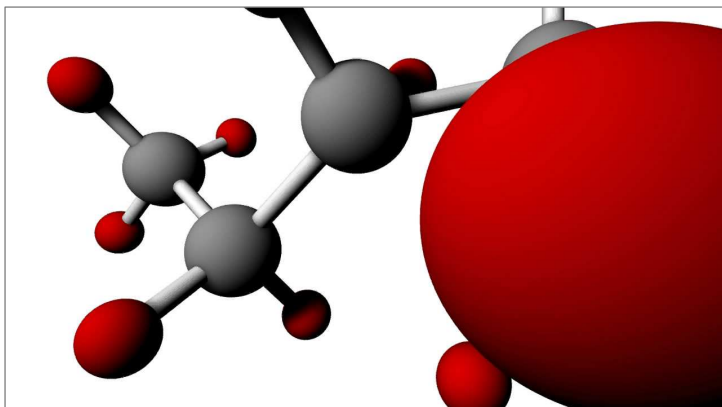




CHEMICAL RESISTANCE GUIDE

Résoltech [2010]

Epoxy Vinyl Ester Resins

FORWARD

RESOLTECH epoxy vinyl ester resins are designed and manufactured by Epoxy Products and Intermediates, a business group of RESOLTECH Sarl. These resins possess outstanding corrosion-resistant properties and satisfy critical requirements in Fiber-Reinforced Plastic (FRP). Because they possess outstanding corrosion-resistant properties, RESOLTECH resins are particularly well suited for tough industrial applications.

This guide briefly describes the various RESOLTECH resins, and it presents detailed chemical resistance data needed to assist engineers in specifying and designing corrosion-resistant FRP applications.

Recommendations given in this guide apply to “state-of-the-art” corrosion-resistant structures. Typically these structures have a corrosion barrier that is 2.5 to 6.3 mm (100 to 250 mils) thick and are designed for contact with a specific chemical environment. The first layer of the corrosion barrier usually is 0.3 to 0.8 mm (10 to 20 mils) thick and is 95% resin, reinforced by one or two surfacing veils. This layer is then backed with 2 to 6 mm (90 to 230 mils) of 75% resin, reinforced with chopped strand mat (powder binder only). Finally, the corrosion barrier is backed with a structural laminate that provides the strength and stiffness of the overall corrosion-resistant composite structure.

Because many of the variables that affect the performance of a laminate are beyond RESOLTECH’s control, no warranty concerning the use of RESOLTECH epoxy vinyl ester resins can be made. However, the service conditions shown in this bulletin are believed to be well within the capabilities of RESOLTECH epoxy vinyl ester resins when laminates are properly designed, fabricated, and installed.

For the design of FRP equipment, prospective users of RESOLTECH resins should refer to the appropriate industry standards and design guidelines.

The family of RESOLTECH resins and their detailed properties are discussed in another RESOLTECH bulletin, *Technical Product Information*. A third bulletin, *Fabricating Tips*, presents information on fabricating with RESOLTECH resins. These bulletins are available from your RESOLTECH sales representative, any RESOLTECH sales office, or by accessing our web site at www.resoltech.com

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Brief Product Description

RESOLTECH VI 5010 is an elastomer-modified bisphenol-A epoxy vinyl ester resin that offers very high toughness, impact- and fatigue-resistance, and excellent adhesion. It is the resin of choice for demanding structural applications and as a primer for chemically resistant FRP linings.

RESOLCOAT VI 5020 series are the industry’s standard epoxy vinyl ester resins. They are based on bisphenol-A epoxy resin, and they provide resistance to a wide range of acids, alkalis, bleaches, and solvents for use in many chemical processing applications. They offer excellent toughness and fatigue resistance.

RESOLCOAT VI 5030, VI 5080 series are epoxy novolac-based vinyl ester resins designed to provide exceptional thermal and chemical resistance properties. They offer high resistance to solvents, acids, and oxidizing substances such as chlorine. They also offer high retention of strength and toughness at elevated temperatures, making them the resins of choice for flue gas applications.

[1] The degree of retardance achieved in properly formulated cured products made of these resins is most frequently quantified by the ASTM E84 tunnel test. This is a controlled test that compares flammability characteristics of one material with another, but may not be predictive of behavior in a real fire situation. RESOLTECH epoxy vinyl ester resins are organic materials and will burn under the right conditions of heat and oxygen supply.

How to Use the Chemical Resistance Table

Content

This listing of chemical reagents and environments shows the highest known temperature at which equipment made with RESOLTECH resins has in general either:

- given good service in industry or
 - been tested in the field or in the laboratory (in accordance with ASTM C 581)
- with results that indicate a good life expectancy in service.

It should be noted that this is not necessarily the maximum service temperature.

The temperature limits in each row are representative of the whole series of resins.

The following table lists the resins that are included in the respective columns.

In the chemical resistance tables, a blank space simply indicates that no data were available at the time that temperature ratings were assigned. NR stands for “not recommended” at any temperature.

LS stands for “limited service” (at least 3 days to 1 year at maximum 40°C/100°F). Generally in these cases, the respective resins can be used for FRP that is exposed accidentally, and where cleaning and inspection are possible after no more than 3 days.

This guide is updated on a regular basis in order to take into consideration all the new experiences and data (new products, other temperatures or concentrations, etc.). An Internet based version with user-friendly search capabilities is available at www.resoltech.com

Example

		RESOLTECH Resin			
Chemical Environment	Concentration %	VI 5020	VI 5030	VI 5080	VI 5010
Hydrochloric Acid & Dissolved Organics [8,9,13]	0 - 33% HCl	NR	65/150 [15]	NR	

[8] Double surfacing veil and a 5 mm/200 mil CR barrier should be used

[9] Double C-veil should be used in the CR barrier.

[13] Acid resistant glass should be used in the corrosion liner and may be used in the structural wall weight (unless otherwise stated)

not recommended

highest recommended temperature (°C/°F)

no data available

[15] Slight discoloration of high purity acid can occur during first exposures

Footnotes

Information indicated in footnotes is essential in order to ensure a good service life of FRP equipment. It is strongly recommended that they are followed.

1. Double synthetic veil should be used in the CR barrier.
2. Postcure recommended to maximize service life.
3. Benzoyl Peroxide/Amine cure system with postcure recommended to increase service life.
4. Recommended provided that solvent used for dissolution is also recommended.
5. Satisfactory up to maximum stable temperature for product.
6. Check with corrosion technical service lab for specific recommendations.
7. Probably satisfactory at higher temperatures, but temperature shown is the highest for which information was available.
8. Double surfacing veil and a 5 mm/200 mil CR barrier should be used.
9. Double C-veil should be used in the CR barrier.
10. For reactors, use VI 5020 resin.
11. Within the solubility limits in aqueous solution.
12. Above 50°C/120°F, acid resistant glass should be used in the CR barrier and may be used in the structural wall.
13. Acid resistant glass should be used in the corrosion liner and may be used in the structural wall.
14. If chemical composition is unknown, obtain safety data sheet from supplier.
15. Slight discoloration of high purity acid can occur during first exposures.
16. The use of the resin above the maximum allowable design temperature as limited by national design standards may require approval of the relevant authorities.

NR: Not Recommended

LS: Limited service, in general 3 days to 1 year lifetime at room temperature (max. 40°C/100°F), usually sufficient for secondary containment.

Postcure

For a service temperature below 100°C/210°F: A postcure may extend the service life if the operating temperature is within 20°C/40°F of the present CR guide maximum temperature for the service. This means that a postcure can be beneficial for solvent applications with a temperature limit of 25-40°C/80-100°F.

For a service temperature above 100°C/210°F: Postcure in service may be sufficient, provided the resin specific minimum Barcol hardness values are reached before start up.

For service in pure and neutral salt solutions: Postcure may in general not be required, provided the resin specific minimum Barcol hardness values are reached and no acetone sensibility is shown before start up.

The postcure conditions as detailed in DIN 18820 may be used:

- For VI 5020 and VI 5010 resins: 80°C/180°F.
- For VI 5030 and VI 5080 resins: 100°C/210°F.
- This norm recommends 1 hour per mm thickness of the laminate (between 5 and 15 hours).

Special Cases

Insufficient Information

In cases where the environment or exposure conditions are outside the scope of this guide and if, therefore, no specific recommendations can be made, a test laminate should be exposed to the actual, or simulated, conditions proposed so that a final decision on resin suitability is made.

Coatings and Linings (reinforced and non-reinforced)

Coatings and linings have their own specific properties and may be limited in operating temperatures because of thermal expansion. In special cases, it is recommended to consult with the RESOLTECH technical service laboratory or with a company in your region that specializes in linings and coatings technology.

Laminate linings can be more durable in liquid environments than other lining systems. For quality reasons, they should be applied by hand lay-up and not by spray-up techniques. As a general rule, and as a result of the low or missing exotherm during polymerization, linings and coatings should be postcured whenever possible (see also "Postcure").

Special precautions are required for strongly diffusing media (HCl, HF, etc.). As a general rule, the thicker and the better cured the lining, the higher the diffusion resistance and the longer the life expectancy.

High (Flue) Gas Temperatures

If a synthetic veil is recommended for hot gas environments, the temperature resistance of the veil must be sufficient.

If it is not, a carbon veil can often be used. If the environment contains water vapor and/or acids, special measures must be taken to prevent sub dew point conditions in the laminate.

Short Term Exposure/Spillage

If exposure is intermittent or limited to fumes or spills only, it is possible to have good service life at temperatures considerably higher than those shown and even have good service life in chemical environments shown as NR (Not Recommended).

Mixtures or Alternating Environments

The information given in this guide represents the performance of full FRP structures under continuous use in contact with the stated chemical environment (unless otherwise indicated).

It is sometimes difficult to predict just how aggressive certain combinations of chemicals will be toward FRP. Some mixtures are more aggressive toward FRP than the individual components, so special attention should be paid to aggressively synergistic chemicals that could not be simply predicted from the corrosion properties of the individual components.

The chemical resistance may also be negatively influenced by using the same equipment for alternating storage or transport of different products, particularly where these products have widely differing properties, such as acids and bases that chemically react with each other.

When in doubt, please consult with your local distributor or your RESOLTECH sales representative, who can put you in touch with the appropriate technical resources at RESOLTECH.

Chemical Resistance Enquiry

When requesting resin recommendations for corrosion applications, the following data are necessary for your request to be processed:

- Chemical nature of all products in a process or a batch, with their corresponding concentrations (even traces).
- Service temperatures, including maximum and upset temperatures (with corresponding duration).
- State: liquid/gas/solid (risk of phasing or condensation if any).
- Type of equipment (tank, pipe, lining, etc.) Please feel free to make copies of the enclosed “Chemical Resistance Enquiry” form and use them to fax your inquiries to your local distributor or the CIG (fax number on form).

Safety Precautions

RESOLTECH epoxy vinyl ester resins and the materials (solvents, accelerators, catalysts, etc.) used with them can be hazardous unless simple but precise precautions are taken (see Safe Handling and Storage, available from your RESOLTECH sales representative or any RESOLTECH sales office). The precautions necessary for handling RESOLTECH resins are similar to those for unsaturated poly- esters and will therefore be familiar to trained personnel. Safety data sheets (SDS) on all RESOLTECH resins are available to help customers satisfy their own handling and disposal needs.

Notice

Recommendations as to methods and use of material made in this publication are based on the experience of the RESOLTECH Chemical Company and knowledge of the characteristics of RESOLTECH resins, and are given in good faith. However, since as a material supplier, RESOLTECH does not exercise any control over the use of RESOLTECH resins, no legal responsibility is accepted for such recommendations. In particular, no responsibility is accepted by RESOLTECH for any system or application in which RESOLTECH resins are utilized. The legal obligations of RESOLTECH Sarl in respect of any sale of RESOLTECH resins shall be determined solely by the terms of its respective sales contract.

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RESOLTECH* Epoxy Vinyl Ester Resins

CHEMICAL RESISTANCE ENQUIRY FORM

Date:

Number of Pages:

From

To

(Distributor, or CIG, Name: Fax+33 4 42 95 01 95)

Company:

Fax:

Phone:

User/Project/Engineering:

Industry Sector/Process:

(Chemical, Paper, Mining, Flue Gas)

Equipment Type:

(Tank, Scrubber, Pipe/Duct, Lining)

Dimensions/Capacity:

Chemical Environment	Concentrations		
	Minimum	Normal	Maximum

NOTE: Please show all major/minor components, concentrations – including traces. (If insufficient space, please add extra sheet or include the respective safety data sheet.)

Temperatures (°C):

normal operating

highs/low

upsets

Pressure/Vacuum:

pH:

typical

min.

max.

