AOC®
World Leader in Resin Technology

Vipel®
CORROSION
RESISTANT RESINS

Corrosion Resistant Resin Guide

www.corrosionresins.com

The information contained in this guide is based on laboratory data and field experience. We believe this information to be reliable, but do not guarantee its applicability to the user's process or assume any liability for occurrences arising out of its use. The user, by accepting the products described herein, agrees to be responsible for thoroughly testing each such product before committing to production. Our recommendations should not be taken as inducements to infringe any patent or violate any law, safety code or insurance regulation.

Introduction

AOC corrosion resistant resins are designed to meet the demands of the fiber-reinforced polymer (FRP) composite industry when corrosion resistance performance is critical. This guide is designed to assist the fabricator of FRP components in selecting the appropriate resin for parts which will be exposed to highly corrosive environments.

This data is the result of years of extensive laboratory testing and actual field exposure in North America and Europe.

The term resistance is used in the sense which is commonly used in the trade, not as the complete retention of all optical and mechanical characteristics. Refer to ASTM G 15 and ASME/ANSI RTP-1 for common corrosion definitions.

Resin System Selection

Resin system selection is governed by the chemical service and environment to which the equipment will be exposed, end user specifications and preferences, or fabricator recommendation.

User specified:

Frequently the user will specify the resin system and laminate construction for particular applications. The requirement may be based on past experience, resin manufacturer recommendations, the supplier of the chemicals being handled, or the manufacturer of an equipment package. The fabricator should always confirm the source of selection and the acceptability of equivalent alternate systems.

Fabricator recommendation:

When the user depends on the fabricator to recommend aresin system, it is important to be certain that the user states allaspects of the application and service.
The following information should be clearly defined:

- The common name and, when possible, the chemical name. For example, muriatic is a common name for hydrochloric acid. This information is generally contained in the Material Safety Data Sheet for the medium.
- Concentration of each of the chemical components.
- Specific gravity of each chemical solution or mixture.
- pH, if it is an aqueous system.
- Normal operating temperature range. Also include any anticipated temperature excursions due to process upset or other abnormal condition.
- Maximum use temperature - (not maximum design temperature).
- Pressure and/or vacuum conditions. For tanks it is also important to know if filling will be by pressure such as from a tank wagon.
- Use in food and drug applications should be identified where applicable.
- Length of exposure to the medium if less that continuous. In unusual cases, only a short period of exposure is to be expected. For example, the laminate may need to withstand only occasional splashes.
- Process description - where a reaction such as neutralization takes place in the tank.
- Fire retardancy, where applicable, including flame spread rating and smoke requirements.

Resin Selection:

Normally a suitable resin can be selected from the Corrosion Resistance Resins Guide based on the above information. The temperature data presented in the guide represents the highest temperature at which the individual product has demonstrated acceptable service life in a laboratory environment or in actual field use. Testing of coupons is ongoing, and environments not tested may be done at customer request. Serviceability should not be interpreted to mean the full retention of all visual and mechanical properties, but rather an expectation of how a properly designed and fabricated structure will perform. Short exposure periods at higher temperatures usually do not affect product integrity if the heat distortion temperature of the cured resin is not exceeded. However, the highest temperature reached and the exposure duration at this temperature should be indicated when making inquiries.

The resistance of Vipel® resins to chemical environments listed in this guide has been established according to ASTM C581 and the ASME/ANSI RTP-1 standard coded "Reinforced Thermoset Plastic Corrosion Resistant Equipment."

This list does not apply to mixtures of different media unless we have explicitly stated. It contains chemically declared media and some brand name chemicals, which were not precisely identified with respect to chemical composition. When the concentration is listed as less than 100%, the remaining product is water unless specifically stated otherwise.

Caution: Many of the applications and chemical services listed in the guide make reference to NOTES in the column adjacent to the chemical. These notes are an integral part of the listing recommendation and must be strictly followed. The notes will indicate those applications requiring different veil materials, cure systems, liner construction or thickness and post curing requirements.

In those instances where the specific application is not listed, the fabricator is encouraged to contact AOC. The above information should be included and should be directed to:

Corrosion Product Leader
AOC
950 Highway 57 East
Collierville, TN 38017
Phone: (901) 854-2800
Fax: (901) 854-2895
E-mail: Corrosion@aoc-resins.com

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Vipel® Product Selection Guide

Resin Type	Resin Series	Description
Bisphenol A Epoxy with Vinyl Esters	Vipel F010	Balances corrosion resistance to acids and alkalies with good processability. Generally achieves the corrosion resistance of a bisphenol A fumarate polyester resin while providing excellent toughness and resistance to cracking. User friendly in both filament winding and hand lay-up applications.
	Vipel F007	Low VOC/HAP version of Vipel F010.
	Vipel F015	Designed for closed mold process such as RTM, pultrusion and compression molding. It is not designed for open molding.
	Vipel K022-AAA and K022-PT	Fire retardant ASTM E 84 Class I flame and smoke without the use of synergists. Excellent corrosion resistance for fire resistant applications.
	Vipel K022-AC	Fire retardant ASTM E 84 Class I flame without the use of synergists. Lower specific gravity version of Vipel K022-AAA-00.
	Vipel K022-C	Fire retardant ASTM E 84 Class II flame without the use of synergists. ASTM E 84 Class I flame with 1.5% antimony trioxide. Excellent corrosion resistance for fire resistant applications.
	Vipel K022-CN	Fire retardant ASTM E 84 Class I flame without the addition of synergists. Contains antimony products. Excellent corrosion resistance for fire resistant applications.
	Vipel K023	A Low VOC/HAP Fire retardant high cross-linked vinyl ester that is less than 35% styrene and will achieve ASTM E 84 Class I flame requirements neat. Excellent corrosion resistance to oxidizing chemicals at elevated temperatures.
Elastomeric Bisphenol A Epoxy Vinyl Ester	Vipel F017	Epoxy vinyl ester resin that is used for bonding, improving interlaminar adhesion and manufacturing composites that require extra flexibility.
High Cross-linked Bisphenol A Epoxy Vinyl Esters	Vipel F080	A high performance vinyl ester that provides excellent corrosion resistance in both acidic and alkaline environments plus good thermal mechanical properties
	Vipel F083	A Low VOC/HAP A low styrene version (<35%) of Vipel F080 that provides outstanding corrosion resistance to chemicals such as acids at elevated temperatures
Epoxy Novolac Vinyl Esters	Vipel F085	Exceptional organic solvent resistance with improved high temperature properties.
	Vipel F086	High heat distortion version of Vipel F085
	Vipel K095	Fire retardant epoxy novolac vinyl ester. Recommended where ASTM E 84 Class I flame and smoke requirements are needed as a neat resin. Used for severe corrosion applications in the pulp and paper industry.

Bisphenol A Fumarate Polyesters	Vipel F282	Bisphenol A backbone contributes to excellent resistance from acids and alkalies. Used where severe caustic environments will be encountered.
Chlorendic Fire Retardant Polyester	Vipel K190-B	Fire retardant resin that provides excellent resistance to hot wet chlorine and oxidizing acids and has excellent thermal mechanical properties. Will achieve an ASTM E 84 Class II flame and smoke rating with the use of 3.0% antimony trioxide. Not for caustic environments.
Isophthalic Polyesters	Vipel F701	High molecular weight isophthalic/propylene glycol resin with a broad chemical resistance at moderate temperatures. Excellent processability.
	Vipel F707	Isophthalic/neopentyl glycol resin that provides good adhesion to certain grades of PVC.
	Vipel F737	Resilient isophthalic resin designed to be used for thick composites.
	Vipel F738	Resilient isophthalic resin designed to be used for thin composites. Vipel F738-PTA series resins are used for applications requiring Lloyd's of London approval.
	Vipel F764	High cross-linked isophthalic resin recognized by Underwriters Laboratory (UL) for underground storage applications. Meets UL 1316 and UL 1746 parts II and III and Steel Tank Institute requirements.
	Vipel K733-A	Fire retardant resin for mild corrosion service such as hood and duct service. Will achieve an ASTM E 84 Class I flame rating neat.
	Vipel K733-B	Fire retardant resin for mild corrosion service such as hood and duct service. Will achieve an ASTM E 84 Class I flame rating with the use of 1.5% antimony trioxide.
Terephthalic Polyesters	Vipel F774	High cross-linked terephthalic resin recognized by Underwriters Laboratory (UL) for underground storage applications. Meets UL 1316 and UL 1746 parts II and III and Steel Tank Institute requirements.

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Cross Reference to AOC Corrosion Resins

	AOC Vipel®	ASHLAND Hetron®/Aropol®	ASHLAND Derakane®	INTERPLASTIC CoREZYN®	REICHHOLD Atlac® /Dion®
Bisphenol A Epoxy Vinyl Ester	F010	922	411	8100	9100
	F007	942	441	8300 8360	
High Cross Linked Bisphenol- A Epoxy Vinyl Ester	F080	980		8710 8770	
High Cross Linked Bisphenol-A Epoxy Vinyl Ester Low VOC content	F083	980/35	441	8360	
Epoxy Novolac Vinyl Ester	F085	970	470	8730	9480
	F086		470 HT		
Bisphenol A Fumarate Polyester	F282				382 6694
Elastomeric, Bisphenol A, Epoxy Vinyl Ester	F017		8084	8550 8510 8515	9500
High Cross-Linked Isophthalic	F764				
Rigid Isophthalic	F701	7241 7242		75-AQ-001 75-AQ-001S 75-AQ-010 75-AQ-011	6631 33402 33404
Resilient Isophthalic	F737 F738	7334		75-AQ-610	31509
High Cross-Linked Terephthalic	F774				490
Fire Retardant Bisphenol A, Epoxy Vinyl Ester, Neat, ASTM E 84 Class I ***	K022-A K022-PT		510A		
Fire Retardant Bisphenol A, Epoxy Vinyl Ester, Neat, contains antimony products, ASTM E84 Class I ***	K022-CN	FR992 SB			
Fire Retardant Bisphenol A Epoxy Vinyl Ester, Neat, ASTM E 84 Class II and ASTM E 84 Class I with 1.5% antimony trioxide ***	K022-C	FR992*	510C*	VE 8440 VE 8450	FR9300
Fire Retardant Epoxy Novolac Vinyl Ester, ASTM E 84 Class I, Class I neat ***	K095		510N*		
Fire Retardant High Cross Linked Bisphenol A Epoxy Vinyl Ester Epoxy, Neat, ASTM E 84 Class I ***	K023	998			
Chlorendic Fire Retardant Polyester, ASTM E 84 Class II with 3.0% antimony trioxide ***	K190-B	197P**			FR797**
Fire Retardant Isophthalic, ASTM E 84 Class I ***	K733-APT-20				FR7767
Fire Retardant Isophthalic, ASTM E 84 Class I with 1.5% antimony trioxide ***	K733-BPT-20	604T-20 99P*			

* According to literature, 3.0% antimony trioxide was used.
** According to literature, 5.0% antimony trioxide was used.
*** Only flame spread ratings of ASTM E 84 are referenced.

