

Corrosion

| | Stainless Steel 18/8 (304, 304L, 321) | | | Molybdenum Stainless Steel (316, 316L) | | | Duplex Stainless Steel (2205) | | | 3CR12 / 5CR12 | | |
|--|---|-----|------|--|-----|------|-------------------------------------|-----|------|---------------|-----|------|
| | 20° | 60° | 100° | 20° | 60° | 100° | 20° | 60° | 100° | 20° | 60° | 100° |
| Temperature °C | 20° | 60° | 100° | 20° | 60° | 100° | 20° | 60° | 100° | 20° | 60° | 100° |
| Aldehydes | R1 | R1 | R1 | R1 | R1 | R1 | R1 | R1 | R1 | R1 | R1 | R1 |
| Acetic Acid (10%) | R | R | R | R | R | R | R | R | R | R | R | ND |
| Acetic Acid (glac. & anh.) | R | R | NR | R | R | R | R | R | NR | ND | ND | ND |
| Acetic anhydride | R2 | NR | NR | R | R | NR | R | R | R | R2 | NR | ND |
| Ketones | R | R | R | R | R | R | R | R | R | R | ND | ND |
| Acetylene | R | R | R | R | R | R | R | R | R | R | ND | ND |
| Acid Fumes | R3 | R3 | R3 | R3 | R3 | R3 | R4 | NR | NR | NR | NR | NR |
| Alcohols | R | R | R | R | R | R | R | R | R | R | R | R |
| Aliphatic Esters | R | R | R | R | R | R | R | R | R | R | ND | ND |
| Alkyl Chlorides | R5 | R5 | R5 | R5 | R5 | R5 | R | R | R | R5 | ND | ND |
| Alum | R | R6 | NR | R | R | NR | R | R | NR | ND | ND | ND |
| Ammonia | R | R | R | R | R | R | R | R | R | R | R | R |
| Amyl Acetate | R | R | R | R | R | R | R | R | R | R | R | R |
| Aniline | R | R | R | R | R | R | R | R | R | R | R | R |
| Antimony Trichloride | R5 | NR | NR | R5 | R5 | NR | R | R | NR | NR | NR | NR |
| Aromatic Solvents | R | R | R | R | R | R | R | R | R | R | R | R |
| Atmospheric | | | | | | | | | | | | |
| Industrial | R7 | ND | ND | R | ND | ND | R | ND | ND | R7 | ND | ND |
| Marine | R7 | ND | ND | R | ND | ND | R | ND | ND | R7 | ND | ND |
| Rural | R | ND | ND | R | ND | ND | R | ND | ND | R7 | ND | ND |
| Ascorbic Acid | R1 | R1 | R1 | R | R | R | R | R | R | R1 | ND | ND |
| Benzoic Acid | R | R | R | R | R | R | R | R | R | R | R | R |
| Boric Acid | R | R | R | R | R | R | R | R | R | R | R | R |
| Brines, saturated | R8 | NR | NR | R8 | NR | NR | R | R | R | NR | NR | NR |
| Bromide (K) soln. | R9 | NR | NR | R9 | R9 | R9 | R | ND | ND | NR | NR | NR |
| Bromine (+ aqu.) | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Butyl Acetate | R | R | R | R | R | R | R | R | R | R | R | R |
| Calcium Chloride | NR | NR | NR | R8 | NR | NR | R10 | R10 | R10 | NR | NR | NR |
| Carbon Disulphide | R | R | ND | R | R | ND | R | R | R | R | R | R |
| Carbonic Acid | R | R | R | R | R | R | R | R | R | R | R9 | NR |
| Carbon Tetrachloride | R | R | R | R | R | R | R | R | R | R | R | R |
| Caustic Soda & Potash | R | R | R6 | R | R | R6 | R6 | R6 | ND | ND | R6 | R6 |
| Cellulose Paint | R | R | R | R | R | R | R | R | R | R | R | R |
| Chlorates of Na, K, Ba | R1 | R1 | R1 | R1 | R1 | R1 | R | R | R | ND | ND | ND |
| Chlorine, dry | R | R | R | R | R | R | R | R | ND | ND | ND | ND |
| Chlorine, wet | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Chlorides of Na, K, Mg, Ca, Ni, NH4, Al, Sn, Zn | R10 | NR | NR | R9 | R11 | R11 | R | R | ND | R5 | NR | NR |
| Chlorosulphuric Acid | NR | NR | NR | NR10 | NR | NR | ND | ND | ND | ND | ND | ND |
| Chromic Acid (80%) | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Citric Acid | R6 | R6 | R6 | R | R | R6 | R | R | R | NR | NR | NR |
| Cresylic Acids (50%) | R | R | R | R | R | R | R | R | R | R | R | R |
| Detergents, synthetic | R | R | R | R | R | R | R | R | R | R | R | R |
| Emulsifiers (all conc.) | R | R | R | R | R | R | R | R | R | ND | ND | ND |
| Esters & Ethers | R | R | R | R | R | R | R | R | R | R | R | R |
| Fatty Acids (> C6) | R | R | R | R | R | R | R | R | R | R | R | R |
| Ferric Chloride | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Fluorinated Refrigerants, Aerosols e.g. Freon | R5 | R | R | R5 | R | R | R | R | R | R6 | R | NR |
| Fluorine, dry | R | ND | ND | R | ND | ND | R | R | ND | ND | ND | ND |
| Fluorine, wet | NR | NR | NR | R | ND | ND | ND | ND | ND | NR | NR | NR |
| Formic Acid | R | NR | NR | R | R | ND | R | R | ND | NR | NR | NR |
| Fruit Juices | R12 | R | R | R | R | R | R | R | R | R13 | NR | NR |
| Gelatine | R1 | R | R | R1 | R | R | R | R | R | R1 | R1 | ND |
| Glycols | R | R | R | R | R | R | R | R | R | R | R | R |
| Hydrobromic Acid (50%) | NR | NR | ND | NR | NR | ND | NR | NR | ND | NR | NR | NR |
| Hydrochloric Acid (10%) | NR | NR | NR | NR | NR | NR | NR | NR | ND | NR | NR | NR |
| Hydrochloric Acid (conc.) | NR | NR | NR | NR | NR | NR | NR | NR | ND | NR | NR | NR |
| Hydrocyanic Acid | R | R | ND | R | R | ND | R | R | ND | R | ND | ND |
| Hydrofluoric Acid | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Hydrogen Peroxide (30%) | R | R | R | R | R | R | R | R | R | R | R | ND |