Comments/Notes:

(e.g.,: unusual process conditions, temperature cycling, high/low concentrations, addition and dilution, novel design or construction)

Chemical Resistance Table
Maximum Service Temperatures for RESOLTECH Resins

Chemical Resistance Table

Maximum Service Temperatures for RESOLTECH Resins

Chemical Environment	Concentration %	RESOLTECH VINYLESTER RESINS		
		VI 5020	VI 5030, VI 5080	VI 5010
		°C/°F	°C/°F	°C/°F
Acetaldehyde	20	40/100	40/100	40/100
Acetaldehyde	100	NR	LS	NR
Acetic Acid	0.5 - 25	100/210	100/210	65/150
Acetic Acid	26 - 50	80/180	80/180	
Acetic Acid	51 - 75	65/150	65/150	
Acetic Acid	76 - 85	45/110	45/110	
Acetic Acid, Glacial	100	NR	40/100	NR
Acetic Anhydride	100	NR	40/100	NR
Acetic Acid/Nitric Acid/ Chromic Oxide	3/5/3	65/150	80/180	65/150
Acetic Acid/Sulfuric Acid	20/10	100/210	100/210	65/150
Acetone	10		80/180	
Acetone	100	NR	LS	NR
Acetone, Fumes, no condensation or coalescence	Fumes		80/180	
Acetonitrile	20	40/100	40/100	
Acetonitrile	100	NR	LS	NR
Acetonitrile, Fumes, no condensation or coalescence	Fumes		80/180	
Acetyl Acetone	20	40/100	50/120	40/100
Acetyl Acetone	100	NR	LS	NR
Acid Cleaner - 31% hydrochloric acid [2,8,9,13]	31	65/150	80/180 [15]	65/150
Acrolein (Acrylaldehyde)	20	40/100	40/100	
Acrolein (Acrylaldehyde)	100	NR	LS	NR
Acrylamide	50	40/100	40/100	40/100
Acrylic Acid [7]	25	40/100	40/100	40/100
Acrylic Acid	100	NR	40/100	NR
Acrylic Latex	All	80/180	80/180	
Acrylonitrile	20	40/100	40/100	
Acrylonitrile	100	NR	LS	NR
Acrylonitrile Latex Dispersion [7]	2	25/80	25/80	25/80
Activated Carbon Beds, Water Treatment		80/180	100/210	65/150
Adipic Acid (1.5 g sol. in water at 25°C, sol. hot water)	23	80/180	80/180	
Adogen (see Quaternary Amine Salts)				
Air [16]		180/360	230/450	
Alcohol, Amyl	100	50/120	65/150	50/120
Alcohol, Butyl	100	50/120	65/150	NR
Alcohol, Ethyl	95	25/80	40/100	NR
Alcohol, Isodecyl	100	50/120	80/180	50/120
Alcohol, Propyl	100	50/120	50/120	NR
Alkaline Cleaner (see Sodium and Potassium Hydroxides)				
Alkaline Solutions (see Sodium, Potassium, and Ammonium Hydroxides, and Carbonates)				
Alkane Sulfonate (see Sodium Dodecylbenzene Sulfonate)				
Alkyl (C8-C10) Dimethyl Amine	100	80/180	100/210	
Alkyl (C8-C18) Chloride	> 0.5	80/180	100/210	
Alkyl Aryl Sulfonic Acid (see Alkyl Benzene Sulfonic Acid)				
Alkyl Benzene Sulfonic Acid [6]	> 0.5	80/180	100/210	
Alkyl Toly Trimethyl				

Chemical Resistance Table

Maximum Service Temperatures for RESOLTECH Resins

Chemical Environment	Concentration %	RESOLTECH VINYLESTER RESINS		
		VI 5020	VI 5030, VI 5080	VI 5010
		°C/°F	°C/°F	°C/°F
Ammonium Chloride		40/100	50/120	
Allyl Alcohol	100	NR	25/80	NR
Allyl Chloride	100	25/80	25/80	NR
Alpha-Oleum Sulfates	100	50/120	50/120	
Alpha-Methylstyrene	100	25/80	50/120	NR
Alum	Sat'd	100/210	120/250	80/180
Alumina Hydrate	All	80/180	80/180	80/180
Aluminum Chloride	Sat'd	100/210	120/250	80/180
Aluminum Chlorohydrate	> 0.5	100/210	100/210	80/180
Aluminum Chlorohydrate/ Hydrochloric Acid [9,10,12]	> 0.5/<15	80/180	100/210	65/150
Aluminum Chlorohydroxide	50	100/210	100/210	80/180
Aluminum Fluoride	All	25/80	25/80	25/80
Aluminum Hydroxide	100	80/180	95/200	80/180
Aluminum Nitrate	> 0.5	100/210	100/210	80/180
Aluminum Potassium Sulfate	Sat'd	100/210	120/250	80/180
Aluminum Sulfate	Sat'd	100/210	120/250	80/180
Aluminum Sulfate Reactor [10]	> 0.5	100/210		
AMBITROL* Ethylene Glycol	> 0.5	100/210	100/210	
Amine Salts	All	50/120	65/150	
Amino Acids	All	40/100	40/100	
Ammonia	Liquified Gas	NR	NR	NR
Ammonia Gas	100	40/100	40/100	40/100
Ammonia Vapors (Wet)	40 vol %	80/180	80/180	
Ammonia, Aqueous (see Ammonium Hydroxide)				
Ammonium Acetate	> 0.5	25/80	40/100	NR
Ammonium Bicarbonate	0.5 - 50	70/160	70/160	70/160
Ammonium Bifluoride [1]	> 0.5	65/150	65/150	65/150
Ammonium Bisulfite Black Liquor		80/180	80/180	
Ammonium Bisulfite Cooking Liquor		65/150	65/150	
Ammonium Bromate	0.5 - 43	70/160	70/160	70/160
Ammonium Bromide	0.5 - 43	70/160	70/160	70/160
Ammonium Carbonate	> 0.5	65/150	65/150	65/150
Ammonium Chloride	> 0.5	100/210	100/210	80/180
Ammonium Citrate	> 0.5	65/150	65/150	65/150
Ammonium Fluoride [1]	> 0.5	65/150	65/150	65/150
Ammonium Hydroxide [1]	0.5 - 5	80/180	65/150	80/180
Ammonium Hydroxide [1]	6 - 20	65/150	40/100	65/150
Ammonium Hydroxide [1]	30 (as NH3)	40/100	40/100	40/100
Ammonium Hydroxide/Ammonium Chloride/ Ammonium Carbonate [1]	30 (as NH3) 35/5	40/100		40/100
Ammonium Lauryl Sulfate	0.5 - 30	50/120	50/120	50/120
Ammonium Ligno Sulfonate	0.5 - 50	80/180	80/180	65/150

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		VI 5020	VI 5030, VI 5080	VI 5010
		°C/°F	°C/°F	°C/°F
Ammonium Molybdate	> 0.5	65/150		65/150
Ammonium Nitrate	Sat'd	100/210	65/150	80/180
Ammonium Oxalate	> 0.5	65/150		
Ammonium Pentaborate	0.5 - 12	50/120		50/120
Ammonium Perchlorate	0.5 - 15	75/170		
Ammonium Persulfate	> 0.5	100/210	100/210	80/180
Ammonium Phosphate, dibasic	> 0.5	100/210	100/210	80/180
Ammonium Phosphate, monobasic	> 0.5	100/210	100/210	80/180
Ammonium Polysulfide	> 0.5	50/120	65/150	50/120
Ammonium Sulfate	Sat'd	100/210	120/250	80/180
Ammonium Sulfate/Ethyl Alcohol/Ethoxylate	60/15/3	40/100	65/150	40/100
Ammonium Sulfide (Bisulfide)	Sat'd	50/120	50/120	50/120
Ammonium Sulfite	Sat'd	65/150	65/150	65/150
Ammonium Thiocyanate	0.5 - 20	100/210	100/210	80/180
Ammonium Thiocyanate	Sat'd	50/120	50/120	
Ammonium Thioglycolate	All	40/100	40/100	
Ammonium Thiosulfate	All	60/140	60/140	
Amyl Acetate	> 0.5	20/70	50/120	
Amyl Alcohol	100	50/120	65/150	50/120
Amyl Alcohol, Vapor	100	50/120	100/210	
Amyl Chloride	100	50/120	50/120	
Aniline	20	40/100	40/100	
Aniline	100	NR	20/70	NR
Aniline Hydrochloride	> 0.5	80/180	80/180	
Aniline Sulfate	> 0.5	100/210	100/210	
Animal Fat	100	80/180		
Anionic Surfactant	All	40/100	50/120	
Anionic/Cationic Polymer Emulsions in Kerosene or Petroleum Distillates/Water	0 - 50	40/100	50/120	
Anodize (15% Sulfuric acid)		100/210	100/210	
Antimony Pentachloride, for aqueous solutions (see Hydrochloric Acid)	> 99	40/100	40/100	40/100
Aqua Regia [6]				
Armeen™ H.T. Amines (C8-C18)	100	40/100		
Aromatic Naphtha/ Naphthalene/Isopropanol	60/5/10		50/120	
Arsenic Acid	> 0.5	80/180	80/180	
Arsenic Acid/Copper Sulfate/ Sodium Dichromate	17/37/20	80/180	80/180	
Arsenic Pentoxide/ Copper Oxide/Chromic Acid	17/9/24	40/100	40/100	40/100
Arsenious Acid	19Be	80/180	80/180	65/150
Barium Acetate	> 0.5	80/180	80/180	
Barium Bromide	> 0.5	100/210	100/210	80/180
Barium Carbonate (slurry)	All	80/180	80/180	80/180
Barium Chloride	> 0.5	100/210	100/210	80/180
Barium Cyanide	> 0.5	65/150	65/150	65/150
Barium Hydroxide	> 0.5	65/150	65/150	65/150
Barium Sulfate	Sat'd	100/210	120/250	80/180
Barium Sulfide	> 0.5	80/180	80/180	

Chemical Resistance Table

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Chemical Environment	Concentration %	RESOLTECH VINYLESTER RESINS		
		VI 5020	VI 5030, VI 5080	VI 5010
		°C/F	°C/F	°C/F
Barley Solution	> 0.5	75/170	NR	NR
Beer	> 0.5	50/120	NR	NR
Beet Sugar Liquor	> 0.5	80/180	NR	NR
o-Benzoyl Benzoic Acid	All	100/210	100/210	65/150
Benzaldehyde	100	NR	20/70	NR
Benzalkonium Chloride	Dilute	40/100		40/100
Benzene	100	NR	40/100	NR
Benzene, 120°F	100	NR	50 LS/120 LS	NR
Benzene Sulfonic Acid [6]	> 0.5	65/150	65/150	65/150
Benzene, Vapor		25/80	50/120	NR
Benzene/Methyl Tertiary Butyl Ether	80/20	NR	40/100	NR
Benzene/ Ethylbenzene/ Toluene/ Trimethylbenzene/ Xylene	All	NR	40/100	NR
Benzene/Ethylbenzene	33/67	NR	40/100	NR
Benzoic Acid	Sat'd	100/210	100/210	80/180
Benzyl Alcohol	20	40/100	50/120	40/100
Benzyl Alcohol	100	NR	40/100	NR
Benzyl Chloride	100	NR	25/80	NR
Benzyltrimethylammonium Chloride	60	40/100	40/100	
Black Liquor (Pulp & Kraft Mill) [1,2]	Thin	80/180	80/180	
Black Liquor (Pulp & Kraft Mill) Thick, Heavy [1,2]	Thick	95/200	105/220	
Black Liquor Recovery, Furnace Gases [6,16]		165/325	205/400	
Blow Down (Non-Condensable, Gases from Pulp Digester, i.e., Dimethyl Sulfide and Mercaptanes) [8]		120/250	120/250	
Borax	> 0.5	100/210	100/210	80/180
Boric Acid	> 0.5	100/210	100/210	80/180
Boron Trichloride Scrubbing	> 0.5	65/150	65/150	
Brake Fluids	100	50/120	50/120 [7]	50/120
Brass Plating Solution: 3% Copper, 1% Zinc, 5.6% Sodium Cyanides, 3.0% Sodium Carbonate [1]		80/180	80/180	80/180
Brine Mixture (0.4% MgSO ₄ , 9.5% NaCl, 5.0% Na ₂ SO ₄ , 2.0% K ₂ SO ₄ , 7% CaSO ₄ /2H ₂ O, 3% Na ₂ SO ₃ /9H ₂ O, pH 7)		100/210	100/210	80/180
Brine, Chlorinated (see Chlorinated Brine)				
Brine, Salt	> 0.5	100/210	100/210	80/180
Brine, Salt	Sat'd	100/210	120/250	80/180
Brominated Phosphate Ester	> 0.5		50/120	

Chemical Resistance Table

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Chemical Environment	Concentration %	RESOLTECH VINYLESTER RESINS		
		VI 5020	VI 5030, VI 5080	VI 5010
		°C/°F	°C/°F	°C/°F
Bromine, Dry Gas	100	40/100	40/100 [7]	40/100
Bromine, Liquid	100	NR	NR	NR
Bromine, Wet Gas	100	40/100	40/100	40/100
Brown Stock		95/200	80/180	
Bunker C Fuel Oil (heavy fraction)	100	100/210	105/220	65/150
Butadiene (Gas) [2]	100	45/110	45/110	45/110
Butane	100	60/140	60/140	60/140
Butanol	100	50/120	65/150	NR
2,2-Butoxyethoxyethanol (DOWANOL* DB)	100	40/100	40/100	NR
2-Butoxyethanol(DOWANOL EB)	20	40/100	50/120	40/100
2-Butoxyethanol(DOWANOL EB)	100	40/100	40/100	NR
Butyl Acetate	100	NR	30/90	NR
Butyl Acrylate	100	NR	25/80	NR
Butyl Alcohol	100	50/120	65/150	NR
Butyl Alcohol/Benzene	93/4	NR	50/120	NR
Butyl Amine	100	NR	LS	NR
Butyl Benzoate	70		40/100	
Butyl Benzyl Phthalate	100	80/180	100/210	
Butyl Carbitol, Diethylene				
Glycol Butyl Ether				
(DOWANOL DB)	100	40/100	40/100	
Butyl CELLOSOLVE™ Solvent				
(DOWANOL EB)	100	40/100	40/100	
Butyl Chloride	0.1 - 100	NR	25/80	NR
Butyl Hypochlorite	98	NR	NR	NR
Butyl Stearate				
(5% in Mineral Spirits)		40/100		
Butylene Glycol	100	70/160	80/180	
Butylene Oxide	100	NR	LS	NR
Butyraldehyde	100	NR	40/100	NR
Butyric Acid	0.5 - 50	100/210	100/210	
Butyric Acid	100	25/80	50/120	
Cadmium Chloride	> 0.5	100/210	100/210	80/180
Cadmium Cyanide Plating Bath, (3% Cadmium Oxide, 10% Sodium Cyanide, 1.2% Sodium Hydroxide) [1]		80/180	80/180	80/180
Calcium Bisulfite	> 0.5	100/210	100/210	80/180
Calcium Bromide	> 0.5	100/210	100/210	80/180
Calcium Carbonate (slurry)	All	80/180	80/180	80/180
Calcium Chlorate	> 0.5	100/210	100/210	80/180
Calcium Chloride	> 0.5	100/210	100/210	80/180
Calcium Chloride	Sat'd	100/210	120/250	80/180
Calcium Hydroxide [1]	100	100/210	100/210	80/180
Calcium Hydroxide Slurry [1]	0.5 - 25	80/180	40/100	65/150
Calcium Hypochlorite [1,2,3,5]	All	80/180	40/100	80/180
Calcium Nitrate	> 0.5	100/210	100/210	80/180
Calcium Sulfate Slurry	All	100/210	100/210	80/180