Chemical Listings

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CONCENTRATIONS AND RECOMMENDED MAXIMUM CONTINUOUS EXPOSURE TEMPERATURE - DEGREES F

CHEMICAL	CONC.%	NOTES	F010 K022	F007 F015	F080	F083 K023	F085 F086 K095	F282	K190	F701 F707 F764 F774	F737 F738	Hood & Duct F733
			TEMPERATURE									
ACETALDEHYDE	100		NR	NR	NR	NR	NR	NR	NR	N/R	N/R	
ACETIC ACID	10		200		210	210	200	200	210	130		150
ACETIC ACID	25		195		210	210	195	195	210	130		125
ACETIC ACID	50		160		180	180	175	130	180	120		90
ACETIC ACID	75		140		150	150	150	100	150	N/R	N/R	NR
ACETIC ACID	85			NR					80	N/R	N/R	NR
ACETIC ACID GLACIAL	100		NR	NR	NR	NR	80	NR	80	N/R	N/R	NR
ACETONE	1			NR	150	NR	150	150	NR	NR	N/R	NR
ACETONE	100		NR	NR	NR	NR	NR	NR	NR	N/R	N/R	NR
ACETONE / MEK / MIBK (2%/2%/2%)	6			NR	NR	NR	105		NR	NR	NR	NR
ACETONITRILE	ALL		NR	NR	NR	NR	NR	NR	NR	N/R	N/R	NR
ACRYLAMIDE	50			100	80	100	95		80			NR
ACRYLIC ACID	10		100	80	100	100	100	100	100	100	NR	NR
ACRYLIC ACID	25		100	NR	100	100	100	100	100	100	NR	NR
ACRYLIC LATEX	ALL		175	125	180	180	175	175	100			
ACRYLONITRILE	100		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
ADIPIC ACID	100		175	180	180	180	175	175	200			
ADIPINONITRILE	100		120	100	140	140	120	120	160			
ALKYL BENZENE SULPHONIC ACID	ALL		140	140	180		140	140	100			
ALKYLAMINOPOLYGLYCOLETHER	ALL		NR	80	80	80	80	80	90			
ALKYLARYL SULFONATE SALTS	ALL		140	120	140	140	140	140	150			80
ALKYLARYL SULFONIC ACID	ALL		140	120	140	140	140	140	160			
ALKYLARYLAMMONIUM SALT	ALL		175	175	180	180	175	175	175			80
ALKYLBENZENEAMMONIUM SALT	ALL		175	175	180	180	175	175				80
ALKYLBENZENESULFONIC ACID	ALL		140	120	140	140	140	140	150			80
ALKYLNAPHTOLOPOLYGLYCOLETHER	ALL		140	120	140	140	140	140	150			NR
ALKYLOLAKOXYLATE	ALL		140	120	140	140	140	140	150			
ALKYLOLETHERPHOSPHATE	ALL		80	80	80	80	80	80	90			80
ALKYLOLETHERSULFATE	ALL		140	120	140	140	140	140	150			80
ALKYLOLSULFATES AND SALTS	ALL		140	120	140	140	140	140	150			80
ALKYLPHENOLPOLYGLYCOLETHER	ALL			80	80	80	80	80	80			
ALKYLPHENOLPOLYGLYCOLETHERSULFATES AND SALTS	ALL		140	120	140	140	140	140	150			80

Notes

1 Synthetic veil recommended
2 Double synthetic veil recommended
3 Double C-glass veil recommended
4 Double C-glass veil recommended. The thickness of the chemical resistance barrier (veil plus chopped glass fibers) should be ≈0.200 inches thick
5 Carbon Veil is recommended for improved service life.
6 Acid resistant (ECR) glass recommended in chopped glass layer behind the veil layer(s)
7 BPO/DMA or BPO/DEA curing system is recommended for improved service life.
8 Post cure recommended for improved service life.
9 Satisfactory up to maximum stable temperature of component.
10 Contact Corrosion Product Leader (see page 3)
11 Vipel® F764 or Vipel® F774 are recommended as the preferred products over Vipel® F701.
NR Not recommended.
"**ALL**" in concentration column refers to concentrations in water.
"**100**" in concentration column refers to the pure chemical.

Fahrenheit to Centigrade Conversions

300°F= 149°C	230°F= 110°C	160°F= 71°C	100°F= 38°C
290°F= 143°C	220°F= 104°C	150°F= 66°C	90°F= 32°C
280°F= 138°C	210°F= 99°C	140°F= 60°C	80°F= 27°C
270°F= 132°C	200°F= 93°C	130°F= 54°C	77°F= 25°C
260°F= 127°C	190°F= 88°C	120°F= 49°C	70°F= 21°C
250°F= 121°C	180°F= 82°C	110°F= 44°C	60°F= 16°C
240°F= 116°C	170°F= 77°C		

Room temperature is assumed to be 77°F

Chemical Listings

Vipel®
CORROSION
RESISTANT RESINS

CONCENTRATIONS AND RECOMMENDED MAXIMUM CONTINUOUS EXPOSURE TEMPERATURE - DEGREES F

CHEMICAL	CONC.%	NOTES	F010 K022	F007 F015	F080	F083 K023	F085 F086 K095	F282	K190	F701 F707 F764 F774	F737 F738	Hood & Duct F733
			TEMPERATURE									
ALKYLSULFONATE	ALL		140	120	140	140	140	140	150			80
ALKYLSULFONIC ACID AND SULFONATES	ALL		140	120	140	140	140	140	150			80
ALLYL ALCOHOL	100		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
ALLYL CHLORIDE	100		NR	80	80	80	80	NR	80		NR	
ALPHA METHYLSTYRENE	100		NR	NR	NR	NR	115	NR	NR	NR	NR	NR
ALUM	ALL		195	190	200	200	210	210	220	170	150	180
ALUMINUM CHLORIDE	ALL		195	190	200	200	210	210	220	170	100	180
ALUMINUM CHLOROHYDRATE	100		200	190	200	200	210	210	165	170	100	180
ALUMINUM CHLOROHYDROXIDE	50		195	190	200	200	210	210		170	100	180
ALUMINUM CITRATE	ALL		195	190	200	200	210	210	220	170	100	180
ALUMINUM FLUORIDE	100	**1**	115	90	90	90	115	115	90	90	90	90
ALUMINUM HYDROXIDE	100	**2**	160	160	200	NR	175	160	NR	NR	NR	NR
ALUMINUM NITRATE	SAT'D		160	180	180	180	175	160	190	150	130	80
ALUMINUM POTASSIUM SULPHATE	ALL		195	190	210	210	210	210	210	170	140	160
ALUMINUM SULFATE/ACETIC ACID	ALL	**10**	140	100	175	180	175	175	200			
ALUMINUM SULPHATE	ALL		195	180	210	210	210	210	210	170	140	170
AMINO ACIDS	100		105	80	130	130	105	105	140			80
AMINOSULPHONIC ACID	ALL		175	120	175	180	175	175	190			80
AMMONIA (DRY GAS)	100		105	80	180	100	105	105	90	80	N/R	90
AMMONIA (WET GAS)	100		105	100	150	NR	105	105	NR	80		90
AMMONIA, LIQUIFIED GAS	100		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
AMMONIUM ACETATE	ALL		115	80	110	115	115	115				NR
AMMONIUM BENZOATE	ALL		175	140	180	180	175	175	120			80
AMMONIUM BICARBONATE	ALL		160	160	160	160	160	160		NR	NR	140
AMMONIUM BICARBONATE	SAT'D		150	130	150	150	150	150	NR	NR	NR	NR
AMMONIUM BIFLUORIDE	ALL		105	130	160		150	105				NR
AMMONIUM BISULPHITE BLACK LIQUOR			175	140	180	180	175	175	195	NR	NR	
AMMONIUM BROMATE	ALL		195	170	210	210	210	210	210	180	120	160
AMMONIUM BROMIDE	ALL		195	170	210	210	210	210	210	180	120	160
AMMONIUM CARBONATE	ALL		150	150	150	150	150	150	NR	NR	NR	NR
AMMONIUM CHLORIDE	ALL		195	170	210	210	210	210	200	180	160	180
AMMONIUM CITRATE	ALL		150	150	150	150	160	160		120		80
AMMONIUM FLUORIDE	ALL	**1**	150	150	150	150	150	170		NR	NR	
AMMONIUM HYDROXIDE (AQUEOUS AMMONIA)	1	**2**	180	160	200	NR		175	NR	NR	NR	140
AMMONIUM HYDROXIDE (AQUEOUS AMMONIA)	5	**2**	180	140	180	NR		160	NR	NR	NR	90
AMMONIUM HYDROXIDE (AQUEOUS AMMONIA)	10	**2**	160	130	180	140	120	150	NR	NR	NR	90
AMMONIUM HYDROXIDE (AQUEOUS AMMONIA)	20	**2**	150	110	150	NR		140	NR	NR	NR	NR
AMMONIUM HYDROXIDE (AQUEOUS AMMONIA)	29	**2**	125	80	120	NR		105	NR	NR	NR	NR
AMMONIUM LAURYL SULPHATE	ALL		120	100	130		140	140	130	130		
AMMONIUM LIGNOSULPHONATE	50						175					

CONCENTRATIONS AND RECOMMENDED MAXIMUM CONTINUOUS EXPOSURE TEMPERATURE - DEGREES F

CHEMICAL	CONC.%	NOTES	F010 K022	F007 F015	F080	F083 K023	F085 F086 K095	F282	K190	F701 F707 F764 F774	F737 F738	Hood & Duct F733
			TEMPERATURE									
AMMONIUM MOLYBDATE	ALL		105	80	110	110	105	105	NR			NR
AMMONIUM NITRATE	ALL		195	170	210	210	210	210	200	160	140	160
AMMONIUM OXALATE	ALL		105	80	110		105	105	NR			
AMMONIUM PENTABORATE	ALL		105	80	110		105	105	NR			
AMMONIUM PERSULPHATE	ALL		175	180	180	180	175	175	150	NR	NR	150
AMMONIUM PHOSPHATE, DIBASIC	ALL		195	180	210	210	210	210	150	NR	NR	150
AMMONIUM PHOSPHATE, MONOBASIC	ALL		195	180	210	210	210	210		150	130	NR
AMMONIUM POLYSULPHIDE	ALL		115	80	140		150	115	NR			
AMMONIUM SULPHATE	ALL		195	180	210	210	210	210	210	170	120	180
AMMONIUM SULPHIDE	ALL		120	80	120	120	120	100	120			
AMMONIUM SULPHITE	10		110	80	100	100	150	100	NR	NR	NR	
AMMONIUM THIOCYANATE	20		195	180	210	210	210	210	200	170	130	
AMMONIUM THIOCYANATE	50		115	80	120	120	115	115	180	140	90	120
AMMONIUM THIOSULFATE	ALL		140	100	100	100	140	140	180	100	80	NR
AMYL ACETATE	100		NR	NR	100	120	120	NR	90	NR	NR	90
AMYL ALCOHOL (SEC-)	ALL	**11**	120	150	150	150	210	210	210	100	NR	NR
AMYL ALCOHOL (SEC-)	VAPORS	**11**	120	150	150	150	210	210	210	100	NR	NR
AMYL ALCOHOL (TERT-)	100	**11**	120	150	150	150	210	210	210	100	NR	NR
AMYL ALCOHOL (TERT-)	VAPORS	**11**	120	150	150	150	210	210	210	100	NR	NR
AMYL CHLORIDE	100		NR	80	120	120	120	120	80	NR	NR	NR
ANILINE	100		NR	NR	NR	NR		NR	NR	NR	NR	NR
ANILINE HYDROCHLORIDE	ALL		175	160	180	180	175	175				
ANILINE SULPHATE	ALL		195	170	210	210	210	210	200	NR	NR	140
ANTIMONY PENTACHLORIDE	100		105	80	90	110	105	105	90	90	80	90
ANTIMONY TRICHLORIDE	100		175	150	210	210	175	175	200	140	100	160
AQUA REGIA (37% HCL 60% / 70% NITRIC 20% / WATER 20%)	100		NR	NR	NR	NR	NR	NR	130	NR	NR	NR
ARSENIC ACID	ALL		175				175	175		NR	NR	
ARSENIOUS ACID	ALL		175	100	90	100	175	175				
BARIUM ACETATE	ALL		175	180	190	180	175	175	180	NR	NR	NR
BARIUM BROMIDE	ALL		175	180	210	210	210	210				
BARIUM CARBONATE	100		195	180	210	210	210	210	200	130	NR	180
BARIUM CHLORIDE	ALL		195	180	210	210	210	210	200	170	130	180

Notes

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CONCENTRATIONS AND RECOMMENDED MAXIMUM CONTINUOUS EXPOSURE TEMPERATURE - DEGREES F

