Selecting Corrosion Resisting Alloys

FLOWSERVE

Flowserve Corporation has devoted more than 85 years to the development of alloys and the production of equipment to provide long, trouble-free life when handling severe corrosives. Pumps, valves, pipe, fittings, anodes, towers and various accessory castings are among the equipment engineered and produced by Flowserve Corporation in various nickel-base alloys, iron-base alloys, and reactive alloys.

The ratings listed in this bulletin represent the concentration and temperature at which each alloy experiences 20 mpy corrosion or less in an uncontaminated environment, unless otherwise indicated. Where applicable, localized forms of corrosion, such as pitting and stress corrosion cracking, have been considered. However, many other factors must be considered when selecting a material for a corrosive service. These include: primary corrosive; secondary corrosive; contaminants; concentration; pH; maximum, minimum and normal operating temperature; viscosity; velocity; solids in suspension; continuous or intermittent operation; degree of aeration; type or design of equipment; and any other peculiarities of the solution.

These ratings may be used as a guide in selecting materials for many Flowserve product components, including pipe, casings, covers, impellers, and valve bodies. Critical components such as plugs, shafts, and mag drive containment shells require lower rates of corrosion. In these cases, we recommend consulting with the Flowserve Materials Engineering Department.

The corrosion chart in this bulletin is intended to be a guide to the selection of the proper corrosion resistant material for a given application. The ratings are not a blanket recommendation or warranty, expressed or implied, for any of the materials for any media. These ratings are the compilation of extensive laboratory and field tests, operating experience and best judgement.

Corrosion Resistance

	Ductile Iron/ Carbon Steel	Type 400 Series	17-4PH	CF-8M	CD-4MCuN (Durcomet 100)	CN-7M (Durimet 20)	Inconel CY-40	Monel M-35-1	Nickel CZ-100	N-7M (Chlorimet 2)	CW-6M (Chlorimet 3)	Duriron	Durichlor 51/ Superchlor 77	Stellite 6	Durco DC-8 (10 mpy or less)	Titanium	Titainium-Pd	Zirconium 702 Zirconium 705
Acetaldehyde CH_3CHO	10^C	10^B	–	All^D	All^D	All^D	–	10^D	10^E	All^D	All^D	All^D	All^D	10^A	–	All^D	All^D	All^D
Acetic Acid CH_3COOH	NR	NR	0-6*	All^C	All^D	All^D	All^A	–	–	All^D	All^E	All^D	All^D	1-9*	All^D	All^E	All^E	All^E
Acetic Anhydride $(CH_3CO)_2O$	NR	NR	All^A	All^E	All^E	All^E	All^D	All^D	9-10^E	All^E	All^E	All^D	All^D	–	All^D	All^D	All^D	All^D
Acetone CH_3COCH_3	All^E	All^E	All^E	All^E	All^E	All^E	All^E	All^E	All^E	All^E	All^E	All^E	All^E	All^E	All*	All^E	All^E	All^E
Aluminum Chloride $AlCl_3$	NR	NR	NR	NR	NR	1^A	NR	0-5^A	10^D	All^D	All^D	0-7^D	All^D	NR	All^D	NR	0-4^D	All^D
Aluminum Nitrate $Al(NO_3)_3$	NR	1^D10^D	10^B	All^D	1^D10*	All^D	1^A	1^A	1^A	1^A	1^A	All^D	All^D	–	All^D	1^D	All^D	1^D
Aluminum Sulfate $Al_2(SO_4)_3$	NR	NR	NR	0-5^D	All^D	All^E	0-2^A	0-5^A	0-3^A	All^E	All^E	All^D	All^D	–	All^D	All^D	All^D	All^A
Ammonia-Anhydrous NH_3	10^D	10^E	10^E	10^E	10^E	10^E	10^E	NR	10^E	10^E	10^E	10^A	10^A	–	–	10^E	10^E	10^E
Ammonium Bifluoride NH_4HF_2	NR	NR	NR	1^B	All^C	All^D	1^A10^A	1^D	1^A10^A	1^D	5-10^E	NR	NR	–	–	NR	NR	NR
Ammonium Carbonate $(NH_4)HCO_3$ • $(NH_4)CO_2NH_2$	All^C	All^D	10^B	All^D	0-7^D	All^D	1^D	1^D	10^A	All^D	All^D	All^D	All^D	–	All^D	5*	5*	–
Ammonium Chloride NH_4Cl	10^A	NR	NR	NR	NR	NR	0-4^B	1^D	1^D	0-3^D	0-4^D	0-4^D	All^D	NR	All^D	All^D	All^D	All^D