Chemical Resistance Table

Maximum Service Temperatures for RESOLTECH Resins

Chemical Environment	Concentration %	RESOLTECH VINYLESTER RESINS		
		VI 5020	VI 5030, VI 5080	VI 5010
		°C/°F	°C/°F	°C/°F
Calcium Sulfite	> 0.5	100/210	100/210	80/180
Calgon™ (Product E) Sodium Hexametaphosphate	All	50/120		
Cane Sugar Liquor & Sweetwater	All	80/180		
Capric Acid (Decanoic Acid) [4]	> 0.5	80/180	80/180	80/180
Capric Acid/Lauric Acid/ Fatty Acids (C10-C18)	70/15/15	80/180	95/200	80/180
Caproic Acid (Hexanoic Acid)	100	25/80	50/120	25/80
Caprolactam	0 - 50	40/100	40/100	40/100
Caprolactam	100	NR	LS	NR
Caprolactone	100	NR	LS	NR
Caprylic Acid (Octanoic Acid)	100	80/180	100/210	
Caramel	All	50/120		
Carbon Dioxide Gas [16]	All	165/325	205/400	80/180
Carbon Disulfide	100	NR	LS	NR
Carbon Disulfide Fumes, no condensation or coalescence	All	40/100	65/150	NR
Carbon Monoxide Gas [16]	All	165/325	205/400	80/180
Carbon Tetrachloride	100	65/150	80/180	
Carbon Tetrachloride, Vapor	All	80/180	95/200	
CARBOWAX™ Polyethylene Glycol	100	65/150	80/180	65/150
Carboxyethyl Cellulose	10	65/150	65/150	65/150
Cascade™ Detergent in Solution	All	80/180	80/180	80/180
Cashew Nut Oil	100	65/150		
Castor Oil (Ricinus Oil)	100	70/160	70/160	70/160
Cationic/Anionic Polymer Emulsions in Kerosene or Petroleum Distillates/Water	0 - 50	40/100	50/120	
Caustic (see Sodium Hydroxide)				
Cetyl Alcohol (Hexadecanol)	100	65/150	80/180	50/120
Chlordimeform (Galecron™ Insecticide)	100	25/80	50/120	
Chloric Acid	All	25/80	25/80	25/80
Chlorinated Brine, pH < 2.5	Sat'd Cl2	80/180	95/200	
Chlorinated Brine, pH > 9				
(Hypochlorite), [1,2,3]	Sat'd Cl2	80/180	65/150	
Chlorinated Brine, pH 2.5-9 [6]	Sat'd Cl2	LS	LS	LS
Chlorinated Pulp [6]	All	80/180	95/200	
Chlorinated Solvent Recovery (see Specific Solvents)				
Chlorinated Wax	All	80/180	80/180	
Chlorination Washer (Hoods & Vent Systems)	Vapors, All	80/180	95/200	65/150
Chlorine Dioxide Generator Effluent, R2 System		65/150	80/180	65/150
Chlorine Dioxide Scrubber [1,2,3]		75/170		
Chlorine Dioxide, Chlorine (Bleaching Solution, with or without Pulp) [6]	All	80/180	95/200	
Chlorine Dioxide, No Chlorine (Bleaching Solution, with or without Pulp) [6]	All	80/180	95/200	
Chlorine Dioxide, Solution Storage	Sat'd	20/70	20/70	
Chlorine Water, pH < 2.5	Sat'd Cl2	80/180	95/200	
Chlorine Water, pH > 9 (Hypochlorite), [1,2,3]	Sat'd Cl2	80/180	65/150	

Chemical Resistance Table

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		VI 5020	VI 5030, VI 5080	VI 5010
		°C/F	°C/F	°C/F
Chlorine Water, pH 2.5-9 [6]	Sat'd Cl ₂	LS	LS	LS
Chlorine, Dry Gas [2,8]	100	100/210	120/250	80/180
Chlorine, Wet Gas [2,8]	100	100/210	120/250	80/180
Chlorine/Chlorine Dioxide/ Sulfur Dioxide	0.8/2/0.7	95/200	95/200	80/180
Chlorine-Hydrogen Chloride, with Aqueous Condensate, [8,9,12,16]	8 - 10% HCl	80/180	100/210	80/180
			175/350 LS	
Chloroacetic Acid	0 - 25	50/120	50/120	
Chloroacetic Acid	26 - 50	40/100	40/100	
Chloroacetic Acid	51 - 79	25/80	30/90	
Chloroacetic Acid	80 - 85	25/80	25/80	
Chloroacetic Acid	86 - 100	NR	LS	NR
Chlorobenzene	100	NR	40/100	NR
Chloroform	100	NR	LS	NR
Chloroform, Fumes, No Condensation or Coalescence	Fumes		80/180	
Chloroform/Dichloroethane/ Methylene Chloride	All	NR	LS	NR
Chloropentane (1 to 5 Cl)	100	40/100	55/130	NR
Chloropicrin (Nitrochloroform)	100	NR	LS	NR
Chloropyridine (tetra)	100	25/80	50/120	NR
Chlorosulfonic Acid	10	NR	NR	NR
CHLOROTHENE™ SM (1,1,1-Trichloroethane inhibited)	100	40/100	50/120	NR
Chlorotoluene	100	25/80	40/100	NR
N-Chloro-o-Tolyl (Insecticide Emulsion)	10	50/120	50/120	
Choline Chloride	> 0.5	50/120	65/150	50/120
Chrome Bath, 19% Chromic Acid with Sodium Fluorosilicate and Sulfate [1]		50/120	65/150	50/120
Chrome Reduction Process [6]	25	90/190		
Chromic Acid	0.5 - 10	65/150	65/150	65/150
Chromic Acid	11 - 20	50/120	65/150	50/120

Chemical Resistance Table

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Chemical Environment	Concentration %	RESOLTECH VINYLESTER RESINS		
		VI 5020	VI 5030, VI 5080	VI 5010
		°C/°F	°C/°F	°C/°F
Chromic Acid	30	LS	LS	
Chromic Acid	40	NR	LS	
Chromic Acid/ Sodium Metabisulfite	15/45	50/120	65/150	50/120
Chromic Acid/Nitric Acid Mixture	5/10	40/100	65/150	40/100
Chromic Acid/Sulfuric Acid Mixture (Maximum Total Concentration 10%)	10	50/120	65/150	50/120
Chromium Plate, Electroplating with a Salt Solution (with Sulfuric Acid: Not Recommended)		55/130	55/130	55/130
Chromium Sulfate (water soluble forms)	> 0.5	100/210	100/210	80/180
Citric Acid	> 0.5	100/210	100/210	65/150
Clopidol (Coyden™) [4]	All		40/100	
Cobalt Chloride	> 0.5	100/210	100/210	80/180
Cobalt Chloride Reactor (Hydrochloric/Sulfuric Acid) [10] 40		95/200		
Cobalt Citrate 12	80/180	80/180		
Cobalt Nitrate > 0.5	100/210	100/210	100/210	
Coconut Oil 100	80/180	95/200	80/180	
Cod-liver Oil 100	40/100	40/100		
Copper Chloride	Sat'd	100/210	120/250	80/180
Copper Chloride/Ammonium Chloride/Ammonium Hydroxide (see Ammonium Hydroxide)	26/5/2			
Copper Cyanide	> 0.5	100/210	100/210	80/180
Copper Cyanide Plating Bath (10.5% Copper and 14% Sodium Cyanides; 6% Rochelle Salts)		70/160	70/160	70/160
Copper Cyanide/ Potassium Cyanide/ Potassium Hydroxide [1]	7/2.5/2%	65/150	25/80	
Copper Matte Dipping Bath, (30% FeCl ₃ , 19% Hydrochloric acid) [8,9,13]		80/180	95/200	80/180
Copper Nitrate	> 0.5	100/210	100/210	80/180
Copper Plating Solution (45% Cu(BF ₄) ₂ ; 19% Copper Sulfate; 8% Sulfonic) [1]		80/180	80/180	80/180
Copper Sulfate	Sat'd	100/210	120/250	80/180
Corn Oil	100	80/180	100/210	65/150
Corn Starch	Slurry	100/210		
Corn Sugar/Syrup (Glucose)	All	80/180		
Cottonseed Oil	100	100/210	100/210	65/150
Crude Oil, Sweet, Sour	100	100/210	120/250	65/150
Cumene	100	25/80	50/120	25/80

Chemical Resistance Table

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		VI 5020	VI 5030, VI 5080	VI 5010
		°C/F	°C/F	°C/F
Cumene/Toluene/Xylene	All	25/80	50/120	NR
Curpric Chloride, (see Copper Chloride)				
Cyanide Disposal (Reaction with Hypo gives Sodium Thiosulfite)			40/100	
Cyanuric Acid	All	25/80	50/120	
Cyanuric Chloride [4]	All	50/120	50/120	50/120
Cyclohexane	100	50/120	65/150	
Cyclohexylamine	100		40/100	
Cyclopentane	100	40/100	50/120	
Dalapon™ Grass Killer (2,2-dichloropropionic acid and sodium salt)	100	NR	40/100	NR
Decanoic Acid [4]	> 0.5	80/180	80/180	80/180
Decanol	100	50/120	80/180	
Deionized Water [2]	100	80/180	80/180	80/180
Demineralized Water [2]	100	80/180	80/180	80/180
Detergents, Organic	100	70/160	95/200	70/160
De-waxed Paraffin Distillate	100	80/180	80/180	65/150
Diacetone Alcohol	10		50/120	
Diacetone Alcohol	100	NR	LS	NR
Diallyl Phthalate	All	80/180	100/210	65/150
Diammonium Phosphate	> 0.5	100/210	100/210	80/180
Dibasic Acid (51-61% Glutaric Acid, 18-28% Succinic Acid, 15-25% Adipic Acid, 2% Nitric Acid)	> 0.5 - 50	80/180	95/200	80/180
Dibromonitrilo-Propionamide	100	NR	40/100	NR
Dibromophenol	100	NR	40/100	NR
Dibromopropane	100	NR	40/100	NR
Dibromopropanol	100		40/100	
Dibutyl Carbitol (diethylene glycol dibutyl ether)	100	25/80	40/100	
Dibutyl Ether	100	25/80	80/180	
Dibutyl Sebacate	100	50/120	65/150	
Dibutyl Phthalate	100	80/180	100/210	
2,4-Dichlorophenoxyacetic Acid (Acid, Salts, Esters and Formulations) [4]		50/120	50/120	
Dichloroacetic Acid, (see Chloroacetic Acid)				
Dichlorobenzene (ortho and para)	100	NR	50/120	NR
Dichloroethane	100	NR	25/80	NR
Dichloroethylene	100	NR	LS	NR
Dichloromethane (Methylene Chloride)	100	NR	LS	NR
Dichloropropane	100	NR	40/100	NR

Chemical Resistance Table

Maximum Service Temperatures for RESOLTECH Resins

Chemical Environment	Concentration %	RESOLTECH VINYLESTER RESINS		
		VI 5020	VI 5030, VI 5080	VI 5010
		°C/F	°C/F	°C/F
Dichloropropene	100	NR	25/80	NR
Dichloropropionic Acid (see also Dalapon)	100	NR	40/100	NR
Dichlorotoluene	100	25/80	50/120	NR
Diesel Fuel	100	80/180	100/210	65/150
Diethanolamine	100	50/120	65/150	
Diethanolamine/Ethanolamine	80/20	50/120	50/120	
Diethyl Carbonate	100	NR	40/100	NR
Diethyl Ether	100	NR	NR	NR
Diethyl Formamide	20	40/100	40/100	NR
Diethyl Formamide	100	NR	40/100	NR
Diethyl Hydroxylamine	100	NR	LS	
Diethyl Ketone	20	40/100	50/120	40/100
Diethyl Ketone	100	NR	25/80	NR
Diethyl Sulfate	100	40/100	50/120	
Diethylamine	20	40/100	40/100	NR
Diethylamine	100	NR	LS	NR
Diethylaminoethanol	100	50/120	50/120	40/100
Diethylbenzene	100	40/100	65/150	NR
Diethylene Glycol	100	80/180	100/210	80/180
Diethylene Glycol Dimethylether	20	40/100	40/100	NR
Diethylene Glycol Dimethylether	100	NR	25/80	NR
Diethylenetriaminepentaacetic Acid	All	40/100	50/120	
Diethylenetriaminepentaacetic Acid, sodium salt	40	40/100	50/120	
Di-2-Ethylhexyl Phosphoric Acid (DEHPA) in Kerosene	20	80/180	80/180	
Diglycolamine(Aminoethoxyethanol)	20	40/100	50/120	40/100
Diglycolamine(Aminoethoxyethanol)	50	40/100	40/100	40/100
Diglycolamine (Aminoethoxyethanol)	100	NR	LS	NR
Diisobutyl Ketone	100	NR	50/120	NR
Diisobutyl Phthalate	100	65/150	65/150	
Diisobutylene	100	40/100	40/100	25/80
Diisonoyl Phthalate	100	65/150	100/210	65/150
Diisopropanolamine	100	50/120	65/150	40/100
Dimethyl Acetamide	20	40/100	40/100	NR
Dimethyl Acetamide	100	NR	LS	NR
Dimethyl Acetamide, Fumes, no condensation or coalescence	Fumes		80/180	

