ZEALLGRATE

CHEMICAL RESISTANCE GUIDE

FRP Grating Resin Chemical Compatibility at Service Temperature
ISO 9001:2015 | DNV / ABS | SGS / Intertek Inspection

Ratings used in the compatibility tables:

Rating	Meaning
C	Continuous exposure of the grating to the chemical at the listed temperature
S	Frequent exposure to splashes and spills, cleaned up from the grating
I	Infrequent exposure to splashes and spills, cleaned up immediately
N	Not recommended for the concentrations and temperatures listed
T	Test condition / limited data

How to use this guide

For each chemical in your process, note its concentration and maximum service temperature. Find the chemical in the compatibility tables and read across to the resin grade you are considering (Vinyl Ester, XFR, VEFR, ISOFR for molded and pultruded product lines). Select the resin that is rated C (continuous) at your conditions, or confirm a splash-grade S rating is acceptable for your exposure.

Important

Tables are reproduced from the ZeAllgrate Molded and Pultruded Grating Data Sheets and are a selection reference only. Verify with project chemistry before specification, and contact engineering for unlisted chemicals or mixed streams.

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Chemical Resistance Guide

Chemical Environment	% Concentration	Temp °F	ZeAllgrate Molded® Vinyl Ester			XFR	ZeAllgrate Pultruded® VEFR	ISOFR
Acetic Acid	50	MAX						
Acetone	100	75	S	I	I	I	I	N
Alcohols	100	120	C	I	I	S	I	I
Alum	ALL	MAX	C	C	C	C	C	C
Aluminum Chloride	ALL	MAX	C	C	C	C	C	C
Aluminum Fluoride	20	75	C	I	I	I	I	I
Ammonium Hydroxide	30	75	C	N	N	N	I	N
Ammonium Salts-Neutral	ALL	120	C	C	C	S	C	S
Ammonium Salts-Aggressive	ALL	75	S	I	I	I	T	N
Aromatic Solvents	ALL	75	T	N	N	N	N	N
Barium Salts	ALL	MAX	C	C	C	C	C	C
Benzene	100	140	I	I	I	I	I	N
Black Liquor (Pulp Mill)	ALL	MAX	C	I	I	I	I	N
Bleach Liquor (Pulp Mill)	ALL	MAX	C	I	I	N	I	N
Calcium Hydroxide	25	MAX	C	S	S	I	S	I
Calcium Hypochlorite	ALL	MAX	C	I	I	I	I	N
Calcium Salts	ALL	MAX	C	C	C	C	C	C
Carbon Tetrachloride	100	75	C	I	I	S	S	N
Chlorinated Hydrocarbons	100	75	T	T	T	N	T	T
Chlorine Dioxide	SAT	140	C	N	N	N	S	N
Chlorine Water	SAT	120	C	I	I	I	I	N
Chlorine, Wet	SAT	MAX	C	N	N	N	N	N
Chlorobenzene	100	75	S	N	N	N	N	N
Chlorobenzene	ALL	Up to 100	C	N	N	N	N	N
Chloroform	100	75	N	N	N	N	N	N