0 = 0% weight percent
1 = 10% weight percent
2 = 20% weight percent
3 = 30% weight percent
4 = 40% weight percent
5 = 50% weight percent
6 = 60% weight percent
7 = 70% weight percent
8 = 80% weight percent
9 = 90% weight percent
10 = 100% weight percent
All = All Concentrations
NR = Not Recommended
A = 68°F max. (20°C)
B = 122°F max (50°C)
C = 167°F max (75°C)
D = 212°F max. (100°C)
E = 257°F max. (125°C)
* = To boiling
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Examples:
- 0- 4^B From 0 to 40% (weight percent) the material listed is acceptable to 122°F (50°C).
- 8^C At 80% the material listed is acceptable to 167°F (75°C).
- All^D All concentrations to 212°F (100°C) are acceptable.
- 1^D 10^D Material is acceptable at 10% to 212°F (100°C) and 100% to 212°F (100°C).

Corrosion Resistance

continued

	Ductile Iron/ Carbon Steel	Type 400 Series	17-4PH	CF-8M	CD-4MCuN (Durcomet 100)	CN-7M (Durimet 20)	Inconel CY-40	Monel M-35-1	Nickel CZ-100	N-7M (Chlorimet 2)	CW-6M (Chlorimet 3)	Duriron	Durichlor 51/ Superchlor 77	Stellite 6	Durco DC-8 (10 mpy or less)	Titanium	Titanium-Pd	Zirconium 702 Zirconium 705
Ammonium Fluoride NH_4F	NR	1^{A}	–	$1^{A}10^{A}$	1^{A}	1^{A}	$0\text{-}2^{A}$	$0\text{-}2^{C}$	$1^{D}10^{A}$	$0\text{-}2^{D}$	$0\text{-}5^{D}$	NR	NR	–	All^{D}	NR	NR	NR
Ammonium Hydroxide NH_4OH	$0\text{-}3^{D}$	$0\text{-}3^{D}$	1*	All^{D}	All^{D}	All^{D}	All^{A}	NR	NR	All^{D}	All^{D}	$0\text{-}3^{D}$	$0\text{-}3^{D}$	–	All^{D}	$0\text{-}4^{D}$	$0\text{-}4^{D}$	All^{D}
Ammonium Nitrate NH_4NO_3	$0\text{-}5^{D}$	All^{B}	10^{B}	All^{D}	All^{D}	All^{D}	10^{A}	NR	1^{A}	NR	All^{D}	All^{D}	All^{D}	NR	All^{D}	All*	All^{D}	All^{D}
Ammonium Phosphate $(NH_4)_2HPO_4$ or $NH_4H_2PO_4$	10^{A}	1^{A}	–	$0\text{-}4^{D}$	$0\text{-}4^{D}$	$0\text{-}4^{D}$	1^{D}	$0\text{-}3^{D}$	1^{D}	10^{A}	$0\text{-}4^{D}$	All^{D}	All^{D}	–	All^{D}	1^{D}	1^{D}	1^{D}
Ammonium Sulfate $(NH_4)_2SO_4$	$0\text{-}3^{A}$	NR	$0\text{-}4^{A}$	$0\text{-}5^{D}$	$0\text{-}5^{D}$	$0\text{-}5^{D}$	$0\text{-}5^{D}$	$0\text{-}4^{D}$	$0\text{-}9^{D}$	$0\text{-}5^{D}$	All^{D}	All^{D}	All^{D}	NR	All^{D}	All^{D}	All^{D}	All^{D}
Ammonium Sulfide $(NH_4)_2S$	$1^{D}10^{A}$	1^{D}	–	$1^{D}10^{D}$	$1^{D}10^{D}$	$1^{D}10^{D}$	$0\text{-}2^{D}$	1^{D}	1^{D}	1^{D}	$1^{D}10^{D}$	–	–	–	–	–	–	–
Ammonium Sulfite $(NH_4)_2SO_3$	NR	NR	–	$0\text{-}5^{E}$	$0\text{-}5^{E}$	$0\text{-}5^{E}$	NR	NR	NR	$0\text{-}3^{D}$	$0\text{-}6^{D}$	$0\text{-}5^{D}$	$0\text{-}5^{D}$	–	–	6^{D}	6^{D}	–
Amyl Acetate $CH_3COOC_5H_{11}$	$1^{A}10^{E}$	10^{E}	10^{B}	All^{E}	All^{E}	All^{E}	All^{B}	All^{D}	All^{E}	All^{E}	All^{E}	All^{D}	All^{D}	10^{B}	10^{C}	All^{B}	$8\text{-}10^{B}$	All^{D}
