

Aluminum Chemical Compatibility

1) Nonoxidizing Or Reducing Media

- *Acid Solutions:* excluding hydrochloric (ex) phosphoric, sulfuric, most conditions, many organics (Ratings: 1).

- *Neutral Solutions:* (ex) many nonoxidizing salt solutions, chlorides, sulfates (Ratings: 3).

A) Alkaline Solutions

- Caustic and mild alkalis, excluding ammonium hydroxide (Ratings: 0).
- Ammonium hydroxide and amines (Ratings: 6).

2) Liquids

A) Oxidizing Media

- Acid solutions (ex) nitric (Ratings: 0-5).
- Neutral or alkaline solutions (ex) persulfates, peroxides, chromates (Ratings: 0-4).
- Pitting media, acid ferric chloride solutions.
- Ratings: 0

B) Natural Waters - Fresh Water Supplies

- Static or slowmoving (Ratings: 4).
- Turbulent (Ratings: 5).

C) Natural Waters - Sea Water Supplies

- Static or slowmoving (Ratings: 0-5).
- Turbulent (Ratings: 4).

3) Gases - Common Industrial Media

A) Steam

- Moist, condensate (Ratings: 5)
- Dry at high temperature, promoting slight dissociation (Ratings: 2).

B) Furnace Gases With Incidental Sulfur Content

- Reducing (ex) heat treatment furnace gases (Ratings: 5).
- Oxidizing (ex) flue gases (Ratings: 4).

C) Ambient Air, City Or Industrial (Ratings: 5).

D) Halogens And Derivatives

- Halogens: Moist (ex) chlorine below dew point (Ratings: 0).

- Halogens: Dry (ex) fluorine above dew point (Ratings: 6).

- Halide acids, moist (ex) hydrochloric, hydrolysis, products of organic halides (Ratings: 0).

- Hydrogen halides, dry (ex) dry hydrogen chloride (Ratings: 3 < 400, 1 < 750).

E) Available Forms

- Wrought, cast, clad

F) Cold Formability In Wrought And Clad Form

- Good

G) Weldability

- Good

H) Maximum Strength Annealed Condition x 1000 lb/in²

- 9-90

I) Coefficient Of Thermal Expansion Millionths Per °F, 70 - 212°F

- 11.5 - 13.7

J) *Remarks:* Extent of corrosion dependent upon type and concentration of acidic ions; wide range of mechanical properties obtainable by alloying and heat treatment.

RATINGS LEGEND:

- 0: Unsuitable. Not available in form required or not suitable for fabrication requirements or not suitable for corrosion conditions.
- 1: Poor to fair.
- 2: Fair. For mild conditions or when periodic replacement is possible. Restricted use.
- 3: Fair to good.
- 4: Good. Suitable when superior alternatives are uneconomic.
- 5: Good to excellent.
- 6: Normally excellent.

NOTE: Small variations in service conditions may appreciably affect corrosion resistance. Choice of materials is therefore guided wherever possible by a combination of experience and laboratory and site tests.