Chromic Acid	50	140	S	S	S	N	I	N
Citric Acid	ALL	MAX	C	C	C	C	C	C
Copper Cyanide Plating	ALL	125	C	S	S	N	S	I
Copper Salts	ALL	MAX	C	C	C	C	C	C
Crude Oil (Sweet or Sour)	ALL	MAX	C	C	C	C	C	C
Dichlorobenzene	100	75	T	N	N	N	N	N
Ethers		75	T	N	N	N	N	N
Ferric Chloride	100	MAX	C	C	C	C	C	C
Ferric Salts	ALL	MAX	C	C	C	C	C	C
Fluoride Salts+HCl	ALL	75	C	S	S	I	I	N
Fluosilicic Acid	10	75	C	S	S	S	S	I
Formaldehyde	37	150	C	I	I	I	S	I
Formic Acid	25	100	C	S	S	I	S	I
Fuel (Diesel, Jet, Gasoline)	ALL	100	C	C	C	C	C	C
Glycerine	100	MAX	C	C	C	C	C	C
Green Liquor (Pulp Mill)	ALL	MAX	C	N	N	N	I	N
Hydrobromic Acid	48	MAX	S	S	S	I	I	N
Hydrochloric Acid	10	MAX	C	S	S	C	S	S
Hydrochloric Acid	30	MAX	C	S	S	I	I	I
Hydrochloric Acid (concentrated)	ALL	Up to 180	I	N	N	N	N	N
Hydrocyanic Acid	ALL	MAX	C	I	I	I	S	I
Hydrofluoric Acid	20	75	S	N	N	N	N	N
Hydrogen Peroxide	30	75	C	N	N	I	S	N
Lactic Acid	100	MAX	C	C	C	C	C	C
Lime Slurry	SAT	MAX	C	C	C	C	C	C
Lithium Chloride	SAT	MAX	N	N	N	N	N	N
Lithium Salts	ALL	MAX	C	C	C	C	T	T
Magnesium Salts	ALL	MAX	C	C	C	C	C	C
Maleic Acid	100	MAX	C	S	S	C	S	I
Mercury Chloride	100	MAX	C	C	C	C	C	C
Nickel Salts	ALL	MAX	C	C	C	C	C	C
Nitric Acid	20	120	C	S	S	I	I	I
Nitric Acid	35	100	C	N	N	I	I	N
Nitric Acid	40	Ambient	I	N	N	N	N	N
Nitric, Hydrofluoric	20:2	75	I	N	N	N	N	N
Nitrous Acid	10	75	C	C	C	C	C	C
Ozone for Sewage Treatment		100	C	C	C	C	C	C
Perchloroethylene	100	75	S	N	N	I	I	N
Phenol	10	75	C	N	N	N	I	N
Phenol	88	Ambient	S	N	N	N	N	N
Phosphoric Acid	85	MAX	C	C	C	C	C	S
Phosphoric Acid, Super	115	MAX	C	I	I	S	S	N
Potassium Hydroxide	10	120	C	I	I	N	S	N
Potassium Salts	ALL	MAX	C	C	C	C	C	C
Silver Nitrate	100	MAX	C	C	C	C	C	C
Sodium Cyanide	ALL	75	C	I	I	I	S	I
Sodium Hydroxide	50	MAX	C	I	I	N	I	N
Sodium Hydroxide	10	MAX	C	N	N	N	N	N
Sodium Hypochlorite (Stable)	10	100	C	S	S	S	S	I
Sodium Salts-Neutral	ALL	MAX	C	C	C	C	C	C
Sodium Salts-Aggressive	ALL	75	S	I	I	I	T	N
Sulfur Dioxide	SAT	MAX	C	S	S	S	S	S
Sulfuric Acid	25	MAX	C	S	S	S	S	I
Sulfuric Acid	50	MAX	C	S	S	S	S	N
Sulfuric Acid	75	100	C	I	I	I	I	N
Toluene	100	120	S	I	I	N	I	N
Trichloroethane1,1,1	ALL	75	S	I	I	I	I	N
Trisodium Phosphate	50	MAX	C	I	I	I	I	N
Water (Fresh, Salt, Moderate D.I.)	100	MAX	C	C	C	C	C	C
Wet Chlorine/Hydrochloric Acid	10-20	Up to 350	S	N	N	N	N	N
White Liquor (Pulp Mill)	ALL	MAX	C	I	I	I	S	N
Zinc Chloride Plating	ALL	75	C	S	S	S	S	N
Zinc Salts	100	MAX	C	C	C	C	C	C