Amyl Alcohol $C_5H_{11}OH$	10^{D}	10^{D}	10^{B}	All^{B}	All^{B}	All^{B}	10^{D}	10^{D}	10^{D}	10^{D}	10^{D}	All^{D}	All^{D}	–	All^{B}	10^{D}	10^{D}	10^{D}
Amyl Chloride $CH_3(CH_2)_3CH_2Cl$	10^{A}	NR	10^{A}	NR	10^{C}	10^{C}	10^{D}	$9\text{-}10^{D}$	$8\text{-}10^{D}$	All^{A}	All^{A}	$1^{D}10^{D}$	All^{D}	10^{B}	10^{D}	10^{D}	10^{D}	10^{D}
Aniline Hydrochloride $C_5H_5NH_2 \cdot HCl$	NR	NR	NR	NR	NR	NR	NR	NR	NR	$0\text{-}2^{D}$	NR	All^{D}	All^{D}	NR	–	$0\text{-}2^{D}$	$0\text{-}2^{D}$	$0\text{-}2^{D}$
Barium Chloride $BaCl_2$	10^{A}	–	–	–	–	–	$0\text{-}6^{D}$	$0\text{-}6^{D}$	All^{D}	$0\text{-}6^{D}$	All^{D}	$0\text{-}6^{D}$	All^{D}	NR	All^{D}	All^{D}	All^{D}	All^{D}
Barium Nitrate $Ba(NO_3)_2$	$1^{A}10^{A}$	$0\text{-}3^{D}$	–	NR	$0\text{-}3^{D}$	All^{D}	1^{D}	NR	$0\text{-}3^{D}$	$1^{D}10^{E}$	All^{D}	All^{D}	All^{D}	–	All^{D}	All^{B}	All^{B}	All^{A}
Barium Sulfate $BaSO_4$	10^{D}	10^{D}	10^{B}	$1^{D}10^{D}$	$1^{D}10^{D}$	$1^{D}10^{D}$	10^{D}	All^{D}	10^{D}	10^{D}	All^{D}	All^{D}	All^{D}	–	All^{D}	All^{D}	All^{D}	All^{D}
Benzaldehyde C_6H_5CHO	10^{D}	10^{D}	10^{D}	10^{E}	10^{E}	10^{E}	10^{E}	10^{E}	10^{E}	10^{D}	10^{D}	All^{D}	All^{D}	NR	All^{D}	10^{A}	10^{A}	10^{D}
Benzene C_6H_6	10^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	$0\text{-}7^{D}$	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{C}	All^{D}	All^{D}	All^{D}
Benzoic Acid C_6H_5COOH	NR	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	$0\text{-}4^{C}$	All^{D}	All^{D}	$0\text{-}7^{D}$	All^{D}	All^{D}	All^{D}	–	All^{D}	All^{D}	All^{D}	All^{E}
Black Liquor	NR	–	–	All^{C}	All^{D}	All^{D}	–	–	NR	–	–	–	–	–	All^{D}	–	–	All^{D}
Boric Acid H_3BO_3	NR	$1^{D}10^{B}$	10^{B}	$0\text{-}4^{D}$	$0\text{-}5^{E}$	$0\text{-}5^{E}$	$0\text{-}2^{D}$	$0\text{-}2^{D}$	$0\text{-}2^{D}$	All^{E}	All^{E}	All^{D}	All^{D}	–	All^{D}	All^{D}	All^{D}	All^{D}
Brine, Neutral TypicAlly NaCl	All^{B}	–	–	All^{D}	All^{D}	All^{E}	All^{D}	All^{D}	All^{D}	All^{E}	All^{E}	All^{D}	All^{D}	NR	All^{D}	All^{C}	All^{C}	All^{D}
Bromine, dry Br	NR	NR	NR	NR	10^{A}	10^{A}	10^{D}	10^{B}	10^{D}	10^{E}	10^{E}	NR	NR	NR	–	NR	NR	NR
Bromine, wet Br	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	10^{D}	NR	NR	NR	–	All^{A}	All^{A}	NR
Butane $CH_3CH_2CH_2CH_3$	All^{D}	10^{D}	10^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	10^{A}	–	All^{D}	All^{D}	All^{D}
Butyric Acid $CH_3CH_2CH_2COOH$	NR	NR	10^{B}	All^{D}	All^{D}	All^{D}	NR	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	–	–	All^{C}	All^{C}	All^{D}
Calcium Bisulfite $Ca(HSO_3)_2$	NR	NR	–	All^{E}	All^{E}	All^{E}	NR	NR	NR	10^{A}	All^{E}	NR	NR	–	All^{D}	10^{D}	10^{D}	All^{D}

