



RPS Chemical Resistance Guide

HPPE Dual Laminate and FRP Piping Systems



RPS Chemical Resistance Guide



FRP and Dual Laminate piping systems are inherently resistant to chemical attack, and are often the material of choice for aggressive chemical services. RPS has developed a number of piping systems, which have been designed to provide outstanding resistance to a wide range of chemical environments. The RPS family of HPPE (High Performance Pre-Engineered) piping systems is composed of:

HPPE MAXAR™ Blue – Our standard corrosion-resistant fluoropolymer dual laminate (FEP/FRP) piping system; liner resists aggressive services up to 150°C/300°F.

HPPE MAXAR™ White – Our corrosion-resistant fluoropolymer dual laminate (PFA/FRP) piping system; liner resists aggressive services up to 230°C/450°F.

HPPE MAXAR™ Red – Our corrosion-resistant fluoropolymer dual laminate (PVDF/FRP) piping system; liner resists aggressive services up to 110°C/230°F and also provides excellent abrasion resistance.

HPPE P-150 – Our standard corrosion-resistant vinylester FRP piping system for a wide range of corrosive applications up to 82°C/180°F.

HPPE H-150 – Our high temperature corrosion-resistant vinylester FRP piping system, appropriate for corrosive applications up to 93°C/200°F.

HPPE H-150-200 – Our high temperature corrosion-resistant vinylester FRP piping system with a fortified corrosion barrier for more aggressive services with temperatures up to 104°C/220°F.

HPPE A-150 – Our corrosion and abrasion-resistant vinylester FRP piping system preferred for slurry services with > 5% solids and temperatures up to 82°C/180°F.

This Guide is intended as a reference to assist engineers in selecting and specifying FRP and Dual Laminate piping systems. The recommendations in this guide are based on corrosion testing, published information, case histories, and RPS judgement. It is RPS' belief that adherence to these recommendations, along with proper system design, installation, operation and maintenance, will result in excellent service life. However, the determination of the suitability of any piping products described in this Guide is the sole responsibility of the user. *RPS makes no warranties, expressed or implied, for the use of this information.*

How to Use this Guide:

The Guide contains hundreds of chemical environments with a rating and maximum temperature for which the rating applies. The ratings are:

- A – Long term chemical resistance can be expected up to the listed temperature. Note: For MAXAR™ piping, the temperatures represent the capability of the lining material. For services with temperatures above 82°C (180°F), RPS should be contacted for recommendations.
- B – Moderate service can be expected, but RPS should be contacted for recommendations to improve performance.
- C – Only limited service life can be expected (likely not more than 1 year). RPS should be contacted for recommendations to improve performance.
- NR – The product is not recommended for the service.

RPS HPPE FRP piping systems should be selected in preference to RPS HPPE MAXAR™ piping systems if they are suitable for the service as they will generally provide a more cost-effective solution.

Whatever your service requirements are, we encourage you to contact our technical staff to find the best solution for your chemical-resistant piping needs.

