/Hr. = GPM X 500 X Temp Rise

Typical chilled water system design flow rates

2.4 GPM per ton (assuming 10°F difference between entering and leaving temperatures)

Evaporation rate of cooling tower condenser water

3 GPM per 100 tons

Condenser water flow rate requirement

3 GPM per ton

BTU per ton of cooling

12,000 BTU = 1 ton

Note: For many more helpful formulae, see "Tech Stuff" in the Technical Library on our website www.federalcorp.com.

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TECH TIP #52

ELECTRIC MOTOR DATA

AMPERE RATINGS, RESISTANCE LOADS
Single Phase

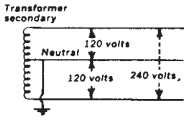
KW	120V.	208V.	240V.	277V.
.50	4.2	2.5	2.1	1.9
.75	6.3	3.7	3.2	2.8
1	8.4	4.9	4.2	3.7
2	16.7	9.7	8.4	7.3
3	25.0	14.5	12.5	10.9
4	33.4	19.3	16.7	14.5
5	41.7	24.1	21.0	18.1
6	50.0	28.9	25.2	21.7
7½	62.5	36.1	31.3	27.1
10	83.4	48.1	41.7	36.2
12	100.0	57.7	50.0	43.4
15	125.0	72.2	62.5	54.2
20	166.7	96.2	83.4	72.3
25	208.4	120.2	104.2	90.3
30	250.0	144.3	125.0	108.4
50	416.7	240.4	208.4	180.6
75	625.0	360.6	312.5	270.8
100	833.4	480.8	416.7	361.1

For kw ratings not listed, combine total of ratings. For example, for 24kw, 240 volts, single phase: 4kw 16.7 amps; 20kw = 83.4 amp. Total, 24kw = 100.1 amp.

AMPERE RATINGS, RESISTANCE LOADS
Three Phase

KW	208V.	240V.	480V.
1	2.8	2.5	1.3
2	5.6	4.9	2.5
3	8.4	7.3	3.7
4	11.2	9.7	4.9
5	13.9	12.1	6.1
6	16.8	14.5	7.3
8	22.4	19.4	9.8
10	27.8	24.1	12.1
12	33.4	29.0	14.5
15	41.7	36.2	18.1
20	55.6	48.2	24.1
25	69.5	60.3	30.2
30	83.4	72.3	36.2
50	139.0	120.5	60.3
75	208.5	180.7	90.4
100	278.0	240.9	120.5

For kw ratings not listed, combine total of ratings. For example, for 9kw, 240 volts, three phase: 4kw = 9.7 amp; 5kw = 12.1 amp. Total 9kw = 21.8 amp.

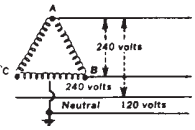


For single-phase light and power branch circuits

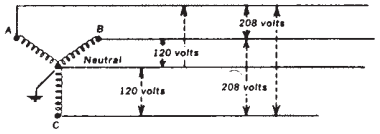
Single-phase, 3-wire

For three-phase power circuits and single-phase light and power branch circuits

Three-phase, 4-wire delta with one phase center tapped and grounded (Three-phase, 3-wire delta for power loads is used with a separate single-phase supply for lighting)

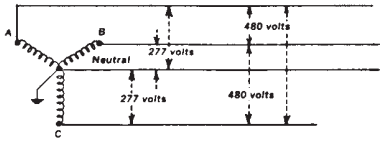


For three-phase power circuits and single-phase light and power branch circuits



Three-phase, 4-wire wye (or star) with grounded neutral rated 120/208 volts

For three-phase power circuits and lighting circuits using 277-volt ballasts. 120-volt lighting and receptacle loads are fed from this system through single-phase transformers rated 480/-120-240 volts or three-phase transformers rated 480/120-208 volts



Three-phase, 4-wire wye (or star) with grounded neutral rated 480Y/277.

MOTOR WIRING

3-phase Squirrel-cage Induction Motors

HP	230 Volts: Approx. Full-load Amp	230 Volts: * Copper Wire Size, Min AWG R,T	230 Volts: * Copper Wire Size, Min AWG RH	230 Volts: † Conduit Size, Inches R,T	230 Volts: † Conduit Size, Inches RH	230 Volts: ¶ Branch-circuit Fuse, Amperes	460 Volts: Approx. Full-load Amp	460 Volts: * Copper Wire Size, Min AWG R,T	460 Volts: * Copper Wire Size, Min AWG RH	460 Volts: † Conduit Size, Inches R,T	460 Volts: † Conduit Size, Inches RH	460 Volts: ¶ Branch-circuit Fuse, Amperes
1	3.6	14	14	½	½	15	1.8	14	14	½	½	15
1½	5.2	14	14	½	½	15	2.6	14	14	½	½	15
2	6.8	14	14	½	½	20	3.4	14	14	½	½	15
3	9.6	14	14	½	½	30	4.8	14	14	½	½	15
5	15.2	12	12	½	½	45	7.6	14	14	½	½	25
7½	22	10	10	¾	¾	70	11	14	14	½	½	35
10	28	8	8	¾	¾	80	14	12	12	½	½	45
15	42	6	6	1	1	125	21	10	10	¾	¾	60
20	54	4	6	1¼	1	175	27	8	8	¾	¾	80
25	68	3	4	1¼	1¼	200	34	8	8	¾	¾	100
30	80	1	3	1½	1¼	250	40	6	6	1	1	125
40	104	00	1	2	1½	350	52	4	6	1¼	1	175
50	130	000	00	2	2	400	65	3	4	1¼	1¼	200
60	154	4/0	000	2½	2	450	77	2	3	1¼	1¼	225

* The values given are for not more than three conductors in a raceway or cable, and having 60 C insulations, Types R, RW, RU, RUW, T and TW; or 75 C insulation: Types RH and RHW. For other conditions and insulations see the National Electrical Code.

† Conduit size for 3-phase squirrel-cage induction motors refers to three conductors in one conduit. Conduit size for single-phase and direct-current motors refers to two conductors in one conduit.

¶ The values given are for branch-circuit protection using fuses and full-voltage starting. For circuit breaker ratings, reduced-voltage starting, and motor overload protection, see National Electrical Code.

MOTOR WIRING

	HP	115 Volts: Approx. Full-load Amp	115 Volts: * Copper Wire Size, Min AWG R,T	115 Volts: * Copper Wire Size, Min AWG RH	115 Volts: † Conduit Size, Inches R,T	115 Volts: † Conduit Size, Inches RH	115 Volts: ¶ Branch-circuit Fuse, Amperes	230 Volts: Approx. Full-load Amp	230 Volts: * Copper Wire Size, Min AWG R,T	230 Volts: * Copper Wire Size, Min AWG RH	230 Volts: † Conduit Size, Inches R,T	230 Volts: † Conduit Size, Inches RH	230 Volts: ¶ Branch-circuit Fuse, Amperes
Single-phase Induction Motors	½	9.8	14	14	½	½	30	4.9	14	14	½	½	15
	¾	13.8	12	12	½	½	45	6.9	14	14	½	½	20
	1	16	12	12	½	½	50	8	14	14	½	½	25
	1½	20	10	10	¾	¾	60	10	14	14	½	½	30
	2	24	10	10	¾	¾	80	12	14	14	½	½	40
	3	34	6	8	1	¾	110	17	10	10	¾	¾	60
	5	56	—	—	—	—	—	28	8	8	¾	¾	90
Direct-current Motors	1	9.6	14	14	½	½	15	4.8	14	14	½	½	15
	1½	13.2	12	12	½	½	20	6.6	14	14	½	½	15
	2	17	10	10	¾	¾	30	8.5	14	14	½	½	15
	3	25	8	8	¾	¾	40	12.5	12	12	½	½	20
	5	40	6	6	1	1	60	20	10	10	¾	¾	30
	7½	58	3	4	1¼	1¼	90	29	8	8	¾	¾	45
	10	76	2	3	1¼	1¼	125	38	6	6	1	1	60
	15	112	00	0	2	1½	175	56	4	4	1¼	1¼	90
	20	148	4/0	000	2	2	225	74	2	3	1¼	1¼	125

* See note preceding page.

† Conduit size for 3-phase squirrel-cage induction motors refers to three conductors in one conduit. Conduit size for single-phase and direct-current motors refers to two conductors in one conduit.

¶ The values given are for branch-circuit protection using fuses and full-voltage starting. For circuit breaker ratings, reduced-voltage starting, and motor overload protection, see National Electrical Code.

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TECH TIP #53

DELTA CONTROLS CORPORATION

HOUSING AND ENCLOSURE RATING INFORMATION

RATINGS SHOWN ARE STANDARDS OF THE NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION

CLASS 1 **GENERAL PURPOSE**
For indoor use only; primarily utilized as protection against contact with the enclosed circuits. Commonly used on panel mounted recorded, meters, etc.

CLASS 3 **WEATHER RESISTANT**
(also known as "Weatherproof", "Splashproof", "Sleetproof") For outdoor use; protects enclosed components from wind-blown dust, rain, sleet and external icing. This enclosure is usually inadequate for protecting modern electronic instrumentation.

CLASS 4 **WATERTIGHT** (also known as "Hoseproof")
Similar to "3" above; but also passes the "Hose Test", which is described as: a 1 inch nozzle, delivering 65 gpm of water, from a distance of 10 feet, from all directions, for a 5 minute time period, no water leak to the interior is allowed. This enclosure is the one of choice for most general outdoor applications.

CLASS 4X **WATERTIGHT**
Same as "4" above; also constructed of corrosion resistant materials suitable for the corrosive conditions of the installed location. The generally preferred materials are polyester/glass, stainless steel, and epoxy coatings. This enclosure is the "standard" for protecting today's plant instrumentation.

CLASS 6 **SUBMERSIBLE**
Used for protection against temporary submergence to limited depths (a 15-foot spec is common). These enclosures should also be rated NEMA 4X for conditions at the installation site. Typical uses are in manholes, quarries, mines, etc.

CLASS 7 **EXPLOSIONPROOF (GASES)**
CLASS I is a location with an atmospheric mixture of flammable gases. The enclosure is intended to contain an explosion internally while the surrounding ambient gas-air mixture is not ignited. These enclosures should also be rated NEMA 4 so as to be suitable for instrument service.

DIVISION I is a location in which hazardous mixtures are expected during normal operations.

DIVISION II is a location in which the flammables are contained and escape only during a system rupture.

GROUP A: acetylene
GROUP B: hydrogen, manufactured gas or equivalent
GROUP C: ethyl ether, ethylene, cyclopropane, or equivalent
GROUP D: gasoline, hexane, naphtha, butane, alcohol, acetone, lacquer solvents, natural gas, and equivalents. Commonly used by oil refineries, petrochemical plants and sewage treatment plants.

CLASS 9 **EXPLOSION PROOF (DUSTS)**
CLASS II is a location hazardous because of combustible dusts. The enclosure excludes the dust from the internal power sources and ignition is thereby prevented. It also must not overheat when covered by a layer of the dust.