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Corrosion Resistance
continued

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Calcium Carbonate $CaCO_3$	All[A]	1[D]10[A]	10[B]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	–	–	All[D]	All[D]	All[D]
Calcium Chlorate $Ca(ClO_3)_2$	All[A]	0-3[D]	–	0-3[D]	0-3[D]	0-3[D]	0-3[D]	0-3[D]	0-3[D]	0-3[D]	0-7[D]	NR	–	–	All[D]	10[B]	10[B]	–
Calcium Chloride $CaCl_2$	NR	NR	NR	NR	All[B]	All[B]	0-6[D]	0-6[D]	0-5[E]	All[E]	All[E]	All[D]	All[D]	–	All[D]	All[D]	All[D]	All[C]
Calcium Hydroxide $Ca(OH)_2$	All[B]	1[D]	–	All[D]	All[D]	All[D]	All[E]	All[D]	All[D]	All[D]	All[D]	All[B]	All[B]	–	–	All*	–	0-2[D]
Calcium Hypochlorite $Ca(OCl)_2$	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0-2[B]	0-7[D]	All[D]	NR	All[D]	All[D]	All[D]	0-2[D]
Calcium Nitrate $Ca(NO_3)_2$	0-3[B]	NR	–	0-4[D]	0-4[D]	0-4[D]	0-4[D]	0-4[D]	0-5[D]	0-4[D]	0-4[D]	1[D]	All[D]	–	–	1[D]	1[D]	–
Calcium Phosphate $Ca_3(PO_4)_2$, $CaH_4(PO_4)_2$	10[D]	–	–	1[D]	1[D]	1[D]	1[D]	1[D]	1[D]	1[D]	All[D]	All[D]	All[D]	–	All[D]	1[D]	1[D]	1[D]
Calcium Sulfate $CaSO_4$	1[D]	1[D]10[D]	10[B]	1[D]10[D]	1[D]10[D]	1[D]10[D]	1[D]10[D]	1[D]10[A]	1[D]10[D]	1[E]	1[E]	1[D]10[A]	All[D]	–	–	1[D]10[D]	1[D]10[D]	1[D]10[D]
Calcium Sulfite $CaSO_3$	1[D]	1[D]	–	1[D]	1[D]	1[D]	–	10[D]	NR	1[D]	1[D]	1[D]	1[D]	–	–	1[D]	1[D]	–
Carbon Disulfide CS_2	NR	10[D]	10[D]	9[A]10[D]	9[A]10[D]	9[A]10[D]	All[B]	10[D]	10[D]	10[C]	All[D]	9[A]10[D]	9[A]10[D]	–	–	10[D]	10[D]	All[D]
Carbon Tetrachloride, dry CCl_4	10[B]	NR	10[B]	10[B]	10[D]	10[D]	10[D]	All[D]	10*	All[B]	All[C]	10[D]	All[D]	–	All[D]	All[D]	All[D]	All[C]
Carbon Tetrachloride, wet CCl_4	NR	NR	NR	NR	NR	NR	10[A]	All[B]	9-10*	All[A]	All[B]	All[B]	All[D]	NR	All[D]	All[D]	All[D]	All[C]