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			TEMPERATURE									
BARIUM CYANIDE	ALL		140	120	150	150	150	150				
BARIUM HYDROXIDE	ALL		140	110	160	160	150	150	NR	NR	NR	NR
BARIUM NITRATE	ALL		190	180	210	210	210	210	200			160
BARIUM SULPHATE	ALL		190	180	210	210	210	210	180	170	120	150
BARIUM SULPHIDE	ALL		140	180	180	180	175	175		NR	NR	NR
BEER	100		115	120	NR	NR	NR	115	NR	90	NR	NR
BEER SUGAR LIQUOR	ALL		175	180	180	180	175	175	NR		NR	NR
BENZALDEHYDE	100		NR	NR	NR	NR	70	NR	NR	NR	NR	NR
BENZENE	100		NR	NR	100	100	95	NR	90	NR	NR	90
BENZENE	VAPORS	**11**	NR	80	NR	NR	95	NR	90	90	NR	NR
BENZENE SULPHONIC ACID	50		140	120	200	200	195	200	200	NR	NR	140
BENZENE / ETHYL BENZENE (33.3% / 66.7%)	100		NR	NR			80	NR	100		NR	NR
BENZOIC ACID	ALL		195	180	210	210	210	210	210	170	100	180
BENZOQUINONES	100		150	120	175	175	175	175	150			140
BENZOYL BENZOIC ACID (2-)	ALL		195	180	210	210	210	210	210			150
BENZOYL BENZOIC ACID (4-)	ALL		195	180	210	210	210	210	210			150
BENZYL ALCOHOL	100	**11**	80	80	100	100	105	105	100		NR	NR
BENZYL CHLORIDE	100		NR	NR	80	80	80	80	NR	NR	NR	NR
BENZYLTRIMETHYLAMMONIUM CHLORIDE	100		140	120	150	150	140	140	120			80
BLACK LIQUOR (PULP MILL)	ALL		175	140	180	180	175	175		NR	NR	
BLEACH, CHLORINE DIOXIDE, WET	SAT'D	**9,10**	180	100	180	180	170	170	140	NR	NR	NR
BLEACH, CHLORINE WATER	SAT'D		140	100	160	180	175	175	140	NR	NR	NR
BLEACH, CHLORITE (10 w/w% Sodium chlorite and 10 w/w% Sodium nitrate)	10		100		120	130	120	120	140	NR	NR	NR
BLEACH, (SODIUM HYPOCHLORITE, PH >11, ACTIVE CHLORINE <18%)		**2,7,8,9,10**	125		125	125	125	120	NR	NR	NR	NR
BLEACH, (CALCIUM HYPOCHLORITE, PH >11, ACTIVE CHLORINE <18%)		**2,7,8,9,10**	160		160	160	150	120	NR	NR	NR	NR
BORAX	100		195	180	210	210	210	210	180	170	120	
BORIC ACID	ALL		195	180	210	210	210	210	210	180	120	140
BRINE CHLORINATED	ALL		210	180	210	210	210	210	210			
BRINE, SALT	100		210	160	210	210	210	210	210	150	140	140
BROMINE GAS, DRY	100		105	100	100	100	105	105	140	NR	NR	140
BROMINE GAS, WET	100		105	100	90	90	105	105	90	NR	NR	80
BROMINE LIQUID	100		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
BROMINE WATER	5		175	150	200	210	175	175		NR	NR	NR
BUTANEDIOL (1,3-)	ALL		100	150	175	180	175	175	190	175		
BUTANEDIOL (1,4-)	ALL		100	150	175	180	175	175	190	175		140
BUTANEDIOL (2,3-)	ALL		100	150	175	180	175	175	190	175		140
BUTOXYDIETHYLENE GLYCOL	100		95	120	120	120	120	120	130	NR	NR	100
BUTOXYETHANOL (2-)	100		95	100	100	100	95	95	85			80
BUTOXYETHOXYETHANOL (2,2-)	100		95	100	100	100	120	120	85	NR	NR	80

CONCENTRATIONS AND RECOMMENDED MAXIMUM CONTINUOUS EXPOSURE TEMPERATURE - DEGREES F

CHEMICAL	CONC.%	NOTES	F010 K022	F007 F015	F080	F083 K023	F085 F086 K095	F282	K190	F701 F707 F764 F774	F737 F738	Hood & Duct F733
			TEMPERATURE									
BUTYL ACETATE (N-)	100		NR		80	80	80	90			NR	
BUTYL ACETATE (SEC)	100		NR		80	80	80	90		NR	NR	
BUTYL ACETATE (TERT)	100		NR		80	80	80	90		NR	NR	
BUTYL ACRYLATE	100		NR		80	80	80	90		NR	NR	
BUTYL ALCOHOL (N-)	ALL	**11**	115	120	120	120	140	140	100	80	NR	160
BUTYL ALCOHOL (SEC-)	ALL	**11**	115	120	120	120	140	140	100	80	NR	160
BUTYL ALCOHOL (TERT-)	ALL	**11**	115	120	120	120	140	140	100	80	NR	160
BUTYL AMINE (N-)	50		NR		80	80	80	80		NR	NR	
BUTYL AMINE (N-)	100		NR				NR	NR		NR	NR	
BUTYL AMINE (SEC-)	50		80				80	80		NR	NR	
BUTYL AMINE (SEC-)	100		NR	NR	NR	NR	NR	NR		NR	NR	
BUTYL AMINE (TERT-)	50		80				80	80		NR	NR	
BUTYL AMINE (TERT-)	100		NR	NR	NR	NR	NR	NR		NR	NR	
BUTYL BENZOATE	100		105	105	130	140	140	140		NR	NR	
BUTYL BENZYL PHTHALATE	100		175	160	210	210	210	195	200			120
BUTYL CARBITOL	100		95	NR	100	100	100	120	85			
BUTYL CELLOSOLVE	100		NR	100	100	100	100	100	90	80	NR	90
BUTYL DIGLYCOL	100		95	120	120	120	120	120	130		NR	80
BUTYL STEARATE (5% IN MINERAL SPIRITS)			NR				80	80	80	NR	NR	
BUTYLALDEHYDE	100		NR				95	95		NR	NR	
BUTYLENE GLYCOL	100		175	180	180	180	175	175	160	160	120	140
BUTYLENE OXIDE	100		NR	NR	NR	NR	NR	NR		NR	NR	NR
BUTYRIC ACID	50		160	150	160	210	210	150	120	130		120
BUTYRIC ACID	85				120	120	120	115	90	NR	NR	
BUTYRIC ACID	100				100		105	NR	90	NR	NR	NR
CADMIUM CHLORIDE	ALL		175	160	210	210	195	195	210	140	100	160
CALCIUM BISULPHITE	ALL		175	120	180	180	175	175		170	80	160
CALCIUM BROMIDE	ALL		195	160	200	210	210	210		140	80	140
CALCIUM CARBONATE	ALL		195	180	180	180	210	210		160	80	160
CALCIUM CHLORATE	ALL		195	180	210	210	210	210	210	140	100	180
CALCIUM CHLORIDE	ALL		195	195	200	210	210	210	210	180	130	180

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Chemical Listings

Vipel®
CORROSION
RESISTANT RESINS

CONCENTRATIONS AND RECOMMENDED MAXIMUM CONTINUOUS EXPOSURE TEMPERATURE - DEGREES F

CHEMICAL	CONC.%	NOTES	F010 K022	F007 F015	F080	F083 K023	F085 F086 K095	F282	K190	F701 F707 F764 F774	F737 F738	Hood & Duct F733
			TEMPERATURE									
CALCIUM HYDROXIDE	ALL	**2**	175	120	180	NR	175	175	NR	NR	NR	80
CALCIUM HYPOCHLORITE, PH >11, ACTIVE CHLORINE <18%	ALL	**2,7,8,9,10**	160		160	160	150	120	NR	NR	NR	NR
CALCIUM NITRATE	ALL		195	170	210	210	210	210	210	180	130	160
CALCIUM SULPHATE	ALL		195	180	210	210	210	210	210	180	130	180
CALCIUM SULPHITE	ALL		175	120	180	190	175	175				
CALCIUM THIOSULFATE	ALL		120	120	120	180	180	180		90	90	90
CANE SUGAR LIQUOR & SWEET WATER	ALL		175	180	180	190	175	175		90	80	160
CAPRIC ACID	100		195	120	160	160	195	195	200	160	80	
CAPROLACTAM	50		105				105	105				
CAPRYLIC ACID	100		195	170	200	210	210	210	140	160	80	160
CARBON DIOXIDE GAS			210	250	250	250	250	250	200	190	140	180
CARBON DISULPHIDE	100		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
CARBON MONOXIDE GAS			210	250	250	250	250	250	200	190	140	180
CARBON TETRACHLORIDE	100		80		150	180	150	115	125	80	NR	NR
CARBONIC ACID	ALL		160									80
CARBOWAX, POLYETHYLENE GLYCOL	100		175	160	120	160	195	195	160			160
CARBOXY ETHYLCELLULOSE	10		150	100	170	150	150	150				
CARBOXY METHYLCELLULOSE	ALL		150	100	160	150	150	150				
CASHEW NUT OIL	100		175	120	140	140	195	195	180	180		140
CASTOR OIL	100		195	160	120	120	210	210	210	140		180
CHLORIC ACID	CONC.		80				80	80		NR	NR	
CHLORINATED LIME	ALL		140	80	140	140	140	140				
CHLORINATED WAXES	100		175	180	200	180	175	175	210	140	100	180
CHLORINE	LIQUID		NR	NR	NR	NR	NR	NR	100	NR	NR	NR
CHLORINE DIOXIDE	SAT'D	**9,10**	NR		180	180	180	160	90	NR	NR	NR
CHLORINE GAS, DRY	100	**4**	180		250	250	210	210	270	180		
CHLORINE GAS, WET	100	**4**	180		180	180	210	210	220	NR	NR	
CHLORINE WATER	SAT'D		175	150	180	210	210	175	200	NR	NR	125
CHLORINE/HYDROCHLORIC ACID, WET			160	NR			160	140	80			NR
CHLOROACETIC ACID	50		170	80	120	120	170	170	90	NR	NR	NR
CHLOROACETIC ACID	80		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
CHLOROACETIC ACID	100		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
CHLOROBENZENE	100		NR	NR	80	80	95	NR	NR	NR	NR	NR
CHLOROCHOLINCHLORIDE	75		160				160	140			NR	
CHLOROETHYLENE (1,1,1-)	100		NR	NR	NR	NR	NR	NR		NR	NR	NR
CHLOROFORM	100		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
CHLOROPARAFFIN	100		160	180	190	210	175	190	210	180		180
CHLOROPROPIONIC ACID (-2)	ALL		80				80	80		NR	NR	NR
CHLOROPROPIONIC ACID (-2)	50		80				80	80		NR	NR	NR
CHLOROPROPIONIC ACID (-3)	ALL		80				80	80		NR	NR	NR
CHLOROPROPIONIC ACID (-3)	50		80				80	80		NR	NR	NR

CONCENTRATIONS AND RECOMMENDED MAXIMUM CONTINUOUS EXPOSURE TEMPERATURE - DEGREES F

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			TEMPERATURE									
CHLOROPYRIDINE (TETRA)	100		NR	NR	NR		115	NR		NR	NR	NR
CHLOROSULPHONIC ACID	10		NR	NR	NR	NR	NR	NR		NR	NR	NR
CHLOROSULPHONIC ACID	100		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
CHLOROTOLUENE	10		80		NR		80	NR		NR	NR	NR
CHLOROTOLUENE	100		NR	NR	NR		NR	NR	NR		NR	NR
CHROME PLATING SOLUTION	—		100		110	100	100	NR	100	NR	NR	NR
CHROMIC ACID	10	**8**	140	100	150	150	150	150	180	100	NR	NR
CHROMIC ACID	20	**8**	120		120	120	120	NR	150	100	NR	NR
CHROMIC ACID	30	**8**	NR	NR	NR	NR	NR	NR	120	NR	NR	NR
CHROMIC ACID	40	**8**	NR	NR	NR	NR	NR	NR	90	NR	NR	NR
CHROMIC/SULPHURIC ACID (2.5% / 13.7%)	16.2	**8**	NR				NR	NR		NR	NR	NR
CHROMIC/SULPHURIC ACID, MAX. CONC. MIX. 10%	10	**8**	120		130	150	150	120	150			NR
CHROMIUM SULPHATE	ALL		195	150	195	200	195	195	150	NR	NR	140
CHROMOUS SULPHATE	ALL		195	150	195	200	195	195	150	NR	NR	140
CINNAMALDEHYDE	100		80				80	NR				
CITRIC ACID	ALL		195	170	210	210	210	210	200	180	80	160
COBALT CHLORIDE	ALL		175	150			175	175	190			160
COBALT CITRATE	100		175	150			175	175	190			160
COBALT NITRATE	100		175	150	140	140	175	175	140			160
COCONUT FATTY ACID	100		195	150	200	210	195	195	210			180
COCONUT OIL	100		195	200	175	175	200	195	210	150	100	180
COD LIVER OIL	100		80	100			80	80				180
COPPER ACETATE	ALL		175	130	180	180	175	175	190	160	NR	120
COPPER AMMONIUM CHLORIDE	ALL		175	130	180	180	175	175	190			120
COPPER CYANIDE	100		195	180	220	210	210	210	200	90	NR	90
COPPER(I) CHLORIDE	ALL		195	180	210	210	210	210	210	180	140	180
COPPER(I) SULPHATE	ALL		195	180	210	210	210	210	210	180	100	180
COPPER(II) CHLORIDE	ALL		195	180	210	210	210	210	210	180	140	180
COPPER(II) NITRATE	ALL		195	180	210	210	210	210	210	160	100	180
COPPER(II) SULPHATE	ALL		195	180	210	210	210	210	210	180	100	180
CORN OIL	100		195	210	200	210	210	210	210	150	100	180
CORN STARCH SLURRY	ALL		195	180	210	210	210	210	210	120	100	180