Chemical Resistance Table

Maximum Service Temperatures for RESOLTECH Resins

Chemical Environment	Concentration %	RESOLTECH VINYLESTER RESINS		
		VI 5020	VI 5030, VI 5080	VI 5010
		°C/F	°C/F	°C/F
Dimethyl Amine	20	40/100	40/100	40/100
Dimethyl Amine	40	LS	LS	NR
Dimethylammonium Hydrochloride (Dimethylamine HCl, DMA-HCl)	70	40/100	50/120 [7]	40/100
Dimethyl Aniline	100	NR	40/100	LS
Dimethyl Formamide	20	40/100	40/100	
Dimethyl Formamide	100	NR	LS	NR
Dimethyl Formamide, Fumes, no condensation or coalescence	Fumes		80/180	
Dimethyl Morpholine	100	NR	50/120	NR
Dimethyl Phthalate	100	65/150	80/180	
Dimethyl Sulfate	20	40/100	50/120	40/100
Dimethyl Sulfate	100	NR	LS	NR
Dimethyl Sulfide	100	NR	25/80	NR
Dimethyl Sulfoxide	20	40/100	40/100	40/100
Dimethyl Sulfoxide	100	NR	LS	NR
Dimethyl Sulfoxide (DMSO) - Water Solution	20		20/70	
2,2-Dimethyl Thiazolidine	1	65/150	80/180	
Dimethylcarbonate	100	NR	NR	NR
Dimethylformamide/ Acetonitrile/Methanol	26/9/7	NR	LS	NR
Diocetyl Phthalate	100	65/150	100/210	65/150
Diphenyl Oxide (Diphenyl Ether, Phenyl Ether)	100	25/80	50/120	NR
Dipotassium Phosphate	> 0.5	100/210	100/210	80/180
Dipropylene Glycol	100	80/180	100/210	65/150
Dipropylene Glycol Monomethyl				
Ether (DOWANOL DPM)	20	40/100	65/150	40/100
Dipropylene Glycol Monomethyl Ether (DOWANOL DPM)	100	NR	20/70	NR
Distilled Water [2]	100	80/180	80/180	80/180
Divinylbenzene	100	40/100	50/120	NR
DMA 4 Weed Killer 2,4-D	100	50/120	50/120	
DMA 6 Weed Killer	100	50/120	50/120	
Dodecanol (Lauryl Alcohol)	100	65/150	80/180	50/120
Dodecene	100	65/150	80/180	50/120
Dodecyl Benzene Sulfonic Acid [6]	100	80/180	100/210	
Dodecyl Benzene Sulfonic Acid/ Sulfuric Acid/Water/Oil	85/10/4/1	65/150	65/150	65/150
Dodecyldimethylamine	100	80/180	100/210	
Dodecylmercaptan	100	80/180	100/210	
DOWANOL DB Glycol Ether	100	40/100	40/100	NR

Chemical Resistance Table

Maximum Service Temperatures for RESOLTECH Resins

		RESOLTECH VINYLESTER RESINS		
Chemical Environment	Concentration %	VI 5020	VI 5030, VI 5080	VI 5010
		°C/F	°C/F	°C/F
DOWANOL EB Glycol Ether (Ethylene Glycol n-butyl ether)	100	40/100	40/100	NR
DOWANOL PM Glycol Ether	100	NR	20/70	NR
DOWANOL DPM (Dipropylene Glycol Monomethyl Ether)	100	NR	20/70	NR
DOWANOL DB Diethylene Glycol n-Butyl Ether (see also Butyl CARBITOL™)	100	40/100	40/100	NR
DOWCLENES* EC Solvent		40/100	50/120	
DOWCLENES Solvent	100	50/120	50/120	
DOWEX* 50WX4 Ion Exchange Resin		100/210	100/210	
DOWFAX* 2A1 Surfactant	All	50/120	50/120	
DOWFAX 2AO Solution Surfactant	All	50/120	50/120	
DOWICIDE* Antimicrobial	All	50/120	50/120	
DOWTHERM* Heat Transfer Agent	100	50/120	65/150	
Electrosol™ Antistatic Agent (Petroleum naphtha, heavy alkylate)	All	65/150	65/150	
Epichlorohydrin	100	LS	25/80	NR
Epoxidized Castor Oil	100	40/100		40/100
Epoxidized Soybean Oil	100	65/150	65/150	65/150
Esters, Fatty Acid	100	80/180	80/180	65/150
Ethanol (Ethyl Alcohol)	10	50/120	65/150	50/120
Ethanol (Ethyl Alcohol)	50	40/100	65/150	NR
Ethanol (Ethyl Alcohol)	90 - 95	25/80	40/100	NR
Ethanol (Ethyl Alcohol)	100	NR	40/100	NR
Ethanol, Fumes, no condensation or coalescence	Fumes	65/150	80/180	65/150
Ethanol/Ethylacetate/ Methanol/DMF	35/29/10/10	NR	LS	NR
Ethanolamine	20	40/100	50/120	
Ethanolamine	100	25/80	40/100	NR
Ethephon	100		40/100	
Ethoxy Acetic Acid	10		40/100	
Ethoxy Acetic Acid	100	NR	LS	NR
Ethoxylated Alcohol, C12-C14	100	25/80	50/120	
Ethoxylated Nonyl Phenol	100	NR	40/100	NR
Ethyl Acetate	100	NR	25/80	NR

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		VI 5020	VI 5030, VI 5080	VI 5010
		°C/F	°C/F	°C/F
Ethyl Acetate, Fumes, no condensation or coalescence	Fumes		80/180	
Ethyl Acetate/Sodium Hydroxide [1,2]	4/0 - 50	50/120	40/100	
Ethyl Acrylate	100	NR	25/80	NR
Ethyl Amine	20	40/100	40/100	40/100
Ethyl Amine	70	NR	LS	NR
Ethyl Bromide	100	NR	LS	NR
Ethyl Chloride	100	NR	25/80	NR
Ethyl Ether	100	NR	NR	NR
Ethyl Sulfate	100	40/100	40/100	40/100
2-Ethylhexyl Alcohol	100	65/150	80/180	50/120
Ethyl-3-Ethoxy Propionate	100	NR	25/80	NR
Ethylbenzene	100	25/80	50/120	
Ethylbenzene/Benzene	67/33	NR	40/100	NR
Ethylene Chloride (see Dichloroethane)	100	NR	25/80	NR
Ethylene Chlorohydrin	20	40/100	65/150	40/100
Ethylene Chlorohydrin	100	40/100	40/100	NR
Ethylene Diamine	20	40/100	40/100	40/100
Ethylene Diamine	100	NR	LS	NR
Ethylene Dibromide	100	NR	NR	NR
Ethylene Dichloride (see Dichloroethane)	100	NR	25/80	NR
Ethylene Dichloride/ Ethylene Dibromide/Tetra Ethyl Lead (above water solubility)	5/5/5	NR	LS	NR
Ethylene Glycol	100	100/210	100/210	65/150
Ethylene Glycol Monobutyl Ether (DOWANOL EB)	20	40/100	65/150	40/100
Ethylene Glycol Monobutyl Ether (DOWANOL EB)	100	40/100	40/100	NR
Ethylene Glycol/Sulfuric Acid	0 - 40/0 - 10	65/150	80/180	
Ethylene Oxide	100	NR	NR	NR
Ethylenediaminetetraacetic Acid (EDTA), (see VERSENE* 100 Chelating agent for the Tetrasodium Salt of EDTA)	All	80/180	80/180	80/180
Ethylenesulfonic Acid, Sodium Salt [6]	All	70/160	70/160	
Eucalyptus Oil	100	60/140	60/140	

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		VI 5020	VI 5030, VI 5080	VI 5010
		°C/°F	°C/°F	°C/°F
Fatty Acid/Sterol/Triglyceride	All	100/210	120/250	65/150
Fatty Acid/Sulfuric Acid [10]	5/2	100/210	100/210	
Fatty Acids	All	100/210	120/250	65/150
Ferric Acetate	All	80/180	80/180	
Ferric Chloride	> 0.5	100/210	100/210	80/180
Ferric Chloride/Ferrous Chloride	5/20	100/210	100/210	80/180
Ferric Chloride/Ferrous Chloride/ Hydrochloric Acid	48/0.2/0.2	100/210	105/220	80/180
Ferric Chloride/ Hydrochloric Acid [8,9,12]	0 - 29/1 - 20	80/180	105/220	80/180
Ferric or Ferrous Sulfate/ Sulfuric Acid	0 - 40/0 - 25	100/210	100/210	80/180
Ferric Sulfate	> 0.5	100/210	100/210	80/180
Ferrous Chloride	> 0.5	100/210	100/210	80/180
Ferrous Chloride/ Hydrochloric Acid [8,9,12]	0 - 29/1 - 20	80/180	100/210	80/180
Ferrous Chloride+Manganese Chloride+Ferric Chloride/ Hydrochloric Acid [8,9,12]	1 - 60/0 - 20	80/180	100/210	80/180
Ferrous Nitrate	> 0.5	100/210	100/210	80/180
Ferrous Sulfate	> 0.5	100/210	100/210	80/180
Fertilizer, Uran™; Urea ammonium nitrate composition: 43.4% Ammonium Nitrate, 35.4% Urea, 20.3% Water		65/150	65/150	65/150
8-8-8 Fertilizer Composition: (Parts by wt. 30 Phosphoric Acid, 29 Ammonia, 104.3 Water, 10.4 Uran, 26.0 Potash, 3.0 Borax pH 8.2)		65/150	65/150	65/150
Flue Gas, Dry [16]	All	165/325	205/400	
Flue Gas, Wet	All	80/180	100/210	80/180
Fluoboric Acid [1,2]	All	100/210	100/210	65/150
Fluoride Salts/Hydrochloric Acid [1,2,5]	30/10	50/120	50/120	50/120
Fluorine in Flue Gas, Wet [1]	2	80/180	100/210	80/180
Fluosilicic Acid [1,2]	0 - 10	80/180	80/180	65/150
Fluosilicic Acid [1,2]	11 - 35	40/100	40/100	40/100
Fluosilicic Acid Fumes [1,2]	All	80/180	80/180	65/150
Fluosilicic/Hydrofluoric/ Phosphoric Acids [1,2]	22/5/5	40/100	40/100	40/100
Fluozirconic Acid, Fluotitanic Acid, Ammonium Hydroxide [1,2]	5/4/3	40/100	40/100	40/100
Fly Ash Slurry		80/180	80/180	80/180
Formaldehyde	All	50/120	65/150	
Formaldehyde/Methanol	0 - 37/0 - 15	50/120	65/150	
Formamide	20	40/100	65/150	40/100

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		VI 5020	VI 5030, VI 5080	VI 5010
		°C/F	°C/F	°C/F
Formamide	100	20/70	20/70	
Formic Acid	10	80/180	80/180	65/150
Formic Acid	25	50/120	65/150	50/120
Formic Acid	50	50/120	50/120	
Formic Acid	85	25/80	40/100	
Formic Acid	98		40/100	
Freon™ 11 and 12 Refrigerant	100	25/80	40/100	NR
Freon 113 Refrigerant		40/100	40/100	
Fuel C (50/50 Isooctane/Toluene)	100		50/120	
Fuel C/Methyl t-Butyl Ether (MTBE) Note: Fuel C is 50% toluene and 50% isooctane)	85/15		50/120	
Fuel Oil	100	80/180	100/210	65/150
Furfural [11]	0 - 10	40/100	50/120	
Furfural	100	NR	LS	NR
Furfural in Organic Solvent [4]	0 - 20	NR	40/100	
Furfural/Acetic Acid/Methanol	30/10/5	NR	LS	NR
Furfuryl Alcohol [2]	20	40/100	65/150	40/100
Furfuryl Alcohol [2]	100	NR	25/80	NR
Galecron (Chlordimeform) Insecticide 100		25/80	50/120	
Gallic Acid	Sat'd	80/180	80/180	
Gasohol (5% Methanol)		50/120	50/120	50/120
Gasohol (Up to 10% Alcohol)		40/100	50/120	NR
Gasohol (10-100% Alcohol)		NR	40/100	NR
Gasoline, Aviation	100	80/180	80/180	65/150
Gasoline, Leaded	100	80/180	80/180	65/150
Gasoline, No Lead, No Methanol	100	50/120	65/150	
Gasoline/MTBE	85/15	40/100	50/120	
Glucose	100	80/180		
Glutamic Acid	50	50/120	50/120	
Glutaraldehyde	50	50/120	50/120	50/120
Glutaric Acid	50	50/120	50/120	
Glycerine	100	100/210	100/210	65/150
Glycine and Derivatives	All	40/100	40/100	
Glycol	100	100/210	100/210	65/150
Glycolic Acid (Hydroxyacetic acid)	70	40/100	40/100	
Glyconic Acid	50	80/180	80/180	65/150