C - Continuous exposure of the grating to the Chemical Environment listed at the temperature listed.
S - Frequent exposure of the grating to splashes and spills from the Chemical Environment listed with that environment at the temperature listed.
I - nfrequent exposure of the grating to splashes and spills from the Chemical Environment listed with that environment at the temperature listed and the spill immediately cleaned up or washed from the grating.
N - Not recommended for the concentrations and temperatures listed.
T - Test

Chemical Resistance Guide

Chemical Environment	% Concentration	Temp °F	ZeAllgrate Molded® Vinyl Ester			XFR	ZeAllgrate Pultruded® VEFR	ISOFR
Acetic Acid	50	MAX						
Acetone	100	75	S	I	I	I	I	N
Alcohols	100	120	C	I	I	S	I	I
Alum	ALL	MAX	C	C	C	C	C	C
Aluminum Chloride	ALL	MAX	C	C	C	C	C	C
Aluminum Fluoride	20	75	C	I	I	I	I	I
Ammonium Hydroxide	30	75	C	N	N	N	I	N
Ammonium Salts-Neutral	ALL	120	C	C	C	S	C	S
Ammonium Salts-Aggressive	ALL	75	S	I	I	I	T	N
Aromatic Solvents	ALL	75	T	N	N	N	N	N
Barium Salts	ALL	MAX	C	C	C	C	C	C
Benzene	100	140	I	I	I	I	I	N
Black Liquor (Pulp Mill)	ALL	MAX	C	I	I	I	I	N
Bleach Liquor (Pulp Mill)	ALL	MAX	C	I	I	N	I	N
Calcium Hydroxide	25	MAX	C	S	S	I	S	I
Calcium Hypochlorite	ALL	MAX	C	I	I	I	I	N
Calcium Salts	ALL	MAX	C	C	C	C	C	C
Carbon Tetrachloride	100	75	C	I	I	S	S	N
Chlorinated Hydrocarbons	100	75	T	T	T	N	T	T
Chlorine Dioxide	SAT	140	C	N	N	N	S	N
Chlorine Water	SAT	120	C	I	I	I	I	N
Chlorine, Wet	SAT	MAX	C	N	N	N	N	N
Chlorobenzene	100	75	S	N	N	N	N	N
Chlorobenzene	ALL	Up to 100	C	N	N	N	N	N
Chloroform	100	75	N	N	N	N	N	N
Chromic Acid	50	140	S	S	S	N	I	N
Citric Acid	ALL	MAX	C	C	C	C	C	C
Copper Cyanide Plating	ALL	125	C	S	S	N	S	I
Copper Salts	ALL	MAX	C	C	C	C	C	C
Crude Oil (Sweet or Sour)	ALL	MAX	C	C	C	C	C	C
Dichlorobenzene	100	75	T	N	N	N	N	N
Ethers		75	T	N	N	N	N	N
Ferric Chloride	100	MAX	C	C	C	C	C	C
Ferric Salts	ALL	MAX	C	C	C	C	C	C
Fluoride Salts+HCl	ALL	75	C	S	S	I	I	N
Fluosilicic Acid	10	75	C	S	S	S	S	I