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|-----------------------------------|---|-----|------|--|-----|------|-------------------------------------|-----|------|---------------|-----|------|
| | 20° | 60° | 100° | 20° | 60° | 100° | 20° | 60° | 100° | 20° | 60° | 100° |
| Temperature °C | | | | | | | | | | | | |
| Hydrogen Sulphide | R5 | R5 | R5 | R5 | R5 | R5 | R5 | R5 | R5 | R5 | R5 | R5 |
| Hypochlorite (Na 12-14%) | R14 | NR | NR | R14 | ND | ND | R14 | ND | ND | R14 | ND | ND |
| Lactic Acid (100%) | R | NR | NR | R | R | NR | R | R | ND | NR | NR | NR |
| Lead Acetate | R | R | R | R | R | R | R | R | R | R | R | R6 |
| Lead Perchlorate | R1 | R1 | R1 | R | R1 | ND | ND | ND | ND | NR | NR | NR |
| Lime (CaO) | R | R | R | R | R | R | R | R | R | R | R | R |
| Manganate, Potassium (K) | R | R | R | R | R | R | R | ND | ND | R6 | ND | ND |
| Meat Juices | R | R | ND | R | R | ND | R | R | R | R7 | NR | NR |
| Mercuric Chloride | NR | NR | NR | NR | NR | NR | R | R | R | NR | NR | NR |
| Milk and its products | R | R | R | R | R | R | R | R | R | R | NR | NR |
| Molasses | R | R | R | R | R | R | R | R | R | R | R | R |
| Monoethanolamine | R | R | R | R | R | R | R | R | R | R | R | R |
| Naphthalene | R | R | R | R | R | R | R | R | R | R | R | R |
| Nitrates of Na, K, NH3, Ag | R | R | R | R | R | R | R | R | R | R | R | R |
| Nitric Acid (< 25%) | R | R | R | R | R | R | R | R | R | R | R15 | NR |
| Nitric Acid (50%) | R | R | R | R | R | R | R | R | R | R | R15 | NR |
| Nitric Acid (90%) | R | NR | NR | R | NR | NR | R | NR | ND | R | NR | NR |
| Nitric Acid (Fuming) | R | R2 | NR | R | R2 | NR | R | NR | NR | R | NR | NR |
| Oil, Diesel, Petroleum, Spirits | R | R | R | R | R | R | R | R | ND | R | R | R |
| Oils, essential | R | R | R | R | R | R | R | R | R | R | R | R |
| Oil, Lube with aromatic adds. | R | R | R | R | R | R | R | R | R | R | R | R |
| Oils, vegetable and animal | R | R | R | R | R | R | R | R | R | R | R | R |
| Oxalic Acid | R6 | NR | NR | R6 | R16 | NR | R | R | R | NR | NR | NR |
| Perchloric Acid | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Phenoll | R | R | R | R | R | R | R | R | R | R | R | R |
| Phosphoric Acid (20%) | R | R | R | R | R | R | R | R | R | NR | NR | NR |
| Phosphoric Acid (50%) | R | R | NR | R | R | R | R | R | R | NR | NR | NR |
| Phosphoric Acid (95%) | R | R | NR | R | R | NR | R17 | R17 | R17 | NR | NR | NR |
| Phosphorous Pentoxide | R | R | R5 | R | R | R5 | R | R | R | ND | ND | ND |
| Pyridine | R | R | R | R | R | R | R | R | R | R | R | R |
| Sea Water | R9 | NR | NR | R9 | NR | NR | R | NR | NR | NR | NR | NR |