Chemical Resistance Table

Maximum Service Temperatures for RESOLTECH Resins

Chemical Environment	Concentration %	RESOLTECH VINYLESTER RESINS		
		VI 5020	VI 5030, VI 5080	VI 5010
		°C/°F	°C/°F	°C/°F
Glyoxal	40	40/100	40/100	
Glyphosate	All		40/100	
Gold Plating Solution (23% Potassium Ferrocyanide with Potassium Gold Cyanide and Sodium Cyanide)		100/210	100/210	80/180
Goodrite™ K702/732 Product				
(Sodium Polyacrylate Dispersants)		80/180	80/180	
Green Liquor [1,2]	All	80/180	80/180	80/180
Gypsum Slurry (see also Calcium Sulfate)	All	100/210	100/210	80/180
Hard Chrome Plating Baths (with Sulfuric Acid: Not Recommended)		60/140		
Heptane	100	100/210	100/210	80/180
Heptane, Fumes, no condensation or coalescence	Fumes	80/180	80/180	80/180
Herbicides [14]		50/120	50/120	50/120
Hexachloroethane	100	LS	50/120	NR
Hexadecanol	100	65/150	80/180	50/120
Hexamethylenetetramine	40	40/100	50/120	
Hexane	100	70/160	70/160	
Hexanoic Acid	100	25/80	50/120	25/80
Hot Stack Gas (see Flue Gas)				
Hydraulic Fluid (Glycols) [14]	100	80/180	80/180	
Hydrazine	20		LS	
Hydrazine	100	NR	LS	NR
Hydrazine/Sodium Phosphate	5/10		LS	
Hydriodic Acid	40	65/150	65/150	65/150
Hydriodic Acid	57		40/100	
Hydrobromic Acid	0 - 25	80/180	80/180	80/180
Hydrobromic Acid	48	65/150	65/150	65/150
Hydrobromic Acid	62	40/100	40/100	40/100
Hydrobromic Acid/Bromine	40/2		40/100	
Hydrochloric Acid [9,12]	1 - 15	80/180	110/230	80/180
Hydrochloric Acid [8,9,12]	16 - 20	80/180	110/230	80/180
Hydrochloric Acid [8,9,12]	21 - 25	65/150	100/210	80/180
Hydrochloric Acid [8,9,12]	26 - 30	65/150	95/200	80/180
Hydrochloric Acid [8,9,13]	31 - 32	65/150	80/180 [15]	65/150
Hydrochloric Acid [8,9,13]	33 - 34	50/125	70/160 [15]	50/125
Hydrochloric Acid [8,9,13]	35 - 36	50/125	60/140 [15]	50/125
Hydrochloric Acid [8,9,13]	37	40/100	50/125 [15]	
Hydrochloric Acid & Dissolved Organics [8,9,13]	0 - 33% HCl	NR	65/150 [15]	NR

Chemical Resistance Table

Maximum Service Temperatures for RESOLTECH Resins

Chemical Environment	Concentration %	RESOLTECH VINYLESTER RESINS		
		VI 5020	VI 5030, VI 5080	VI 5010
		°C/°F	°C/°F	°C/°F
Hydrochloric Acid + Aluminum + Aluminum chloride [9,10,12]	< 15% HCl	80/180		
Hydrochloric Acid/Aluminum Chloride [8,9,12]	30/0 - 40	65/150	80/180 [15]	65/150
Hydrochloric Acid + Chlorine [9,12]	0.5 - 20% HCl	80/180	100/210	80/180
Hydrochloric Acid, Fumes + Free Chlorine, dry above 210°F/100°C [8,9,12,16]			175/350	
Hydrochloric Acid, Fumes [9,16]		100/210	175/350	80/180
Hydrochloric Acid/Bromine/ Chlorine [8,9,12]	22/0.1/0.1	65/150	100/210	80/180
Hydrochloric Acid/Calcium Chloride [8,9,12]	27/15	65/150	95/200	80/180
Hydrochloric Acid/Diethylene Triamine (as Hydrochloride)/ Ammonium Chloride [8,9,13]	< 33/>10/10		65/150	
Hydrochloric Acid/ Ferric Chloride [8,9,12]	1 - 20/0 - 29	80/180	105/220	80/180
Hydrochloric Acid/ Ferric Chloride/Organics [2,8,9,13]	28/35/1	NR	65/150	NR
Hydrochloric Acid/ Ferrous Chloride [8,9,12]	1 - 20/0 - 29	80/180	100/210	80/180
Hydrochloric Acid/ Formaldehyde [2,8,9,13]	25/3	NR	65/150	NR
Hydrochloric/ Hydrofluoric Acid [1,2,8,13]	36/1		40/100 [15]	
Hydrochloric Acid/ Hydrofluoric Acid [1,2,8,13]	Max. Total 20	40/100	40/100	40/100
Hydrochloric/ Hydrofluoric Acid [1,2,13]	15/0.1 - 1	80/180	100/210	80/180
Hydrochloric/ Hydrofluoric Acid [1,2,8,13]	25/6	40/100	50/125	
Hydrochloric/Hydrofluoric/ Phosphoric Acid, Nitrobenzene [1,2]	15/1/1/0.5	NR	40/100	NR
Hydrochloric/Hydrofluoric/ Xylene	15/15/70		NR	
Hydrochloric/Hydrofluoric Acid [1,2,8,13]	0.5 - 20/0 - 1	65/150	80/180	
Hydrochloric/Hydrofluoric Acid [1,2,8,13]	30/15		40/100	
Hydrocyanic Acid	All	100/210	100/210	80/180
Hydrofluoric Acid [1,2]	10	65/150	65/150	65/150
Hydrofluoric Acid [1,2]	20	40/100	40/100	40/100
Hydrofluoric/Nitric Acid [1,2]	15/15		40/100	
Hydrofluoric/Nitric Acid [1,2]	6/20	50/120	60/140	40/100

Chemical Resistance Table

Maximum Service Temperatures for RESOLTECH Resins

Chemical Environment	Concentration %	RESOLTECH VINYLESTER RESINS		
		VI 5020 °C/°F	VI 5030, VI 5080 °C/°F	VI 5010 °C/°F
Hydrofluoric/Nitric Acid [1]	3 - 5/30 - 35	NR	LS	NR
Hydrofluoric/Nitric/ Sulfuric Acid [1,2]	8/20/2		60/140	
Hydrofluosilicic Acid/ Polyaluminum Hydroxychloride (or Polyaluminum Chloride, PAC) [1,2]	1 - 22/1 - 35	40/100	40/100	40/100
Hydrofluosilicic Acid [1] (see Fluosilicic Acid)	0 - 10	80/180	80/180	65/150
Hydrofluosilicic Acid [1] (see Fluosilicic Acid)	11 - 35	40/100	40/100	40/100
Hydrofluosilicic Acid/ Zinc Chloride [1]	20/All	40/100	40/100	40/100
Hydrogen Bromide, Dry Gas	100	80/180	100/210	80/180
Hydrogen Bromide, Wet Gas	100	80/180	80/180	80/180
Hydrogen Chloride, Dry Gas [6,16]	100	100/210	175/350	80/180
Hydrogen Chloride, Wet Gas	100	100/210	110/230	80/180
Hydrogen Fluoride, Dry Gas/Vapor (if wet max. 40°C/100°F) [1,2,6]		80/180	80/180	80/180
Hydrogen Peroxide [2,3,6]	0 - 30	65/150	65/150	65/150
Hydrogen Peroxide [2,3,6]	35	25/80	40/100	NR
Hydrogen Peroxide [2,3,6]	50	NR	LS	NR
Hydrogen Peroxide/ Caustic [1,2,3] (See individual listing for details)		85/185		80/180
Hydrogen Peroxide/Caustic Bleach - Aqueous Solution with up to 0.56 wt. % Hydrogen Peroxide, pH = 10.7, 2% Sodium Silicate Pentahydrate, 0.2% Chelating Agent, 0.2% Chelant [1,2,3]		85/185		80/180
Hydrogen Sulfide [6,16]	5	100/210	175/350	80/180
Hydrogen Sulfide, Aqueous	All	100/210	100/210	80/180
Hydrogen Sulfide, Dry Gas	100	100/210	110/230	80/180
Hydrosulfite Bleach, Aqueous Solution containing 5% Zinc Hydrosulfite and 2.5% Tripolyphosphate [5]		80/180	80/180	80/180

Chemical Resistance Table

Maximum Service Temperatures for RESOLTECH Resins

Chemical Environment	Concentration %	RESOLTECH VINYLESTER RESINS		
		VI 5020	VI 5030, VI 5080	VI 5010
		°C/°F	°C/°F	°C/°F
Hydroxyacetic Acid(Glycolic Acid)	20	40/100	65/150	40/100
Hydroxyacetic Acid (Glycolic Acid)	70	40/100	40/100	
Hydroxylamine Acid Sulfate (Hydroxylammonium Acid Sulfate, HSA), Reaction of Hydroxylamine Acid Disulfate with steam to form HAS, Sulfuric Acid, Ammonium Sulfate	> 0.5		100/210	
Hypochlorous Acid [2,3]	0 - 10	40/100	40/100	40/100
Hypophosphorous Acid	0 - 50	50/120	50/120	50/120
Imidazoline Acetate/Solvent [2,4]	20	40/100	50/120	NR
Imidazoline Acetate/Solvent [2,4]	60	NR	40/100	NR
Incinerator Gases (see Flue Gas)				
Insecticide Emulsions	0.5 - 10	50/120	50/120	
Iodine, Crystals	100	65/150	65/150	65/150
Iodine, Vapor	100	65/150	80/180	65/150
Iron and Steel Cleaning Bath, 9% Hydrochloric, 23% Sulfuric acid	9	80/180	100/210	80/180
Iron Plating Solution 45% FeCl ₂ ; 15% CaCl ₂ ; 20% FeSO ₄ ; 11% (NH ₄) ₂ SO ₄		80/180	120/250	80/180
Isoamyl Alcohol	20	65/150	80/180	65/150
Isoamyl Alcohol	100	50/120	65/150	50/120
Isobutyl Alcohol	20	65/150	80/180	40/100
Isobutyl Alcohol	100	50/120	65/150	NR
Isodecanol	100	50/120	80/180	50/120
Isononyl Alcohol	100	65/150	65/150	40/100
Isooctyl Adipate	100	50/120	65/150	40/100
Isooctyl Alcohol	100	65/150	65/150	50/120
Isopropanol Amine	100	50/120	50/120	NR
Isopropyl Alcohol (Isopropanol)	100	50/120	50/120	NR
Isopropyl Amine	0.5 - 50	40/100	40/100	
Isopropyl Amine	100	NR	LS	NR
Isopropyl Myristate	100	100/210	110/230	65/150
Isopropyl Palmitate	100	100/210	110/230	65/150
Itaconic Acid	0.5 - 40	60/140	60/140	60/140
Jet Fuel, General	100	60/140	60/140	60/140

Chemical Resistance Table

Maximum Service Temperatures for RESOLTECH Resins

Chemical Environment	Concentration %	RESOLTECH VINYLESTER RESINS		
		VI 5020	VI 5030, VI 5080	VI 5010
		°C/°F	°C/°F	°C/°F
Kerosene	100	80/180	80/180	65/150
Kraft Recovery Boiler Breeching (see Flue Gas)				
Lactic Acid	All	100/210	100/210	65/150
Lasso™ Herbicide [4]	All		50/120	
Latex (Emulsion in Water) (for specific latices see under				
chemical/polymer name)	All	50/120	50/120	50/120
Lauroyl Chloride	100	40/100	50/120	
Lauryl Alcohol	100	65/150	80/180	50/120
Lauryl Chloride	100	100/210	100/210	65/150
Lauryl Mercaptan	100	80/180	100/210	
Lead Acetate	Sat'd	100/210	110/230	
Levulinic Acid	Sat'd	100/210	110/230	
Lignin Sulfonate	All	80/180	80/180	65/150
Lime Slurry (see Calcium Hydroxide)				
Limestone Slurry (see Calcium Carbonate)	All	80/180	80/180	80/180
Linseed Oil	100	100/210	110/230	65/150
Liquid Petroleum Gas (LPG)	100	60/140	60/140	60/140
Lithium Bromide	Sat'd	100/210	120/250	80/180
Lithium Carbonate [1]	All	80/180	80/180	80/180
Lithium Chloride	> 0.5	100/210	100/210	80/180
Lithium Chloride	Sat'd (35 - 40)	100/210	120/250	80/180
Lithium Hydroxide [1]	All	80/180	40/100	80/180
Lithium Hypochlorite [1,2,3,5]	All	80/180	40/100	80/180
Magnesium Bisulfite	> 0.5	100/210	100/210	80/180
Magnesium Carbonate	All	80/180	80/180	80/180
Magnesium Chloride	Sat'd	100/210	120/250	80/180
Magnesium Fluosilicate [1]	All	80/180	80/180	80/180
Magnesium Hydroxide	> 0.5	100/210	100/210	80/180
Magnesium Nitrate	All	100/210	100/210	80/180
Magnesium Phosphate	> 0.5	100/210	100/210	80/180
Magnesium Sulfate	Sat'd	100/210	120/250	80/180
Magnesium Sulfate, Phosphoric Acid	1 - 40/0 - 36	100/210	100/210	100/210
Magnifloc™ 500 Series Products	All	60/140	60/140	60/140
Magnifloc 837A Products	All	65/150	65/150	65/150
Maleic Acid	> 0.5	80/180	100/210	80/180
Manganese Chloride (Manganous Chloride)	> 0.5	100/210	100/210	80/180
Manganese Nitrate (Manganous)	> 0.5	100/210	100/210	80/180