Formaldehyde	37	150	C	I	I	I	S	I
Formic Acid	25	100	C	S	S	I	S	I
Fuel (Diesel, Jet, Gasoline)	ALL	100	C	C	C	C	C	C
Glycerine	100	MAX	C	C	C	C	C	C
Green Liquor (Pulp Mill)	ALL	MAX	C	N	N	N	I	N
Hydrobromic Acid	48	MAX	S	S	S	I	I	N
Hydrochloric Acid	10	MAX	C	S	S	C	S	S
Hydrochloric Acid	30	MAX	C	S	S	I	I	I
Hydrochloric Acid (concentrated)	ALL	Up to 180	I	N	N	N	N	N
Hydrocyanic Acid	ALL	MAX	C	I	I	I	S	I
Hydrofluoric Acid	20	75	S	N	N	N	N	N
Hydrogen Peroxide	30	75	C	N	N	I	S	N
Lactic Acid	100	MAX	C	C	C	C	C	C
Lime Slurry	SAT	MAX	C	C	C	C	C	C
Lithium Chloride	SAT	MAX	N	N	N	N	N	N
Lithium Salts	ALL	MAX	C	C	C	C	T	T
Magnesium Salts	ALL	MAX	C	C	C	C	C	C
Maleic Acid	100	MAX	C	S	S	C	S	I
Mercury Chloride	100	MAX	C	C	C	C	C	C
Nickel Salts	ALL	MAX	C	C	C	C	C	C
Nitric Acid	20	120	C	S	S	I	I	I
Nitric Acid	35	100	C	N	N	I	I	N
Nitric Acid	40	Ambient	I	N	N	N	N	N
Nitric, Hydrofluoric	20:2	75	I	N	N	N	N	N
Nitrous Acid	10	75	C	C	C	C	C	C
Ozone for Sewage Treatment		100	C	C	C	C	C	C
Perchloroethylene	100	75	S	N	N	I	I	N
Phenol	10	75	C	N	N	N	I	N
Phenol	88	Ambient	S	N	N	N	N	N
Phosphoric Acid	85	MAX	C	C	C	C	C	S
Phosphoric Acid, Super	115	MAX	C	I	I	S	S	N
Potassium Hydroxide	10	120	C	I	I	N	S	N
Potassium Salts	ALL	MAX	C	C	C	C	C	C
Silver Nitrate	100	MAX	C	C	C	C	C	C
Sodium Cyanide	ALL	75	C	I	I	I	S	I
Sodium Hydroxide	50	MAX	C	I	I	N	I	N
Sodium Hydroxide	10	MAX	C	N	N	N	N	N
Sodium Hypochlorite (Stable)	10	100	C	S	S	S	S	I
Sodium Salts-Neutral	ALL	MAX	C	C	C	C	C	C
Sodium Salts-Aggressive	ALL	75	S	I	I	I	T	N
Sulfur Dioxide	SAT	MAX	C	S	S	S	S	S
Sulfuric Acid	25	MAX	C	S	S	S	S	I
Sulfuric Acid	50	MAX	C	S	S	S	S	N
Sulfuric Acid	75	100	C	I	I	I	I	N
Toluene	100	120	S	I	I	N	I	N
Trichloroethane1,1,1	ALL	75	S	I	I	I	I	N
Trisodium Phosphate	50	MAX	C	I	I	I	I	N
Water (Fresh, Salt, Moderate D.I.)	100	MAX	C	C	C	C	C	C
Wet Chlorine/Hydrochloric Acid	10-20	Up to 350	S	N	N	N	N	N
White Liquor (Pulp Mill)	ALL	MAX	C	I	I	I	S	N
Zinc Chloride Plating	ALL	75	C	S	S	S	S	N
Zinc Salts	100	MAX	C	C	C	C	C	C