Chlorinated Water	–	NR	NR	NR	–	–	NR	NR	NR	NR	All[A]	10[A]	All[D]	NR	–	10[D]	All[A]	10[C]
Chlorine, dry (<50 ppm H_20) Cl_2	10[A]	NR	NR	10[A]	10[E]	10[D]	10[E]	10[E]	10[A]	10[E]	10[E]	10[B]	10[C]	–	–	NR	NR	10[D]
Chlorine, wet (>50 ppm H_20) Cl_2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	9-10[B]	All[B]	All[D]	NR	–	–	–	NR
Chlorine Dioxide ClO_2	NR	–	–	NR	NR	NR	NR	NR	NR	NR	10[B]	All[A]	All[D]	NR	All[C]	All[D]	All[D]	NR
Chloroacetic Acid $CH_2ClCOOH$	NR	NR	–	NR	NR	NR	NR	0-9[C]	1[D]10[E]	All[D]	All[D]	All[D]	All[D]	NR	All[B]	All[D]	All[D]	All[D]
Chlorobenzene C_6H_5Cl	10[D]	10[D]	10[A]	10[D]	10[D]	10[D]	10[D]	9-10[C]	10[E]	All[E]	All[D]	9-10[C]	All[D]	NR	All[D]	10[D]	10[D]	10[D]
Chloroform $CHCl_3$	10[D]	10[D]	10[A]	10[D]	7-10[B]	7-10[B]	9-10[D]	8-10[C]	8-10[D]	9-10[D]	9-10[D]	10[D]	All[D]	10[A]	–	8-10[C]	8-10[C]	10[D]
Chlorosulfonic Acid $ClSO_2OH$	10[D]	NR	NR	10[A]	10[A]	10[A]	NR	NR	NR	9-10[E]	All[A]	10[C]	All[D]	–	1[D]	10[D]	10[D]	NR
Chromic Acid CrO_3	NR	NR	NR	NR	0-2[B]	0-2[B]	NR	NR	NR	NR	All[C]	All[D]	All[D]	0-2[B]	1[A]	All[D]	All*	0-5[D]
Copper Nitrate $Cu(NO_3)_2$	NR	0-9[D]	–	All[D]	All[D]	All[D]	NR	NR	NR	NR	All[A]	All[D]	All[D]	–	All[D]	All[B]	All[D]	All[B]
Copper Sulfate $CuSO_4$	NR	0-2[A]	10[B]	All[B]	All[D]	All[D]	0-3[D]	0-3[A]	0-3[A]	10[D]	All[D]	All[D]	All[D]	–	All[D]	All[D]	All[D]	All[D]
Cupric Chloride $CuCl_2$	NR	NR	–	NR	NR	NR	NR	NR	NR	NR	All[B]	NR	All[D]	0-2[A]	All[B]	0-5*	0-5*	NR
Cuprous Chloride CuCl or Cu_2Cl_2	NR	NR	NR	NR	0-5[D]	0-5[D]	NR	NR	NR	NR	All[B]	All[D]	All[D]	NR	All[D]	0-5[D]	0-5[D]	NR
Cyclohexane C_6H_{12}	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[A]	All[D]	All[D]	All[D]	All[D]
Diethanolamine $(HOCH_2CH_2)_2NH$	10[E]	10[D]	–	10[E]	10[E]	10[E]	10[B]	10[B]	NR	10[B]	10[B]	10[E]	All[D]	–	–	10[D]	10[D]	–