RPS Chemical Resistance Guide

Chemical Environment	Concentration (wt % UNO)	HPPE Product						
		MAXAR™ Piping <1>			FRP Piping			
		Blue (FEP)	White (PFA)	Red (Kynar Flex®)	P-150	H-150	H-150-200	A-150
Acetic Acid	0.5 - 10	A to 150°C/300°F	A to 230°C/450°F	A to 93°C/200°F	A to 82°C/180°F	A to 82°C/180°F	A to 82°C/180°F	
Acetic Acid	11-25	A to 150°C/300°F	A to 230°C/450°F	A to 93°C/200°F	A to 82°C/180°F	A to 82°C/180°F	A to 82°C/180°F	
Acetic Acid	26 - 50	A to 150°C/300°F	A to 230°C/450°F	A to 93°C/200°F	A to 82°C/180°F	A to 82°C/180°F	A to 82°C/180°F	
Acetic Acid	51 - 75	A to 150°C/300°F	A to 230°C/450°F	A to 52°C/125°F	A to 65°C/150°F	A to 65°C/150°F	A to 65°C/150°F	
Acetic Acid	76 - 85	A to 150°C/300°F	A to 230°C/450°F	A to 40°C/100°F	A to 40°C/110°F	A to 40°C/110°F	A to 40°C/110°F	
Acetic Acid	86 - 98	A to 150°C/300°F	A to 230°C/450°F	B to 23°C/75°F	NR	NR	NR	NR
Acetic Acid	99 - 100	A to 150°C/300°F	A to 230°C/450°F	C to 23°C/75°F	NR	NR	NR	NR
Alcoholic Spirits	All	A to 150°C/300°F	A to 93°C/200°F	A to 93°C/200°F	A to 40°C/100°F	A to 60°C/140°F	A to 60°C/140°F	
Alumina Hydrate	All			A to 110°C/230°F	A to 82°C/180°F	A to 82°C/180°F	A to 82°C/180°F	
Aluminum Chloride	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Aluminum Chlorohydrate	All			A to 77°C/170°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Aluminum Chlorohydroxide	50			A to 60°C/140°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Aluminum Hydroxide	100	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 82°C/180°F	A to 82°C/180°F	
Aluminum Nitrate	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Aluminum Sulfate	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Ammonia gas (dry)	100	A to 150°C/300°F	A to 230°C/450°F	NR	A to 40°C/100°F	A to 40°C/100°F	A to 40°C/100°F	
Ammonia gas (wet)	100	A to 93°C/200°F		NR	A to 40°C/100°F	A to 40°C/100°F	A to 40°C/100°F	
Ammonia, fumes, wet	40 vol %	A to 93°C/200°F		B to 40°C/100°F	A to 82°C/180°F	A to 82°C/180°F	A to 82°C/180°F	
Ammonium Bicarbonate	All	A to 93°C/200°F		A to 100°C/212°F	A to 70°C/160°F	A to 70°C/160°F	A to 70°C/160°F	
Ammonium Bisulfite black liquor				A to 80°C/175°F	A to 82°C/180°F	A to 82°C/180°F	A to 82°C/180°F	
Ammonium Bisulfite cooking liquor				A to 80°C/175°F	A to 65°C/150°F	A to 65°C/150°F	A to 65°C/150°F	

A = Long term chemical resistance can be expected (See Note 1).

B = Moderate service can be expected. Contact RPS for recommendations to improve performance.

C = Only limited service can be expected. Contact RPS for recommendations to improve performance.

NR = Not recommended

Blank = Data not available

Notes:

1. Temperatures listed for MAXAR™ represent capability of lining material. For service temperatures above 82°C/180°F, contact RPS for recommendations.
2. Service may cause blisters to form in corrosion barrier.
3. Service may discolor corrosion barrier.
4. A-150 is preferred for slurry services.
5. Customized P-150 or H-150 available with A rating at listed temperature. Contact RPS for more information.

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Chemical Environment	Concentration (wt % UNO)	HPPE Product						
		MAXAR™ Piping <1>			FRP Piping			
		Blue (FEP)	White (PFA)	Red (Kynar Flex®)	P-150	H-150	H-150-200	A-150
Ammonium Bromide	All			A to 110°C/230°F	A to 70°C/160°F	A to 70°C/160°F	A to 70°C/160°F	
Ammonium Carbonate	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 65°C/150°F	A to 65°C/150°F	A to 65°C/150°F	
Ammonium Chloride	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Ammonium Fluoride	Sat'd	A to 150°C/300°F	A to 230°C/450°F	A to 65°C/150°F	B to 65°C/150°F <5>	B to 65°C/150°F <5>	C to 65°C/150°F	NR
Ammonium Hydroxide	0.5 - 5 (as NH ₃)	A to 150°C/300°F	A to 230°C/450°F	A to 93°C/200°F	A to 82°C/180°F	A to 65°C/150°F	A to 65°C/150°F	
Ammonium Hydroxide	6 - 20 (as NH ₃)	A to 150°C/300°F	A to 230°C/450°F	A to 93°C/200°F	A to 65°C/150°F	A to 40°C/100°F	A to 40°C/100°F	
Ammonium Nitrate	All	A to 140°C/280°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Ammonium Phosphate, dibasic	All	A to 140°C/280°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Ammonium Phosphate, monobasic	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Ammonium Sulfate	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Arsenic Acid	> 0.5	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 82°C/180°F	A to 82°C/180°F	
Barium Bromide	All			A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Barium Carbonate (slurry)	All	A to 93°C/200°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 82°C/180°F	A to 82°C/180°F	
Barium Chloride	All	A to 93°C/200°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Barium Hydroxide	> 0.5	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 65°C/150°F	A to 65°C/150°F	A to 65°C/150°F	
Barium Sulfate	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 82°C/180°F	A to 80°C/176°F	
Black Liquor (pulp & kraft mill)	Thin	A to 150°C/300°F	A to 230°C/450°F	A to 80°C/175°F	B to 82°C/180°F <5>	B to 82°C/180°F <5>	C to 82°C/180°F	NR
Black Liquor, thick, heavy (pulp & kraft mill)	Thick	A to 150°C/300°F	A to 230°C/450°F	A to 80°C/175°F	B to 82°C/180°F <5>	B to 82°C/180°F <5>	C to 82°C/180°F	NR
Boric Acid	> 0.5	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Brine, chlorinated, pH < 2.5	All	A to 150°C/300°F <2>	A to 230°C/450°F	A to 93°C/200°F	B to 82°C/180°F	B to 82°C/180°F	A to 95°C/200°F	NR

A = Long term chemical resistance can be expected (See Note 1).