DIVISION I locations are where suspended combustible dusts are expected during normal operations.
DIVISION II locations are where normal operations cannot put the dust into atmospheric suspension.

GROUP E: Metal dusts, electrically conductive, such as those of aluminum, magnesium, and their alloys.
GROUP F: Other dusts, electrically conductive, such as those of carbon black, coal, and coke.
GROUP G: Dusts such as those of grain, flour, and starch.

CLASS 12 **INDUSTRIAL USE**
Intended for indoor use; provides protection against dust and dripping liquids; used in machine shops, etc.

CLASS 13 **INDUSTRIAL USE**
Similar to "12" above, but also provides protection against spraying oil, water, coolant, etc. Used for enhanced protection of electronic instruments in manufacturing plants and similar environments.

NOTE: The above information is intended only to generally describe the enclosures commonly used in our industry. Detailed rules and application information can be found in the current National Electrical code and in other governing authority publications; these must be followed for specific installations.

TECH TIP #54

HAYWARD®

Chemical Resistance Tables

The data in the following tables were obtained from numerous sources in the industry. The information is based primarily on the immersion of unstressed strips in the chemicals at ambient temperature and, to a lesser degree, on field experience. The end user should be aware of the fact that actual service conditions will affect the chemical resistance. It should be noted in the following charts that the "A" rating does not mean or imply that material will perform within original specification. The chemical resistance table should be used for reference only. It is the ultimate responsibility of the end user to determine the compatibility of the chemical being used in his or her particular application.

Chemicals	Ultem (GF 40%)	PVC	CPVC	PPL	PVDF	PVCGF (Fiberloc)	Teflon	Viton	EPDM	Nitrile (Buna N)	316 SS	416 SS	Titanium
Acetaldehyde		X	X	B	C	X	A	X	B	X	A	A	A
Acetaldehyde, Aq.	A	X	X	A	X	X	A	B	A				
Acetamide	A			A			A	C	A	A	A		
Acetate Solv., Crude		X	X	X	A	X							
Acetate Solv., Pure		X	X	X	A	X	A	X	C	X	A	A	
Acetic Acid 5%	A						A	A	A	B			
Acetic Acid 10%	A	A	A	A	A	A	A	X	B	B	A	A	B
Acetic Acid 20%	A	A	B	A	A	A	A	C	B	B	A	B	A
Acetic Acid 30%	A					A	A	C	A	B			
Acetic Acid 50%	A	A	A	A	A	A	A	C	B	A	A	C	
Acetic Acid 60%	A	A		B	A	A	A	C	C		A	X	
Acetic Acid 80%	A	B	B	C	A	C	A	C	B	C	A	X	
Acetic Acid, Glacial	C	X	X	B	B	C	A	X	B	X	A	X	B
Acetic Aldehyde							A	X	A	X			
Acetic Anhydride		X	C	B	B	X	A	X	C	C	A	X	B
Acetic Ester							A	X	B	X			
Acetic Ether							A	X	B	X			
Acetol							A						
Acetone	C	X	X	B	X	X	A	X	A	C	A	A	A
Acetonitrile	C	X		B	A	X	A	C	A	C	A		
Acetophenone				A	A		A	X	A	C	A		
Acetyl Acetone		X	X		X	X	A	X	A	X			
Acetal Benzene							A	X	A	X			
Acetyl Bromide					A		A						
Acetyl Chloride		X	X	A	A	X	A	C	X	C	A		
Acetal Oxide							A	X	B	C			
Acetyl Propane							A	X	B	X			
Acetylene		C	C	A	A	C	A	A	A	A	A	A	
Acetylene Dichl.							A	A		X			
Acetylene Tetrachl.							A	A	X	X			
Acid Mine Water		A	A	B	A	A	A	A					

Chemicals	Ultem (GF 40%)	PVC	CPVC	PPL	PVDF	PVCGF (Fiberloc)	Teflon	Viton	EPDM	Nitrile (Buna N)	316 SS	416 SS	Titanium
Acrylic Acid		X	X		A	X	A						
Acrylic Emulsions				X									
Acrylonitrile		X	X	B	A	X	A	X	X	C	C		
Adipic Acid, Aq.		A	A	A	A	A	A	A	A	A			
Air	A	A	A	A	A	A	A	A	A	A			
Alcohol						A	B	A	A				
Alcohol, Allyl		X	X	A	A	C	A	B	A	A		A	
Alcohol, Amyl		C	B	A	A	C	A	A	A	A	A		A
Alcohol, Benzyl		X	X	A	A	X		A	C	X	A		A
Alcohol, Butyl		C	A	A	A	C	A	A	A	A	A	A	A
Alcohol, Diacetone		X		C	B	X	A	X	A	C	A		A
Alcohol, Ether							A	B	A	C			
Alcohol, Ethyl	A	A	A	A	A	A	A	B	A	A	A	B	A
Alcohol, Hexyl		A		A		A	A	A	A	A	A		A
Alcohol, Isobutyl					A		A	A	A	B	A		A
Alcohol, Isopropyl		A	A	A	B	A	A	A	A	B	A		A
Alcohol, Methyl		A	X	A	A	A	A	X	A	A	A		A
Alcohol, Octyl								A		B	A		A
Alcohol, Polyvinyl		A	A	A		A	A	A	A				
Alcohol, Propargyl		A											
Alcohol, Propyl		A	A	A	A	A	A	A	A	A	A		A
Aldehyde							A	X	A	X			
Alkanes							A	A	X	A			
Alkazene							A	B	X	X			
Allyl Aldehyde							A	A		B			
Allyl Bromide							A	B		X			
Allyl Chloride		X			A	X	B	B	X	X	A		A
Allyl Trichloride							A	A		X			
Alum		A	A	A	A	A	A	A	A	A	A		A
Alum, Ammonium		X	X	A	A	C		A	A	A			
Alum, Chrome		A	A	A		A		A		A			

A = Excellent, no effect • B = Good, minor effect • C = Fair, data not conclusive, testing recommended • X = Not recommended
Ratings are based on testing at an ambient temperature of 70 F. Customer should test to determine application suitability.

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TECH TIP #54 (Cont.)

Chemicals	Ultem (GF 40%)	PVC	CPVC	PPL	PVDF	PVCGF (Fiberloc)	Teflon	Viton	EPDM	Nitrile (Buna N)	316 SS	416 SS	Titanium
Alum, Potassium		A	A	A	A	A	A	A	A	A			
Aluminum, Acetate							A	C	A	B			
Alum., Ammonium				A	A		A	A	A	B			
Aluminum, Bromide							A	A	A	A			
Aluminum, Chloride	A	A	A	A	A	A	A	A	A	A	C	X	C
Alum. Chlorohydr.							A						
Aluminum, Citrate													
Aluminum, Fluoride		A	A		A	C		A	A	A	C	X	C
Aluminum, Formate							A	X		X			
Alum. Hydroxide	A	A	A	A	A	C	A	C	A	A	A	A	A
Alum. Nitrate		A	A	A	A	A	A	B	A	A		A	
Alum. Oxychloride		A	A	A	A	A		X					
Alum. Phosphate							A	A	A	A			
Alum. Potassium		A	A	A	A	A	A	A	A	A		X	
Aluminum, Salts		A		A	A	A	A	A	A	A	X	X	
Aluminum, Sulfate		A	A	A	A	A	A	A	A	A	B	X	A
Amber Acid		A	A	A	A	A	A	A	A				
Amines		C			B	C	A	X		X	A	A	B
Ammonia 10%		A		A		A	A	A		X	A	A	A
Ammonia, Anhydrous		X	X	A	B	X	A	X	A	C	A	A	B
Ammonia, Aq. 25%		A	A	A	A	A						B	
Ammonia, Dry Gas		A	A	A		A	A	X	A	A		A	A
Ammonia, Liquid	C	X		A	A	X	A	X	A	B	A	A	
Ammonia. Nitrate		B	B	A	A	C		A	A	B	A	A	
Ammonium Ph. Mono		A		A		A	A	A	A	A	A	A	A
Ammonium Ph.Tri.		A		A		A	A	A	A	A	A	B	A
Ammonium Acetate		A	A	A		A	A	A	A	A			
Ammonium Alum							A			B			
Ammonium Bichrom.							A		A	A			
Ammonium, Bifluoride		A	A	A	A	A	A	A	A	B	A		
Ammonium Bisulfide		A			A	A							
Ammonium Carbonate		A	A	A	A	A	A	A	A	C	B	B	A
Ammonium Casenite											A		
Ammonium Chloride		A	A	A	A	A	A	A	A	B	B	C	A
Ammonium Dichromate		A				A	A		A	A			
Ammonium, Fluoride							A			B			
Ammonium, Fluoride 10%		A	A	A	A	C	A	A	A				
Ammonium, Fluoride 20%		A		A	A	C	A	A	A				
Ammonium, Fluoride 25%		X	X	A	A	X							
Ammonium, Hydroxide	X	A	X	A	A	A	A	B	A	B	A	A	A
Ammon. Metaphosph.		A	A	A	A	A	A	A	A	A			

Chemicals	Ultem (GF 40%)	PVC	CPVC	PPL	PVDF	PVCGF (Fiberloc)	Teflon	Viton	EPDM	Nitrile (Buna N)	316 SS	416 SS	Titanium
Ammonium, Nitrate		B	B	A	A	A		A	A	A	A	A	
Ammonium, Oxalate										A	A		
Ammonium, Persulfate		A	A	C	A	A	A	C	B	C	A	A	A
Ammonium, Phosphate	A	A	A	A	A	A	A	A	A	A		A	
Ammonium, Ph. Di Basic		A	A	A		A	A	A	A	A	A	A	A
Ammonium, Ph. Mono.			A	A		A		A		A	C	B	A
Ammonium, Ph. Tri.			A	A		A		A		A	A	A	A
Ammonium, Salts		A		A	A	A	A	C	A	A	X		
Ammonium, Sulfate	A	A	A	A	A	A	A	C	A	B	B	B	A
Ammonium, Sulfide		A	A	A	A	A	A	C	A	A			
Ammonium, Thiocyan.		A	A	A		A	A	A	A	A			
Ammonium, Thiosulf.							A	A	A	A	A		A
Amyl Acetate		X	X	X	C	X	A	X	A	C	A		X
Amyl Alcohol		C	B	A		C	A	A	A	A	A		C
Amyl Borate					A		A	A	X	A			
Amyl Bromide							A	B	X	X			
Amyl Chloride		X	X	X	A	X	A	A	X	X	B	C	C
Aniline		X	X	A	C	X	A	B	B	X	A	B	B
Aniline Chlorohydrate		X				X							
Aniline Hydrochloride		X	X	A	A	X	A	B	B	C		X	
Anthraquinone Sulf. Ac.		A	A	A	A	A		A					
Anti-Freeze	C	A		A		A	A	A	A	A	A		
Antichlor							A	A	A	A			
Antimony Chloride				A	A		A	A		X			
Antimony Pentachloride							A			X			
Antimony Trichloride		A		A	A		A	A	A	A		X	
Aqua Regia		X	X	X	A		A	C	C	C	X	X	B
Argon							A	A	A	C			
Arochlor								A		X			
Aromatic Hydrocarbons		X	X			X		A	X	X	A		
Arsenic Acid		A	A	A	A	A	A	A	A	B	B	B	
Arsenous Acid													
Aryl Supfonic Acid		X	X	X	X								
Asphalt		X	X	A	A	X	A	A	X	B	A	B	
Aviation Fuel							A						
Aviation Turbine Fuel							A						
Baking Soda							A	A	A	A		A	
Barium Acetate													
Barium Carbonate		A	A	A	A	A	A	A	A	A	B	B	A
Barium Chloride		A	A	A	A	A	A	A	A	A	B	B	A
Barium Cyanide								A		C	A		

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Ratings are based on testing at an ambient temperature of 70 F. Customer should test to determine application suitability.