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continued

	Ductile Iron/ Carbon Steel	Type 400 Series	17-4PH	CF-8M	CD-4MCuN (Durcomet 100)	CN-7M (Durimet 20)	Inconel CY-40	Monel M-35-1	Nickel CZ-100	N-7M (Chlorimet 2)	CW-6M (Chlorimet 3)	Duriron	Durichlor 51/ Superchlor 77	Stellite 6	Durco DC-8 (10 mpy or less)	Titanium	Titainium-Pd	Zirconium 702 Zirconium 705
Diethyl Ether $(C_2H_5)_2O$	10[D]	10[D]	–	9-10[D]	9-10[D]	9-10[D]	10[D]	10[D]	10[D]	10[D]	10[D]	10[D]	All[D]	–	–	10[D]	10[D]	10[D]
Dimethyl Amine $(CH_3)_2$ NH	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	–	All[D]	All[D]	All[D]	All[D]	–	–	All[D]	All[D]	All[D]
Ethyl Acetate $CH_3COOC_2H_5$	10[D]	10[A]	10[A]	All[E]	All[E]	All[E]	8-10[C]	8-10[B]	10[E]	All[E]	All[E]	All[D]	All[D]	10[A]	All[D]	All[D]	All[D]	All[D]
Ethyl Alcohol C_2H_5OH	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[A]	All[C]	All[D]	All[D]	All[D]
Ethyl Benzene $C_6H_5C_2H_5$	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[A]	All[D]	All[D]	All[D]	All[D]
Ethyl Chloride C_2H_5Cl	10[E]	10[E]	10[D]	10[D]	10[E]	10[E]	10[E]	10[E]	10[E]	All[A]	All[A]	10[D]	All[D]	NR	All[D]	10[E]	10[D]	10[E]
Ethylene $H_2C : CH_2$	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]
Ethylene Dichloride $ClCH_2CH_2Cl$	10[D]	10[A]	10[A]	10[D]	10[D]	10[D]	10[D]	9-10[D]	All[D]	9-10[D]	9-10[D]	9-10[D]	All[D]	10[A]	All*	10*	10*	All[D]
Ethylene Glycol CH_2OHCH_2OH	All[C]	10[D]	10[B]	All[D]	All[D]	All[D]	10[D]	8-10[D]	10[D]	All[D]	All[D]	All[D]	All[D]	10[A]	All[D]	All[D]	All[D]	All[D]
Ferric Chloride $FeCl_3$	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0-3[B]	NR	All[D]	1[A]10[C]	All[D]	All[D]	All[D]	NR
Ferric Nitrate $Fe(NO_3)_3$	NR	0-6[A]	0-5[A]	0-5[D]	All[D]	All[D]	NR	NR	NR	NR	All[B]	All[D]	All[D]	1-5[A]	All[D]	All[D]	All[D]	–