B = Moderate service can be expected. Contact RPS for recommendations to improve performance.

C = Only limited service can be expected. Contact RPS for recommendations to improve performance.

NR = Not recommended

Blank = Data not available

Notes:

1. Temperatures listed for MAXAR™ represent capability of lining material. For service temperatures above 82°C/180°F, contact RPS for recommendations.
2. Service may cause blisters to form in corrosion barrier.
3. Service may discolor corrosion barrier.
4. A-150 is preferred for slurry services.
5. Customized P-150 or H-150 available with A rating at listed temperature. Contact RPS for more information.

Continued...

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Chemical Environment	Concentration (wt % UNO)	HPPE Product						
		MAXAR™ Piping <1>			FRP Piping			
		Blue (FEP)	White (PFA)	Red (Kynar Flex®)	P-150	H-150	H-150-200	A-150
Brine, chlorinated, pH 2.5 - 9	All	A to 150°C/300°F <2>	A to 230°C/450°F	A to 93°C/200°F	A to 40°C/100°F	A to 40°C/100°F	A to 40°C/100°F	
Brine, chlorinated, pH > 9	All	A to 150°C/300°F <2>	A to 230°C/450°F	A to 93°C/200°F	C to 82°C/180°F	C to 65°C/150°F	B to 65°C/150°F	NR
Brine, salt	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Bromine liquid	All	A to 93°C/200°F	A to 230°C/450°F	A to 52°C/125°F	NR	NR	NR	NR
Bromine water	Sat'd	A to 150°C/300°F	A to 230°C/450°F	A to 93°C/200°F	A to 75°C/165°F			
Brown stock				A to 80°C/175°F	A to 82°C/180°F	A to 82°C/180°F	A to 82°C/180°F	
Butadiene	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 40°C/100°F	A to 40°C/100°F	A to 40°C/100°F	
Calcium Bisulfite	All	A to 150°C/300°F	A to 230°C/450°F	A to 93°C/200°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Calcium Bromide	All			A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Calcium Carbonate (slurry)	All	A to 150°C/300°F <4>	A to 230°C/450°F <4>	A to 110°C/230°F	A to 82°C/180°F <4>	A to 82°C/180°F <4>	A to 82°C/180°F <4>	A to 82°C/180°F
Calcium Chlorate	All			A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Calcium Chloride	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Calcium Hydroxide	100	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	B to 82°C/180°F <5>	B to 65°C/150°F <5>	C to 65°C/150°F	NR
Calcium Hypochlorite	All	A to 150°C/300°F	A to 230°C/450°F	A to 93°C/200°F	C to 82°C/180°F	C to 82°C/180°F	B to 82°C/180°F	NR
Calcium Nitrate	> 0.5	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Calcium Sulfate	All	A to 150°C/300°F <4>	A to 230°C/450°F <4>	A to 110°C/230°F	A to 82°C/180°F <4>	A to 93°C/200°F <4>	A to 100°C/212°F <4>	A to 82°C/180°F
Calcium Sulfite	All	A to 21°C/70°F		A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Carbon Dioxide	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	A to 82°C/180°F
Chlorinated Brine; see Brine, chlorinated								
Chlorinated Pulp	All			A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 93°C/200°F	
Chlorine Dioxide, Chlorine (bleaching solution, with or without pulp)	All			A to 65°C/150°F	A to 82°C/180°F	A to 93°C/200°F	A to 93°C/200°F	

A = Long term chemical resistance can be expected (See Note 1).

B = Moderate service can be expected. Contact RPS for recommendations to improve performance.

C = Only limited service can be expected. Contact RPS for recommendations to improve performance.

NR = Not recommended

Blank = Data not available

Notes:

1. Temperatures listed for MAXAR™ represent capability of lining material. For service temperatures above 82°C/180°F, contact RPS for recommendations.
2. Service may cause blisters to form in corrosion barrier.
3. Service may discolor corrosion barrier.
4. A-150 is preferred for slurry services.
5. Customized P-150 or H-150 available with A rating at listed temperature. Contact RPS for more information.

Continued...