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			TEMPERATURE									
CORN SUGAR	ALL		195	180	210	210	210	210	210	120	100	180
COTTONSEED OIL	100		195	210	200	210	210	210	100	100	NR	180
CRESOL (M-)	10		NR				80	NR				NR
CRESOL (O-)	10		NR				80	NR				NR
CRESOL (P-)	10		NR				80	NR				NR
CRUDE OIL, SOUR AND SWEET	100	**11**	195	200	210	210	210	210		180	100	180
CYCLOHEXANE	100	**11**	120	130	150	150	140	115	140	120	NR	
CYCLOHEXANOL	100	**11**	105				120	120			NR	
CYCLOHEXANONE	100	**11**	NR				80	NR		NR	NR	NR
CYCLOHEXYLAMINE	100		80				80	NR			NR	NR
DECALIN	100		140	120	140	140	140	140				
DECANES	100		175	175	180	180	175	175	180			140
DECANOL	100	**11**	140	175	180	180	175	175	100	160	NR	
DECENES	100		175				175	175				
DEIONISED WATER	100	**11**	180	180	210	210	180	175	180	150	100	
DEMINERALISED WATER	100	**11**	210	180	210	210	180	180	210	180	100	140
DETERGENTS, SULPHONATED	100		195	180	210		210	210		160	80	140
DI 2-ETHYL HEXYL PHOSPHORIC ACID (IN KEROSENE)	20				210	210	210	210	210			
DIALLYL PHTHALATE	100	**11**	175	210	210	210	210	175	210	160	110	140
DIAMMONIUM PHOSPHATE	ALL		195	150	200	210	195	195	210			140
DIBROMOPHENOL	100		NR				95	NR	NR	NR	NR	NR
DIBROMOPROPANOL	100		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
DIBUTYL ETHER	100		NR	140	150	180	150	150	80	80	NR	80
DIBUTYL PHTHALATE	100		175	180	200	200	210	210	90	90	NR	80
DIBUTYL SEBACATE	100		140	150	200	200	150	150	90	140	NR	80
DIBUTYLAMINE (N-)	50		80				80	80				
DICHLOROACETIC ACID	80		NR				80	NR	110			NR
DICHLOROBENZENE (M-)	100		NR		100	120	115	115	NR		NR	NR
DICHLOROBENZENE (O-)	100		NR		100	120	115	115	100	NR	NR	NR
DICHLOROBENZENE (P-)	100		NR		100	120	115	115	NR		NR	NR
DICHLOROETHANE	100		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
DICHLOROETHYLENE	100		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
DICHLOROMETHANE	0.2		80				80	80			NR	
DICHLOROMETHANE	100		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
DICHLOROPROPANE	100		NR		NR	NR	85	NR	NR	NR	NR	NR
DICHLOROPROPENE	100		NR	NR	NR	NR	80	NR	NR	NR	NR	NR
DICHLOROPROPIONIC ACID	100		NR		NR	NR	NR	NR				NR
DICHLOROTOLUENE	80		NR				115	NR				

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			TEMPERATURE									
DICHLOROTOLUENE	100		NR				115	NR				
DIESEL FUEL, NO AROMATICS, NO METHANOL	100		175	190	200	200	195	195	175	175	120	100
DIESEL FUEL, AROMATICS, METHANOL	100	**11**						90		90	NR	
DIETHANOL AMINE	100		120	120	120	120	120	115	110			90
DIETHYL AMINE	ALL		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
DIETHYL ANILINE N,N	100		NR	NR	NR	NR	80	80	NR			NR
DIETHYL BENZENE	100		80	120	120	150	150	NR	120	NR	NR	
DIETHYL CARBONATE	100		NR	80	NR		95	NR			NR	
DIETHYL ETHER	100		NR				NR	NR		NR	NR	
DIETHYL FORMAMIDE	100		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
DIETHYL KETONE	100		NR	NR	NR	80	80	NR		NR	NR	NR
DIETHYL MALEATE	100		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
DIETHYL PHTHALATE	100	**11**	140	175			175	175	180	140	80	100
DIETHYL SULPHATE	100		105	120	100	100	120	105	100			
DIETHYLENE GLYCOL	100		195	210	210	210	210	210	250	180	80	180
DIETHYLENE GLYCOL DIMETHYL ETHER	100		NR				80	NR				NR
DIETHYLENE GLYCOL MONOBUTYL ETHER	100		95				120	105				NR
DIETHYLENETRIAMINE	100		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
DIISOBUTYL KETONE	100		NR	NR	NR	NR	115	NR	80			NR
DIISOBUTYL PHTHALATE	100	**11**	140	150	150	150	175	175	90	110		80
DIISOBUTYLENE	100	**11**	80	100	100	100	80	NR	100	80	NR	
DIISOPROPANOL AMINE	100		105	120	120	120	150	105				
DIISOPROPYLAMINE	100		80				80	NR				
DIMETHYL ACETAMIDE	100		NR				80	NR	150			
DIMETHYL AMINE	100		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
DIMETHYL ANILINE	100		80				80	80				NR
DIMETHYL FORMAMIDE	100		NR	NR	NR	NR	80	NR	NR	NR	NR	NR
DIMETHYL PHTHALATE	100		150	180	150		175	175			NR	NR
DIMETHYL SULPHATE	100		80				80	N.R				
DIMETHYL SULPHIDE	100		NR				70	NR		NR	NR	
DIMETHYL SULPHOXIDE	20		NR				70	NR				
DIMETHYL SULPHOXIDE	100		NR				NR	NR				NR

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280°F= 138°C	210°F= 99°C	140°F= 60°C	80°F= 27°C
270°F= 132°C	200°F= 93°C	130°F= 54°C	77°F= 25°C
260°F= 127°C	190°F= 88°C	120°F= 49°C	70°F= 21°C
250°F= 121°C	180°F= 82°C	110°F= 44°C	60°F= 16°C
240°F= 116°C	170°F= 77°C		

Room temperature is assumed to be 77°F

Chemical Listings

Vipel®
CORROSION
RESISTANT RESINS

CONCENTRATIONS AND RECOMMENDED MAXIMUM CONTINUOUS EXPOSURE TEMPERATURE - DEGREES F

CHEMICAL	CONC.%	NOTES	F010 K022	F007 F015	F080	F083 K023	F085 F086 K095	F282	K190	F701 F707 F764 F774	F737 F738	Hood & Duct F733
			TEMPERATURE									
DIMETHYLMORPHOLINE (2,6-)	100		80				115	NR		NR	NR	
DINONYL PHTHALATE	100		140				175	175				
DIOCTYL PHTHALATE	100		120	190	150	150	210	140				NR
DIOCTYLSULFOSUCCINATE SODIUM SALT	ALL		175	160	180	180	175	175	180			80
DIOXANE (1,4-)	ALL		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
DIPHENYL ETHER	100		80	120	120	120	120	120	120	NR	NR	NR
DIPIPERAZINE SULPHATE SOLUTION	ALL		105	80	105	105	105	105				NR
DIPOTASSIUM PHOSPHATE	ALL		180	180	195	195	195	175	195	100	80	140
DIPROPYLAMINE (N-)	50		80				80	80				NR
DIPROPYLENE GLYCOL	100		175	210	210	210	210	210	210	160	NR	160
DISPERSIONS, COPOLYMER VINYL ACETATE/VINYL VERSATATE	50		80				80	80				
DIVINYL BENZENE	100		80	120	120	120	115	NR	90			
DODECANOL	100	**11**	140	160	175	175	175	150	180	120	NR	
DODECENE	100	**11**	140	160	175	175	175	140	120	140	NR	
DODECYL BENZENE SULPHONIC ACID	ALL	**11**	195	200	210	210	210	210	210	80	NR	180
DODECYL GUANIDINE HYDROCHLORIDE	ALL	**11**	175	160	180	180	175	175	180	80	NR	140
DOWANOL DB GLYCOLETHER	ALL			80	80	80	80	80	80			
EMBALMING FLUID	100		80				115	115				
EPICHLOROHYDRIN	100		NR				80	NR		NR	NR	
EPOXIDISED VEGETABLE OILS	100		195	200	210	210	195	195	230			180
EPOXIDIZED CASTOR OIL	100		195	200	210	210	195	195	230	120	NR	180
EPOXIDIZED SOYBEAN OIL	100		195	200	210	210	195	195	230	120	NR	180
ESTERS, FATTY ACID	100		195	180	180	180	195	195	120	180	130	140
ETHANOL AMINE	100	**10**	120	NR	90	90	120	NR	90	NR	NR	
ETHYL ACETATE	100		NR	NR	NR	NR	80	NR	NR	NR	NR	NR
ETHYL ACRYLATE	100		NR	NR	NR	NR	80	NR	NR	NR	NR	NR
ETHYL ALCOHOL	10	**11**	140	150	140	140	150	150		80	NR	
ETHYL ALCOHOL	50	**11**	105	80	150	150	120	120	150	90	NR	
ETHYL ALCOHOL	96			100	90	90	100	100	100	NR	NR	
ETHYL AMINE	35		80				80	NR				NR
ETHYL BENZENE	100		NR	100	100		120	NR	NR	NR	NR	NR
ETHYL BROMIDE	100		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
ETHYL CHLORIDE	100		NR	80	NR	80	NR	NR	90	NR	NR	NR
ETHYL ETHER	100		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
ETHYL SULPHATE	100		NR	100	100	100	95	NR	100			
ETHYLENE CHLORIDE	100		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
ETHYLENE CHLOROHYDRIN	100		105	100	100	100	115	115	200			
ETHYLENE DIAMINETETRAACETIC ACID, EDTA	ALL		140				140	115				
ETHYLENE DICHLORIDE	100		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

