



RECOMMENDED USE DEFINITIONS

IMMERSION SERVICE (Most Severe) – IS

Suitable for continuous contact with chemical exposure up to specified temperature.

CARGO/TEMPORARY IMMERSION – CI

Suitable for 60 day continuous contact with chemical exposure up to specified temperature. Coating will show no effect except slight softening or color change, possibly permanent, after 60 days or less continuous immersion. When used in transport or hauling conditions, the vessel must be completely drained to prevent puddling that would constitute continuous immersion.

SECONDARY CONTAINMENT – SC

Suitable for continuous contact with chemical for up to 72 hours. Softening or discoloration may occur during the exposure.

FREQUENT CONTACT – FC

Suitable for frequent splash or up to 72 hours exposure to concentrated vapors. The coating will show no effects except slight softening or color change, possibly permanent, after eight hours continuous immersion in the liquid chemical or 72 hours exposure to the vapor.

OCCASIONAL CONTACT (Least Severe) – OC

Suitable for occasional splash and spillage or occasional exposure to concentrated vapors. The coating shows no effects, except slight softening or color changes, following short exposure to splash or spillage which evaporates, is hosed off, or dried overnight or, 24 hours exposure to vapor.

NOT TESTED – This chemical has not been tested or evaluated for the listed chemical.

NOT RECOMMENDED – This product is not recommended for the listed exposure. The product's resistance to the listed chemical is often queried, therefore this information is provided as a reference even though the product is not recommended.

IMPORTANT NOTES

The term "chemicals" is used broadly in this guide and can refer to various constituents including, but not limited to, acids, fatty acids, food and beverage materials, finished and unrefined hydrocarbons, as well as individual chemicals and chemical blends.

Temperature can have a significant effect on a coating's chemical resistance. Prior to coating selection, due care should be taken to determine the service temperature of stored chemicals, elevated temperature caused by natural environmental conditions (i.e. radiant heat from sun, weather), and temperature fluctuations during service (i.e. loading of cargo, service cycling).

Chemical mixtures and alternating chemical storage can aggressively degrade a coating or lining system. Prior to coating selection and application, the expected chemical exposures and sequence of chemical storage should be discussed with Tnemec Technical Service to ensure the proper coating is selected.

Proper surface preparation is always important to ensure optimum coating performance but it is even more so for coatings that will undergo chemical exposure. Carefully read product data sheets along with related application guides to determine the required level of surface preparation and surface profile.

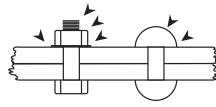
Structural designs of tanks, structures, and containment areas can greatly affect coating performance. Sharp angles, channels, edges, corners, pits, voids, defects, rough welds, and other similar conditions present areas that are either difficult to coat or achieve the required film thickness. Avoid skip welds in favor of continuous welds. A stripe coat on these areas, prior to full coating application, can help achieve needed film thickness and prevent premature coating failure. (Reference NACE SP0178-2007 for more information.)

The length of a coating system's service life depends on surface cleanliness and preparation prior to application, proper application procedures, exposure conditions, physical abuse, cleaning techniques, and frequency of inspection, maintenance, and repair. No coating system has an unlimited service life. Regular inspection of the coating system can prolong service life by identifying areas in need of repair. Additionally, regular inspections can determine when the coating system is nearing its end of service and should be completely replaced.

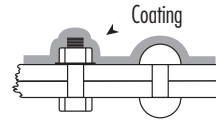
Chemical resistance information is provided for the purpose of establishing a general profile of the coating and was obtained through laboratory testing, field experience, and industry knowledge. Test results were produced in a controlled environment and Tnemec makes no claim that any tests, or published chemical resistance information, accurately represent all environments or correlate to actual field performance. Application, environmental and design factors, chemical temperatures, chemical mixtures, sequence of storage, conditions of service, and cleaning procedures can significantly impact coating performance, so due care must be exercised in the selection and use of the coating. Tnemec disclaims responsibility for product use outside its published information. Contact Tnemec Technical Service to review full project details before the coating or coating system is selected and applied.