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TECH TIP #54 (Cont.)

Chemicals	Ultem (GF 40%)	PVC	CPVC	PPL	PVDF	PVCGF (Fiberloc)	Teflon	Viton	EPDM	Nitrile (Buna N)	316 SS	416 SS	Titanium
Barium Hydrate							A	A	A	A			
Barium Hydroxide		A	A	A	A	A	A	A	A	A	A	B	B
Barium Nitrate		A	A	A		A	A	A		A	A	A	A
Barium Salts		A		A	A	A	A	A	A	A	A		
Barium Sulfate		A	A	A	A	A	A	A		A	A	B	A
Barium Sulfide		A	A	A	A	A	A	A	A	A	A	B	
Beer		A	A	A	A	A	A	A	A	C	A	A	A
Beet Sugar Liquid		A	A	A		A	A	A	A	A	A	A	
Beet Sugar Liquors		A	A	A	A	A	A	A	A	A		B	
Benzaldehyde		X	X	C	C	X		C	C	X	A		A
Benzalkonium Chl.		A											
Benzene	C	X	X	C	B	X	A	B	X	C	B	B	A
Benzene Sulf Ac .		X	X	X	B	X	A	A	X	C			
Benzene Sulf. Ac. 10%		X	X	X	B	X	A	A					
Benzil Chloride							A	A	X	X			
Benzoic Acid		A	A	A	A	A	A	A	B	X	B	B	A
Benzyl Alcohol	X			A			A	A	B	C			
Benzyl Benzoate							A	A	C	X			
Benzyl Chloride				A	X		A	X	X	X			
Bismuth Carbonate		A	A	A	A	A	A	A	A	A			
Black Liquor		A	A	A	A	A	A	A	B	A			
Bleach		A	A	A	A	A	A	A	A	X			
Borax		A	A	A	A	A	A	A	A	A	A	A	A
Boric Acid		A	A	A	A	A	A	A	A	B	B	B	A
Brake Fluid	C						A	X	A	C			
Brewery Slop								A		A	A		
Brine		A	A	A	A	A	A	A	A	A			
Brine Acid		A	A	A	A	A	A	A	A	A			
Bromic Acid		A	A	X	A	A	A	A	B				
Bromine Dry							A	A	X	X		X	
Bromine Gas		C		X	A	C	A	A	X	X		X	
Bromine Liquid, Br		X	X	X	A	X	A	A	X	X		X	
Bromine Water		X	C	C	A	X	A	A	X	C	X	X	A
Bromobenzene		X				X	A	A	X	C			
Bromotoluene		X		X		X							
Butadiene Gas		B	A	A	A	C	A	A	X	X	A	A	
Butane		A	A	A	A	A	A	A	X	A	A	A	
Butanediol		A	B		A	A		A	X				
Butanol							A				A		
Butter							A	A		A	A	A	
Buttermilk							A	A		A	A	A	

Chemicals	Ultem (GF 40%)	PVC	CPVC	PPL	PVDF	PVCGF (Fiberloc)	Teflon	Viton	EPDM	Nitrile (Buna N)	316 SS	416 SS	Titanium
Butyl Acetate	C	X	X	C	B	X	A	X	B	C	C	B	
Butyl Acrylate Pure		X	X	X	A	X	A	X	A				
Butyl Acrylate Satur.								X	A				
Butyl Amine		X	X	X	B	X	A	X	X	C			
Butylbenzene							A	A		X			
Butyl Benzoate							A	A	A	X			
Butyl Bromide					A		A	B		X			
Butyl Butyrate							A	C	B	X			
Butyl Carbitol							A	A	A	C			
Butyl Cellosolve		A	X		A	A	A	X	B	C			
Bufyl Chloride					A		A	A		X			
Butyl Diol		B	A	A	A	C	A	A	A				
Butyl Ether		X	X	X	A	X	A	X	X	B			
Butyl Formate							A			X			
Butyl Hydrate							A	A	B	A			
Butyl Hydride							A	A	X	A			
Butyl Hydroxide							A	A	B	A			
Bufyl Mercaptan		X			A	X	A						
Butyl Phenol		C	A	A	A	C							
Butyl Phthalate		X	X	A	A	X	A	C	B	X			
Butyl Stearate					A		A	A	B	B			
Butylene		A	A	X	A	A	A	A	X	B	A		
Butyraldehyde							A	X	B	X			
Butyric Acid		X	B	A	A		A	B	B	X	B	C	A
Cadmium Cyanide		A	A			A		A					
Cadmium Salts				A	A		A	A					
Caffeine Citrate		A			A		A						
Calamine							A	A		B			
Calcium Acetate		A	A	A	A	A	A	X	A	B			
Calcium Bisulfide		A	A	A	A	A	A	A	X	A	B		A
Calcium Bisulfite		A	A	A	A	A	A	A	X	A		X	
Calcium Carbonate		A	A	A	A	A	A	A	A	A	A	A	A
Calcium Chlorate		A	A	A	A	A	A	A	A	A	A		
Calcium Chloride		A	A	A	A	A	A	A	A	A	B	B	A
Calcium Cyanide							A		A	A			
Calcium Hydroxide	A	A	A	A	A	A	A	A	A	A	A		A
Calcium Hypochloride							A	A	A	X			
Calcium Hypochlorite	A	A	A	B	A	A	A	A	A	B	X	X	B
Calcium Nitrate		A	A	A	A	A	A	A	A	B			
Calcium Oxide		A			A	A	A		A	A			
Calcium Phosphate							A	A	A	A			

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TECH TIP #54 (Cont.)

Chemicals	Ultem (GF 40%)	PVC	CPVC	PPL	PVDF	PVCGF (Fiberloc)	Teflon	Viton	EPDM	Nitrile (Buna N)	316 SS	416 SS	Titanium
Calcium Sulfate		A	A	A	A	A	A	A	A	A	B		A
Calcium Sulfide		A	A	A	A	A	A	A	A	A			
Calcium Thiosulfate							A	A	A	B			
Calgon				C	A		A	A		A	A		
Cane Sugar Liquors		A	A	A	A	A	A	A	A	A	A		
Caprylic Acid					A		A			C			
Carbinol							A	X	A	A			
Carbolic Acid			A	A						C	A		B
Carbon Bisulfide		X	X	X	A	X	A	A		X	C		
Carbon Dioxide		A	A	A	A	A	A	A	B	A	A	A	A
Carbon Disulfide		X	X	X	A	X	A	A	X	C	A	B	
Carbon Monoxide		A	A	A		A	A	A	A	A	A	A	
Carbon Tetrachloride	A	X	X	X	A	X	A	B	X	C	A	A	A
Carbonic Acid		A	A	A	A	A	A	A	A	B	B	B	
Casein					A		A	A	A	A			
Castor Oil		A	C	A	A	A	A	A	B	A			
Catsup		A	A	A		A		A		A	A		
Caustic Lime							A	B	A	A			
Caustic Potash		A	A	A	A	A	A	X	A	A		B	
Caustic Soda		A	A	A	A	A	A	B	A	C		C	
Cellosolve	C	B		A	A		A	C	B	C			
Chloral Hydrate		A	A	A	A	A		A		C			
Chlorasetic Acid		A		X			A	X	B	X	X	X	A
Chloric Acid		A			A		A			X	X	X	
Chloric Acid 20%		A	A	X	A	A							
Chlorinated Glue								A	B	C	A		
Chlorine Dioxide		A	A	C	A	A	A	A	X				
Chlorine, Dry							A	C	B	X	A		X
Chlorine Gas, Dry	A	X	X	X	A	X	A	B	X	C			
Chlorine Gas, Wet	C	X	X	X	A	X	A	C	X	C			
Chlorine, Liquid		X	X	X	A	X	C			C			
Chlorine Water		A	A	C	A	A	A	A	B	C	X	X	A
Chlorosulfonic,Acid		X	X	X	C	X	A	X	X	X	X	X	A
Chlorox Bleach 5.5%	A	A	A	C	A	A	A	A	B	C	A		
Chocolate Syrup				A				A		A	A	A	
Chresylic Acid 50%		A			B			A		X	A		
Chrome Alum		A	A	A	A	A		A		A			
Chromic Acid 5%	A	A		X		A		A	A	X	A		A
Chromic Acid 10%	A	A	A	B	A	A	A	A	B	X			A
Chromic Acid 20%		B	B	X	A	C	A	B	B	C			A
Chromic Acid 30%		B	B	X	A	C	A	A		X			A

Chemicals	Ultem (GF 40%)	PVC	CPVC	PPL	PVDF	PVCGF (Fiberloc)	Teflon	Viton	EPDM	Nitrile (Buna N)	316 SS	416 SS	Titanium
Chromic Acid 50%	C	X	X	X	A	X	A	A	B	X	X		A
Chromium Alum		A	A	A	A	A	A	A	A				
Citric Acid	A	A	A	A	A	A	A	A	A	B	A		A
Citric Oils				A			A	A	B	A	A		
Cobalt Chloride							A	A	A	A			
Coconut Oil		A	A	A	A	A	A	A	B	A			
Cod Liver Oil							A	A	A	B			
Coffee			A	A				A	A	A	A		
Coke Oven Gas		X	A	A	A	X	A	A	A	X			
Cola Concentrates				A									
Copper Acetate		A	A	A	A	A	A	X	A	B			
Copper Borofluoride		A	A	A	A	A	A	A	A				
Copper Carbonate		A	A	A	A	A	A	A	A	X			
Copper Chloride		A	A	A	A	A	A	A	A	A	B	B	A
Copper Cyanide		A	A	A	A	A	A	A	A	B	A	B	A
Copper Fluoborate		A			A	A	A		B	X			
Copper Fluoride		A	A	A	A	A	A	A					
Copper Nitrate		A	A	A	A	A	A	A	A	A	B	B	A
Copper Salts		A	A	A	A	A	A	A	A				
Copper Sulfate		A	A	A	A	A	A	B	A	B	A		A
Copper Sulfate 5%		A		A		A	A	A		A	A	B	A
Corn Oil		A	A	A		A	A	A	B	A			
Corn Syrup		A	A	A	A	A	A	A	B	A			
Cottonseed Oil		A	A	A	A	A	A	A	B	B			
Cream			A	A				A		A	A		
Creosol		X	X	C	C	X	A	A	X	X	A		
Creosote		X	X			X	A	A	X	B			
Cresols		X	X	C	A	X	A	A	X	X	A		
Cresylic Acid		C	C	A	A		A	A	X	X	A	A	A
Croton Aldehyde		X	X	A	C	X	A	A	B				
Crude Oil		A	A	A	A	A	A	A	X	X	A	B	
Cryolite		B	B	A	A		A	A	A	B			
Cupric Cyanide													
Cupric Fluoride		A	A	A	A	A	A	A	A				
Cupric Nitrate							A	A	A	A			
Cupric Salts		A		A	A	A	A	A	A		X		
Cupric Sulfate		A	A	A	A	A	A	A	A	A			
Cutting Oil							A	A	X	A			
Cyanic Acid							A		A	A			
Cyclohexane	A	X	X	X	A	X	A	A	X	C			A
Cyclohexanol		X	X	A	C	X	A	A	B	B			

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TECH TIP #54 (Cont.)