CONCENTRATIONS AND RECOMMENDED MAXIMUM CONTINUOUS EXPOSURE TEMPERATURE - DEGREES F

CHEMICAL	CONC.%	NOTES	F010 K022	F007 F015	F080	F083 K023	F085 F086 K095	F282	K190	F701 F707 F764 F774	F737 F738	Hood & Duct F733
			TEMPERATURE									
ETHYLENE GLYCOL	ALL	**11**	195	210	210	210	210	210	250	180	130	180
ETHYLENE GLYCOL MONOBUTYL ETHER	100		150	150	150	150	150	105	90		NR	90
ETHYLENE OXIDE	100		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
ETHYLHEXANOL -2	100		105				120	120		100		
ETHYLHEXYLACRYLATE -2	100		80				80	80				
EUCALYPTUS OIL	100	**11**	195	200	200	200	195	195	210	140	NR	170
FATTY ACIDS (C12 OR HIGHER)	100	**11**	195	250	220	250	210	210	250	180	130	180
FERRIC ACETATE	ALL		175	180	180	180	180	180	180			120
FERRIC CHLORIDE	ALL		195	180	210	210	210	210	210	180	120	140
FERRIC CHLORIDE / FERROUS CHLORIDE (5% / 20%)	25		195	180	220	210	210	210	210	180		140
FERRIC CHLORIDE / FERROUS CHLORIDE/HYDROCHLORIC ACID (48% / 2% / 2%)	52		195	180	220	210	210	210	210		NR	140
FERRIC CHLORIDE / HYDROCHLORIC ACID (29% / 18.5%)	47.5		175	160	180	180	210	210	180		NR	140
FERRIC NITRATE	ALL		195	180	210	210	210	210	210	180	120	180
FERRIC SULPHATE	ALL		195	180	210	210	210	210	200	180	120	180
FERRIC SULPHATE / SULPHURIC ACID	SAT'D/10		175	130	180	180	175	175	180		NR	120
FERROUS CHLORIDE	ALL		195	180	210	210	210	210	210	160	120	180
FERROUS CHLORIDE / FERRIC CHLORIDE (20% / 5%)	25		195	170	210	210	210	210	210	180		180
FERROUS CHLORIDE-HYDROCHLORIC ACID	ALL	**6**	120	80	120	120	120	120	150			100
FERROUS NITRATE	ALL		195	180	210	210	210	210	210	160	120	160
FERROUS SULPHATE	ALL		195	180	210	210	210	210	210	160	120	180
FERROUS SULPHATE / MAGNESIUM OXIDE (20% / 10%)	30		195	180	210	210	210	210	210			180
FERTILIZER UREA (Phosphoric acid + Ammonia + Uran + Potash + Borax)			140	100	150	150	140	140		80		100
FERTILIZER, 8-8-8			140	100	150	150	140	140		80	NR	100
FERTILIZER, UREAAMMONIUM CONT'D 35,4% UREA			140	100	150	150	140	140		80		100
FLUOBORIC ACID	10	**1**	175	120	210	210	210	175	210			180
FLUOBORIC ACID	15	**2**	160	110	180	180	195	160	200			120
FLUOBORIC ACID	25	**2**	140	100	180	180	175	140	190			100
FLUOBORIC ACID	SAT'D	**2**	120	80	160	160	160	120	180	80	NR	100
FLUORIDE SALTS / HYDROCHLORIC ACID (30% / 10%)	40	**1**	120	80	120	120	120	120	120			
FLUORINE GAS		**1**	210	80	250		70					
FLUOROCARBON 11	100	**1**	115				115	115				

Notes

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- **8** Post cure recommended for improved service life.
- **9** Satisfactory up to maximum stable temperature of component.
- **10** Contact Corrosion Product Leader (see page 3)
- **11** Vipel® F764 or Vipel® F774 are recommended as the preferred products over Vipel® F701.
- **NR** Not recommended.
- "**ALL**" in concentration column refers to concentrations in water.
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Fahrenheit to Centigrade Conversions

300°F= 149°C	230°F= 110°C	160°F= 71°C	100°F= 38°C
290°F= 143°C	220°F= 104°C	150°F= 66°C	90°F= 32°C
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240°F= 116°C	170°F= 77°C		

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Chemical Listings

Vipel®
CORROSION
RESISTANT RESINS

CONCENTRATIONS AND RECOMMENDED MAXIMUM CONTINUOUS EXPOSURE TEMPERATURE - DEGREES F

CHEMICAL	CONC.%	NOTES	F010 K022	F007 F015	F080	F083 K023	F085 F086 K095	F282	K190	F701 F707 F764 F774	F737 F738	Hood & Duct F733
			TEMPERATURE									
FLUOSILICIC ACID	10	1	150	150	150	180	180	150	180	80	NR	100
FLUOSILICIC ACID	25	2	105	80	110	110	110	105	160	NR	NR	90
FLUOSILICIC ACID	35	2	80		100	100	100	80	160	NR	NR	NR
FORMALDEHYDE	50		80				150	120				NR
FORMAMIDE	100		80		100		105	80	100			NR
FORMIC ACID	30		175				175	150		NR	NR	
FORMIC ACID	50		140		120	120	140	115	100	NR	NR	90
FORMIC ACID	85		80				80	80				
FORMIC ACID	98		NR				NR	NR		NR	NR	
FREON 11	100		80				105	80				
FUEL OIL, AROMATICS, METHANOL	100	11						90		90	NR	
FUEL OIL, NO AROMATICS, NO METHANOL	100	11	170	170	170	170	170	175		160	120	
FURFURAL	5		160		150	150	160	160	90		NR	90
FURFURAL	20		105				115	115				
FURFURAL	100		NR	NR	NR	NR	NR	NR		NR	NR	NR
FURFURYL ALCOHOL	100		NR	NR			80	80	100	NR	NR	
GALLIC ACID	ALL						100	80	80			
GASOLINE FUEL	100	10,11								120		
GLUCONIC ACID	ALL		140		125		175	140	125	120	100	120
GLUCONIC ACID	50		115		125		175	115	125			120
GLUCOSE	100		195	250	220	250	210	210	180	180	120	180
GLUTARALDEHYDE	50		80				120	80		80	NR	
GLUTARIC ACID	ALL		140				140	120		140		
GLYCERINE	100		195	210	220		210	210	200	180	130	180
GLYCERINE TRIACETATE	ALL		80				80	NR		80	NR	
GLYCOLIC ACID	35		140		200	200	140	140	140	140	80	140
GLYCOLIC ACID	70		80	80	100	100	105	105	100	80	NR	120
GLYME			NR				NR	NR		NR	NR	
GLYOXAL	40		105	80	80		115	115		NR	NR	
GREEN LIQUOR (PULP MILL)			180	140	180	180	180	180	NR	NR	NR	
GYPSUM SLURRY; PHOSPHORIC ACID;FLUORINE WATER			115				115	115	100	NR	NR	
HEPTANE	100		195	210	200	200	210	195	200	180	NR	120
HEPTENE	100		195				210	195				
HEXACHLOROCYCLOPENTADIENE	100				180		115	115	200		NR	
HEXAMETHYLENETETRAMINE	60		105				115	115				
HEXANE	100		140	160	160	160	160	140	160	140	140	
HEXANEDIOL	ALL		195				195	195				
HEXENE	100		140				160	140				
HEXENE (2-)	100		140				160	140				
HEXENE (2-TRANS-)	100		140				160	140				

CONCENTRATIONS AND RECOMMENDED MAXIMUM CONTINUOUS EXPOSURE TEMPERATURE - DEGREES F

CHEMICAL	CONC.%	NOTES	F010 K022	F007 F015	F080	F083 K023	F085 F086 K095	F282	K190	F701 F707 F764 F774	F737 F738	Hood & Duct F733
			TEMPERATURE									
HEXENE (3-TRANS-)	100		140				160	140				
HYDRAULIC FLUID, ALKALINE	100		80				80	80		NR	NR	
HYDRAULIC FLUID, NEUTRAL	100	**11**	195				195	195		80	NR	
HYDRAZINE	50		NR				80	NR		NR	NR	
HYDRAZINE	100		NR				NR	NR		NR	NR	
HYDRAZINE HYDRATE	16		85				85	85				
HYDROBROMIC ACID	18		200	160	200	200	200	200	200	160	80	160
HYDROBROMIC ACID	26		160	140	160	160	160	175	200	160		
HYDROBROMIC ACID	48		210		210	210	210	160	200	150	NR	160
HYDROBROMIC ACID	62		105				105	105				
HYDROCHLORIC ACID	10	**3,6**	210	210	210	210	210	210	210	160	120	180
HYDROCHLORIC ACID	18	**3,6**	200	200	200	200	210	180	210	100	80	
HYDROCHLORIC ACID	21	**4,6**	200	200	200	200	210	180	210	100	80	
HYDROCHLORIC ACID	25	**4,6**	175	170	180	180	180	180	180	140		150
HYDROCHLORIC ACID	37	**4,6**	100	80	100	100	125	90	100	NR	NR	
HYDROCHLORIC ACID AND TRACE ORGANICS		**4,6**	NR					NR	80			
HYDROCYANIC ACID, SATURATED			150		150	150	210	200	200	80	NR	180
HYDROFLUORIC ACID	10	**2,10**	100		100	100	100	100	100	80	NR	100
HYDROFLUORIC ACID	20	**2**	70	NR	NR	80	90	NR	90	NR	NR	NR
HYDROFLUOSILICIC ACID	10	**1,10**	150	150	150	180	180	150	180	80	NR	
HYDROFLUOSILICIC ACID	25	**2,10**	105		110	100	110	105	160	NR	NR	
HYDROFLUOSILICIC ACID	35	**2,10**	80		100	100	100	80	160	NR	NR	NR
HYDROGEN BROMIDE GAS, DRY	ALL		180		180	180	180	180	200	90	NR	90
HYDROGEN BROMIDE GAS, WET	ALL		180		180	180	180	180	180	90	NR	
HYDROGEN CHLORIDE GAS, DRY	ALL	**6**	195	195	220	250	210	210	250	120	NR	
HYDROGEN CHLORIDE GAS, WET	ALL	**6**	195	195	220	220	210	210	230	120	NR	120
HYDROGEN FLUORIDE GAS, DRY	ALL	**2,10**						100				
HYDROGEN PEROXIDE	5		150		150	150	150	150	210	150	NR	
HYDROGEN PEROXIDE	30		100	100	100	150	150	105		NR	NR	
HYDROGEN PEROXIDE	50								100			
HYDROGEN SULPHIDE, GAS	5		175				250	250		140	77	
HYDROGEN SULPHIDE, GAS	100		175	190	220	210	210	210	250	140	77	180

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Chemical Listings

Vipel®
CORROSION
RESISTANT RESINS

CONCENTRATIONS AND RECOMMENDED MAXIMUM CONTINUOUS EXPOSURE TEMPERATURE - DEGREES F

CHEMICAL	CONC.%	NOTES	F010 K022	F007 F015	F080	F083 K023	F085 F086 K095	F282	K190	F701 F707 F764 F774	F737 F738	Hood & Duct F733
			TEMPERATURE									
HYDROXYACETIC ACID	35		140		200	200	140	140	140	120		140
HYDROXYACETIC ACID	70		80		100	100	105	105	100	100	NR	120
HYDROXYBENZENESULFONIC ACID	ALL		140				140	140				
HYPOCHLOROUS ACID	ALL		80		150		80	80	105	80	NR	105
HYPOPHOSPOROUS ACID	50		120	80	90	90	120	120	115			
IODINE	CRISTALS		150				150	150				
IODINE	VAPOR						175		175			180
ISOAMYL ALCOHOL	100	**11**	105	120	120	120	120	105		80		
ISOBUTYL ALCOHOL	ALL	**11**	140				140	120		120	NR	
ISODECANOL	20	**11**	140				150	150		140	NR	
ISODECANOL	100	**11**	140	120	180	180	150	150	150	140	NR	
ISONONYL ALCOHOL	100	**11**	140				150	150		140	NR	
ISONONYL ALCOHOL	100	**11**	140				150	140		140	NR	
ISOOCTYL ADIPATE	100		175				175	175			NR	
ISOOCTYL ALCOHOL	100	**11**	140				150	140		140	NR	
ISOPROPYL ALCOHOL	100	**11**	80				120	115		80	NR	
ISOPROPYL AMINE	100		100		120	120	120	120	90			
ISOPROPYL MYRISTATE	100		195				210	210				
ISOPROPYL PALMITATE	100		195	180	220		210	210		120	NR	180
ISOPROPYL SULFATE	ALL		80				80	80				
ITACONIC ACID	40		140				140	140				
ITACONIC ACID	SAT'D		120				120	120			NR	
JET FUEL AV GAS	100	**10**	120	120	120	120	120	120		120		
JET FUEL A AND A1	100	**10**	120	120	120	120	120	120		120		
JET FUEL B	100	**10**	120	120	120	120	120	120		120		
JET FUEL JP-4	100	**10**	120	120	120	120	120	120		120		
JET FUEL JP-8	100	**10**	120	120	120	120	120	120		120		
JET FUEL JP-10	100	**10**	120	120	120	120	120	120		120		
JOJOBA OIL	100		175				175	175				
KEROSENE	100	**10**	160	180	175	180	180	180	180	175	120	120
LACTIC ACID	10		175				175	175		160	120	
LACTIC ACID	80		80				80	80		80	80	
LATEX, ALKALINE	ALL		80				80	80				
LATEX, PAINT EMULSION	ALL		105				120	115			NR	
LATEX, PVA EMULSION	ALL		105				120	115				
LATEX, RUBBER EMULSION	ALL		105		100	120	120	115			NR	
LAURIC ACID	ALL		195		210		210	210		180	120	
LAUROYL ALCOHOL	100	**11**	195				195	195		80		
LAUROYL CHLORIDE	100		120				120	120				
LAURYL ALCOHOL	ALL	**11**	195	180	120	180	195	195	120	80		