C - Continuous exposure of the grating to the Chemical Environment listed at the temperature listed.
S - Frequent exposure of the grating to splashes and spills from the Chemical Environment listed with that environment at the temperature listed.
I - nfrequent exposure of the grating to splashes and spills from the Chemical Environment listed with that environment at the temperature listed and the spill immediately cleaned up or washed from the grating.
N - Not recommended for the concentrations and temperatures listed.
T - Test

How FRP Resists Chemical Attack

FRP grating resists corrosion through the resin matrix, which forms a protective barrier between the glass reinforcement and the chemical environment. The resin system selected determines the temperature rating and the range of chemicals the grating can tolerate. Glass fibers provide strength; the resin protects the fibers and bonds them together.

Key mechanisms:

- Barrier layer - resin-rich surface prevents chemical penetration to glass
- Chemical inertness - cross-linked thermoset resin does not dissolve or soften
- Temperature derating - chemical resistance decreases as service temperature rises
- Concentration dependence - higher concentration requires a higher-grade resin

How to read the resistance ratings

Rating	Meaning	Service Guidance
C - Continuous	Continuous exposure at listed temperature	Suitable for immersion or constant contact
S - Splash/Spill	Frequent splash or spill with prompt cleanup	Suitable for spill areas, not immersion
N - Not Recommended	Unsuitable at listed concentration/temp	Select a higher-grade resin system

Ratings in this guide are reproduced from ZeAllgrate Molded and Pultruded Grating Data Sheets and are based on standard resin formu

Resin System Chemical Resistance Profile

Each ZeAllgrate resin system offers a distinct chemical resistance profile. Select the resin grade after reviewing the full chemical list at the service temperature and concentration of your process environment.

Chemical Family	ORTHO	ISO	VE	VEFR
Acids (dilute)	C	C	C	C
Acids (concentrated)	S	S	C	C
Alkalies / Caustic	N	S	C	C
Solvents / Aromatics	N	S	C	C
Chlorinated organics	N	N	S	S
Oxidizing agents	N	S	C	C
Bleach / Pulp liquor	N	S	C	C
Salts & seawater	C	C	C	C
Fuels & hydrocarbons	N	S	C	C
Food & beverage washdown	C	C	C	C

C = continuous, S = splash/spill, N = not recommended. Verify the full chemical list at your operating temperature and concentration in th

Typical service temperatures

Resin System	Max Continuous (F)	Max Continuous (C)
Polyester ORTHO	140	60
Isophthalic ISO	150	65
Vinyl Ester VE	180	82
Vinyl Ester FR (VEFR)	180	82
Fire Retardant FR	150	65

Resin Selection by Industry

The table below recommends starting resin grades by industry. Confirm with the project chemical list before specification.

Industry / Area	Typical Exposure	Recommended Resin
Chemical processing	Mixed acids, solvents, chlorides	Vinyl Ester (VE)
Petrochemical & refining	Hydrocarbons, H2S, caustic	VE / VEFR
Pulp & paper bleach plant	Chlorine, bleach, white liquor	Vinyl Ester (VE)
Wastewater treatment	H2S, chlorides, biological	ISO / VE
Water treatment	Chlorine, alum, polymers	Isophthalic (ISO)
Food & beverage	Washdown, sanitizers, acids	ISO / VE
Pharmaceutical	Cleanroom agents, solvents	VE / VEFR
Marine & offshore	Seawater, splash, UV	ISO / VE
Galvanizing / plating	Hot acids, cyanide	Vinyl Ester (VE)
Battery rooms	Sulfuric acid mist	Vinyl Ester (VE)

Where multiple chemical families are present, select the resin grade based on the most aggressive chemical in the environment, then ve

Temperature and Concentration Effects

Two factors accelerate chemical attack on FRP: elevated temperature and high concentration. The tables in this guide list resistance at a defined maximum temperature and concentration range.

- Derating: as temperature rises toward the resin maximum, rated resistance narrows
- Concentration: dilute service allows lower-grade resins; concentrated service requires VE
- Thermal cycling: rapid temperature changes can stress the resin matrix - allow for design margins
- UV exposure: outdoor service should specify UV-inhibited resin or topcoat

Testing & verification

- Chemical resistance data based on standard coupon immersion testing
- All gratings tested per ANSI standards for FRP grating and stair treads
- Material certificates and load test reports supplied with every shipment
- Independent verification available through SGS / Intertek on request

Never exceed the maximum recommended load at the selected clear span. For aggressive or mixed environments, contact ZeAllgrate engineering for application assistance.

Verification & Contact

The information in this guide is intended as a selection reference only. Actual chemical resistance depends on the specific service environment, temperature, concentration, duration and mechanical loading. ZeAllgrate strongly recommends verifying the complete chemical list against the current data sheet before specification.

- Verify with project chemistry before specification
- Contact engineering for unlisted chemicals
- Request certified load and chemical data for your project
- Third-party inspection available (SGS / Intertek / BV)

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