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Chemical Environment	Concentration (wt % UNO)	HPPE Product						
		MAXAR™ Piping <1>			FRP Piping			
		Blue (FEP)	White (PFA)	Red (Kynar Flex®)	P-150	H-150	H-150-200	A-150
Chlorine Dioxide, no Chlorine (bleaching solution, with or without pulp)	All			A to 65°C/150°F	A to 82°C/180°F	A to 93°C/200°F	A to 93°C/200°F	
Chlorine, dry gas, acidic pH	100	A to 150°C/300°F	A to 150°C/300°F	A to 77°C/170°F	B to 82°C/180°F	B to 93°C/200°F	A to 100°C/212°F	NR
Chlorine, wet gas, acidic pH	100	A to 150°C/300°F <2>	A to 150°C/300°F <2>	A to 77°C/170°F	B to 82°C/180°F	B to 93°C/200°F	A to 100°C/212°F	NR
Chlorine liquid	100	A to 150°C/300°F <2>	A to 150°C/300°F <2>	A to 80°C/175°F				
Chloroacetic Acid (Monochloroacetic Acid)	1	A to 150°C/300°F	A to 230°C/450°F	A to 93°C/200°F	A to 50°C/120°F	A to 50°C/120°F	A to 50°C/120°F	
Chloroacetic Acid	2 - 25	A to 150°C/300°F	A to 230°C/450°F	B to 40°C/100°F	A to 50°C/120°F	A to 50°C/120°F	A to 50°C/120°F	
Chloroacetic Acid	26 - 50	A to 150°C/300°F	A to 230°C/450°F	C to 40°C/100°F	A to 40°C/100°F	A to 40°C/100°F	A to 40°C/100°F	
Chloroacetic Acid	51 - 85	A to 150°C/300°F	A to 230°C/450°F	C to 23°C/75°F	A to 25°C/80°F	A to 25°C/80°F	A to 25°C/80°F	
Chloroacetic Acid	86 - 100	A to 150°C/300°F	A to 230°C/450°F	NR	NR	NR	NR	NR
Chromic Acid	0.5 - 10	A to 150°C/300°F	A to 230°C/450°F	A to 93°C/200°F	A to 65°C/150°F	A to 65°C/150°F	A to 65°C/150°F	
Chromic Acid	11-20	A to 150°C/300°F	A to 230°C/450°F	A to 82°C/180°F	A to 50°C/120°F	A to 65°C/150°F	A to 65°C/150°F	
Chromic Acid	30			A to 80°C/175°F	NR	NR	NR	NR
Chromic Acid	40	A to 150°C/300°F	A to 230°C/450°F	A to 80°C/175°F	NR	NR	NR	NR
Citric Acid	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 100°C/212°F	A to 100°C/212°F	
Copper Chloride	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Copper Nitrate	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Copper Sulfate	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Corn Syrup	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 100°C/212°F	A to 100°C/212°F	
Crude Oil	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 100°C/212°F	A to 100°C/212°F	
Diesel Fuel	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 100°C/212°F	A to 100°C/212°F	
Ethanol	All	A to 150°C/300°F	A to 230°C/450°F		NR	NR	NR	NR

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C = Only limited service can be expected. Contact RPS for recommendations to improve performance.

NR = Not recommended

Blank = Data not available

Notes:

1. Temperatures listed for MAXAR™ represent capability of lining material. For service temperatures above 82°C/180°F, contact RPS for recommendations.
2. Service may cause blisters to form in corrosion barrier.
3. Service may discolor corrosion barrier.
4. A-150 is preferred for slurry services.
5. Customized P-150 or H-150 available with A rating at listed temperature. Contact RPS for more information.

Continued...