Chemical Resistance Table

Maximum Service Temperatures for RESOLTECH Resins

Chemical Environment	Concentration %	RESOLTECH VINYLESTER RESINS		
		VI 5020	VI 5030, VI 5080	VI 5010
		°C/F	°C/F	°C/F
(Manganous Sulfate)	> 0.5	100/210	100/210	80/180
Melamine Formaldehyde Resin	All	40/100	50/120	40/100
Mercaptoacetic Acid	All	NR	40/100	NR
Mercaptoethanol	10		80/180	
Mercuric Chloride	> 0.5	100/210	100/210	80/180
Mercurous Chloride	> 0.5	100/210	100/210	80/180
Mercury	100	100/210	120/250	65/150
Metal Pickling Solutions (Sulfuric-, Hydrochloric-, and/or Phosphoric Acids) [9]	0.5 - 15 Total	100/210	100/210	
Methacrylic Acid [7]	25	40/100	50/120	40/100
Methacrylic Acid	100	LS	40/100	
Methane/Nitrogen	70/30	60/140	95/200	60/140
Methane Sulfonic Acid [6]	20 - 100	NR	40/100	NR
Methanol (Methyl Alcohol)	5	50/120	50/120	50/120
Methanol (Methyl Alcohol)	20	NR	40/100	NR
Methanol (Methyl Alcohol)	40 - 100	NR	40/100	NR
Methanol, Fumes, no condensation or coalescence	Fumes		80/180	
Methanol/Ethanolamine	0 - 60/0 - 20	NR	40/100	NR
Methanol/Formaldehyde/Sulfuric	60/20/2	NR	40/100	NR
Methanol/Formaldehyde	0 - 15/0 - 37	50/120	65/150	
Methanol/Formaldehyde	35/4	NR	40/100	
1-Methoxy-2-Propanol	100	NR	20/70	NR
Methyl Acetate	20	40/100	40/100	40/100
Methyl Acetate	100	NR	LS	NR
Methyl Bromide	10	25/80	25/80	NR
Methyl Bromide	100	NR	LS	NR
Methyl Butyl Ketone (MBK), includes Methyl t-Butyl Ketone (MTBK) and other Isomers	100	25/80	50/120	NR
Methyl Chloride, Gas	All	40/100	65/150	NR
Methyl Chloride, Fumes, no condensation or coalescence	Fumes		80/180	
Methyl Distearyl Ammonium Chloride/Isopropanol	75/25	50/120	50/120	
Methyl Ethyl Ketone	20	40/100	40/100	40/100
Methyl Ethyl Ketone	100	LS	20/70	NR
Methyl Ethyl Ketone, 2-Butanol, Triethylamine, 2-Butoxy Ethanol	< 25 Total	LS	40/100	NR
Methyl Formate	5	40/100	50/120	
Methyl Isobutyl Ketone (MIBK)	100	25/80	50/120	NR
Methyl Mercaptan (Gas)	All	40/100	65/150	NR

Chemical Resistance Table

Maximum Service Temperatures for RESOLTECH Resins

Chemical Environment	Concentration %	RESOLTECH VINYLESTER RESINS		
		VI 5020	VI 5030, VI 5080	VI 5010
		°C/F	°C/F	°C/F
Methyl Methacrylate	All	NR	25/80	NR
N-methyl-2-pyrrolidone	10		LS	
N-methyl-2-pyrrolidone	100	NR	LS	NR
Methyl t-Butyl Ether	100	NR	25/80	NR
Methyl t-Butyl Ether (MTBE)/ Fuel C (Fuel C is 50% toluene and 50% isooctane)	15/85	40/100	50/120	NR
Methyl t-Butyl Ether, Fumes, no condensation or coalescence	Fumes		80/180	
2-Methyl-3-butenenitrile	All	25/80	40/100	
Methylamine	20	40/100	40/100	40/100
Methylamine	40	LS	LS	NR
Methylamine	100	NR	LS	NR
Methyldiethanolamine	20	50/120	80/180	40/100
Methyldiethanolamine	100	50/120	65/150	
Methylene Chloride	100	NR	LS	NR
Methylene Chloride, Fumes, no condensation or coalescence	Fumes		80/180	
Methylene Chloride/Methanol/				
Water	1/4/95	40/100	50/120	40/100
Methylstyrene (alpha)	100	25/80	50/120	NR
Mineral Oils, Aliphatic	100	100/210	120/250	65/150
Molasses	100	80/180		
Monochloroacetic Acid (see Chloroacetic Acid)				
Monochlorobenzene	100	NR	40/100	NR
Monoethanolamine (see Ethanolamine)				
Monomethylhydrazine	100	NR	LS	NR
Morpholine [2]	20	40/100	50/120	40/100
Morpholine [2]	100	NR	25/80	NR
Morpholine/Cyclohexylamine	All	NR	25/80	NR
Motor Oil	100	100/210	120/250	65/150
Muriatic Acid (see Hydrochloric Acid)				
Myristic Acid	100	100/210	120/250	65/150
Naphtha	100	80/180	100/210	80/180
Naphtha, Heavy Aromatic	100		50/120	

Chemical Resistance Table

Maximum Service Temperatures for RESOLTECH Resins

Chemical Environment	Concentration %	RESOLTECH VINYLESTER RESINS		
		VI 5020	VI 5030, VI 5080	VI 5010
		°C/F	°C/F	°C/F
Naphthalene	100	100/210	100/210	80/180
Neutralizer & Desmut™	All	65/150	65/150	65/150
Nickel Chloride	> 0.5	100/210	100/210	80/180
Nickel Nitrate	> 0.5	100/210	100/210	80/180
Nickel Plating Solution #1 (11% Nickel Sulfate/ 2% Nickel Chloride/ 1% Boric Acid)		80/180	80/180	80/180
Nickel Plating Solution #2 (44% Nickel Sulfate/ 4% Ammonium Chloride/ 4% Boric Acid)		80/180	80/180	80/180
Nickel Plating Solution #3 (15% Nickel Sulfate/5% Nickel Chloride/3% Boric Acid)		100/210	100/210	80/180
Nickel Sulfamate	All	80/180	80/180	80/180
Nickel Sulfate	> 0.5	100/210	100/210	80/180
Nitric Acid	0 - 5	65/150	80/180	65/150
Nitric Acid	6 - 10	65/150	65/150	50/120
Nitric Acid	11 - 20	50/120	65/150	50/120
Nitric Acid [2]	21 - 29	40/100	50/120	40/100
Nitric Acid [2]	30 - 35	25/80	40/100	NR
Nitric Acid [2]	36 - 40	NR	40/100	NR
Nitric Acid	70	NR	LS	NR
Nitric Acid Fumes [2]	< 60 (soln.)	80/180	80/180	80/180
Nitric Acid Fumes, no condensation [2]	> 60 (soln.)	80/180	80/180	80/180
Nitric Acid/Hexavalent Chrome (Chromic Acid)	10/5	40/100	65/150	40/100
Nitric Acid/Hydrogen Peroxide/ Hydrofluoric Acid [1,2,3]	30/5/0.5	25/80	40/100	NR
Nitric/Hydrofluoric Acid [1,2]	25/3	40/100	50/120	40/100
Nitric/Hydrofluoric Acid	30 - 35/3 - 5	NR	LS	NR
Nitric/Hydrofluoric Acid [1,2]	15/15		40/100	
Nitric/Hydrofluoric Acid [1,2]	20/6	50/120	60/140	40/100
Nitric/Hydrofluoric/ Sulfuric Acid [1,2]	20/8/2		60/140	
Nitric/Phosphoric Acid [2]	24/23	40/100	50/120	40/100
Nitric/Sulfuric Acid [2]	20/20	40/100	50/120	40/100
Nitric/Sulfuric/Phosphoric Acid	20/5/2	40/100	50/120	40/100
Nitric/Phosphoric Acid [2]	5 & 5	65/150	80/180	65/150
Nitrobenzene	100	NR	40/100	NR

Chemical Resistance Table

Maximum Service Temperatures for RESOLTECH Resins

Chemical Environment	Concentration %	RESOLTECH VINYLESTER RESINS		
		VI 5020	VI 5030, VI 5080	VI 5010
		°C/°F	°C/°F	°C/°F
Nitrophenol [11]	[11]	NR	40/100	NR
N-methyl-2-pyrrolidone	10		LS	
N-methyl-2-pyrrolidone	100	NR	LS	NR
Noncondensable Blow Down Gases (see Flue Gas or Blow Down)				
Octanoic Acid	100	80/180	100/210	
Oil, Sweet and Sour, Crude	100	100/210	120/250	65/150
Oleic Acid	100	100/210		
Oleum (Fuming Sulfuric)		NR	LS	NR
Olive Oils	100	100/210		
Ortho-Dichlorobenzene (see Dichlorobenzene)				
Oxalic Acid	Sat'd	50/120	50/120	
Ozone in solution [6]	2 mg/L	40/100	40/100	40/100
Palladium Suspensions in Ammonium Hydroxide, (see Ammonium Hydroxide)				
Palladium Suspensions in Hydrochloric Acid (see Hydrochloric Acid)				
Palmitic Acid	100	100/210		
Paper Mill Effluent (see Sulfite/ Sulfate Liquors (Pulp Mill))				
Para-Dichlorobenzene (see Dichlorobenzene)				
Peanut Oil	100	80/180		
Pentabromo Diphenyl Oxide	100	25/80	50/120	NR
Pentachlorophenol [4]	All	50/120	50/120	50/120
Pentanedioic Acid (see Glutaric Acid)				
Peracetic Acid [1,2,3,6]	20	40/100	40/100	
Peracetic Acid	35	NR	LS	NR
Perchloric Acid	10	65/150	65/150	65/150
Perchloric Acid	30	40/100	40/100	40/100
Perchloroethylene	100	25/80	50/120	NR
Phenol (Carbolic Acid) [2]	0 - 2	25/80	50/120	NR
Phenol (Carbolic Acid) [2]	5	NR	50/120	NR
Phenol (Carbolic Acid) [2]	10	NR	50/120	NR
Phenol (Carbolic Acid) [2]	15	NR	30/90	NR
Phenol (Carbolic Acid) [2]	88	NR	20/70	NR
Phenol Formaldehyde Resin	All	40/100	50/120	40/100
Phenol Sulfonic Acid [6]	All	25/80	25/80	
Phenol/Methanol/ Anionic Detergent	15/10/20	NR	LS	NR
Phenolic Resin/Phenol [2]	80/20		25/80	

Chemical Resistance Table

Maximum Service Temperatures for RESOLTECH Resins

Chemical Environment	Concentration %	RESOLTECH VINYLESTER RESINS		
		VI 5020	VI 5030, VI 5080	VI 5010
		°C/F	°C/F	°C/F
Phenolic Resin/Phenol [2]	90/10		50/120	
Phosphoric Acid	0.5 - 85	100/210	100/210	80/180
Phosphoric Acid	85 - 100	100/210	105/220	80/180
Phosphoric Acid(Polyphosphoric Acid)	115	100/210	105/220	80/180
Phosphoric Acid (Superphosphoric Acid 76% P ₂ O ₅)	105	100/210	105/220	80/180
Phosphoric Acid/Tributyl Phosphate (Vapor Phase, Condensation)	85/0.5	50/120	60/140	40/100
Phosphoric Acid with Phosphorous Pentoxide, Hydrochloric Acid and Sulfuric Dioxide	Fumes	100/210	110/230	80/180
Phosphoric Acid, Vapor [6]	All	100/210	120/250	80/180
Phosphoric Acid/Gypsum	61/39	100/210	100/210	80/180
Phosphoric Acid/Sulfuric Acid	85/15	40/100	50/120	40/100
Phosphoric Acid/Tributyl Phosphate/Hydrofluoric Acid (no condensation of TBP)	88/0.1/0.03	80/180	100/210	
Phosphoric Acid/Zinc Chloride	0 - 100/0.5 - 70	100/210	100/210	80/180
Phosphoric Acid/Hydrochloric Acid, sat'd with Cl ₂ [9,12]	15/9	100/210	100/210	
Phosphoric/Sulfuric Acid	0 - 45/0.5 - 40	100/210	100/210	80/180
Phosphoric/Sulfuric/ Hydrofluoric [1,2]	0 - 75/1/0 - 3	65/150	65/150	65/150
Phosphorous Acid 70%/ Hydrochloric Acid 37% [9,15]	0 - 100/1 - 10	100/210	100/210	80/180
Phosphorous Acid 70%/ Hydrochloric Acid 37% [8,9,15]	0 - 100/11 - 20	65/150	80/180	
Phosphorus Oxychloride	100	NR	LS	NR
Phosphorus Trichloride	100	NR	LS	NR
Phthalic Acid [4]	All	100/210	100/210	
Picric Acid (Alcoholic) [4]	10	NR	40/100	NR
Pine Oil	100	90/190	90/190	
Plating Chemicals [6]				
Polyacrylamide	All	80/180	80/180	80/180
Polyacrylic Acid	All	80/180	80/180	80/180
Polyethylene Glycol methyl ether [6]	100			
Polyethyleneimine	All	80/180	80/180	
Polyphosphoric Acid H ₃ PO ₄	115%	100/210	105/220	80/180
Polyvinyl Acetate Adhesives	All	50/120	50/120	