COMMON PROBLEM AREAS FOR COATINGS AND SOLUTIONS

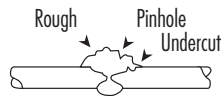
Problem:
Points of failure due to thin spots in coating



Solution:
Carefully and fully coat



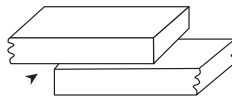
Problem:
Uneven welds



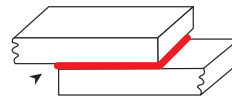
Solution:
Grind smooth



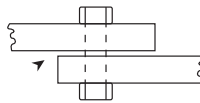
Problem:
Gaps between plates, coating can not cover



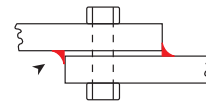
Solution:
Continuous welds



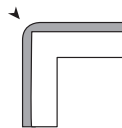
Problem:
Gaps between plates, coating can not cover



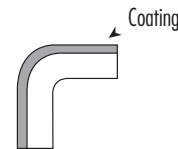
Solution:
Continuous welds



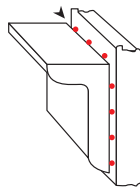
Problem:
Sharp surface contours create thin spots in coating



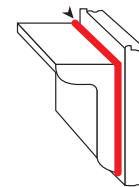
Solution:
Round the contours



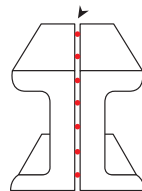
Problem:
Skip welding creates gaps that coating can not cover



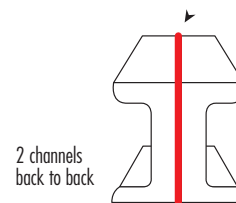
Solution:
Continuous welds



Problem:
Skip welding creates gaps that coating can not cover



Solution:
Continuous welds



2 channels back to back

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² Product is suitable for direct or indirect food contact. Reference the product data sheet for more information.

Chemical	Intended Use (Maximum Temperature Listed)				
	Occasional Contact	Frequent Contact	Secondary Containment	Cargo Immersion	Immersion Service
1, 1, 1-Trichloroethane (Trichloroethane)	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Acetaldehyde	NR	NR	NR	NR	NR
Acetic Acid					
5%	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	100°F (38°C)
10%	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	
30%	100°F (38°C)				
Acetic Acid, Glacial	NR	NR	NR	NR	NR
Acetic Anhydride	NR	NR	NR	NR	NR
Acetone	120°F (49°C)				
Acetonitrile					
20%	NR	NR	NR	NR	NR
100%	NR	NR	NR	NR	NR
Acrylic Acid					
25%	NR	NR	NR	NR	NR
Acrylic Latex Solution	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Acrylonitrile					
100%	NR	NR	NR	NR	NR
Activated Carbon	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Adipic Acid (Dry)	100°F (38°C)	100°F (38°C)			
Allyl Chloride	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Aluminum Chloride					
25%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Aluminum Hydroxide	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Aluminum Nitrate					
50%	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Ammonium Bisulfite	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Ammonium Carbonate	100°F (38°C)	100°F (38°C)	100°F (38°C)		

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Ammonium Chloride					
50%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Ammonium Fluoride	NR	NR	NR	NR	NR
Ammonium Hydroxide					
5%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
10%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
20%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
30%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Ammonium Lauryl Sulfate					
30%	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Ammonium Nitrate					
10%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
20%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
38%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
50%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Ammonium Nitrite					
50%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Ammonium Perchlorate (Dry)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Ammonium Persulfate					
10%	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Ammonium Phosphate	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Ammonium Sulfamate	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Ammonium Sulfate	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Ammonium Sulfide	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Ammonium Sulfite	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Amyl Acetate	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Aniline					
20%	100°F (38°C)	100°F (38°C)	100°F (38°C)		

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	Occasional Contact	Frequent Contact	Secondary Containment	Cargo Immersion	Immersion Service
Animal Fats	120°F (49°C)	120°F (49°C)	120°F (49°C)		
Animal Oil	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Aqua Ammonia	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Aqua Regia	100°F (38°C)				
Aviation Gas	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
B20 Bio Diesel	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Barium Chloride					
50%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Barium Hydroxide					
50%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Barium Nitrate	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Barium Sulfate	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Barium Sulfide	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Beer (non-food contact) ¹	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Benzene	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Benzene Sulfonic Acid	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Benzoic Acid	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Benzoyl Chloride	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Benzyl Alcohol	100°F (38°C)				
Benzyl Chloride	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Borax	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Boric Acid					
1%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
3%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
5%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Butyl Acrylate	NR	NR	NR	NR	NR
Butyl Amine	NR	NR	NR	NR	NR
Butyric Acid	NR	NR	NR	NR	NR