Chemicals	Ultem (GF 40%)	PVC	CPVC	PPL	PVDF	PVCGF (Fiberloc)	Teflon	Viton	EPDM	Nitrile (Buna N)	316 SS	416 SS	Titanium
Cyclohexanone		X	X	B	C	X	A	X	C	C			
Decalin		X	X	A	A	X	A	A	X	X			
Decanal							A	X		X			
Decane					A		A	A	X	B			
Detergents		A	A	B	A	A	A	A	A	A	A		
Detergents, Heavy Duty		A	A	A	A	A							
Developers							A			A			A
Dextrin		A	A	A	A	A	A	A	A				
Dextrose		A	A	A	A	A	A	A	A	A			
Diacetone Alcohol		X	X	A	B	X	A	X	A	X			
Diallyl Phthalate													
Diazo Salts		A	A	A	A	A							
Dibenzyl Ether					A		A		C				
Dibutyl Amine					A		A	C	X	C			
Dibutyl Ether					A		A	C	C	C			
Dibutyl Phthalate		X	X	B	A	X	A	B	A	X			
Dibutyl Sebacate		B			A		A	C	B				
Dicalcium Phosphate													
Dichlorethane	X	X				X	A	C			A		
Dichloro Benzene		X				X	A	B	X	X			
Dichlorobenzene	X	X	X		A	X	A	A	X	X			
Dichloroethylene		X		X	A	X	A	A	X	X			
Dichloroisopropyl Ether					A								
Dichloromethane	X						A	B	X	X			
Diemethyl Phthalate													
Diesel Fuel	A	A	A	B	A	A	A	A	X	A	A		
Diethanolamine													
Diethyl Cellosolve					A				X				
Diethyl Ether		X	X	B	A	X	A	C	C	X		A	
Diethyl Ketone							A	X	B	X			
Diethyl Oxide							A	X	X	B			
Diethylamine		X	X	A	C	X	A	X	B	B			
Diethylbenzene							A	A	X	X			
Diethylene Glycol	A		A	A			A	A		A	A		
Diethylenetriamine					A		A			B			
Diglycolic Acid		A	A	A	A	A	A	A	A				
Diisobutyl Ketone					A			X	X				
Diisobutylene					A		A	A	X				
Diisooctyl Phthalate	A						A	B	B				
Diisopropyl Ketone					B		A	X	B				
Dimethyl Amine		X	X	A	B	X	A	X	C	B			

Chemicals	Ultem (GF 40%)	PVC	CPVC	PPL	PVDF	PVCGF (Fiberloc)	Teflon	Viton	EPDM	Nitrile (Buna N)	316 SS	416 SS	Titanium
Dimethyl Benzene							A	A	X	X			
Dimethyl Ether							A	B	B	B			
Dimethyl Formamide	X	X	X	A	A	X	A	C	B	B			
Dimethyl Ketone							A	X	A	X			
Dimethyl Phthalate					B		A	B	B	X			
Dimethylamine		X	X	A	X	X		X	X				
Dioctyl Phthalate		X	X	X	A	X	A	A	B	X			
Dioxane	X	X	X	B	X	X	A	X	B	X			
Dioxolane					X			X	X				
Diphenyl							A	A	X	X			
Diphenyl Ether													
Diphenyl Oxide								A	X	X			
Dipropylene Glycol							A	A		A			
Disod.Methylarsonate													
Disodium Phosphate		A	A	A	A	A	A		A	A			
Distilled Water		A	A	A	A	A							
Divinylbenzene		X	X	X	X	X							
Dolomite							A	A	B	A			
Dowtherm													
Dry Cleaning Solvents						X	A	A	X	A			
Epichlorohydrin		X	X	A	A		A	X	X				
Epsom Salt		A		A	A	A	A	A	A	A	A		A
Esters		X	X	C	A	X	A						
Ethane							A	A	X	A	A		A
Ethanol	A	A	A	A	A	A	A	B	A	A	A	B	A
Ethanolamine		X	X	X	X	X	A	X	A	B	A	A	
Ethers		X	X	C		X	A	C	C	X	A	B	
Ethyl Acetate	C	X	X	C	A	X	A	X	B	X	A	B	
Ethyl Acetoacetate		X	X		A	X	A	X	A	X			
Ethyl Acrylate	C	X	X	X	A	X	A	X	B	X			
Ethyl Alcohol		A	A	A	A	A	A	B	A	A	A	B	A
Ethyl Benzene					A		A	A	X	X			
Ethyl Benzene													
Ethyl Bromide				X									
Ethyl Butyrate													
Ethyl Cellosolve													
Ethyl Chloride		X	X	X	A	X	A	A	A	B	A	A	A
Ethyl Ether	A	X	X	B	A	X	A	C	X	X			
Ethyl Formate							A	B	B	X			
Ethyl Hexanol					A		A	A	A	B			
Ethyl Sulfate							A	X		C	X		

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TECH TIP #54 (Cont.)

Chemicals	Ultem (GF 40%)	PVC	CPVC	PPL	PVDF	PVCGF (Fiberloc)	Teflon	Viton	EPDM	Nitrile (Buna N)	316 SS	416 SS	Titanium
Ethylcellulose													
Ethylene Bromide		X	X	C	A	X	A	B	C	X			
Ethylene Chloride		X	X	C	A	X	A	A	C	X	A	A	B
Ethylene Chlorohydrin		X	X	A	A	X	A	A	A	X			
Ethylene Diamine	X	X	X	A	C	X	A	X	A	A			
Ethylene Dichloride		X	X	C	A	X	A	A	X	X	A	A	A
Ethylene Glycol	A	A	C	A	A	A	A	A	A	A	A	B	
Ethylene Oxide		X	X	X	A	X	A	X	X	X	A		
Extrin		A	A	A	A		A	A	A				
Fatty Acids		A	B	A	A	A	A	A	X	B	A	B	A
Ferric Acetate		B				B	A	X		X			
Ferric Chl. Anhydrous		A	A	A	A	A	A	A	A	B	X	X	A
Ferric Hydroxide		A	A	A		A	A	C	A				
Ferric Nitrate		A	A	A	A	A	A	A	A	A	B	B	A
Ferric Sulfate		A	A	A	A	A		A	A	B	B	B	A
Ferrous Chloride		A	A	A	A	A	A	A	A	B	X	X	A
Ferrous Nitrate		A	A	A	A	A	A	A	B	A			
Ferrous Sulfate		A	A	A	A	A	A	A	A	A	C	B	A
Fish Solubles		A	A	B		A							
Fluoboric Acid	B	A	A	A	A	A		A	A	B	B		X
Fluorine Gas (Wet)		A	A	B	A	C	A	A	A	X			
Fluorine Liquid		C		X	A	X	B	B	C	X	X		X
Fluosilicic Acid 25%		A	A	A	A		A	A	A	A	B	C	X
Formaldehyde	A	X	A	A	A	B	A	B	B	B	A	B	A
Formaldehyde 35%		A	A	A	A	A	A	A	A			B	
Formaldehyde 50%		A	A	A	A	A	A	B	X				
Formic Acid	B	A	A	A	A	A	A	X	A	C	B	B	C
Freon 11		X	A	A	A	X	A	B	X	B	A	A	
Freon 113		A			A	A	A	B	X	A	A	A	
Freon 114		A			A	A	A	A	C	A			
Freon 12		C	A	A	A	C	A	B	A	B	A	A	
Freon 12 (Wet)		B		A		C	A	A	B	A	X	A	
Freon 22		X	X	A	A	X	A	X	B	X	A	A	
Freon TF	A	B	B	X		C	A	B	X	A	A	A	
Fructose		A	A	A	A	A	A	A	A	A	A		
Fruit Juice		A	A	A	A	A	A	A		A	A		
Fruit Pulp		A	A	A	A	A		A					
Fuel Oil		B		B	A	C	A	A	X	A	A		A
Fumaric Acid							A	A		A			
Furan							A	X	X				
Furfural (Ant Oil)		X	X	C	B	X	A	X	B	X	A	A	

Chemicals	Ultem (GF 40%)	PVC	CPVC	PPL	PVDF	PVCGF (Fiberloc)	Teflon	Viton	EPDM	Nitrile (Buna N)	316 SS	416 SS	Titanium
Furfuryl Alcohol				B		A	X	C					
Gallic Acid		A	A	A	A	A	A	A	A	A	A	B	
Gas, Natural		A	A	A	A	A		A	X	A			
Gasoline, Leaded	A	A	X	X	A	A	A	B	X	A	A	A	X
Gasoline, Sour		A	B	X	A	A	A	A	X	A	A	A	X
Gasoline, Unleaded	A	C	X	X	A	C	A	B	X	A	A	A	X
Gelatin		A	A	A	A	A	A	A	A	A	A	A	
Gin		A	A	A	A	A	A	A	A				
Gluconic Acid 50%													
Glucose		A	A	A	A	A	A	A	A	A	A	A	
Glue		A	A	A	A	A	A	A	B	A	A	A	A
Glycerin	A	A	A	A	A	A	A	A	A	A	A	A	A
Glycerol		A	A	A	A	A	A	A	A	A			
Glycolic Acid		A	A	A	A	A	A	A	A	A			
Glycols		A	A	A	A	A	A	A	A	A			
Glyoxal								A					
Gold Monocyanide								A		A	A		
Grape Juice		A	A			A		A		A	A		
Grape Sugar		A	A	A	A	A	A	A	A	A			
Grease		A		A	A	A	A	A	X	B	A		
Green Liquor		A	A	A	A	A	A	A	A	B			
Helium							A	A	A	A			
Heptane		A	A	B	A	A	A	A	X	A	A		
Hexane	A	X	A	B	A	X	A	A	X	A	A		
Hexene							A	A	X	A			
Hexyl Alcohol		A	A	A	A	A	A	A	B				
Honey		A		A	A	A	A	A		A	A		
Hydraulic Oil	A						A	A	X	A			
Hydraulic Oil (Synth.)				X		C		A		C	A		
Hydrazine		X	X	X	X	X	A	X	A	C	A		
Hydrobromic Acid		A	A	B	A	A	A	A	A	X	X	X	A
Hydrobromic Acid 20%		A	A	A	A	A	A	A	A	X	X	X	A
Hydrobromic Acid 50%		A	A	B	A	A	A	A	A	X	C	X	X
Hydrochloric Acid	A	A					A		A		A		
Hydrochloric Acid 10%	A	A	A	A	A	A	A	A	A	B		X	C
Hydrochloric Acid 20%	A	A	A	A	A	A	A	A	A	B	X	X	C
Hydrochloric Acid 25%	A	A	A	A	A	A	A	A	A	C		X	
Hydrochloric Acid 37%	A	A		A	A	A	A	A	C	C	X	X	C
Hydrocyanic Acid		A	A	A	A	A	A	A	A	B	A	B	A
Hydrocyanic Acid 10%		A	A	A	A	A	A	A	A	B	X	X	
Hydrofluoric Acid 10%		A	A	A	A	C	A	A	A	B		X	

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Ratings are based on testing at an ambient temperature of 70 F. Customer should test to determine application suitability.