Chemical Resistance Table

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Chemical Environment	Concentration %	RESOLTECH VINYLESTER RESINS		
		VI 5020	VI 5030, VI 5080	VI 5010
		°C/°F	°C/°F	°C/°F
Polyvinyl Alcohol	100	80/180	80/180	
Polyvinyl Chloride Latex with 35 parts Dioctylphthalate	All	50/120	50/120	
Potassium Aluminum Sulfate	Sat'd	100/210	120/250	80/180
Potassium Bicarbonate	> 0.5	80/180	80/180	80/180
Potassium Bromide	> 0.5	100/210	100/210	80/180
Potassium Carbonate [1]	0 - 50	80/180	65/150	80/180
Potassium Carbonate/Boric Acid/ Potassium Metavanadate [1]	20/4/1	80/180	65/150	80/180
Potassium Chloride	> 0.5	100/210	100/210	80/180
Potassium Dichromate	> 0.5	100/210	100/210	80/180
Potassium Ferricyanide	> 0.5	100/210	100/210	80/180
Potassium Ferrocyanide	> 0.5	100/210	100/210	80/180
Potassium Fluoride	All	80/180	80/180	80/180
Potassium Gold Cyanide	12	100/210	100/210	80/180
Potassium Hydroxide [1,2]	0 - 45	65/150	25/80	
Potassium Hydroxide/Potassium Cyanide/Copper Cyanide [1]	2/3/8 oz/gal, 2/2.5/7%	65/150	25/80	
Potassium Hypochlorite, Potassium Hydroxide, Potassium Metasilicate [1,2,3]	50/40/10	50/120		
Potassium Iodide	All	65/150	65/150	65/150
Potassium Nitrate	> 0.5	100/210	100/210	80/180
Potassium Oxalate	All	65/150	65/150	65/150
Potassium Permanganate	> 0.5	100/210	100/210	80/180
Potassium Persulfate	All	100/210	100/210	80/180
Potassium Pyrophosphate	60	55/130	65/150	55/130
Potassium Silicofluoride [1]	All	40/100	40/100	40/100
Potassium Sulfate	> 0.5	100/210	100/210	80/180
Propane	100	60/140	60/140	60/140
Propanol (n-)	100	50/120	50/120	NR
Propanol (n-), Fumes, no condensation or coalescence	Fumes	80/180	80/180	80/180
Propionic Acid	0 - 50	80/180	80/180	80/180
Propionic Acid	100	NR	40/100	NR
Propionyl Chloride	100	NR	LS	NR
Propyl Acetate	100	NR	25/80	NR
Propyl Bromide	100	NR	25/80	NR
Propyl Chloride	100	NR	25/80	NR
Propylene Glycol	100	100/210	100/210	
Propylene Glycol Monomethyl Ether Acetate (DOWANOL PMA) [2]	20	40/100	50/120	40/100

Chemical Resistance Table

Maximum Service Temperatures for RESOLTECH Resins

Chemical Environment	Concentration %	RESOLTECH VINYLESTER RESINS		
		VI 5020 °C/F	VI 5030, VI 5080 °C/F	VI 5010 °C/F
Propylene Glycol Monomethyl Ether Acetate (DOWANOL PMA) [2] Propylene Glycol Monomethyl Ether (see DOWANOL PM)	100	NR	20/70	NR
Propylene Glycol/ Ethoxylated Fatty Alcohols/ Diethylene Glycol Monobutyl Ether (DOWANOL DB) Propylene Glycol/	60/20/20	40/100	50/120	NR
Monoethanolamine	0 - 99/1	25/80	40/100	NR
Propylene Oxide	100	NR	NR	NR
Propylene Oxide, Fumes, no condensation or coalescence	Fumes		80/180	
Pulp Paper Mill Blow Down (Noncondensable Gases, see also Blow Down)				
Pyridine	20	40/100	40/100	NR
Pyridine	100	NR	LS	NR
Quaternary Amine Salts	> 0.5	80/180	80/180	
Quinoline	20	40/100	40/100	
Quinoline	100		LS	
Radiation Resistance [6]				
Rayon Spin Bath			60/140	
Rayon Spinning	Fumes	60/140	60/140	
Recovery Boiler Gases (see Flue Gas)				
Red Liquor	All	80/180	80/180	65/150
Salicylic Acid	All	70/160		
Salt Brine	Sat'd	100/210	120/250	80/180
Scrubbing Low MW Amines with 10% Sulfuric Acid, (see Amine Salts)				
Sea Water		100/210	100/210	80/180
Selenious Acid	All	100/210	100/210	80/180
Silicon Tetrafluoride/Hydrofluoric/				
Sulfuric Acid [1,2]	< 10 Total	50/120	50/120	50/120
Silver Nitrate	> 0.5	100/210	100/210	80/180
Silver Plating Solution, 4% Silver; 7% Potassium and 5% Sodium Cyanides; 2% Potassium Carbonate [1]		80/180	65/150	
Sodium Acetate	> 0.5	100/210	100/210	
Sodium Alkyd Aryl Sulfonates	All	80/180	80/180	65/150
Sodium Aluminate [1]	All	70/160	50/120	50/120
Sodium Benzoate	All	80/180	80/180	80/180
Sodium Bicarbonate	All	80/180	80/180	80/180

Chemical Resistance Table

Maximum Service Temperatures for RESOLTECH Resins

Chemical Environment	Concentration %	RESOLTECH VINYLESTER RESINS		
		VI 5020	VI 5030, VI 5080	VI 5010
		°C/°F	°C/°F	°C/°F
Sodium Bicarbonate / Sodium Carbonate [1]	15/20	80/180	65/150	80/180
Sodium Bifluoride [1]	All	50/120	50/120	50/120
Sodium Bisulfate	> 0.5	100/210	100/210	80/180
Sodium Bisulfide (Hydrosulfide)	All	80/180	80/180	80/180
Sodium Bisulfite	> 0.5	100/210	100/210	80/180
Sodium Borate	> 0.5	100/210	100/210	80/180
Sodium Borohydride SWS (Stabilized Water Solution)	All	40/100		
Sodium Bromate	> 0.5	100/210	100/210	80/180
Sodium Bromide	> 0.5	100/210	100/210	80/180
Sodium Carbonate [1]	All	80/180	65/150	80/180
Sodium Carbonate/Sodium Bicarbonate [1]	20/15	80/180	65/150	80/180
Sodium Chlorate, Stable	> 0.5	100/210	100/210	80/180
Sodium Chlorate/Phosphoric Acid [6]	1 - 20/1 - 20			
Sodium Chlorate/Sulfuric Acid [6]	1 - 20/1 - 20			
Sodium Chlorate/Sodium Chloride	34/20	100/210	100/210	80/180
Sodium Chloride	> 0.5	100/210	100/210	80/180
Sodium Chloride (see Salt Brine)	Sat'd	100/210	120/250	80/180
Sodium Chloride with Chlorine, pH > 9 (see Chlorinated Brine)				
Sodium Chloride with Chlorine, pH 2.5 - 9 [6]		LS	LS	LS
Sodium Chloride, pH < 2.5, Cl ₂ Sat'd (see Chlorinated Brine)				
Sodium Chloride/Ethyl Vanillin	0.1 - 25/1	50/120		
Sodium Chloride/	0.5 - 26/0.1 - 20/			
Magnesium Oxide/Lime	0.1 - 10	100/210	100/210	80/180
Sodium Chloride/Sodium Hydroxide [1,2]	0.5 - 10/0.1 - 2	80/180	40/100	50/120
Sodium Chloride/Sodium Chlorate	20/34	100/210	100/210	
Sodium Chlorite, pH < 6, (see Chlorine Dioxide)				
Sodium Chlorite, pH > 6, [5]	All	80/180	80/180	80/180
Sodium Chlorite/Sodium Hypochlorite pH>11, [1,2,3]	0.1 - 25/0.1 - 15	40/100	40/100	40/100
Sodium Chromate	> 0.5	100/210	100/210	80/180
Sodium Cyanide	> 0.5	100/210	100/210	
Sodium Dichromate	> 0.5	100/210	100/210	80/180

Chemical Resistance Table

Maximum Service Temperatures for RESOLTECH Resins

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		VI 5020	VI 5030, VI 5080	VI 5010
		°C/F	°C/F	°C/F
Sodium Dimethyldithiocarbamate/ Disodium Ethylene Bisdithiocarbamate	0.1 - 15/0.1 - 15	40/100	50/120	40/100
Sodium Diphosphate	> 0.5	100/210	100/210	80/180
Sodium Dodecylbenzene Sulfonate	All	70/160	70/160	
Sodium Ferricyanide	> 0.5	100/210	100/210	
Sodium Ferrocyanide	> 0.5	100/210	100/210	80/180
Sodium Fluoride	All	80/180	80/180	80/180
Sodium Fluoroborate [1]	> 0.5	95/200	95/200	
Sodium Fluorosilicate [1]	All	50/120	50/120	50/120
Sodium Gluconate	> 0.5	80/180	100/210	65/150
Sodium Glycolate	> 0.5	80/180	100/210	65/150
Sodium Hexametaphosphate	All	80/180	80/180	80/180
Sodium Hydrosulfide (Sodium Bisulfide)	All	80/180	80/180	80/180
Sodium Hydroxide [1,2]	All	80/180	40/100	65/150
Sodium Hydroxide/ Sodium Bisulfite [1,2]	All	80/180	40/100	65/150
Sodium Hydroxide/Sodium Chloride/Sodium Sulfate/ Sodium Hypochlorite	1 - 20/1 - 15/			
(active Chlorine) [1,2,3,5]	1 - 8/0 - 15	80/180	40/100	
Sodium Hydroxide/Organics (within solubility limits, i.e., no phase separation or coalescence)	8/trace	80/180		
Sodium Hydroxide/Sodium Hypochlorite [1,2]	0 - 20/0 - 0.1	80/180		
Sodium Hypochlorite, pH>11 (active Chlorine) [1,2,3,5]	0 - 18	80/180	50/120	65/150
Sodium Hypochlorite, pH>11 (active Chlorine) [1,2,3,5]	21			
Sodium Hypochlorite, pH>11 (active Chlorine) [1,2,3,5]	24	LS	LS	NR
Sodium Lauryl Sulfate	All	70/160	70/160	
Sodium Metabisulfite	> 0.5	100/210	100/210	80/180
Sodium Methylthiocarbamate	All	80/180	80/180	
Sodium Monophosphate	> 0.5	100/210	100/210	80/180
Sodium Myristyl Sulfate	All	70/160	70/160	
Sodium Nitrate	> 0.5	100/210	100/210	80/180
Sodium Nitrite	> 0.5	100/210	100/210	80/180
Sodium Oxalate	> 0.5	100/210	100/210	80/180
Sodium Perchlorate	60	40/100	40/100	40/100
Sodium Persulfate	All	100/210	100/210	80/180

Chemical Resistance Table

Maximum Service Temperatures for RESOLTECH Resins

Chemical Environment	Concentration %	RESOLTECH VINYLESTER RESINS		
		VI 5020 °C/°F	VI 5030, VI 5080 °C/°F	VI 5010 °C/°F
Sodium Phosphate, mono-,di-, tribasic	> 0.5	100/210	100/210	80/180
Sodium Polyacrylate, pH 9 - 10.5	All	80/180	80/180	
Sodium Sarcosinate	40	50/120	50/120	
Sodium Silicate	> 0.5	100/210	100/210	80/180
Sodium Sulfate	> 0.5	100/210	100/210	80/180
Sodium Sulfate/Sodium Sulfite	> 0.5	100/210	100/210	80/180
Sodium Sulphhydrate (see Sodium Hydrosulfide)				
Sodium Sulfide	> 0.5	100/210	100/210	80/180
Sodium Sulfite	> 0.5	100/210	100/210	80/180
Sodium Sulphite/Sodium Hydroxide/Toluene	22/10/5	25/80	40/100	NR
Sodium Tartrate	> 0.5	100/210	100/210	80/180
Sodium Tetraborate	All	80/180	80/180	80/180
Sodium Thiocyanate	All	80/180	80/180	80/180
Sodium Thiosulfate	All	80/180	80/180	80/180
Sodium Tripolyphosphate	> 0.5	100/210	100/210	80/180
Sodium Xylene Sulfonate All	70/160	70/160	70/160	
Solder Plate (see Plating Chemicals)				
Solvent Extraction Solutions: 3% Isodecanol, 6% Alamine™ 336, 91% Kerosene		80/180	80/180	65/150
Solvent Extraction Solutions: 4% Trioctylphosphine Oxide (TOPO), 4% Di 2-Ethylhexyl Phosphoric Acid (DEHPA), 92% Kerosene		80/180	80/180	
Sorbitol Solutions	All	70/160	80/180	
Sour Crude Oil (see Crude Oil)				
Soy (Soya) Sauce		70/160		
Soya Oil	100	100/210	100/210	65/150
Spearmint Oil	100	40/100		
Stannic Chloride	> 0.5	100/210	100/210	80/180
Stannous Chloride	> 0.5	100/210	100/210	80/180
Steam, Dry, No Condensation		100/210	105/220	80/180
Steam, Wet, Condensation		80/180	80/180	80/180
Stearic Acid	All	100/210	100/210	65/150
Styrene	100	NR	50/120	NR
Styrene Acrylic Emulsion	All	50/120	50/120	
Styrene-Butadiene Latex	All	60/140	60/140	60/140
Succinonitrile, Aqueous	All	25/80	40/100	NR
Sugar/Sucrose	All	100/210		
Sugar Beet, Liquor	All	80/180		