Ferric Sulfate $Fe_2 (SO_4)_3$	NR	0-2[A]	10[A]	All[B]	All[D]	All[B]	NR	NR	NR	All[C]	All[B]	All[D]	All[D]	–	All[D]	All[D]	All[D]	All[D]
Ferrous Chloride $FeCl_2$	NR	NR	NR	NR	NR	NR	NR	NR	NR	0-5[D]	0-5[D]	0-5[D]	All[D]	NR	All[D]	All[D]	0-5[D]	All[D]
Ferrous Sulfate $FeSO_4$	NR	0-4[A]	10[A]	All[D]	All[D]	All[D]	0-2[D]	10[C]	10[A]	All[D]	All[D]	All[D]	All[D]	–	–	All[D]	All[D]	All[D]
Fluosilicic Acid H_2SiF_6	NR	NR	–	NR	–	0-2[B]	NR	0-3[A]	NR	All[A]	All[E]	NR	NR	–	All[C]	NR	NR	NR
Formaldehyde HCHO	NR	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[B]	All[D]	All[D]	All[D]	All[D]	–	All[D]	All[D]	All[D]	All[D]
Formic Acid HCOOH	NR	NR	1[C]	All[D]	All[D]	All[D]	All[A]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	0-9*	All[D]	All[B]	0-5*	All[D]
Furfural C_4H_3OCHO	1[D]10[C]	NR	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]
Furfuryl Alcohol $C_4H_3OCH_2OH$	All[D]	10[D]	10[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	10[D]	10[D]	All[D]	10[D]	All[D]
Gasoline	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[A]	All[D]	All[D]	All[D]	All[D]
Glycerol $C_3H_5(OH)_3$	10[B]	All[D]	All[B]	All[D]	All[D]	All[D]	All[D]	All[D]	All[E]	All[D]	All[D]	All[D]	All[D]	All[A]	All[D]	All[D]	All[D]	All[D]
Heptane $CH_3(CH_2)_5CH_3$	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[A]	All[D]	All[D]	All[D]	All[D]
Hydrobromic Acid HBr	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	10[B]	0-4[A]	0-4[B]	NR	–	0-4[B]	0-4[C]	NR
Hydrochloric Acid HCl - aerated	NR	NR	NR	NR	NR	NR	NR	NR	NR	0-4[B]	0-4[B]	0-4[A]	0-4[B]	NR	1[C]	1[A]	1[C]	0-4[C]
Hydrochloric Acid HCl - non-aerated	NR	NR	NR	NR	NR	NR	1[A]	0-3[A]	0-2[A]	0-4[D]	0-4[B]	0-4[B]	0-4[B]	NR	1[C]	1[A]	1[C]	0-4[D]
HCL Waste Pickel Liquor	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	All[B]	All[B]	All[C]	NR	NR	1[C]	0-2[C]	NR
Hydrofluoric Acid HF - aerated	NR	NR	NR	NR	NR	0-2[B]	NR	NR	NR	NR	All[B]	NR	NR	NR	NR	NR	NR	NR