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Chemical Environment	Concentration (wt % UNO)	HPPE Product						
		MAXAR™ Piping <1>			FRP Piping			
		Blue (FEP)	White (PFA)	Red (Kynar Flex®)	P-150	H-150	H-150-200	A-150
Ethyl Acetate	All	A to 150°C/300°F	A to 230°C/450°F	NR	NR	NR	NR	NR
Ethylene Dichloride	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	NR	NR	NR	NR
Ferric Chloride	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Ferric Sulfate	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Ferrous Chloride	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Ferrous Sulfate	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Formaldehyde	37	A to 150°C/300°F	A to 230°C/450°F	A to 52°C/125°F	A to 65°C/150°F	A to 65°C/150°F	A to 65°C/150°F	
Formaldehyde	50	A to 150°C/300°F	A to 230°C/450°F					
Formaldehyde	100	A to 150°C/300°F	A to 150°C/300°F					
Formic Acid	10	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 82°C/180°F	A to 82°C/180°F	
Formic Acid	25	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 50°C/120°F	A to 65°C/150°F	A to 65°C/150°F	
Formic Acid	50	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 50°C/120°F	A to 50°C/120°F	A to 50°C/120°F	
Formic Acid	85	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 25°C/80°F	A to 25°C/80°F	A to 25°C/80°F	
Formic Acid	100	A to 150°C/300°F	A to 230°C/450°F	A to 65°C/150°F	NR	A to 40°C/100°F	A to 40°C/100°F	NR
Fructose	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 100°C/212°F	A to 100°C/212°F	
Gasoline		A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	NR	A to 60°C/140°F	A to 60°C/140°F	NR
Glucose		A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 100°C/212°F	A to 100°C/212°F	
Green Liquor	All	A to 93°C/200°F		A to 110°C/230°F	B to 82°C/180°F <5>	B to 82°C/180°F <5>	B to 82°C/180°F	NR
Gypsum Slurry, see also Calcium Sulfate	All	A to 150°C/300°F <4>	A to 230°C/450°F <4>	A to 110°C/230°F	A to 82°C/180°F <4>	A to 93°C/200°F <4>	A to 100°C/212°F <4>	A to 82°C/180°F
Hydrobromic Acid	1 - 25	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 82°C/180°F	A to 82°C/180°F	
Hydrobromic Acid	48	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 65°C/150°F	A to 65°C/150°F	A to 65°C/150°F	
Hydrobromic Acid	62	A to 150°C/300°F	A to 230°C/450°F	A to 65°C/150°F	A to 40°C/100°F	A to 40°C/100°F	A to 40°C/100°F	

A = Long term chemical resistance can be expected (See Note 1).

B = Moderate service can be expected. Contact RPS for recommendations to improve performance.

C = Only limited service can be expected. Contact RPS for recommendations to improve performance.

NR = Not recommended

Blank = Data not available

Notes:

1. Temperatures listed for MAXAR™ represent capability of lining material. For service temperatures above 82°C/180°F, contact RPS for recommendations.
2. Service may cause blisters to form in corrosion barrier.
3. Service may discolor corrosion barrier.
4. A-150 is preferred for slurry services.
5. Customized P-150 or H-150 available with A rating at listed temperature. Contact RPS for more information.

Continued...

RPS Chemical Resistance Guide

Chemical Environment	Concentration (wt % UNO)	HPPE Product						
		MAXAR™ Piping <1>			FRP Piping			
		Blue (FEP)	White (PFA)	Red (Kynar Flex®)	P-150	H-150	H-150-200	A-150
Hydrochloric Acid	1 - 15	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	B to 82°C/180°F	B to 93°C/200°F	A to 100°C/212°F	NR
Hydrochloric Acid	16 - 20	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	C to 82°C/180°F	B to 93°C/200°F	A to 100°C/212°F	NR
Hydrochloric Acid	21 - 32	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	NR	C to 82°C/180°F	A to 82°C/180°F	NR
Hydrochloric Acid	33 - 34	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	NR	C to 82°C/180°F	A to 70°C/160°F	NR
Hydrochloric Acid	35 - 36	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	NR	NR	A to 60°C/140°F	NR
Hydrochloric Acid	37	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	NR	NR	A to 50°C/120°F	NR
Hydrocyanic Acid	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Hydrofluoric Acid	1 - 15	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	C to 65°C/150°F	C to 40°C/100°F	NR	NR
Hydrofluoric Acid	20	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	C to 40°C/100°F	C to 40°C/100°F	NR	NR
Hydrofluoric Acid	40	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F				
Hydrogen Gas	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F				
Hydrogen Bromide	50	A to 150°C/300°F	A to 230°C/450°F		A to 82°C/180°F	A to 82°C/180°F	A to 82°C/180°F	
Hydrogen Bromide	100	A to 150°C/300°F	A to 150°C/300°F		A to 82°C/180°F	A to 82°C/180°F	A to 82°C/180°F	
Hydrogen Peroxide	All	A to 150°C/300°F	A to 230°C/450°F		NR	NR	NR	NR
Hydrogen Sulfide, aqueous	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Hypochlorous Acid	All	A to 150°C/300°F	A to 230°C/450°F					
Isopropanol	All	A to 150°C/300°F	A to 230°C/450°F	A to 60°C/140°F	A to 50°C/120°F	A to 50°C/120°F	A to 50°C/120°F	
Jet Fuel (JP4,JP5)	All	A to 150°C/300°F	A to 230°C/450°F	A to 93°C/200°F	A to 60°C/140°F	A to 82°C/180°F	A to 82°C/180°F	
Kerosene	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 60°C/140°F	A to 82°C/180°F	A to 82°C/180°F	
Lime Slurry, see also Calcium Hydroxide	100	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	B to 82°C/180°F <5>	B to 65°C/150°F <5>	C to 65°C/150°F	NR
Limestone Slurry, see also Calcium Carbonate	All	A to 150°C/300°F <4>	A to 230°C/450°F <4>	A to 110°C/230°F	A to 82°C/180°F <4>	A to 82°C/180°F <4>	A to 82°C/180°F <4>	A to 82°C/180°F