| Silicic Acid | R | R | R | R | R | R | R | R | R | R | R | R |
| Sodium Peroxide | R16 | NR | NR | R6 | R16 | R16 | R | R | R | NR | NR | NR |
| Sodium Silicate | R | R | R | R | R | R | R | R | R | R | R | R |
| Sodium Sulphide | R | R | NR | R | R | NR | R | R | NR | R6 | R6 | NR |
| Starch | R | R | R | R | R | R | R | R | R | R | R | R |
| Sugar, Syrups, Jams | R12 | R | R | R | R | R | R | R | R | R12 | R12 | R12 |
| Sulphamic Acid | R18 | NR | NR | R | R19 | NR | R | R | NR | NR | NR | NR |
| Sulphates (Na, K, Mg, Ca, Al, Fe) | R | R | R | R | R | R | R | R | R | R | R | R |
| Sulphates | R | R | R | R | R | R | R | R | R | NR | NR | NR |
| Sulphur Dioxide, dry | R | R | R | R | R | R | R | R | R | R | R | R |
| Sulphur Dioxide, wet | R | NR | NR | R | R | NR | R | R | NR | NR | NR | NR |
| Sulphur Dioxide, aqu. soln. (96%) | R | NR | NR | R | R | R | R | R | R | NR | NR | NR |
| Sulphur Trioxide | NR | NR | NR | R5 | R5 | R5 | R5 | R5 | R5 | NR | NR | NR |
| Sulphuric Acid (<50%) | NR | NR | NR | R16 | NR | NR | R | R | NR | NR | NR | NR |
| Sulphuric Acid (70%) | NR | NR | NR | NR | NR | NR | R | NR | NR | NR | NR | NR |
| Sulphuric Acid (95%) | R | NR | NR | R | NR | NR | R | NR | NR | R15 | NR | NR |
| Sulphuric Acid, fuming | R | R2 | NR | R | R | NR | R | R | NR | R2 | R2 | NR |
| Tannic Acid (10%) | R | R | R | R | R | R | R | R | R | R | R | NR |
| Tartaric Acid | R | R | R | R | R | R | R | R | R | NR | NR | NR |
| Trichlorethylene | R5 | R5 | R5 | R5 | R5 | R5 | R5 | R5 | R5 | R5 | R5 | R5 |
| Urea (30%) | R | R | R | R | R | R | R | R | R | R | R | R |
| Water, pure | R | R | R | R | R | R | R | R | R | R | R | R |
| Yeast | R | R | R | R | R | R | R | R | R | R | R | R |

R indicates the material is resistant to the named chemical up to the temperature shown, subject to limitations indicated by the footnotes.

NR indicates that the material is not recommended.

ND indicates that no data is available.

- 1 - not if chlorides present
- 2 - limited data
- 3 - depending upon the acid
- 4 - acid fumes dry, attack may occur if moisture builds up
- 5 - anhydrous
- 6 - depending upon concentration
- 7 - may discolour with time
- 8 - in strong solutions only when inhibited
- 9 - pitting possible in stagnant conditions
- 10 - possibility of pitting

- 11 - may cause stress corrosion cracking
- 12 - when free of SO₂
- 13 - may cause contamination of product
- 14 - dilute hypochlorites can be used to sterilise some stainless steel with extreme care.
- 15 - general corrosion may become excessive
- 16 - 10%
- 17 - in the absence of impurities
- 18 - dilute
- 19 - some attack at high temperatures