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TECH TIP #54 (Cont.)

Chemicals	Ultem (GF 40%)	PVC	CPVC	PPL	PVDF	PVCGF (Fiberloc)	Teflon	Viton	EPDM	Nitrile (Buna N)	316 SS	416 SS	Titanium
Hydrofluoric Acid 20%		A		A		C	A	A	A	X	X	X	X
Hydrofluoric Acid 30%		A	A	A	A	C	A	A	A			X	
Hydrofluoric Acid 40%		B	X	A	A	C	A	A	A			X	
Hvdrofluoric Acid 50%	A	X	X	A	B	X	A	A	A	C	X	X	X
Hydrofluoric Acid 65%							A	A	B	X		X	
Hydrofluoric Acid 75%		X	C	A	A	X	A	A	X	X	X	X	
Hydrofluosilic Acid		A	A	A	A	A	A	A	A	A	X	X	A
Hydrofluosilicic Acid 20%		A	A	A		A	A	A	A	B	X	X	X
Hydrogen		A	A	A	A	A	A	A	A	A	A	A	
Hydrogen Chl. Gas Dry				A	A							X	
Hydrogen Cyanide		A	A	A	A	A	A	A	A	B		C	
Hydrogen Fluoride		X	X	A	A	X						C	
Hydrogen Peroxide 5%		A	X	A	A	A	A	A	A			B	
Hydrogen Peroxide 10%		A	A	A	A	A	A			A	C	B	C
Hydrogen Peroxide 30%	A	A	X	C		A	A	A	B	X	B	B	B
Hydrogen Peroxide 50%		B	B	A	A	C	A	A	C	X		C	
Hydrogen Peroxide 90%		X	X	X	A	C	A	B	C	X		X	
Hydrogen Peroxide		A		A	A	A	A	A	B	C	B	B	B
Hydrogen Phosphide		X	A	A	A	C				C			
Hydrogen Sulfide		A		A	A	A	A	A	A			C	
Hydrogen Sulf. (Aq. Sol.)		A	A	A		A	A	C	A	C	A	C	A
Hydrogen Sulfide (Dry)		A	A	A	A	A	A	A	A	A	A	C	
Hydroquinone		A	A	A	A	A	A	A	A	X			
Hydroxyacetic Acid			A					A		A			A
Hydroxyacetic Acid 70%		A	A			A		A	A	A			B
Hydroxylamine Sutfate		A	A	A	A	A			A				
Hypochlorous Acid		A	A	A	A	A	A	B	B	X	X		
Ink				A	A					A	A		
Iodine Solution	A	X	A	C	A	X	A	A	A	C	X	X	A
Isobutyl Alcohol	A				A		A	A	A				
Isooctane		A	A	A	A	A	A	A	X	A			
Isophorone		X	X			X		X	X				
Isopropyl Acetate							A	X	B	X	B		
Isopropyl Alcohol		A	A	A	B	A	A	A	A	B	A		A
Isopropyl Ether		X	X	C	A	X	A	X	X	B	A		
Jet Fuel JP-3				A			A	A	X	A	A	A	
Jet Fuel JP-4		A	A	C	A	A	A	A	X	B	A	A	
Jet Fuel JP-5	A	A	A	C	A	A	A	A	X	A	A	A	
Kerosene	A	A	A	A	A	A	A	A	X	A	A	A	A
Ketones		X	X	A	A	X	A	X	C	X	A		A
Kraft Liquor		A	A	A	A	A							

Chemicals	Ultem (GF 40%)	PVC	CPVC	PPL	PVDF	PVCGF (Fiberloc)	Teflon	Viton	EPDM	Nitrile (Buna N)	316 SS	416 SS	Titanium
Lacquer				A			A	X	X	X	A		
Lacquer Thinner		C		B		C	A		A	X	A		A
Lactic Acid	A	A	A	A	A	A	A	B	B	B	A	C	B
Lard	A	A	A	A	A	A	A	A	C	A	A	A	
Lard Oil		A	A	A	A	A	A	A	A				
Latex				A			A	A	B	B	A	A	
Lauric Acid		A	A	A	A	A	A						
Lauryl Chloride		A	A	A	A	A	A						
Lead Acetate		A	A	A	A	A	A	C	A	B	B	B	A
Lead Chloride		A	A	A	A	A	A	A	A				
Lead Nitrate		A	A	A		A	A	A	A	A		B	
Lead Sulfate		A	A	A	A	A	A	A	A	A			
Lemon Oil		A	A	X	A	A	X						
Levulinic Acid													
Ligroin		X	X	C	A	X		A	C	A	A		
Lime (Calcium Oxide)		A		A		A	A	A	C	A	A		A
Lime - Sulfur Solution		A	A	A	A	A				X		B	
Linoleic Acid		B	A	A	A	C	A	B	X	B		A	
Linseed Oil		A	A	A	A	A	A	A	B	A		A	
Lithium Bromide		A			A	A	A	A		A			
Lithium Chloride						A						X	
LPG							A						
Lubricants		A		A		A	A	A		A	A	A	A
Lubricating Oil		A	A	A	A	A	A	A				A	
Lye Solution													
Machine Oil		A	A	A	A	A	A	A					
Magnesium Acetate							A	X		X			
Magnesium Carbonate		A	A	A	A	A	A	A	B	A	A	A	
Magnesium Chloride		A	A	A	A	A	A	A	A	A	B	B	A
Magnesium Citrate		A	A	A	A	A	A	A	A				
Magnesium Hydroxide		A	A	A	A	A	A	A	A				
Magnesium Nitrate		A	A	A	A	A	A	A	B	A	A	A	A
Magnesium Oxide							A	A	A	A	A	B	
Magnesium Sulfate		A	A	A	A	A	A	A	C	A	A	A	A
Maleic Acid		A	A	A	A	A	A	A	C	X	A	A	A
Maleic Anhydride								A		X			
Malic Acid		A	A	A	A	A	A	A	X	A	A	B	A
Manganese Sulfate		A	A	A		A	A	A	A	A			
Mash										A	A		
Mayonnaise				A			A	A		A	A		
Melamine										C	X		

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TECH TIP #54 (Cont.)

Chemicals	Ultem (GF 40%)	PVC	CPVC	PPL	PVDF	PVCGF (Fiberloc)	Teflon	Viton	EPDM	Nitrile (Buna N)	316 SS	416 SS	Titanium
Mercuric Chloride		A	A	A	A	A	A	A	A	A	X	X	A
Mercuric Cyanide		A	A	A	A	A	A	A	B	A	A	X	A
Mercuric Nitrate							A	A	A			A	
Mercuric Sulfate		A	A	A	A	A	A	A	A	A			
Mercurous Chloride													
Mercurous Nitrate		A	A	A	A	A	A	A	A				
Mercury		A	A	A	A	A	A	A	A	A	A	A	B
Methacrylic Ac.Glacial		X											
Methane		A	A	A	A	A	A	A	C	A		A	
Methane Sulfonic Ac.					A		A						
Methanol	A	A	X	A	A	A	A	X	A	A	A		A
Methoxyethyl Oleate		A				A							
Methyl "Cellosolve"		X	X	A	A	X		X	B	X			
Methyl Acetate		X	X	B	A	X	A	X	B	X	A		
Methyl Acetone							A	X		X	A		
Methyl Acrylate					A		A	X	B	X	A		
Methyl Alcohol		A	A	A	A	A	A	C	A	A		B	
Methyl Benzene							A	A	X	X			
Methyl Bromide		X	X	X	A	X	A	A	C	X			
Methyl Butanol							A	B		A			
Methyl Butyl Ketone							A	X	B	X	A		
Methyl Chloride		X	X	X	A	X	A	C	C	C	A	B	A
Methyl Chloroform		X	X	C	A	X	A	B	X				
Methyl Ether							A	C	C	B			
Methyl Ethyl Ketone	C	X	X	C	X	X	A	X	A	X	A		A
Methyl Formate								X	A				
Methyl Isobutyl Alcohol										X			
Methyl Isobutyl Carbinol							A	A	A				
Methyl Isobutyl Ketone		X	X	C	A	X	A	X	B	X	A		A
Methyl Isopropyl Ketone		X	X	B	A	X	A	X	C	X	A		
Methyl Methacrylate	C	A					A	X	X	X			
Methyl Propanol							A	A	B	A			
Methyl Salicylate		A	A	A	A	A							
Methyl Sulfate		B	A	A	A	C							
Methylamine		X	X	X	C	X	A		A	B	A		
Methylene Bromide		X			X	X							
Methylene Chloride		X	X	X	C	X	A	B	X	X	A	B	A
Methylene Iodine		X			C	X	A	A					
Methylhexane							A	A	X	A			
Methylisobutyl Carb.		A	A	A	A	A		A	A				
Methylmethacrylate					A		A	X	X				

Chemicals	Ultem (GF 40%)	PVC	CPVC	PPL	PVDF	PVCGF (Fiberloc)	Teflon	Viton	EPDM	Nitrile (Buna N)	316 SS	416 SS	Titanium
Methylsulfuric Acid		A	A	A	A	A	A						
Milk	B	A	A	A	A	A	A	A	A	A	A	A	
Mineral Oil	A	B	A	A	A	A	A	A	X	A		A	
Molasses		A	A	A		A	A	A	C	A	A	A	
Monochlorocetic Acid		A	A	B	A	A	A	B	C			X	
Monochlorobenzene				B	A		A	A	X				
Monoethanolamine		X			X	X	A	A	A	A		A	
Morpholine							A				A		
Motor Oil	A	A	A	C	A	A	A	A	X	A			
Mustard		A	A	A		A		A		B	A		
Naphtha	A	A	A	A	A	A	A	A	X	B	A	A	A
Naphthalene		X	X	B	A	X	A	B	X	X	B	A	A
Natural Gas		A	A	A	A	A		A	X	A			
Neon							A	A	A	A			
Nickel		A	A	A		A	A	A	A	A			
Nickel Acetate		A	A	A	A	A	A	X	A	B			
Nickel Chloride		A	A	A	A	A	A	A	A	B	B	X	A
Nickel Cyanide		A	A			A							
Nickel Nitrate		A	A	A	A	A	A	A	B	A		B	
Nickel Sulfate		A	A	A	A	A	A	A	A	A	C	B	
Nicotine		A	A	X	C	A	A						
Nicotine Acid		A	A	A	A	A	A		A				
Nitric Acid 10%	A	A	A	A	A	A	A	A	B	X	A	B	A
Nitric Acid 20%	A	A		A		A	A	A	X	X		B	
Nitric Acid 30%	A	A	A	A	B	A	A	A	B	X		B	
Nitric Acid 40%	A	A	A	C	B	A		A	X	X		C	
Nitric Acid 50%		A	A	C	B	A	A	A	X	X		X	
Nitric Acid 70%	A	X	X	X	X	X	A	C	X	X		X	
Nitric Acid Concentr.		X	X	X	X	X	A	C	X	X		C	
Nitric Acid Fuming		X	X	X	X	X						C	
Nitrobenzene	C	X	X	C	A	X	A	C	C	C	B	B	A
Nitroethane					A		A	X	A				
Nitrogen							A	A	A	A		A	
Nitrogen Dioxide					A		A						
Nitrogen Solutions													
Nitroglycerine		X							A				
Nitromethane					A		A		B				
Nitrous Oxide		A	A	A	A	A	A	A	A	A			
Ocenol		A	A	X	A	A							
Octane					A		A	A	X				
Octyl Acid					A		A			C			

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TECH TIP #54 (Cont.)