Chemical Resistance Table

Maximum Service Temperatures for RESOLTECH Resins

Chemical Environment	Concentration %	RESOLTECH VINYLESTER RESINS		
		VI 5020	VI 5030, VI 5080	VI 5010
		°C/F	°C/F	°C/F
Sugar Cane, Liquor & Sweetwater	All	80/180		
Sulfamic Acid	0.5 - 10	100/210	100/210	80/180
Sulfamic Acid	11 - 15	80/180	80/180	65/150
Sulfamic Acid	16 - 25	65/150	65/150	65/150
Sulfamic/Boric/ Glycolic Acid	0.5 - 25/0.5 - 30/ 0.5 - 10		65/150	
Sulfanilic Acid (meta)	> 0.5	100/210	100/210	80/180
Sulfanilic Acid (para) [4]	All	100/210	100/210	80/180
Sulfate Process Noncondensable Gases (see Flue Gas)				
Sulfated Detergents (see Sulfonated Detergents)				
Sulfated Tall Oil Fatty Acid (see Tall Oil)	1 - 70			
Sulfides Scrubbing with Caustic (see Sodium Hydroxide)				
Sulfite/Sulfate Liquors (Pulp Mill)		95/200	95/200	80/180
Sulfonated Detergents	100	70/160	80/180	70/160
Sulfur Chloride	Fumes	95/200	95/200	80/180
Sulfur Chloride	100	NR	LS	NR
Sulfur Dioxide (see Flue Gas)				
Sulfur Trioxide, Dry [16]	Fumes	100/210	150/300	80/180
Sulfur Trioxide, Wet (see Sulfuric Acid)				
Sulfur, Molten (Dry) [16]	100		150/300	
Sulfur, Wettable, Fungicide [4]	All	80/180	80/180	80/180
Sulfuric/Nitric/ Phosphoric Acids	0 - 13/ 0 - 11/0 - 30	65/150	65/150	
Sulfuric Acid	0.5 - 25	100/210	105/220	80/180
Sulfuric Acid	26 - 50	100/210	100/210	80/180
Sulfuric Acid	51 - 70	80/180	80/180	80/180
Sulfuric Acid [15]	71 - 75	40/100	80/180	40/100
Sulfuric Acid [2,15]	76 - 80	40/100	50/120	
Sulfuric Acid [15]	> 80	NR	LS	NR
Sulfuric Acid/ Ammonium Bifluoride [1]	0 - 75/0.1 - 3	40/100	65/150	
Sulfuric Acid/Copper Sulfate	0 - 25/1 - 35	100/210	100/210	
Sulfuric Acid/Copper Sulfate/ Sodium Persulfate/EDTA	13/12/1/1	55/130	55/130	55/130

Chemical Resistance Table

Maximum Service Temperatures for RESOLTECH Resins

Chemical Environment	Concentration %	RESOLTECH VINYLESTER RESINS		
		VI 5020 °C/F	VI 5030, VI 5080 °C/F	VI 5010 °C/F
Sulfuric Acid/ Hydrofluoric Acid [1,2]	25/10	40/100	50/120	
Sulfuric Acid/ Hydrofluoric Acid [1,2]	10/10	40/100	65/150	
Sulfuric Acid/ Hydrogen Peroxide [3]	1 - 20/1 - 10	65/150	65/150	
Sulfuric Acid/Hydrogen Peroxide/ Ammonium Sulfate/ Copper Sulfate [3]	10/5/5/5	40/100	40/100	
Sulfuric Acid/Hydrogen Sulfide	1 - 50/0 - 10	100/210	100/210	80/180
Sulfuric Acid/Methanol	30/5		50/120	
Sulfuric Acid/Nitric Acid	20/5	65/150	80/180	65/150
Sulfuric Acid/Phosphoric Acid	0 - 25/0 - 25	80/180	80/180	80/180
Sulfuric Acid/Sodium Chromate [6]				
Sulfuric Acid/Sodium Dichromate, (see Sulfuric Acid/ Chromic Acid Mixture)				
Sulfuric Acid/ Hydrochloric Acid [8,9,13]	50/15	40/100	50/125	
Sulfuric Acid/ Hydrochloric Acid [9,12]	1 - 25/1 - 10	80/180	100/210	80/180
Sulfuric Acid/ Hydrofluoric Acid [1,2]	1 - 20/3 - 6	55/130	60/140	40/100
Sulfuric Acid/Hydrofluoric Acid	30 - 35/3 - 5	LS	LS	LS
Sulfuric Acid/Inorganic Salts	0.5 - 20/0.5 - 50	100/210	100/210	80/180
Sulfuric Acid/Inorganic Salts	21 - 50/0.5 - 20	80/180	80/180	80/180
Sulfuric Acid/Sulfate Salts, Max. Total Concentration 80%, (see Sulfuric Acid)				
Sulfuric Acid/Chromic Acid Mixture (Maximum Total Concentration 10%)		50/120	65/150	50/120
Sulfuric/Hydrochloric/ Hydrofluoric/Phosphoric Acids/ Chlorinated Solvents	40/20/5/35/1	NR	LS	NR
Sulfuric/Hydrofluosilicic Acids/MIBK [1,2]	25/10/2	LS	50/120	
Sulfuric/Lactic Acids/ Sodium Sulfate	50/20/0 - 10	40/100	65/150	40/100
Sulfurous Acid	10	50/120	50/120	50/120
Superphosphoric Acid (76% P2O5)	105% H3PO4	100/210	100/210	80/180
Surfactant, Anionic	All	40/100	50/120	

Chemical Resistance Table

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		VI 5020 °C/°F	VI 5030, VI 5080 °C/°F	VI 5010 °C/°F
Surfactant (see underchemical name)				
Tall Oil (Storage)	100	95/200	105/220	
Tall Oil Reactor [6]		100/210	105/220	
Tallow/Sulfuric Acid	99/1	80/180		
Tannic Acid	> 0.5	100/210	100/210	65/150
Tap Water, Hard [2]	All	100/210	100/210	80/180
Tap Water, Soft [2]	All	80/180	80/180	80/180
Tartaric Acid	> 0.5	100/210	100/210	65/150
t-Butyl Methyl Ether (MTBE)	20	40/100	50/120	30/80
t-Butyl Methyl Ether (MTBE)	100	NR	25/80	NR
Tetrabutyltin	100	50/120	50/120	
Tetrachloroethane	100	40/100	55/130	NR
Tetrachloroethylene (Perchloroethylene)	100	25/80	50/120	NR
Tetrachloropyridine	100	25/80	50/120	NR
Tetrahydrofuran	0-5	40/100	50/120	
Tetrahydrofuran	10-100	NR	LS	NR
Tetrahydrofuran, Fumes, no condensation or coalescence	Fumes		80/180	
Tetramethyl Ammonium Hydroxide [1]	0 - 10	50/120		
Tetra-n-Butylammonium Hydroxide [1,2]	40	40/100		
Tetra-n-Butylphosphonium Hydroxide [1,2]	40	40/100		
Tetrapotassium Pyrophosphate	0 - 60	55/130	65/150	55/130
Tetrasodium Ethylenediaminetetraacetic Acid (Tetrasodium Salt of EDTA)	All	80/180	65/150	80/180
Textone™ Liquid Product (50% Aqueous Solution of Sodium Chlorite, see there)				
Thermal Oxidizer (HCl Absorption) (see Flue Gas, Wet)				
Thioglycolic Acid (see Mercaptoacetic Acid)				
Thionyl Chloride	100	NR	LS	NR
Thiourea	0 - 50	65/150	65/150	65/150
Tin Fluoborate Plating Bath: 18% Stannous Fluoborate, 7% Tin, 9% Fluoboric Acid, 2% Boric Acid [1]		100/210	100/210	80/180
Titanium Dioxide	All	80/180	80/180	80/180

Chemical Resistance Table

Maximum Service Temperatures for RESOLTECH Resins

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		VI 5020	VI 5030, VI 5080	VI 5010
		°C/F	°C/F	°C/F
Titanium Dioxide/Sulfuric Acid	0 - 30/30	100/210	100/210	80/180
Titanium Tetrachloride	All	65/150	80/180	
Tobias Acid (2-Naphthylamine- 1-Sulfonic) [6]	100	100/210	100/210	
Toluene	100	25/80	50/120	NR
Toluene Sulfonic Acid [6]	> 0.5	80/180	100/210	
Toluene, Fumes, no condensation or coalescence	Fumes		80/180	
Toluidine (o-, p-, m-)	100	NR	20/70	NR
Tomato Sauce	All	90/190		
Transformer Oils (Ester types)	100	50/120	65/150	
Transformer Oils (Silicone and Mineral Oils) [16]	100	100/210	150/300	
Tributyl Phosphate	100	50/120	60/140	40/100
Trichloroacetic Acid (see Chloroacetic Acid)				
Trichloroethane	100	40/100	50/120	NR
Trichloroethylene	100	NR	LS	NR
Trichloromonofluoromethane (see Freon 11)				
Tricresyl Phosphate	100	70/160	70/160	
Triethanolamine	100	50/120	65/150	NR
Triethylamine	All	50/120	50/120	NR
Triethylamine/Triethylamine Hydrochloride/Hydrochloric Acid [9]	50/20/5	50/120	50/120	NR
Triethylene Glycol (see Ethylene Glycol)				
Trifluoroacetic Acid (see Chloroacetic Acid)				
Trimethyl Ammonium Chloride (Trimethylamine HCl, TMA-HCl)	70	40/100	50/120 [7]	40/100
Trimethyl Benzene	100	25/80	50/120	NR
Trimethylamine	20	40/100	50/120	NR
Trimethylamine	100	25/80	40/100	
Trimethylamine, Fumes, no condensation or coalescence	Fumes		80/180	
Trimethylene Chlorobromide		NR	40/100	NR
Trioctyl Phosphine Oxide/ Di 2-Ethylhexyl Phosphoric Acid (DEHPA)/Kerosene	4/4/92	80/180	80/180	
Trioctylphosphate	100	70/160	80/180	40/100
Tripropylene Glycol (see Ethylene Glycol)				

Chemical Resistance Table

Maximum Service Temperatures for RESOLTECH Resins

Chemical Environment	Concentration %	RESOLTECH VINYLESTER RESINS		
		VI 5020	VI 5030, VI 5080	VI 5010
		°C/F	°C/F	°C/F
Trisodium Phosphate	Sat'd	100/210	120/250	80/180
TRITON™ X-100 Wetting Agent (see Ethylene Glycol)				
Turpentine	100	65/150	100/210	40/100
Tween™ Surfactant (see Ethylene Glycol)				
Ultrawet™ Surfactant (see Sodium Dodecylbenzenesulfonate)				
Uran Fertilizer Urea – Ammonium Nitrate Composition: 44.3% Ammonium Nitrate, 35.4% Urea, 20.3% Water		65/150	65/150	65/150
Uranium Extraction (see Kerosene)				
Urea	0 - 50	70/160	70/160	65/150
Urea Formaldehyde Resin	All	40/100	50/120	40/100
Urea/Ammonium Nitrate/Water	35/44/20	65/150	65/150	65/150
Urine (see Urea)	All			
Vanillin Black Liquor		50/120		
VERSENE 100 Chelating Agent (see also Tetrasodium Ethylenediaminetetraacetic Acid)	All	80/180	65/150	80/180
VERSENE Chelating Agents (others)	All	50/120	50/120	
Vetran™ 650 [1] (16.7 Vol. % VERSENE 100 Aqueous Solution, pH 9.5 - 10)		80/180	65/150	80/180
Vidden™ D Fumigant (see Dichloropropane)				
Vinegar	100	100/210	100/210	65/150
Vinyl Acetate	20	40/100	40/100	NR
Vinyl Acetate	100	NR	LS	NR
Vinyl Chloride	100	NR	LS	NR
Vinyl Chloride Fumes, no condensation	All		80/180	
Vinyltoluene	100	25/80	50/120	NR
VORANOL* P-400 Polyol (see Ethylene Glycol)				
Water Deionized [2]	100	80/180	80/180	80/180
Water Vapor, no condensation (see Flue Gas, Dry)				

Chemical Resistance Table

Maximum Service Temperatures for RESOLTECH Resins

Chemical Environment	Concentration %	RESOLTECH VINYLESTER RESINS		
		VI 5020	VI 5030, VI 5080	VI 5010
		°C/°F	°C/°F	°C/°F
Water Vapor, Wet [2]	Sat'd	80/180	80/180	80/180
Water, Distilled [2]	100	80/180	80/180	80/180
Water, Phenol (see Phenol)				
Water, Sea, Desalination	All	80/180	80/180	80/180
Water, Steam Condensate [2]	100	80/180	80/180	80/180
Water, Tap, Hard [2]	100	100/210	100/210	80/180
Water, Tap, Soft [2]	100	80/180	80/180	80/180
Whey	All	65/150		
White Liquor (Pulp Mill) [1,2]	All	80/180	40/100	80/180
Xylene	100	25/80	50/120	NR
Xylene, Fumes, No Condensation or Coalescence	Fumes		80/180	
Xylene/Methyl Ethyl Ketone/ Butyl Acetate/Methyl Acetate	50/20/20/10	NR	LS	NR
Zinc Chloride	Sat'd	100/210	120/250	80/180
Zinc Cyanide Plating Bath, 9% Zinc and 4% Sodium Cyanides, 9% Sodium Hydroxide [1,2]		80/180	40/100	80/180
Zinc Electrolyte (Zinc Sulfate, 35 g/L Sulfuric Acid), see Sulfuric Acid				
Zinc Fluoborate Plating Bath, 49% Zinc Fluoborate; 5% Ammonium Chloride, 6% Ammonium Fluoborate [1]		95/200	95/200	80/180
Zinc Nitrate	Sat'd	100/210	120/250	80/180
Zinc Phosphate (slurry)	> 0.5	80/180	80/180	80/180
Zinc Sulfate	Sat'd	100/210	120/250	80/180