CONCENTRATIONS AND RECOMMENDED MAXIMUM CONTINUOUS EXPOSURE TEMPERATURE - DEGREES F

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			TEMPERATURE									
LAURYL CHLORIDE	100		120	100			120	120	210			
LAURYL ETHER SULFATE	100		140				140	140		80	NR	
LAURYL MERCAPTAN	100		195	150			195	195	120			
LEAD ACETATE	ALL	**11**	175	160	210	210	210	175	160	160	100	160
LEAD CHLORIDE	SAT'D		195		210	210	210	210				
LEAD NITRATE	ALL		195	180	210	210	210	210		120	90	
LEVULINIC ACID	ALL		195	170	210	210	210	210		160		
LIGNIN SULPHATE, PH 3-7	ALL		175				175	175				
LIGNINSULFONATE SODIUM SALT	ALL		175				175	175				
LINOLEIC ACID	100		195				195	195		160		
LINOLENIC ACID	100		195				195	195				
LINSEED OIL	100	**11**	195	210	220	220	210	210	200	180	120	
LIQUID SUGAR	ALL		175				175	175		180	120	
LITHIUM BROMIDE	ALL		195	180	210	210	210	210	180	140		
LITHIUM CARBONATE	ALL		140	100	150	180	175	175	180			
LITHIUM CHLORIDE	ALL		195		210	210	210	210	210	140		
LITHIUM HYDROXIDE	ALL	**2,10**	105		150		105	105	NR			
LITHIUM HYPOCHLORITE	ALL	**2,7,8,9,10**	105				105	105				
LITHIUM SULPHATE	ALL		195		210	210	195	175	200			
MAGNESIUM BICARBONATE	ALL		175		180	180	175	175	180	140	100	150
MAGNESIUM BISULPHITE	ALL		175	140	180	180	175	175	180			
MAGNESIUM CARBONATE	15		175				175	175		175		
MAGNESIUM CARBONATE	SAT'D		150	140	180	180	150	150	160	150	100	160
MAGNESIUM CHLORIDE	ALL		195	170	210	210	210	210	210	100	80	180
MAGNESIUM FLUOSILICATE	37.5	**2**	105				140	140				
MAGNESIUM HYDROXIDE	ALL	**2**	195	140	210	NR	210	210	NR		NR	
MAGNESIUM NITRATE	ALL		195	150	160	210	210	210		140	100	160
MAGNESIUM SILICOFLUORIDE	37.5	**2**	105				140	140			NR	
MAGNESIUM SULPHATE	ALL		195	170	210	210	210	210	200	180	120	180
MALEIC ACID	ALL		195		220		210	210		140	80	
MALEIC ANHYDRIDE	100		195		150		210	210		140		
MANGANESE SULPHATE / SULPHURIC ACID (90% / 10%)	100		175				210	210	100		NR	

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Chemical Listings

Vipel®
CORROSION
RESISTANT RESINS

CONCENTRATIONS AND RECOMMENDED MAXIMUM CONTINUOUS EXPOSURE TEMPERATURE - DEGREES F

CHEMICAL	CONC.%	NOTES	F010 K022	F007 F015	F080	F083 K023	F085 F086 K095	F282	K190	F701 F707 F764 F774	F737 F738	Hood & Duct F733
			TEMPERATURE									
MANGANESE(II)CHLORIDE	ALL		195				210	210		140	100	
MANGANESE(II)NITRATE	ALL		195				210	210			NR	
MANGANESE(II)SULPHATE	ALL		195				210	210		140	100	
MAPLE SYRUP	ALL		175				175	175		180	120	
MELAMINE RESINS	ALL		80				80	80	80			
MERCAPTOACETIC ACID	ALL		NR				85	80			NR	
MERCAPTOPROPIONIC -2	10		175				175	175	NR			
MERCURIC CHLORIDE	ALL		195	150	210	210	210	210	210	170	120	180
MERCURIC NITRATE	ALL		195				210	210			NR	
MERCUROUS CHLORIDE	ALL		195	150	210	210	210	210	210	170	120	180
MERCURY	100		195	250	220		250	210	250	180	120	180
METHACRYLIC ACID	40		80				80	80	100		NR	
METHANE SULPHONIC ACID	ALL		105				105	105			NR	
METHANOL = METHYL ALCOHOL	5		80				105	95				
METHANOL = METHYL ALCOHOL	100	**10, 11**	NR	NR	100	100	100	95	100	90	NR	90
METHOXYETHYLACETATE	100		NR				NR	NR		NR	NR	
METHYL BROMIDE, GAS	10		NR				NR	NR		NR	NR	
METHYL ETHYL KETONE	100		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
METHYL ISOBUTYL KETONE	100		NR	NR	NR	NR	80	NR	NR	NR	NR	NR
METHYL METHACRYLATE	100		NR				NR	NR		NR	NR	
METHYL STYRENE	100		NR		NR	NR	115	NR	NR	NR	NR	
METHYL-2-PENTANEDIOL-2,4	100	**11**	195				195	175		120		
METHYLAMINE	100		NR				NR	NR		NR	NR	
METHYLANILINE	100						105					
METHYLCELLOSOLVE	100		NR				NR	NR		NR	NR	
METHYLCHLOROPHENOXYACETIC ACID (MCPA)	100		80				80					
METHYLCHLOROPHENOXYPROPIONIC ACID (MCPP)	100		80				80					
METHYLDIETHANOLAMINE	100		120				120					
METHYLENE BROMIDE	100		NR				NR	NR		NR	NR	
METHYLENE CHLORIDE	0.2		80				80	80				
METHYLENE CHLORIDE	100		NR				NR	NR		NR	NR	
METHYLENEBLUE SALTS PH 2-5.5, AQ	ALL		140				140	140		100		
METHYLPENTANOL-2 (ETHYLHEXANOL)	100		105				120	120				
MILK AND MILK PRODUCTS	ALL		160		180	NR	160	160		160		
MINERAL OILS	100	**11**	195	230	210	250	210	210	220	180	140	180
MINERAL SPIRITS	100		220	220	220	250	280	250	280	180	140	
MOLASSES & INVERT MOLASSES (2<PH<9)	100		175				175	175		140	100	
MOLYBDIC ACID	100							150			NR	
MONOCHLOROACETIC ACID	50		80				120	120	90		NR	
MONOCHLOROACETIC ACID	80		NR				NR	NR				

CONCENTRATIONS AND RECOMMENDED MAXIMUM CONTINUOUS EXPOSURE TEMPERATURE - DEGREES F

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			TEMPERATURE									
MONOCHLOROACETIC ACID	100		NR				NR	NR				
MONOCHLOROBENZENE	100		N.R		80	80	95	NR	NR	NR	NR	NR
MONOETHANOL AMINE	100		120		80	80	120	NR	80	NR	NR	
MONOMETHYLHYDRAZINE	100		NR				NR	NR		NR	NR	
MORPHOLINE	100		NR				80	NR	100		NR	
MOTOR OIL	100	**11**	195	250	220	220	250	210		175	110	
MURIATIC ACID (SEE HYDROCHLORIC ACID)												
MUSTARD	100		160				-	210		150		
MYRISTIC ACID	100		195	180	210	210	210	210				
NAPHTALENE	100		175	210	200	210	210	175	90	150	100	130
NAPHTANOIC ACID (1-)	ALL		80				80	80				
NAPHTANOIC ACID (2-)	ALL		80				80	80				
NAPHTHA, ALIPHATIC	100	**11**	195				210	150		180	140	
NAPHTHA, AROMATIC	100	**11**	115				120	115		120		
NAPHTHYLAMINE-1-SULPHONIC ACID (2-)	ALL						210					
NEOPENTYL GLYCOL	80		140				140	140				
NEOPENTYL GLYCOL	100	**11**	150				150	150		140	100	
NICKEL CHLORIDE	ALL		195	180	210	210	210	210	210	180	100	180
NICKEL NITRATE	ALL		195	180	210	210	210	210	210	180	100	180
NICKEL SULPHATE	ALL		195	180	210	210	210	210	210	180	100	180
NICOTINIC ACID	ALL		115				115	115			NR	
NITRIC ACID	2		195			210	200	200	210			
NITRIC ACID	5		160	140	160	160	180	175	210			180
NITRIC ACID	15		120		140	150	150	150	150		NR	
NITRIC ACID	20		120		150	150	150	120	140		NR	
NITRIC ACID	30		100		120	120	100	105	140		NR	
NITRIC ACID	50		NR	NR	NR	NR	NR	80	110		NR	
NITRIC ACID	60		NR	NR			NR	NR		NR	NR	
NITRIC ACID	FUMES		160		180	180	175	175	180		NR	
NITRIC ACID/CHROMIC ACID (15% / 3%)	18	**10**	NR					NR				
NITRIC ACID / HYDROFLUORIC ACID (8% / 4%)	12	**10**							80			
NITROBENZENE	100		35	80	NR	NR	95	NR		NR	NR	

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Chemical Listings

Vipel®
CORROSION
RESISTANT RESINS

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			TEMPERATURE									
NITROGEN TETROXIDE	100		NR				NR	NR		NR	NR	
NITROUS ACID	10		80				80	80	90			90
N-METHYL-2-PYRROLIDONE	3		95				140	140				
N-METHYL-2-PYRROLIDONE	100		NR				NR	NR				
NONANES	100		195				195	195				
NONENES	100		195				195	195				
OCTANE	100		195				195	195				
OCTANOIC ACID (SEE CAPRYLIC ACID)	100		195	170	200	200	210	175	140	160	80	
OCTANOL (2-)	100		120				120	120		140		
OCTANOL (DL-2-)	100		120				120	120		140		
OCTANOL (DL-3-)	100		120				120	120		140		
OCTANOL (L-2-)	100		120				120	120		140		
OCTANOL (N-)	100		120				120	120		140		
OCTENE	100		195				195	195				
OCTYLAMINE (2-)	100						115	115				
OCTYLAMINE (N-)	100						115	115				
OCTYLAMINE (TERT-)	100						115	115				
OIL, SOUR AND SWEET CRUDE	100	**11**	195	200			210	210		180	100	
OILS (GREASE, LUBE, VEGETABLE)	100		195	200			195	195		120	90	
OLEIC ACID	ALL		195	170	210	210	205	210	200	170	120	180
OLEUM (FUMING SULPHURIC ACID)			NR	NR	NR	NR	NR	NR		NR	NR	NR
OLIVE OIL	100	**11**	195	250	210	250	210	210	140	170	120	
ORANGE OIL	100		175				175	175				
OXALIC ACID	ALL		195	120	210	210	210	210	210	170	120	180
OZONE GAS	ALL		NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
PALM OIL	100		175				195	175				
PALMITIC ACID	100		195	180	210	210	210	210		170	120	160
PALMITOYL CHLORIDE	100	**10**	120				120	120				
PARAFFIN WAX	100		195				195	195		180	140	
PEANUT OIL	180		195	180	180		195	195		170	80	
PENTANE	100		120				120	120				
PENTANEDIOIC ACID	ALL		140				175	140				
PENTASODIUM TRIPHOSPHATE	10		195				210	210				
PENTENE	100		120				120	120				
PERCHLORIC ACID	10		150	110	150		150	150	150	NR	NR	
PERCHLORIC ACID	30		95	80	80		95	95	100	NR	NR	
PERCHLORIC ACID	70		80				80	80	85	NR	NR	
PERCHLOROETHYLENE	100		80	110	100	100	120	100	100	NR	NR	NR
PHENOL	<1		80		100	100	120	115	180	NR	NR	
PHENOL	<5		NR		80	80	80	NR	180	NR	NR	