Chemicals	Ultem (GF 40%)	PVC	CPVC	PPL	PVDF	PVCGF (Fiberloc)	Teflon	Viton	EPDM	Nitrile (Buna N)	316 SS	416 SS	Titanium
Octylamine						A	X		C				
Oils		A	A	A	A								
Oils, Aniline		X		A		X	A	A	B	X	A		A
Oils, Anise			X								A		
Oils, Bay			X					A			A		
Oils, Bone								A		A	A		
Oils, Castor		A	C					A	B	A	A		
Oils, Cinnamon		A	X					A			A		
Oils, Citric			X	A				A		A	A		
Oils, Clove			X	B						A	A		
Oils, Coconut			C	A				A	A	A	A		
Oils, Cod Liver			C	A				A	A	A	A		
Oils, Corn			C	A				A	C	A	A		
Oils, Cotton Seed		A	C	A		A	A	A	C	A	A		
Oils, Creosote				X		X		A	X	B	A		
Oils, Crude Sour												C	
Oils, Diesel Fuel			A	A		A		A	X	A	A		
Oils, Fuel		A				A	A	A	X	B	A		A
Oils, Linseed		A	C	A		A		A	X	A	A		
Oils, Mineral		A	A	A		A		A	X	A	A	A	
Oils, Olive		A	C	A		A	A	A	B	A	A	A	
Oils, Pine		A	X			A	A	A		C	A		
Oils, Silicone			A	A		A		A		A	A		
Oils, Vegetable		A	C	A	A	A		A		A		A	
Oleic Acid	A	A	B	A	A	A	A	B	C	B	A	B	
Oleum		X	X	X	X	X	A	X	X	X	A		
Orange Extract			X	A	A		A						
Oxalic Acid		A	A	A	A	A	A	A	A	B	B	C	C
Oxygen Gas		A	A	A	A	A	A	A	A	C			
Ozone		B	B	C	A	B		A	A	X			
Palmitic Acid 10%		A	A	A	A	A	A	A	B	A			
Palmitic Acid 70%		X	A	A			A	A	B	A			
Paraffin		A	A	A	A	A	A	B	X	A	A	A	
Pentane							A	A	X	A	C		
Peracetic Acid 40%		X	X	X	A	X	A	A	B				
Perchlorlc Acid 10%		A	A	A	A	A	A	A	B	X		B	
Perchlorlc Acid 70%	X	X	X	A	A	X	A	A	A	X		X	
Perchloroethylene		X	X	C	A	X	A	A	X	X	A		
Perphosphate		A	A	A		A	A	A	A				
Petrolatum		A	A	A	A	A	A	A	C	A	A		
Petroleum (Sour)		A				A		A	X	A		C	

Chemicals	Ultem (GF 40%)	PVC	CPVC	PPL	PVDF	PVCGF (Fiberloc)	Teflon	Viton	EPDM	Nitrile (Buna N)	316 SS	416 SS	Titanium
Petroleum Oils		A	A	B	A	A	A	A	X	A		A	
Phenols 100%	X	X	A	A	A	X	A	B	C	X	A		C
Phenylacetate							A	X	B	X			
Phenylhydrazine		X	X	X	A	X	A	C	C	X			
Phenylhydrazine Hydrochl		X	A	X	A	X							
Phosgene Gas		X	X	C	A	X		X	A	X			
Phosgene Liquid		X	X	X	C	X		X	A	X			
Phosphoric Acid 10%	A	A	A	A	A	A	A	A	A	C	A		B
Phosphoric Acid 20%	A	A	A	A	A	A	A	A	A	C			
Phosphoric Acid 40%	A	A		A		A	A	A	B	X	A		A
Phosphoric Acid 50%	A	A	A	A	A	A	A	A	A	C	B		B
Phosphoric Acid 80%	A	A	A	A	A	A	A	A	A				
Phosphoric Acid 85%	A	A	A	A	B	A	A	A	A	C	B		C
Phosphoric Acid 100%		A		A		A	A	A	B	X	B		B
Phosphoric Acid Crude							A	A	B	C	C		C
Phosphorous Oxychloride							A						
Phosphorous Red		A	A	A	A	A	A						
Phosphorous Trichloride		X	X	C	A	X	A	C	C	X	A		
Phosphorous Yellow		A	A	A	A	A	A						
Photographic Developer		A	A	A	A	A		A		A	A		A
Photographic Solutions		A	A	A	A	A	A	A		A			
Phthalic Acid		X	X	X	A	X	A	A	A			B	
Phthalic Anhydride		X	X	X		X	A	A	A	C	B	A	
Pickle Brine		A	A	A	A	A							
Pickling Solutions		A	A	A	A	A	A	B	C	X			
Picric Acid		X	C	A	A	X	A	A	C	B	A	B	
Pine Oil						A	A	A	X	B			
Plating So!. Antimony		A	A	A		A	A	A		A	A		A
Plating Sol. Arsenic		A	A	A		A		A		A	A		A
Plating Solutions, Brass		A	A	A	A	A	A	A	A	A	A		A
Plating Solutions, Bronze		A	A	A		A	A	A		A	A		A
Plating Sol. Cadmium		A	A	C	A	A	A	A	A	A	A		A
Plating Solutions, Chrome		A	A	C	A	A	A	C	B	X	C	A	A
Plating Solutions, Copper		A	A	A	A	A	A	A	A	A	X		A
Plating Solutions, Gold		A	A	C	A	A	A	A	A	A	C		A
Plating Solutions, Indium		A	A	A		A	A	A		A	C		A
Plating Solutions, Iron		X	A	C		X	A	A		A	C		A
Plating Solutions, Lead		A	A	A	A	A	A	A	A	B	C		X
Plating Solutions, Nickel		A	A	A	A	A	A	A	A	A	C		A
Plating Solut. Rhodium		A	A	A	A	A	A	A	A	A	X		X
Plating Solutions, Silver		A	A	A	A	A	A	A	A	A	A		A

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TECH TIP #54 (Cont.)

Chemicals	Ultem (GF 40%)	PVC	CPVC	PPL	PVDF	PVCGF (Fiberloc)	Teflon	Viton	EPDM	Nitrile (Buna N)	316 SS	416 SS	Titanium
Plating Solutions, Tin		A	A	A	A	A	A	A	A	B	C		X
Plating Solutions, Zinc		A	A	A	A	A	A	A	A	A	X		A
Polyethylene Glycol		A	A	A	A	A	A	A	A	A			
Polyvinyl Acetate Emul					A		A	A	A				
Polyvinyl Alcohol		A	X	A	A	A	A	A	A				
Potash		A	A	A	A	A	A	C	B	C	A		
Potassium Acetate		A	A	A	A	A	A	X	A	B			
Potassium Alum		A	A	A	A	A	A	A	A	A		B	
Potossium Bicarbonate		A	A	A	A	A	A	A	A	A	B	B	A
Potassium Bichromate		A	A	A	A	A	A	A	A	A		B	
Potassium Bisulfate		A	A	A	A	A	A	A	A	A			
Potassium Bromate		A	A	A	A	A	A	A	A	A			
Potassium Bromide		A	A	A	A	A	A	A	A	A	B	B	A
Potassium Carbonate	A	A	A	A	A	A	A	A	A	B	A	B	A
Potassium Chlorate		A	A	A	A	A	A	A	A	A	A	B	A
Potassium Chloride		A	A	A	A	A	A	A	A	A	A	B	A
Potassium Chromate		A	A	A	A	A	A	A	A	A	B	B	
Potass. Coppercyanide		A	A	A	A	A	A	A	A				
Potassium Cyanide		A	A	A	A	A	A	B	A	A	B	B	A
Potassium Dichromate		A	A	A	A	A	A	A	A	A	A	B	A
Potassium Ferricyanide		A	A	A	A	A	A	A	A	A		A	
Potassium Ferrocyanide		A	A	A	A	A	A	A	A	C		A	
Potassium Fluoride		A	A	A	A	A	A	A	A	A			
Potassium Hydroxide	A	A	A	A	A	A	A	C	B	C	C	A	C
Potassium Hydroxide 25%						A							
Potassium Hydroxide 50%		A	A	A	B	A							
Potassium Hypochlorite		A	A	A	A	A	A	A	A	X		X	
Potassium Iodide		A	A	A	A	A	A	A	A	A		A	
Potassium Nitrate		A	A	A	A	A	A	B	A	A	B	B	A
Potassium Perborate		A	A	A	A	A	A						
Potassium Perchlorate		A	A	A		A	A		A				
Potassium Permangan.		A	A	B	A	A	A	B	A	C	B	B	B
Potassium Persulfate		A	A	A	A	A	A		A				
Potassium Phosphate										A			
Potassium Salts				A	A		A	A	A				
Potassium Sulfate		A	A	A	A	A	A	A	A	A	B	B	A
Potassium Sulfide		A				A	A	A	A	A		B	
Potassium Thiosulfate							A	A		A			
Propane		A	A	B	A	A	A	A	X	A	A	A	
Propanol							A	A	A	A		A	
Propargyl Alcohol		A	A	A	A	A							