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Chemical	Intended Use (Maximum Temperature Listed)				
	Occasional Contact	Frequent Contact	Secondary Containment	Cargo Immersion	Immersion Service
Cadmium Bromide					
10%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Cadmium Chloride					
50%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Cadmium Plating (Cyanide)	NR	NR	NR	NR	NR
Calcium Bisulfate	NR	NR	NR	NR	NR
Calcium Bromide	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Calcium Carbonate	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Calcium Chloride					
50%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Calcium Hydroxide (Lime Slurry)					
10%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
30%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Calcium Hypochlorite					
5%	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Calcium Nitrate	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Calcium Nitrite	100°F (38°C)				
Calcium Oxide	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Calcium Sulfate	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Calcium Sulfite	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Caprolactam	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Carbon Disulfide	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Carbon Tetrachloride	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Castor Oil	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Caustic Potash	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Chlorine Dioxide	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Chlorobenzene	100°F (38°C)	100°F (38°C)	100°F (38°C)		

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Chloroform	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Chlorosulfonic Acid	NR	NR	NR	NR	NR
Chromic Acid					
10%	100°F (38°C)	100°F (38°C)	100°F (38°C)		
20%	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Citric Acid					
50%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Coal (high and low sulfur)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Cola (non-food contact) ¹	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Copper Acetate					
50%	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Copper Chloride	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Copper Nitrate	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Copper Sulfate					
10%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
20%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
50%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Copper Sulfate (dry)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Corn Mash Solution (non-food contact) ¹	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Corn Oil (non-food contact) ¹	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Cottonseed Oil (non-food contact) ¹	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Cresylic Acid	NR	NR	NR	NR	NR
Crude Oil (Sour)	275°F (135°C)	275°F (135°C)	275°F (135°C)	275°F (135°C)	275°F (135°C)
Crude Oil (Sweet)	220°F (104°C)	220°F (104°C)	220°F (104°C)	220°F (104°C)	220°F (104°C)
Cumene Hydroperoxide	NR	NR	NR	NR	NR
Cuprous Chloride	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Cyclohexane	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Cyclohexanol	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)

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Chemical	Intended Use (Maximum Temperature Listed)				
	Occasional Contact	Frequent Contact	Secondary Containment	Cargo Immersion	Immersion Service
Cyclohexanone	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Cyclohexamine	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Dextrose	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Diacetone Alcohol	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Dibutyl Phthalate	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Diesel Fuel (Fuel Oil, Diesel Oil)	140°F (60°C)	140°F (60°C)	140°F (60°C)	140°F (60°C)	140°F (60°C)
Diethanolamine	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Diethylene Glycol	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Diethylene Glycol Monobutyl Ether (Butyl "Carbitol")	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Diethylenetriamine	NR	NR	NR	NR	NR
Diglycolamine					
62%	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Dimethyl Formamide	NR	NR	NR	NR	NR
Dimethyl Sulfoxide					
20%	NR	NR	NR	NR	NR
Dioctyl Phthalate	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Dipropylene Glycol	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Dodecyl Alcohol (Lauryl Alcohol)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Ethanol (Ethyl Alcohol, Denatured Alcohol)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Ethanolamine	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Ethyl Acetate	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Ethyl Benzene	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Ethyl Tert-Butyl Ether (ETBE)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Ethylamine					
20%	NR	NR	NR	NR	NR
Ethylene Glycol	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)