CONCENTRATIONS AND RECOMMENDED MAXIMUM CONTINUOUS EXPOSURE TEMPERATURE - DEGREES F

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			TEMPERATURE									
PHENOL	>5		NR				NR	NR		NR	NR	
PHENOLFORMALDEHYDE RESIN	100		105				120	115				
PHENOLSULPHONIC ACID	ALL		80				80					
PHOSPHORIC ACID	ALL		210	170	210	210	210	210	210	100	NR	
PHOSPHORIC ACID (P2O5, HCL, H2S, SO2)	FUMES	**10**							250			
PHOSPHORIC ACID, (POLYMERIC 115% PHOSPHOROIC ACID)			195				210	210			NR	
PHOSPHORIC ACID, (SUPER 105% PHOSPHORIC ACID)			195				210	210		90	NR	
PHOSPHOROUS ACID	70		80	80	100	100	95	95				
PHOSPHOROUS TRICHLORIDE	100		NR	NR	NR	NR	NR	NR	NR			NR
PHOSSY WATER								NR		NR	NR	
PHTHALATES/PHTHALATE ESTERS	100		140				140	140			NR	
PHTHALIC ACID	100		195	180	210	210	210	210				
PHTHALIC ACID	100		195	210	220	210	210	210				
PHTHALIC ANHYDRIDE	100		195		220		210	210	100	150	80	150
PICRIC ACID	10		80	NR	100	100	115	115	100	NR	NR	100
PINE OIL	100		195				195	195				
PINE OIL DISINFECTANT	100		120				120	120				
PIPERAZINE DIHYDROCHLORIDE	ALL						115	115				
PLATING SOLUTION, CADMIUM	14.4						210	210				
(3.2% Cadmium oxide / 10% Sodium cyanide / 1.2% Sodium hydroxide)												
PLATING SOLUTION, CHROME	19.11		100	80	100	140	130	NR	200			
(18.5% Chromic acid / 0.6% Sodium fluorosilicate / 0.01% Sodium sulphate)												
PLATING SOLUTION, COPPER			180	150	180	180	175	175	180			
PLATING SOLUTION, GOLD	23.8		200	80	200	200	100	210	200			
(22.8% Potassium ferrocyanide / 0.2% Potassium gold cyanide / 0.8% Sodium cyanide)												
PLATING SOLUTION, LEAD	9.2	**2**	180		180			210	NR			
(8% Lead / 0.8% Fluoboric acid / 0.4% Boric acid)												
PLATING SOLUTION, NICKEL			200		200	200	180	210				
1. (11.3% Nickel sulphate / 1.4% Nickel chloride / 1.1% Boric acid)	13.8											
2. (43.7% Nickel sulphate / 3.5% Ammonium chloride / 3.5% Boric acid)	50.7											
PLATING SOLUTION, PLATINUM							210	175				
PLATING SOLUTION, SILVER		**2**	200		200	180	180	210	NR			

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CORROSION
RESISTANT RESINS

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			TEMPERATURE									
PLATING SOLUTION, TIN	37.2	**2**	200		200	210	210	210	200			
(18.3% Stannous fluoborate / 7.4% Metallic tin / 9.1% Fluoboric acid / 2.3% Boric acid / 0.1% Naphtol)												
PATING SOLUTION, ZINC	59.3	**2**	160		160		210	210	NR			
(49% Zinc fluoborate / 4.4% Ammonium chloride / 5.9% Ammonium fluoborate)												
PLURONIC SURFACTANT 25R-2	ALL		140				140	140				
POLYACRYLAMIDE	ALL		80				95		NR			
POLYESTER RESINS	100		NR				80	80				
POLYETHYLENE GLYCOL	100		140				140	140		140		
POLYOLS	100		140				140	140				
POLYVINYL ACETATE EMULSION	ALL		105		210		120	115	100			100
POLYVINYL ALCOHOL	ALL	**11**	175	100	120	120	175	175	80	80		90
POTASSIUM ACETATE	ALL		160	140	190	190	180	180	190	120	80	140
POTASSIUM ALUMINUM SULPHATE	ALL		195	180	210	210	210	210	180	180	130	160
POTASSIUM AMYL XANTHANE	5							150				
POTASSIUM BICARBONATE	10	**2**	160	150	160	150	160	160	90	160	110	90
POTASSIUM BICARBONATE	50	**2**	115				115	115			NR	
POTASSIUM BROMATE	ALL		195				210	210				
POTASSIUM BROMIDE	ALL		195	100	160	160	210	210		140	100	
POTASSIUM CARBONATE	10	**2**	140	100	180	180	140	140	110	90		90
POTASSIUM CARBONATE	25	**2**	115	80	180	180	150	150	110	90		90
POTASSIUM CARBONATE	50	**2**	105				115	115			NR	
POTASSIUM CHLORATE	ALL		195				210	210				
POTASSIUM CHLORIDE	ALL		195	180	210	210	210	210	210	180	120	180
POTASSIUM CHROMATE	ALL		195				210	210				
POTASSIUM CYANIDE	ALL		140				140	140				
POTASSIUM DICHROMATE	ALL		195	180	210		210	210	200	180	120	
POTASSIUM FERRICYANIDE	ALL		195	180	210	210	210	210		180	130	180
POTASSIUM FERROCYANIDE	ALL		195	180	210	210	210	210	200	180	130	180
POTASSIUM FLUORIDE	ALL	**2**	140		150		140	140	150			
POTASSIUM GOLD CYANIDE	12						95					
POTASSIUM HYDROXIDE	1	**2,8**	150					150		NR	NR	
POTASSIUM HYDROXIDE	10	**2,8**	150	110	150	NR		150	NR	NR	NR	
POTASSIUM HYDROXIDE	25	**2,8**	150		150	NR		115	NR	NR	NR	
POTASSIUM HYDROXIDE	45	**2,8**	150		150	NR		105	NR	NR	NR	
POTASSIUM HYDROXIDE	CONC	**2,8**	105					105		NR	NR	
POTASSIUM IODIDE	ALL		140				150	150		NR	NR	
POTASSIUM NITRATE	ALL		195	180	210	210	210	210	210	170	120	200
POTASSIUM NITRITE	ALL		195				210	210				
POTASSIUM OXALATE	AL		140	110			140	140				

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			TEMPERATURE									
POTASSIUM PERMANGANATE	ALL		195	180	210	210	210	210	150	120	NR	150
POTASSIUM PERSULPHATE	ALL		195	180	210	210	210	210	90	90		90
POTASSIUM PHOSPHATE (DIBASIC)	ALL		195				210	210				
POTASSIUM PHOSPHATE (MONOBASIC)	ALL		195				210	210				
POTASSIUM PHOSPHATE (TRIBASIC)	ALL		195				210	210				
POTASSIUM PYROPHOSPHATE	100		100	100	100	150	150	150	100			
POTASSIUM SILICOFLUORIDE	ALL	**2**	80				95					
POTASSIUM SULPHATE	ALL		195	180	210	210	210	210	210	180	100	180
PROPANOL (1-)	100		140				140	140				
PROPANOL (2-)	100		140				140	140				
PROPIONIC ACID	40		140				170	140				
PROPIONIC ACID	100		NR				95	NR		NR	NR	
PROPYLAMINE N OR ISO	50		80				80			140		
PROPYLENE GLYCOL 1,2	ALL		195	210	220	210	210	210	180	170	130	170
PYRIDINE	100		NR				NR	NR		NR	NR	
QUARTERNARY AMMONIUM SALTS	25		175				175	150				
QUARTERNARY AMMONIUM SALTS	>25		150				150	150				
RAYN SPIN BATH							140	140				
REF. FUEL C (ISOOCTANE/TOLUENE)	100	**11**	80				80			80	NR	
ROSIN SIZES			195				195	175				
SALICYLALDEHYDE	100		80				80				NR	
SALICYLIC ACID	ALL		140	120	160		150	150				
SALT BRINE (SEE SODIUM CHLORIDE)	ALL		195				210	210		180	140	
SELENIOUS ACID	ALL		175		210	120	210	175				
SEWAGE MUNICIPAL	ALL	**10**	100	100	100	100	100	100	90	100	80	90
SILICONE OILS OR GREASES	100		195	180			195	175		180	120	
SILVER CYANIDE	ALL		195	180	210		210	210				
SILVER NITRATE	ALL		195	180	210	210	210	210	210	170	120	180
SOAPS	ALL		140				140	140				
SODIUM ACETATE	ALL		195		210	210	210	210	200	150		150
SODIUM ALKYL ARYL SULPHONATE	ALL		175		120		175	175	120			
SODIUM ALUMINATE	ALL		140	100	160		150	150	NR	NR	NR	NR

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250°F= 121°C	180°F= 82°C	110°F= 44°C	60°F= 16°C
240°F= 116°C	170°F= 77°C		

Room temperature is assumed to be 77°F

Chemical Listings

Vipel®
CORROSION
RESISTANT RESINS

CONCENTRATIONS AND RECOMMENDED MAXIMUM CONTINUOUS EXPOSURE TEMPERATURE - DEGREES F

CHEMICAL	CONC.%	NOTES	F010 K022	F007 F015	F080	F083 K023	F085 F086 K095	F282	K190	F701 F707 F764 F774	F737 F738	Hood & Duct F733
			TEMPERATURE									
SODIUM BENZOATE	ALL		140		210		175	175	175	170		175
SODIUM BICARBONATE	ALL	**2**	175	100	180	180	175	175	140	140		
SODIUM BICARBONATE / SODIUM CARBONATE (15% / 20%)	35	**2**	175	100	185		175	175	185			
SODIUM BIFLUORIDE	ALL	**2**	105				105	105				
SODIUM BISULPHATE	ALL		195	100	210	210	210	210	200	170	120	180
SODIUM BISULPHITE	ALL		195	180	210	210	210	210	200	170	120	180
SODIUM BORATE	ALL		195	180	210	210	210	210	170	170	120	170
SODIUM BOROHYDRIDE / SODIUM HYDROXIDE (12% / 48%)	60							115		NR	NR	
SODIUM BROMATE	ALL		195	180			195	195		80	NR	
SODIUM BROMIDE	ALL		195	180	210	210	210	210	210	170	120	180
SODIUM BROMIDE / SODIUM BROMATE (20% / 20%)	40		195				210	210				
SODIUM BUTYL XANTHANE	5		150				150	150				
SODIUM CARBONATE	10	**2**	180	100	180	180	175	175	160	100	NR	
SODIUM CARBONATE	35	**2**	160	100	160	180	175	160	90	90	NR	
SODIUM CHLORATE	ALL		195		210	210	210	210	200	130	110	
SODIUM CHLORIDE	ALL		195	190	210	210	210	210	210	180	140	180
SODIUM CHLORITE	10		150				150	150			NR	
SODIUM CHROMATE	50		195		210	210	210	210	180			
SODIUM CYANIDE	5		195				210	210		120		
SODIUM CYANIDE	15		140				140	150		100	NR	
SODIUM DICHROMATE	ALL		195		210	210	210	210		140		
SODIUM DIHYDROGEN PHOSPHATE	ALL		210		210	210	210	210	210	100		
SODIUM DIPHOSPHATE	100		175				210	210		160		
SODIUM DODECYL BENZENE SULPHONATE	ALL		175				175	175	120			
SODIUM ETHYL XANTHANE	5							150				
SODIUM FERRICYANIDE	ALL		170		210		210	210	210	170		180
SODIUM FERROCYANIDE	ALL		195		210		210	210	180	170		180
SODIUM FLUORIDE	ALL	**2**	175	160	180	180	175	175		80	NR	
SODIUM FLUOSILICATE	ALL	**2**	105		150		120	120				
SODIUM HEXAMETAPHOSPHATE	ALL		175		150	150	175	175	150			
SODIUM HYDROSULPHIDE	ALL		175		140		175	175	160			
SODIUM HYDROSULPHITE	ALL		105				105	105				
SODIUM HYDROXIDE	1	**1,5,8,10**	180	120	180	180	160	180	NR	NR	NR	180
SODIUM HYDROXIDE	5	**2,5,8,10**	160	120	160	NR	NR	160	NR	NR	NR	180
SODIUM HYDROXIDE	25	**2,5,8,10**	150		140		NR	150	NR	NR	NR	
SODIUM HYDROXIDE	50	**2,5,8,10**	200	120	180	180	160	200	NR	NR	NR	
SODIUM HYDROXIDE-CHLORINE GAS		**2,7,8,9,10**	100		100					NR	NR	
SODIUM HYPOCHLORITE, PH >11	16% CL	**2,7,8,9,10**	150		150			120		NR	NR	
SODIUM LAURYL SULFATE	ALL		140		180	160	160	160	100			
SODIUM MONOPHOSPHATE	ALL		195	180	210	210	210	210		170		150