Chemicals	Ultem (GF 40%)	PVC	CPVC	PPL	PVDF	PVCGF (Fiberloc)	Teflon	Viton	EPDM	Nitrile (Buna N)	316 SS	416 SS	Titanium
Propyl Acetate					A		A	X	B	X			
Propyl Alcohol		A	A	A	A	A	A	A	A	A		A	
Propylene							A	A	X	X			
Propylene Dichloride		X	X	C	A	X	A	B	X	X			
Propylene Glycol	A		C				A	A	A	A	A		
Pyridine	X	X	X	C	C	X	B	X	C	X	C	B	
Pyrogallic Acid		B			X	C	A	A		A	A	B	
Quaternary Amm. Salts													
Rayon Coagulating Bath		A	A	A	A	A							
Rhodan Salts		A	A	A	A	A	A	A	A				
Rosins				A			A	A		A	A	B	
Rum		A		A		A	A	B	A	A			
Rust Inhibitors				A				A		A	A		
Salad Dressings		A		A		A		A		A	A		
Salicylaldehyde	X	X			C	X	A	A	A				
Salicylic Acid	A	A			A	A	A	A	A	C		B	
Saline Solutions		A	A	A	A	A							
Salt Brine		A	A	A	A	A	A	A	A	A			
Sea Water		A	A	A	A	A	A	A	A	A	C	C	A
Selenic Acid		A	A	A	A	A							
Sewage		A	A	A	A	A	A	A	A	A			
Shellac Bleached				A			A			A	A	A	
Shellac Orange				A			A			A			
Silicic Acid		A	A	A	A	A	A	A	A				
Silicone Oil		A	A	A		A	A	A	A	A	A		
Silver Bromide											C	X	
Silver Cyanide		A	A	A	A	A	A	A	A			A	
Silver Nitrate		A	A	A	A	A	A	A	C	C	B	B	A
Silver Salts		A		A	A	A	A	A	A		A		
Silver Sulfate		A	A	A	A	A	A	A	A	C			A
Soap Solutions		A	A	A	A	A	A	A	A	A	A	A	A
Soda Ash							A	A	A	A			
Sodium		A	A	A	A	A	A	A	A				
Sodium Acetate		A	A	A	A	A	A	C	A	C	B	B	A
Sodium Alum		A	A	A	A	A	A	A	A	A			
Sodium Aluminate							A	A	A	A	A	C	B
Sodium Benzoate		A	A	A	A	A	A						
Sodium Bicarbonate		A	A	A	A	A	A	A	A	A	A	A	A
Sodium Bichromate		A	A	A	A	A	A	A	A			B	
Sodium Bisulfate		A	A	A	A	A	A	A	A	B	A	A	A
Sodium Bisulfite		A	A	A	A	A	A	A	A	A	A	C	A

A = Excellent, no effect • B = Good, minor effect • C = Fair, data not conclusive, testing recommended • X = Not recommended.
Ratings are based on testing at an ambient temperature of 70 F. Customer should test to determine application suitability.

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TECH TIP #54 (Cont.)

Chemicals	Ultem (GF 40%)	PVC	CPVC	PPL	PVDF	PVCGF (Fiberloc)	Teflon	Viton	EPDM	Nitrile (Buna N)	316 SS	416 SS	Titanium
Sodium Borate		C	A	A	A	C	A	A	A	A		A	
Sodium Bromate													
Sodium Bromide		A	A	A	A	A	A	A	A			C	
Sodium Carbonate		A	A	A	A	A	A	A	A	A	A		A
Sodium Chlorate		A	A	A	A	A	A	A	A	C	B	B	A
Sodium Chloride		A	A	A	A	A	A	A	A	A	C	B	A
Sodium Chlorite		X	X	X		X	B	X	X				
Sodium Chromate				A			A	B		A	A	B	
Sodium Cyanide		A	A	A	A	A	A	A	A	A	A	A	A
Sodium Dichromate		A	A	A	A	A	A	A	A				
Sodium Ferricyanide		A	A	A	A	A	A	A	A			B	
Sodium Ferrocyanide		A	A	A	A	A	A	A	A				
Sodium Fluoride		A	A	A	A	A	A	B	A	C		C	A
Sodium Hydrosulfide													
Sodium Hydrosulfite		C					A	A					
Sod. Hydroxide 15%	A	A	A	A	A	A	A	C	A	A	B	B	A
Sodium Hydroxide 20%		A	A	A	A	A	A	C	A	A	B	B	A
Sodium Hydroxide 30%		A	A	A	A	A	A	C	A		B	B	
Sodium Hydroxide 50%		A	A	A	A	A	A	C	A	X	B	C	A
Sodium Hydroxide 70%		A	A	B	B	A	A	X	A	X		X	A
Sod. Hydroxide Conc		A	A	A	A	A	A	B	A	X		C	
Sod. Hypochlorite 20%		A	A	B	A	A	A	A	B	C	C		A
Sodium Hypochlorite	A	A	A	B	A	A	A	X	X	X			
Sodium Hyposulfate							A				A		
Sodium Metaphosphate		A	A	C	A	A	A	A	A	A	A		
Sodium Metasilicate		A	A	A	A	A	A	A	A	A	A	A	
Sodium Nitrate		A	A	A	A	A	A	B	A	C	B	B	A
Sodium Nitrite		A	A	A	A	A	A	A	A		B		
Sodium Palmitrate		A	A	A	A	A	A						
Sodium Perborate		A	A	A	A	A	A	A	A	C	C	B	
Sodium Perchlorate		A	A	A	A	A	A						
Sodium Peroxide		A	A	A	A	A	A	A	B	C	A	A	
Sodium Phosphate Ac		A	A	A	A	A	A	A	A	A			
Sodium Phosph. Alkal		A	A	A	A	A	A	A	A	A			
Sodium Phosph. Neutr		A	A	A	A	A	A	A	A	A			
Sodium Polyphosph							A	A	A	B	A		A
Sodium Silicate		A	A	A	A	A		A	A	A	B	B	A
Sodium Sulfate		A	A	A	A	A	A	A	A	A	B	B	A
Sodium Sulfide		A	A	A	A	A	A	A	A	C	B	X	A
Sodium Sulfite		A	A	A	A	A	A	A	A	A	C	B	A
Sodium Tetraborate		A						A		A	A	A	

Chemicals	Ultem (GF 40%)	PVC	CPVC	PPL	PVDF	PVCGF (Fiberloc)	Teflon	Viton	EPDM	Nitrile (Buna N)	316 SS	416 SS	Titanium
Sodium Thiocyanate		A	A	A	A	A	A	A	A				
Sodium Thiosulfate		A	A	A	A	A	A	A	A	B	A	A	
Sorghum							A		A	A			
Soy Sauce							A		A	A			
Soybean Oil		A	A	A	A	A	A	A	A				
Stannic Chloride		A	A	A	A	A	A	A	A	A	A	X	A
Stannic Salts		A		A	A	A	A	A	A				
Stannous Chloride		A	A	A	A	A	A	B	B	C	C	C	A
Starch		A	A	A		A	A	A	A	A	A		
Stearic Acid		A	A	B	A	A	A	A	C	B	B	B	A
Stoddard Solvent		X	X	C	A	X	A	A	X	B	A		A
Strontium Carbonate													
Styrene					A		A	C	X	X	A		
Succinic Acid		A	A	A	A	A	A	A	A				
Sugar Solutions				A			A	A		A	A	A	
Sulfamic Acid		X	X	X	X	X							
Sulfate Liquors		A	A	A	A	A		A	A	A	C	A	
Sulfated Detergents		A	A	A	A	A							
Sulfer 10%		A		A		A	A	A	X	C	C		A
Sulfer Dioxide		X		X		C	A	C	A	X	A		A
Sulfite Liquor		A	A	A	A	A	A	A	A	B		X	
Sulfur		A	A	X	A	A	A	A	C	C		A	
Sulfur Chloride		A	A	C	A	A	A	A	X	X	X	C	
Sulfur Dioxide Dry		A	A	A	A	A	A	A	A	X	B	B	
Sulfur Dioxide Wet		X	A	A	A	X	A	A	A	X		B	
Sulfur Slurries		A	A	A	A	A							
Sulfur Trioxide Dry		C	C	X	X	C	B	C	C	C	C	B	
Sulfuric Acid 10%	A	A	A	A	A	A	A	A	A	B	C	C	X	A
Sulfuric Acid 30%		A	A	A	A	A	A	A	A	C	X	X	C
Sulfuric Acid 50%		A	A	A	A	A	A	A	A	B	C	X	X	C
Sulfuric Acid 60%		A	A	A	B	A	A	A	B	X	X	X	C
Sulfuric Acid 70%		A	A	C	A	A	A	A	A	C	X	X	C
Sulfuric Acid 80%		X	A	A	A	X	A	A	A	C	X	X	X
Sulfuric Acid 90%		X	A	C	A	X	A	A	A	C	X	X	X
Sulfuric Acid 95%	X	X	C	X	A	X	A	A	X	X	X	X	X
Sulfuric Acid 98%		X	X	X	A	X	B	X	X		X	X	
Sulfuric Acid 100%		X	X	X	C	X	B	C	X	X	C	C	X
Sulfurous Acid		A	A	A	A	A	A	A	C	X	B	C	A
Sulfuryl Chloride		A					A						
Syrup		A		A		A	A	A		A	A		
Tall Oil		A	A	A	A	A	A	A	X	A		X	

A = Excellent, no effect • B = Good, minor effect • C = Fair, data not conclusive, testing recommended • X = Not recommended.
Ratings are based on testing at an ambient temperature of 70 F. Customer should test to determine application suitability.

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TECH TIP #54 (Cont.)

Chemicals	Ultem (GF 40%)	PVC	CPVC	PPL	PVDF	PVCGF (Fiberfloc)	Teflon	Viton	EPDM	Nitrile (Buna N)	316 SS	416 SS	Titanium
Tallow				A	A		A	A	A	A	A		
Tannic Acid		A	A	A	A	A	A	A	B	C	C	B	A
Tanning Liquors		A	A	A	A	A	A	A	B	C	A		A
Tar		X	X	B	A	X	A	A	X	C		B	
Tartaric Acid		A	A	A	A	A	A	A	B	C	B	B	A
Tertiary Butyl Alcohol		A	A	A	A	A	A	A	B				
Tetrachlorethane		X		A		X	A	A	X	X	A		A
Tetrochloroethane					A	X	A	A	X				
Tetraethyl Lead		B	A	A	A	C	A	B	X	C			
Tetrahydrofuron	X	X	X	B	B	X	A	X	X	X	A		
Tetralin		X	X	X	A	X	A	A	X	X			
Thionyl Chloride		X	X	X	X	X	A						
Thread Cutting Oils		A	A	A	A	A			X				
Titanium Tetrachloride		X	X	X	X	X	A	A	X	C			
Titanous Sulfate		A	A	A	A	A	A						
Toluene	C	X	X	C	A	X	A	B	X		A	A	
Toluene Toluol		X	X	C	B	X	A	C	X	X	A	A	A
Tomato Juice		A	A	C	A	A	A		A	A	A	C	
Toxaphene-Xylene		X	X	X	A	X							
Transformer Oil		A	A	A	A	A	A	A	X	A			
Tributyl Phosphate		X	X	C	A	X	A	X	A	X			
Trichloroacetic Acid		A	A	C	A	A	A	X	X	X	X	X	
Trichloroethane	X					X	A	A	X	X	A		A
Trichloroethylene	X	X	X	B	A	X	A	A	X	C	A	A	B
Trichloropropane						X	A	A		A	A	A	
Tricresyl Phosphate		X				X	A	B	A	X	A		B
Triethanolamine		B		C	C	C		X	A				
Triethyl Phosphate	C	A	A	A	A	A	A	A	A		A		
Triethylamine	A	A	A	X	C	A		A		A			
Trimethylpropane		A	A	A	A	A	A						
Trisodiun Phosphate		A	A	A	A	A	A	A	A	A	A	B	
Turbine Oil		A	A	B		A	A	A	X	B			
Turpentine	A	X	A	B	A		A	A	C	C	A	B	
Urea	A	A	A	A	A	A	A	A	A	C			
Urine		A	A	A	A	A	A	A	A	A	A		