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Notes:

1. Temperatures listed for MAXAR™ represent capability of lining material. For service temperatures above 82°C/180°F, contact RPS for recommendations.
2. Service may cause blisters to form in corrosion barrier.
3. Service may discolor corrosion barrier.
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Continued...

RPS Chemical Resistance Guide

Chemical Environment	Concentration (wt % UNO)	HPPE Product						
		MAXAR™ Piping <1>			FRP Piping			
		Blue (FEP)	White (PFA)	Red (Kynar Flex®)	P-150	H-150	H-150-200	A-150
Lithium Bromide	All	A to 150°C/300°F		A to 105°C/220°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Lithium Carbonate	All			B to 40°C/100°F	B to 82°C/180°F <5>	B to 82°C/180°F <5>	C to 82°C/180°F	NR
Lithium Chloride	All	A to 52°C/125°F	A to 93°C/200°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Lithium Hydroxide	All	A to 52°C/125°F	A to 93°C/200°F	A to 105°C/220°F	B to 82°C/180°F <5>	B to 82°C/180°F <5>	C to 82°C/180°F	NR
Lithium Hypochlorite	All			A to 50°C/120°F	C to 82°C/180°F	C to 82°C/180°F	B to 82°C/180°F	NR
Magnesium Carbonate	All	A to 150°C/300°F	A to 205°C/400°F	A to 110°C/230°F	A to 82°C/180°F	A to 82°C/180°F	A to 82°C/180°F	
Magnesium Chloride	All	A to 150°C/300°F	A to 205°C/400°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Magnesium Hydroxide	All	A to 150°C/300°F	A to 205°C/400°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Magnesium Nitrate	All	A to 150°C/300°F	A to 205°C/400°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Magnesium Phosphate	All			A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Magnesium Sulfate	All	A to 150°C/300°F	A to 205°C/400°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Methanol	All	A to 150°C/300°F	A to 205°C/400°F	A to 110°C/230°F	NR	NR	NR	NR
Methyl Bromide	All	A to 150°C/300°F	A to 205°C/400°F	A to 110°C/230°F	NR	NR	NR	NR
Nickel Chloride	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Nickel Nitrate	> 0.5	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Nitric Acid	1	A to 150°C/300°F	A to 230°C/450°F	A to 80°C/176°F	A to 82°C/180°F	A to 82°C/180°F	A to 82°C/180°F	
Nitric Acid	2 - 5	A to 150°C/300°F	A to 230°C/450°F	A to 80°C/176°F	A to 65°C/150°F	A to 82°C/180°F	A to 82°C/180°F	
Nitric Acid	6 - 10	A to 150°C/300°F	A to 230°C/450°F	A to 80°C/176°F	A to 65°C/150°F	A to 65°C/150°F	A to 65°C/150°F	
Nitric Acid	11 - 20	A to 150°C/300°F	A to 230°C/450°F	A to 65°C/150°F	A to 50°C/120°F	A to 65°C/150°F	A to 65°C/150°F	
Nitric Acid	21 - 29	A to 150°C/300°F	A to 230°C/450°F	A to 65°C/150°F	NR	A to 50°C/120°F	A to 50°C/120°F	NR
Nitric Acid	30 - 35	A to 150°C/300°F	A to 230°C/450°F	A to 65°C/150°F	NR	A to 40°C/120°F	A to 40°C/120°F	NR
Nitric Acid	36 - 40	A to 150°C/300°F	A to 230°C/450°F	A to 65°C/150°F	NR	NR	A to 25°C/80°F	NR
Nitric Acid	50	A to 150°C/300°F	A to 230°C/450°F	A to 65°C/150°F	NR	NR	NR	NR

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Notes:

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2. Service may cause blisters to form in corrosion barrier.
3. Service may discolor corrosion barrier.
4. A-150 is preferred for slurry services.
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Continued...