CONCENTRATIONS AND RECOMMENDED MAXIMUM CONTINUOUS EXPOSURE TEMPERATURE - DEGREES F

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			TEMPERATURE									
SODIUM NITRATE	ALL		195	180	210	210	210	210	210	170	120	180
SODIUM NITRITE	ALL		195	180	210		210	210	180	170	120	
SODIUM ORTHOPHOSPHATE (SEE TRISODIUM PHOSPHATE)	ALL		195	180			210	210		NR	NR	
SODIUM OXALATE	ALL		195				210	210				
SODIUM PERSULPHATE	ALL		80				80	210	165			
SODIUM PHOSPHATE	ALL		195	180			210	210	200			
SODIUM POLYACRYLATE	ALL		150		150	180	175	150	180			
SODIUM SILICATE	ALL	**1**	195	180	210	210	210	210	160	NR	NR	
SODIUM SULPHATE	ALL		195	180	210	210	210	210	210	170	120	180
SODIUM SULPHHYDRATE	ALL		175		140		175	175	160			
SODIUM SULPHIDE	ALL		195		210		210	210	140			
SODIUM SULPHITE	ALL		195		210	210	210	210	210	90		
SODIUM TARTRATE	ALL		195				210	195				
SODIUM TETRABORATE	ALL		195		200	180	195	175	180	170		180
SODIUM THIOCYANATE	ALL		195	180	200	200	195	175				
SODIUM THIOSULPHATE	ALL		195	180	120	180	195	175		140		90
SODIUM TRIDECYLSULPHATE	ALL		195				195	175				
SODIUM TRIPHOSPHATE	ALL		195				210	210				
SODIUM TRIPOLYPHOSPHATE	ALL		195		210	210	210	210	125	140		125
SODIUM XYLENE SULPHONATE	ALL		140		210		210	200	150	80	NR	
SORBITOL SOLUTIONS	ALL		195		150	150	195	150		170		180
SOY SAUCE		**8**	100	100				115			NR	
SOYA OIL	100	**11**	195	150	180	210	195	195		170	120	
SOYBEAN OIL	100		210	150	150	210	210	175	125			
SPEARMINT OIL	100		195	180			195	195				
STANNIC CHLORIDE	ALL		195	180	180	180	210	210	180	170	100	180
STANNOUS CHLORIDE	ALL		195	180	210	210	210	210	250	170	100	180
STANNOUS SULFATE	ALL		175				175	175				
STARCH 4 < PH < 9	ALL		195				210	210				
STEARIC ACID	100		210		210	210	210	210	250	170	120	180
STYRENE	100		NR		80	80	105	NR	NR	NR	NR	NR
SUCCINIC ACID	ALL		175				175	175				

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Chemical Listings

Vipel®
CORROSION
RESISTANT RESINS

CONCENTRATIONS AND RECOMMENDED MAXIMUM CONTINUOUS EXPOSURE TEMPERATURE - DEGREES F

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			TEMPERATURE									
SUCCINONITRIL (AQUEOUS)	ALL		175		100	100	175	175		NR	NR	
SUCROSE	ALL		175	170			210	195		140	100	
SULPHAMIC ACID	10		195	170			210	210		150	80	
SULPHAMIC ACID	25		150	140			150	150		100		
SULPHANILIC ACID	ALL		175	160	210	210	210	175				
SULPHATED DETERGENTS	ALL		140				140	175		80	NR	
SULPHITE/SULPHATE LIQUORS (PULP MILL)			175		210	210	195	210	160			160
SULPHONATED DETERGENTS	ALL		140				175	175		NR	NR	
"SULPHONYL CHLORIDE, AROMATIC"	ALL		NR				NR	NR	80	NR	NR	
SULPHUR	100						150					
SULPHUR CHLORIDE	ALL		NR		NR	NR	NR	NR	NR	NR	NR	
SULPHUR DICHLORIDE	100		NR				NR	NR		NR	NR	
SULPHUR DIOXIDE GAS, DRY	ALL		200		220	220	220	220	220	150		
SULPHUR DIOXIDE GAS, WET	ALL		200		220	220	220	220	220	100	NR	
SULPHUR TRIOXIDE GAS		**10**			220				90		NR	
SULPHURIC ACID	1		210	180	210	210	210	210	210	170	120	180
SULPHURIC ACID	5		210	180	210	210	210	210	210	170	120	180
SULPHURIC ACID	10		210	180	210	210	210	210	210	150	100	
SULPHURIC ACID	25		210	180	210	210	210	210	210	150	100	180
SULPHURIC ACID	50		195	180	200	200	200	210	200	120	NR	180
SULPHURIC ACID	70		180	100	180	180	180	180	190	NR	NR	150
SULPHURIC ACID	75		100		120	120	120	100	175	NR	NR	
SULPHURIC ACID	93		NR	NR	NR	NR	NR	NR		NR	NR	
SULPHURIC ACID	FUMING		NR	NR	NR	NR	NR	NR	NR	NR	NR	
SULPHURIC ACID / FERROUS SULPHATE	10 / SAT'D		195				195	210	180			
SULPHURIC ACID / PHOSPHORIC ACID (10% / 20%)	30		175				175	175	100			
SULPHUROUS ACID	10		115		100	125	115	115	150	NR	NR	90
SULPHURYL CHLORIDE	100		NR				NR	NR		NR	NR	
SUPERPHOSPHORIC ACID (76% P2O5)	105		195				210	210		80	NR	
TALL OIL	100	**11**	210	120	150	150	210	150	200	140		
TANNIC ACID	ALL		195	180	210		210	210	210	170	120	180
TARTARIC ACID	ALL		195	180	210	210	210	210	210	140	NR	160
TETRACHLOROETHANE	100		NR				105	NR		NR	NR	
TETRACHLOROETHYLENE	100		120				120	105		NR	NR	
TETRACHLOROPENTANE	100						95	NR		NR	NR	
TETRACHLOROPYRIDINE	100				120		95	NR	120	NR	NR	
TETRAETHYLENEGLYCOL DIMETHYLETHER	100											
TETRAPOTASSIUM PYROPHOSPHATE	5		180				210	210				
TETRAPOTASSIUM PYROPHOSPHATE	60		100		100		150	120	125		NR	125
TETRASODIUM ETHYLENEDIAMINETETRAACETATE	ALL	**2**	140		150		140	120				

CONCENTRATIONS AND RECOMMENDED MAXIMUM CONTINUOUS EXPOSURE TEMPERATURE - DEGREES F

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			TEMPERATURE									
TETRASODIUM PYROPHOSPHATE	5		195		150		210	210	125	120	NR	125
TETRASODIUM PYROPHOSPHATE	60		120				150	120		90	NR	
THIOGLYCOLIC ACID	10		120		100		120	120				
THIOGLYCOLIC ACID	80		NR				85	NR				
THIOGLYCOLIC ACID	100		NR				85	NR				
THIONYL CHLORIDE	100		NR				NR	NR	150			
TOBIAS ACID	ALL				210	210						
TOLUENE	100		NR		100	120	115	NR	90	NR	NR	90
TOLUENE DIISOCYANATE	100		80		80		80	NR	150	NR	NR	NR
TOLUENE SULPHONIC ACID	ALL		195		210	210	210	210				
TRANSFORMER OILS	100	**11**	195				195	210		80	NR	
TRI-(2-CHLOROETHYL) PHOSPHATE	ALL		80				80	80				
TRIBUTYL PHOSPHATE	100		80		150	150	140	140				
TRIBUTYLAMINE -N	100		80				80					
TRICHLOROACETALDEHYDE	100		NR				NR	NR				
TRICHLOROACETIC ACID	50		195		210	210	210	210	200			
TRICHLOROBENZENE	100		80				80		NR	NR	NR	
TRICHLOROETHANE	100		NR		80	80	105	NR	NR	NR	NR	
TRICHLOROETHYLENE	100		NR		NR	NR	NR	NR	NR	NR	NR	
TRICHLOROMONOFLUORMETHANE	100	**2**	NR		80	80	95	80				
TRICHLOROPHENOL	100		NR				NR	NR				
TRICRESYL PHOSPHATE	100		140		120	120	160	140				
TRIDECYLBENZENE SULPHONATE	100		195		120		210	210	120			
TRIETHANOL AMINE	100		120		150	150	120	150				
TRIETHANOL AMINE LAURYL SULPHATE	ALL							115				
TRIETHYL AMINE	100		105		150	120	120	120				
TRIETHYLENE GLYCOL	100	**11**	175	180			175	175	180	140		
TRIMETHYL AMINE	100		80				80	80				
TRIMETHYL AMINE HYDROCHLORIDE	SAT'D		80		130		80	130	130	NR	NR	
TRIMETHYLENE CHLOROBROMIDE	100		NR				NR	NR				
TRIPHENYL PHOSPHATE	100		140		100	100	140	140	120	80		90
TRIPHENYL PHOSPHITE	100		140				140	140				

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Vipel®
CORROSION
RESISTANT RESINS

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			TEMPERATURE									
TRIPROPYL AMINE -N	ALL		80				80	80				
TRIPROPYLENE GLYCOL	100		140				140	140				
TRISODIUM PHOSPHATE	ALL		195		210	210	210	210	150	NR	NR	
TRITOLYL PHOSPHATE	ALL		140				140	140				
TUNA OIL	100		160	160	160		195	195				
TURPENTINE	100	**11**	150		100	120	210	150		80		90
TWEEN SURFACTANT	100		150				165	150				
URANIUM EXTRACTION								175	90			
UREA	ALL		150		180	120	150	150	160	100		90
UREA / AMMONIUM NITRATE / WATER (35% / 44% / 21%)	100		150	100			150	150	120			
UREA FERTILISER			150				140	150		120		
UREA FORMALDEHYDE RESINS PH<7	ALL		80				80		80			
VARSOL SOLVENT	100	**11**	200		200			200	200	200	NR	
VEGETABLE OILS	100	**11**	195	200			210	210		160	80	
VINEGAR		**11**	200		210	210	200	200	200	130	120	150
VINYL ACETATE	100		NR				NR	NR				
VINYL CHLORIDE	100		NR				NR	NR	90			
VINYL TOLUENE	100		NR		80	80	115	NR	80	NR	NR	
WATER, DEIONISED	100		180	170	210	210	180	180	180	150	120	
WATER, DEMINERALIZED	100		210	180	210	210	180	180	210	150	120	
WATER, DISTILLED	100		200	160	200	200	200	180	200	140	120	
WATER, SEA	100		210	160	210	210	210	210	210	150	140	140
WATER, STEAM CONDENSATE	100		180	110	180	180	180	180	180	150	120	
WHISKEY					80	NR	NR	115	NR	80	NR	
WHITE LIQUOR (PULP MILL)		**10**	150		150	180	180	190				
WINE					NR	NR	NR	115		90	NR	
XYLENE	100	**11**	NR		100	100	115	115	100	90	NR	90
XYLENE (M-)	100	**11**	NR				115	115		90	NR	
XYLENE (O-)	100	**11**	NR				115	115		90	NR	
XYLENE (P-)	100	**11**	NR				115	115		90	NR	
ZEOLITE	ALL							210				
ZINC CHLORATE	ALL		140				140	140				
ZINC CHLORIDE	ALL		195	180			210	210	210	170	120	
ZINC CYANIDE	ALL		175		160		175	175	NR			90
ZINC NITRATE	ALL		195	180	210	210	210	210	180	170	120	180
ZINC SULPHATE	ALL		195	180	210	210	210	210	210	170	120	180
ZINC SULPHITE	ALL		170	160	180	180	175	175		140	100	150

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Acknowledgments
End-use application photos courtesy of:
Air Chem Systems
Harrington Environmental Engineering
PITSA
RL Industries, Inc.

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