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	Occasional Contact	Frequent Contact	Secondary Containment	Cargo Immersion	Immersion Service
Ethylene Glycol Monobutyl Ether (Butyl "Cellosolve")	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Ethylene Glycol Monobutyl Ether Acetate (Butyl "Cellosolve" Acetate)	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Ethylenediamine					
20%	100°F (38°C)	100°F (38°C)			
Fatty Acids (Greater than C6)	100°F (38°C)	100°F (38°C)			
Ferric Chloride	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Ferric Nitrate	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Ferric Sulfate					
20%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Ferrous Chloride	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Fluorosilicic Acid (Hydrofluorosilicic Acid)					
10%	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Formaldehyde					
37%	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Formic Acid					
10%	NR	NR	NR	NR	NR
Fructose (non-food contact) ¹	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Furan	NR	NR	NR	NR	NR
Furfural					
10%	NR	NR	NR	NR	NR
Furfuryl Alcohol	100°F (38°C)				
Gasohol E10 (10% Ethanol)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Gasohol E15 (15% Ethanol)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Gasohol E30 (30% Ethanol)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Gasohol E50 (50% Ethanol)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Gasohol E85 (85% Ethanol)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)

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	Occasional Contact	Frequent Contact	Secondary Containment	Cargo Immersion	Immersion Service
Gasoline (Reformulated)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Gasoline (Unleaded)	140°F (60°C)	140°F (60°C)	140°F (60°C)	140°F (60°C)	140°F (60°C)
Gasoline (w/ETBE, 15% max)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Gasoline (w/MTBE, 15% max)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Gasoline (w/TAME, 15% max)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Gasoline (w/TBA, 15% max)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Gasoline (w/WTBE, 15% max)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Glucose	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Glycerin	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Glycolic Acid					
70%	NR	NR	NR	NR	NR
Gold Plating Solution	NR	NR	NR	NR	NR
Grape Juice	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Guar Gum (non-food contact) ¹	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Heptane	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Hexane	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Hexanol	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Hexylene Glycol	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Hydraulic Fluid (Hydraulic Oil)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Hydrochloric Acid					
5%	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
10%	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
15%	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
20%	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
28%	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
33%	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
37%	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	

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	Occasional Contact	Frequent Contact	Secondary Containment	Cargo Immersion	Immersion Service
Hydrofluoric Acid					
3%	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	
10%	100°F (38°C)				
20%	NR	NR	NR	NR	NR
Hydrofluoroboric Acid					
62%	NR	NR	NR	NR	NR
Hydrogen Peroxide					
30%	100°F (38°C)	100°F (38°C)			
Hydrogen Sulfide	200°F (93°C)	200°F (93°C)	200°F (93°C)		
Iodine					
5%	100°F (38°C)	100°F (38°C)			
Isobutyl Acetate	100°F (38°C)	100°F (38°C)			
Isobutyl Alcohol	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Isooctane	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Isopropyl Acetate	100°F (38°C)	100°F (38°C)			
Isopropyl Alcohol	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Jet A Fuel	150°F (66°C)	150°F (66°C)	150°F (66°C)	150°F (66°C)	150°F (66°C)
JP-4 Aviation Fuel	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
JP-5 Aviation Fuel	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Kaolin	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Kerosene	150°F (66°C)	150°F (66°C)	150°F (66°C)	150°F (66°C)	150°F (66°C)
Lactic Acid					
2%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
10%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
85%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Lauric Acid	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Lauryl Chloride	100°F (38°C)	100°F (38°C)			
Lead Acetate	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)

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	Occasional Contact	Frequent Contact	Secondary Containment	Cargo Immersion	Immersion Service
Levulinic Acid	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Linseed Oil	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Lithium Bromide	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Lithium Chloride	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Lithium Hydroxide (saturated)	100°F (38°C)	100°F (38°C)			
Lubricating Oil (SAE 5W-40, et al) (Motor Oil)	180°F (82°C)	180°F (82°C)	180°F (82°C)	180°F (82°C)	180°F (82°C)
Magnesium Bisulfite	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Magnesium Chloride					
50%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Magnesium Hydroxide					
50%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Magnesium Sulfate	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Maleic Acid	100°F (38°C)	100°F (38°C)			
Maleic Anhydride	100°F (38°C)	100°F (38°C)			
Mercuric Chloride	100°F (38°C)	100°F (38°C)			
Mercury	NR	NR	NR	NR	NR
Methacrylic Acid	NR	NR	NR	NR	NR
Methane Gas	200°F (93°C)	200°F (93°C)			
Methanol (Methyl Alcohol)	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Methyl Acetate					
20%	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Methyl Acrylate	100°F (38°C)	100°F (38°C)			
Methyl Amyl Alcohol	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Methyl Amyl Ketone	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Methyl Ethyl Ketone	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Methyl Isobutyl Chloride	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Methyl Isobutyl Ketone	100°F (38°C)	100°F (38°C)	100°F (38°C)		