RPS Chemical Resistance Guide

Chemical Environment	Concentration (wt % UNO)	HPPE Product						
		MAXAR™ Piping <1>			FRP Piping			
		Blue (FEP)	White (PFA)	Red (Kynar Flex®)	P-150	H-150	H-150-200	A-150
Nitric Acid	70	A to 150°C/300°F	A to 230°C/450°F	A to 65°C/150°F	NR	NR	NR	NR
Perchloric Acid	5	A to 150°C/300°F	A to 230°C/450°F	A to 93°C/200°F	A to 82°C/180°F	A to 82°C/180°F	A to 82°C/180°F	
Perchloric Acid	10	A to 150°C/300°F	A to 230°C/450°F	A to 93°C/200°F	A to 65°C/150°F	A to 65°C/150°F	A to 65°C/150°F	
Perchloric Acid	30	A to 150°C/300°F	A to 230°C/450°F	A to 65°C/150°F	A to 40°C/120°F	A to 40°C/120°F	A to 40°C/120°F	
Phosphoric Acid	0.5 - 100	A to 150°C/300°F	A to 150°C/300°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Phosphorous Acid	70	A to 150°C/300°F	A to 230°C/450°F	A to 23°C/75°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Potassium Bicarbonate	All	A to 150°C/300°F	A to 230°C/450°F	A to 93°C/200°F	A to 82°C/180°F	A to 82°C/180°F	A to 82°C/180°F	
Potassium Bromide	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Potassium Carbonate	0 - 50	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	B to 82°C/180°F <5>	B to 40°C/120°F <5>	B to 40°C/120°F	NR
Potassium Chloride	All	A to 150°C/300°F	A to 205°C/400°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Potassium Fluoride	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	B to 82°C/180°F <5>	B to 82°C/180°F <5>	B to 82°C/180°F	NR
Potassium Hydroxide	0 - 50	A to 150°C/300°F	A to 230°C/450°F	C to 40°C/100°F	B to 65°C/150°F <5>	NR	NR	NR
Potassium Sulfate	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Salt Brine	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Sea Water		A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Silicon Tetrachloride	All	A to 38°C/100°F		A to 52°C/125°F				
Silver Nitrate	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Sodium Bicarbonate	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 82°C/180°F	A to 82°C/180°F	
Sodium Bichromate	All	A to 150°C/300°F	A to 230°C/450°F					
Sodium Bromate	All	A to 93°C/200°F	A to 93°C/200°F	A to 93°C/200°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Sodium Bromide	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Sodium Carbonate	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	B to 82°C/180°F <5>	B to 65°C/150°F <5>	C to 65°C/150°F	NR
Sodium Chlorate	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	

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B = Moderate service can be expected. Contact RPS for recommendations to improve performance.

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Notes:

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Continued...

RPS Chemical Resistance Guide

Chemical Environment	Concentration (wt % UNO)	HPPE Product						
		MAXAR™ Piping <1>			FRP Piping			
		Blue (FEP)	White (PFA)	Red (Kynar Flex®)	P-150	H-150	H-150-200	A-150
Sodium Chloride (Brine, salt)	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Sodium Cyanide	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Sodium Hydroxide	0.5	A to 150°C/300°F	A to 93°C/200°F	A to 23°C/75°F	B to 82°C/180°F <5>	B to 82°C/180°F <5>	NR	NR
Sodium Hydroxide	1	A to 150°C/300°F	A to 93°C/200°F	A to 52°C/125°F	B to 82°C/180°F <5>	B to 82°C/180°F <5>	NR	NR
Sodium Hydroxide	5	A to 150°C/300°F	A to 93°C/200°F	A to 23°C/75°F	B to 82°C/180°F <5>	B to 40°C/100°F <5>	NR	NR
Sodium Hydroxide	10	A to 150°C/300°F	A to 93°C/200°F	A to 23°C/75°F	B to 65°C/150°F <5>	NR	NR	NR
Sodium Hydroxide	25	A to 150°C/300°F	A to 93°C/200°F	B to 40°C/100°F	B to 65°C/150°F <5>	NR	NR	NR
Sodium Hydroxide	50	A to 150°C/300°F	A to 93°C/200°F	B to 23°C/75°F	B to 82°C/180°F <5>	NR	NR	NR
Sodium Hypochlorite (stable, alkaline pH > 11)	2 - 5	A to 150°C/300°F	A to 93°C/200°F	A to 110°C/230°F	B to 65°C/180°F	C to 40°C/100°F	B to 40°C/100°F	NR
Sodium Hypochlorite (stable, alkaline pH > 11)	6 - 15	A to 150°C/300°F	A to 93°C/200°F	A to 93°C/200°F	B to 50°C/120°F <5>	NR	NR	NR
Sodium Nitrate	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Sodium Sulfate	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Sodium Sulfide	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Sodium Sulfite	All			A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Solvent Extraction Solutions (3% Isodecanol, 6% Amines tri-C8-C10-alkyl, 91% Kerosene)					A to 82°C/180°F	A to 82°C/180°F	A to 82°C/180°F	
Solvent Extraction Solutions (4% Triethylphosphine Oxide (TOPO), 4% Di 2-Ethylhexyl Phosphoric Acid (DEHPA), 92% Kerosene)					A to 82°C/180°F	A to 82°C/180°F	A to 82°C/180°F	