Chemicals	Ultem (GF 40%)	PVC	CPVC	PPL	PVDF	PVCGF (Fiberfloc)	Teflon	Viton	EPDM	Nitrile (Buna N)	316 SS	416 SS	Titanium
Vanilla Extract				A		A	A						
Varnish				A	A		A	A	X	B	A	A	
Vaseline		X	A	A	A	X	A	A	X	A			
Vegetable Oil		A	C	A	A	A	A	A	A	A	A		
Vinegar	A	A	A	A	A	A	A	A	A	C	A	A	A
Vinyl Acetate	X	X	X		A	X	A	X	B	X			
Vinyl Chloride							A	A	C	X		A	
Vinyl Ether							A	X		B			
Water Acid Mine		A	A	A	A	A	A	A	A	A	A	C	
Water Deionized		A	A	A	A	A	A	B	A	A	A		
Water Demineralized		A	A	A	A	A		A	A	A			
Water Distilled		A	A	A	A	A	A	A	A	A	A	A	
Water Potable		A	A	A	A	A	A	A	A	A	A	A	
Water Salt		A	A	A	A	A	A	A	A	A	A	C	
Water Sewage		A	A	A	A	A	A	A	A	A			
Weed Killers								A		B	A		
Whey								A		A	A		
Whiskey		A	A	A	A	A	A	A	A	A	A		
White Acid					A		A						
White Liquor		A	A	A	A	A	A	A	A	B	A		
Wines		A	A	A	A	A	A	A	A	A	A	C	
Xenon							A	A	A	A			
Xylene	X	X	X	X	A	X	A	B	X	X	A		
Xylol		X	X	X	A	X	A	A	X	C			
Yeast				A	A		A	A	A				
Zeolite							A	A	A	B			
Zinc Acetate		A	A	A	A	A	A	C	A	B			
Zinc Carbonate							A	A		A		B	
Zinc Chloride	A	A	A	A	A	A	A	A	A	A	B	C	A
Zinc Chromate							A						
Zinc Nitrate		A	A	A	A	A	A	A	A				
Zinc Phosphate													
Zinc Salts				A	A	A	A	A	A	A			
Zinc Sulfate		A	A	A	A	A	A	A	A	A	A	A	A
Zirilite							A	C	A	B			

Chemical Resistance Chart Courtesy of

HAYWARD®
Industrial Products, Inc.

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TECH TIP #55

HONEYWELL 7800 LEGACY TO ENHANCED CHART

What Legacy Devices Can I Replace with the Enhanced Family?

	RM7890 A1056 (1)	RM7890 B1048 (2)	RM7897 A1002 (3)	RM7897 C1000 (4)	RM7898 A1000 (5)	RM7898 A1018 (6)	RM7840 G1022 (7)	RM7840 L1075 (8)	RM7800 L1087 (9)
RM7890A1015	X	X							
RM7890A1056		X							
RM7890B1014		X							
RM7895A1014			X		X				
RM7895A1048						X			
RM7895C1012			X	X	X				
RM7895C1020						X			
RM7896A1012			X		X				
RM7896C1010			X	X	X				
RM7897A1002					X				
RM7897C1000					X				
RM7840G1014							X		
RM7840L1018								X	X
RM7800L1012								X	X
RM7800G1018							X		

(1) The RM7890A1056 has an input for Pre Ignition Interlock
- Jumper Terminals 3-20 or install Pre Ignition Interlock and Jumper Terminals 6-7

(2) The RM7890B1048 has an input for Pre Ignition Interlock and output for Shutter Drive
- Jumper Terminals 3-20 or install Pre Ignition Interlock and Jumper Terminals 6-7

(3) The RM7897A1002 has an input for Pre Ignition Interlock
- Jumper Terminals 5-20 or install Pre Ignition Interlock
  (a) RM7895A1014
  (b) RM7895C1012 – If the Delayed Main Valve terminal is not used
  (c) RM7896A1012 – Post Purge must be programmed using the S7800A1142 Display
  (d) RM7896C1010 – If the Delayed Main Valve terminal is not used. Post Purge must be programmed using the S7800A1142 Display

(4) The RM7897C1000 has an input for Pre Ignition Interlock
- Jumper Terminals 5-20 or install Pre Ignition Interlock
  (a) RM7895C1012
  (b) RM7896C1010 – Post Purge must be programmed using the S7800A1142 Display

(5) The RM7898A1000 has an input for Pre Ignition Interlock
- Jumper Terminals 5-20 or install Pre Ignition Interlock
  (a) RM7895A1014 – Jumper L1 power(T5) to T19 (for Intermittent Pilot function on T8)
  (b) RM7895C1012 – If the Delayed Main Valve terminal is not used
  (c) RM7896A1012 – 15 sec Post Purge must be programmed using the S7800A1142 Display + Jumper L1 (T5) power to T19 (for Intermittent Pilot function on T8)
  (d) RM7896C1010 – If the Delayed Main Valve terminal is not used. Post Purge must be programmed using the S7800A1142 Display
  (e) RM7897A1002 – If Intermittent Pilot, Jumper Terminals 5-19. If Interrupted Pilot, Move RM7897 Terminal 21 to RM7898 Terminal 8. Program desired Post Purge using the S7800A1142 Display.
  (f) RM7897C1000 – If the Delayed Main Valve terminal is not used. If Intermittent Pilot, Jumper Terminals 5-19. If Interrupted Pilot, Move RM7897 Terminal 21 to RM7898 Terminal 8. Program desired Post Purge using the S7800A1142 Display.

(6) The RM7898A1018 has an input for Pre Ignition Interlock
- Jumper Terminals 5-20 or install Pre Ignition Interlock
  (a) RM7895A1048 – Jumper L1 (T5) power to T19 (for Intermittent Pilot function on T8)
  (b) RM7895C1020 – If the Delayed Main Valve terminal is not used.

(7) The RM7840G1022
  (a) RM7840G1014 – The G1022 does not have the Dynamic Airflow Switch/Start-Up Interlock Check (JR3)
  (b) RM7800G1018 – Add S7800A1001 Display or add S7800A1142 Display if VPS will be used or if Post Purge must be changed from default of 15 seconds.

(8) The RM7840L1075
  (a) RM7840L1018 – Can be used with no additional changes
  (b) RM7800L1012 – Add S7800A1001 Display or add S7800A1142 Display if VPS will be used or if Post Purge must be changed from default of 15 seconds.

(9) The RM7800L1087
  (a) RM7840L1018 – RM7800 comes with S7800A1142 Display included
  (b) RM7800L1012 – Can be used with no additional changes.

TECH TIP #56

OVERVIEW OF FLAME SAFEGUARD CONTROLS

ELECTRO-MECHANICAL TO RM7800 CONVERSION

	HONEYWELL	FIREYE	
Flame Switch	R7023	7823	Flame Switch
	R485	7885	+Safe Start Check
	RA890	7890	+Trial For Ignition
Primary	R4795	7895 UL795	MC120 +Pre-Purge
		7896 UL296	TFM-1,2,3 +Interupted Ignition
			UVM-1,2,3 +Timed Ignition Trial
Programmers	R4150/R4140	7840	C,D,E,P SERIES +Interlocks +Firing Rate +Post Purge
	BC7000 R4138A&B	7800 7838	+Annunciation +Diagnostics +Dynamic Self-Check

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TECH TIP #57
CONVERSION FACTORS

burks®
www.cranepumps.com

Conversion Tables

Engineering Information

PRESSURE

	In Water	Ft. Water	PSI	In Hg.	MM Hg	Atm	Kg/Sq. Cm
In. Water =	1.0	0.083	0.0361	0.0736	1.87	0.353	0.0025
Ft. Water =	12.0	1.0	0.433	0.883	22.43	0.0295	0.0304
PSI =	27.72	2.31	1.0	2.040	51.816	0.068	0.0703
In Hg =	13.596	1.133	0.491	1.0	25.40	0.0334	0.0345
MM Hg =	0.535	0.0446	0.0193	0.0394	1.0	0.00132	0.0014
Atm =	2.829	33.947	14.7	29.921	760.0	1.0	1.0033
Kg/Sq. Cm =	393.6	32.80	14.22	28.97	736.03	0.968	1.0

VOLUME

	U.S. Gal.	Imp. Gal.	Cu. Ft.	Lb. Water @ 60°F	Cu. M	Quart	Liter
U.S. Gal. =	1.0	0.833	0.134	8.33	0.00379	4.0	3.785
Imp. Gal. =	1.2	1.0	0.161	10.0	0.00455	4.8	4.546
Cu. Ft. =	7.481	6.232	1.0	62.37	0.0283	29.92	28.32
Lb. Water @ 60°F =	0.12	0.10	0.016	1.0	0.00045	0.48	0.454
Cu. M =	264.2	220.0	35.31	2,202.9	1.0	1,057.0	1,000.0
Quart =	0.25	0.208	0.0334	2.086	0.00095	1.0	0.946
Liter =	0.264	0.22	0.0353	2.204	0.001	1.057.0	1.0

POWER

	HP	Metric HP	kW	HP Hr.	kW Hr	BTU
HP =	1.0	1.014	0.746	---	---	---
Metric HP =	0.986	1.0	0.736	---	---	---
Kw =	1.341	1.36	1.0	---	---	---
HP Hr =	---	---	---	1.0	0.746	2,545.0
Kw Hr =	---	---	---	1.341	1.0	3,413.0
BTU	---	---	---	0.000393	0.000293	1.0

LENGTH

	mm	cm	m	in	ft	yd	mi
mm =	1.0	0.1	0.001	0.0394	0.00328	---	---
cm =	10.0	1.0	0.01	0.394	0.0328	---	---
m =	1,000.0	100.0	1.0	39.37	3.281	1.094	---
km =	---	---	1,000.0	---	---	---	0.621

AREA

	Sq. cm	Sq. m	Sq. in.	Sq. ft.	Sq. yd.
Sq. cm =	1.0	---	0.155	---	---
Sq. m =	10,000.0	1.0	1,550.0	10.76	1.196

ABBREVIATIONS

Atm. = Atmosphere
BTU = British Thermal Unit
cm = Centimeter
Cu = Cubic
Ft. = Foot
Gal. = Gallon
Hg. = Mercury
HP = Horsepower
Hr. = Hour
Imp = Imperial
in. = inch
Kg = Kilogram
KM = Kilometer
Kw = Kilowatt
Lb. = Pound
m = Meter
Mi. = Mile
ml = Milliliter
mm = Millimeter
PSI = Pounds per Square inch
Sq. = Square
yd. = Yard

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