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	Occasional Contact	Frequent Contact	Secondary Containment	Cargo Immersion	Immersion Service
Methyl Methacrylate	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Methyl Propyl Ketone	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Methyl tert-Butyl Ether (MTBE)	NR	NR	NR	NR	NR
Methylene Chloride	NR	NR	NR	NR	NR
Milk (non-food contact) ¹	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Mineral Oil	200°F (93°C)	200°F (93°C)	200°F (93°C)	200°F (93°C)	200°F (93°C)
Mineral Spirits	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Molasses (non-food contact) ¹	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Morpholine	NR	NR	NR	NR	NR
Mustard (non-food contact) ¹	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Naphtha	140°F (60°C)	140°F (60°C)	140°F (60°C)	140°F (60°C)	140°F (60°C)
Naphthalene	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Naphthenic Acid	100°F (38°C)	100°F (38°C)	100°F (38°C)		
n-Butyl Acetate (Butyl Acetate)	100°F (38°C)	100°F (38°C)			
n-Butyl Alcohol (1-Butanol) (Butanol (Normal))	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
n-Decyl Alcohol (Decyl Alcohol (1-Decanol))	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Nickel Chloride	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Nitric Acid					
5%	100°F (38°C)	100°F (38°C)	100°F (38°C)		
10%	100°F (38°C)	100°F (38°C)	100°F (38°C)		
25%	100°F (38°C)	100°F (38°C)			
70%	NR	NR	NR	NR	NR
Nitrobenzene	100°F (38°C)	100°F (38°C)	100°F (38°C)		
n-Methyl-2-Pyrrolidone	NR	NR	NR	NR	NR
n-Octyl Alcohol (Octanol)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
n-Propyl Alcohol (Propyl Alcohol)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)

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Octane	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Oleic Acid	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Oxalic Acid					
10%	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Ozone <2 ppm	NR	NR	NR	NR	NR
Palm Oil	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Paraffin Wax	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Pentane	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Perchloroethylene	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Petroleum Ether	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Petroleum Oil	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Phenol (Carbolic Acid)	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Phosphoric Acid					
5%	100°F (38°C)	100°F (38°C)			
10%	100°F (38°C)	100°F (38°C)			
25%	100°F (38°C)				
43%	NR	NR	NR	NR	NR
85%	NR	NR	NR	NR	NR
Phosphorous	NR	NR	NR	NR	NR
Phosphorous Acid	NR	NR	NR	NR	NR
Phthalic Acid (all)	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Picric Acid (conc)	NR	NR	NR	NR	NR
Pine Oil	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Polyethylene Glycol	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Polypropylene	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Polystyrene	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Polytetrafluoroethane	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)

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	Occasional Contact	Frequent Contact	Secondary Containment	Cargo Immersion	Immersion Service
Polyvinyl Chloride	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Potash Ore	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Potassium Acetate	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Potassium Bromide	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Potassium Carbonate	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Potassium Chlorate	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Potassium Chloride	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Potassium Cyanide	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Potassium Ferricyanide	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Potassium Fluoride	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Potassium Hydroxide					
50%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Potassium Iodide	NR	NR	NR	NR	NR
Potassium Nitrate	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Potassium Permanganate	100°F (38°C)	100°F (38°C)			
Potassium Persulfate	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Potassium Sulfate	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Propionic Acid					
50%	NR	NR	NR	NR	NR
Propylene Glycol	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Pulpmill (Black Liquor)	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Pulpmill (Green Liquor)	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Pulpmill (White Liquor)	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Pyridine					
20%	NR	NR	NR	NR	NR
Silver Nitrate	NR	NR	NR	NR	NR
Skydrol	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Sodium Acetate	NR	NR	NR	NR	NR