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3. Service may discolor corrosion barrier.
4. A-150 is preferred for slurry services.
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RPS Chemical Resistance Guide

Chemical Environment	Concentration (wt % UNO)	HPPE Product						
		MAXAR™ Piping <1>			FRP Piping			
		Blue (FEP)	White (PFA)	Red (Kynar Flex®)	P-150	H-150	H-150-200	A-150
Steam, dry (no condensation)		A to 230°C/450°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Steam, wet (condensation)		A to 230°C/450°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 82°C/180°F	A to 82°C/180°F	
Sulfuric Acid	0.5 - 25	A to 205°C/400°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Sulfuric Acid	26 - 50	A to 205°C/400°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Sulfuric Acid	51 - 70	A to 205°C/400°F	A to 230°C/450°F	A to 93°C/200°F	A to 82°C/180°F <3>	A to 82°C/180°F <3>	A to 82°C/180°F <3>	
Sulfuric Acid	71 - 75	A to 205°C/400°F	A to 230°C/450°F	A to 93°C/200°F	A to 40°C/100°F <3>	A to 50°C/120°F <3>	A to 50°C/120°F <3>	
Sulfuric Acid	76 - 80	A to 205°C/400°F	A to 230°C/450°F	A to 93°C/200°F	A to 40°C/100°F <3>	A to 40°C/100°F <3>	A to 40°C/100°F <3>	
Sulfuric Acid	81 - 92	A to 205°C/400°F	A to 230°C/450°F	A to 93°C/200°F	NR	NR	NR	NR
Sulfuric Acid	93 - 98	A to 205°C/400°F	A to 230°C/450°F	A to 65°C/150°F	NR	NR	NR	NR
Sulfuric Acid	> 98	A to 205°C/400°F	A to 230°C/450°F		NR	NR	NR	NR
Tall Oil	All	A to 150°C/300°F	A to 230°C/450°F	A to 110°C/230°F	A to 82°C/180°F	A to 93°C/200°F	A to 100°C/212°F	
Titanium Dioxide	All			A to 93°C/200°F	A to 82°C/180°F <4>	A to 82°C/180°F <4>	A to 82°C/180°F <4>	A to 82°C/180°F
Water, Deionized	100	A to 150°C/300°F	A to 100°C/212°F	A to 110°C/230°F	A to 82°C/180°F <2>	A to 82°C/180°F <2>	A to 82°C/180°F <2>	
Water, Demineralized	100	A to 150°C/300°F	A to 100°C/212°F	A to 110°C/230°F	A to 82°C/180°F <2>	A to 82°C/180°F <2>	A to 82°C/180°F <2>	
Water, Distilled	100	A to 150°C/300°F	A to 100°C/212°F	A to 110°C/230°F	A to 82°C/180°F <2>	A to 82°C/180°F <2>	A to 82°C/180°F <2>	
White Liquor	All	A to 150°C/300°F	A to 93°C/200°F		B to 82°C/180°F	B to 82°C/180°F	B to 82°C/180°F	
Xylene	All	A to 150°C/300°F	A to 230°C/450°F	A to 95°C/200°F	A to 25°C/80°F	A to 25°C/80°F	A to 25°C/80°F	
Zinc Bromide	All	A to 21°C/70°F		A to 110°C/230°F	A to 82°C/180°F	A to 100°C/212°F	A to 100°C/212°F	

For more information: RPSComposites.com
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A = Long term chemical resistance can be expected (See Note 1).

B = Moderate service can be expected. Contact RPS for recommendations to improve performance.

C = Only limited service can be expected. Contact RPS for recommendations to improve performance.

NR = Not recommended

Blank = Data not available

Notes:

1. Temperatures listed for MAXAR™ represent capability of lining material. For service temperatures above 82°C/180°F, contact RPS for recommendations.
2. Service may cause blisters to form in corrosion barrier.
3. Service may discolor corrosion barrier.
4. A-150 is preferred for slurry services.
5. Customized P-150 or H-150 available with A rating at listed temperature. Contact RPS for more information.

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