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Sodium Aluminate	NR	NR	NR	NR	NR
Sodium Bicarbonate	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Sodium Bisulfate					
30%	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Sodium Bisulfite					
38%	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Sodium Borate	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Sodium Bromide (all)	NR	NR	NR	NR	NR
Sodium Carbonate (sat'd)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Sodium Carbonate (slurry)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Sodium Chlorate					
50%	NR	NR	NR	NR	NR
Sodium Chloride (sat'd) (Brine, Water (Sea), Salt Brine)	180°F (82°C)	180°F (82°C)	180°F (82°C)	180°F (82°C)	180°F (82°C)
Sodium Chlorite (>6 pH)	NR	NR	NR	NR	NR
Sodium Chromate					
50%	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Sodium Cyanide					
18%	NR	NR	NR	NR	NR
Sodium Dichromate (all)	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Sodium Fluoride	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Sodium Formate					
50%	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Sodium Hydrosulfide					
72%	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Sodium Hydrosulfite					
10%	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Sodium Hydroxide (Caustic Soda)					

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50%	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	100°F (38°C)
Sodium Hypochlorite (Bleach)					
5%	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
13%	120°F (49°C)	120°F (49°C)	120°F (49°C)		
Sodium Lauryl Sulfate	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Sodium Nitrate (dry)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Sodium Oxalate					
1%	NR	NR	NR	NR	NR
Sodium Phosphate					
10%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
50%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Sodium Silicate	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Sodium Sulfide (all)	NR	NR	NR	NR	NR
Sodium Sulfite	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Sodium Thiosulfate					
30%	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Sodium Tripolyphosphate					
1%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Solvesso 100	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Soybean Oil (non-food contact) ¹	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Stannic Chloride (all)	NR	NR	NR	NR	NR
Stannous Chloride (all)	NR	NR	NR	NR	NR
Stearic Acid (conc)	NR	NR	NR	NR	NR
Styrene	100°F (38°C)	100°F (38°C)			
Sulfamic Acid					
25%	NR	NR	NR	NR	NR
Sulfite Liquor (paper industry)	NR	NR	NR	NR	NR

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Sulfur Dioxide (dry)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Sulfur Dioxide (wet)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Sulfur Trioxide (dry)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Sulfur Trioxide (wet)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Sulfuric Acid (Sulphuric Acid)					
5%	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	100°F (38°C)
10%	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	100°F (38°C)
30%	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	100°F (38°C)
50%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	
70%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	
98%	NR	NR	NR	NR	NR
Sulfurous Acid					
10%	NR	NR	NR	NR	NR
Tall Oil	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Tallow	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Tannic Acid	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Tartaric Acid	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Tertiary-Amyl Methyl Ether (TAME)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Tertiary-Butyl Alcohol (TBA) (Butanol (Tertiary))	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Tetrachloroethylene	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Tetrahydrofuran	NR	NR	NR	NR	NR
Toluene	140°F (60°C)	140°F (60°C)	140°F (60°C)	140°F (60°C)	140°F (60°C)
Toluenesulfonic Acid	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Transmission Fluid	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Trichloroethylene	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Trichlorofluoroethane	NR	NR	NR	NR	NR
Tricresyl Phosphate	100°F (38°C)	100°F (38°C)	100°F (38°C)		

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Triethanolamine	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Triethylamine	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Triethylenetetramine	NR	NR	NR	NR	NR
Trisodium Phosphate (Sodium Phosphate (Tribasic))					
20%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Turpentine	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Urea					
50%	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Urea Ammonium Nitrate	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Urea, Diesel Emissions Fluid	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Vegetable Oil (non-food contact) ¹	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)	120°F (49°C)
Vinegar (non-food contact) ¹	100°F (38°C)	100°F (38°C)	100°F (38°C)		
Vinyl Trichloride	NR	NR	NR	NR	NR
Water (deionized, non-potable) (Water (Demineralized, Non-potable))	140°F (60°C)	140°F (60°C)	140°F (60°C)	140°F (60°C)	140°F (60°C)
Water (distilled, non-potable)	220°F (104°C)	220°F (104°C)	220°F (104°C)	220°F (104°C)	220°F (104°C)
Water (fresh, non-potable)	220°F (104°C)	220°F (104°C)	220°F (104°C)	220°F (104°C)	220°F (104°C)
Xylene	140°F (60°C)	140°F (60°C)	140°F (60°C)	140°F (60°C)	140°F (60°C)
Zinc Bromide	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Zinc Chloride					
40%	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Zinc Phosphate (dry)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)
Zinc Sulfate	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)	100°F (38°C)

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