Corrosion Resistance
continued

	Ductile Iron/ Carbon Steel	Type 400 Series	17-4PH	CF-8M	CD-4MCuN (Durcomet 100)	CN-7M (Durimet 20)	Inconel CY-40	Monel M-35-1	Nickel CZ-100	N-7M (Chlorimet 2)	CW-6M (Chlorimet 3)	Duriron	Durichlor 51/ Superchlor 77	Stellite 6	Durco DC-8 (10 mpy or less)	Titanium	Titainium-Pd	Zirconium 702 Zirconium 705
Hydrofluoric Acid HF - non-aerated	NR	NR	NR	NR	NR	NR	NR	All[E]	NR	All[B]	All[B]	NR	NR	NR	NR	NR	NR	NR
Hydrogen Chloride HCl	10[E]	NR	–	10[E]	10[E]	10[E]	10[E]	10[E]	10[E]	10[E]	10[C]	10[A]	10[C]	–	–	10[E]	10[E]	10[D]
Hydrogen Fluoride HF	10[E]	NR	–	10[E]	10[E]	10[E]	10[E]	10[E]	10[E]	10[E]	10[E]	NR	NR	–	–	NR	NR	NR
Hydrogen Peroxide H_2O_2	NR	NR	5-9[A]	0-5[D]	0-5[D]	0-5[D]	0-2[C]	NR	NR	NR	NR	10[D]	10[D]	–	–	0-5[D]	0-5[D]	All[D]
Hydrogen Sulfide H_2S	10[A]	NR	NR	1[A]10[E]	10[E]	1[A]10[E]	1[B]	NR	NR	10[C]	10[C]	NR	NR	–	–	10[D]	10[D]	0-5[D]
Isopropyl Alcohol $(CH_3)_2CHOH$	9-10[B]	10[D]	10[A]	9-10[B]	9-10[B]	9-10[B]	9-10[C]	9-10[B]	9-10[C]	10[D]	10[D]	10[D]	10[D]	10[A]	All[D]	10[D]	10[D]	10[D]
Kerosene	10[D]	10[A]	10[A]	10[D]	10[D]	10[D]	10[D]	10[D]	10[D]	10[D]	10[D]	10[D]	10[D]	All[D]	All[D]	10[D]	10[D]	–
Lead Acetate $Pb(C_2H_3O_2)_2$	NR	10[D]	–	All[D]	All[D]	All[D]	1[D]10[D]	All[D]	1[D]	All[D]	All[D]	All[D]	All[D]	–	All[D]	All[D]	All[D]	All[D]
Magnesium Chloride $MgCl_2$	10[A]	–	NR	NR	0-4[A]	0-4[A]	5[D]	0-3[D]	0-5[A]	5-10[D]	All[D]	5-10[D]	All[D]	NR	All[D]	All[C]	All[C]	All[D]
Magnesium Sulfate $MgSO_4$	0-3[C]	10[D]	10[B]	All[D]	All[E]	All[E]	All[C]	All[C]	0-6[D]	All[B]	All[B]	All[D]	All[D]	10[A]	All[D]	All[D]	All[D]	All[D]
Maleic Acid COOH $(CH)_2$ COOH	NR	10[A]	–	All[D]	All[D]	All[D]	0-5[D]	0-5[D]	10[A]	All[D]	All[D]	All[D]	All[D]	–	All[D]	All[D]	All[D]	All[D]
Manganese Chloride $MnCl_2$	10[A]	–	–	NR	0-5[D]	0-5[D]	NR	0-4[A]	0-4[A]	0-4[D]	All[D]	0-4[D]	All[D]	NR	All[D]	All[D]	All[D]	All[D]
Mercuric Chloride $HgCl_2$	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0-3[C]	NR	All[D]	NR	All[D]	0-6[D]	0-6[D]	0-4[D]
Methyl Alcohol CH_3OH	All[D]	All[C]	All[A]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[A]	All[C]	All[D]	All[D]	All[D]
Methyl Ethyl Ketone $CH_3COCH_2CH_3$	All[D]	All[A]	All[A]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[A]	All[D]	All[D]	All[D]	All[D]
Methyl Formate $HCOOCH_3$	All[D]	–	–	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	0-3[D]	0-3[D]	–	–	10[A]	10[A]	10[A]
Nickel Chloride $NiCl_2$	NR	NR	NR	NR	0-3[B]	0-3[B]	NR	NR	NR	All[D]	All[D]	All[D]	All[D]	NR	All[D]	All[D]	All[D]	All[D]
Nickel Nitrate $Ni(NO_3)_2$	NR	10[B]	10[A]	All[D]	All[D]	All[D]	10[E]	10[E]	10[E]	NR	10[A]	All[D]	All[D]	–	–	All[A]	10[A]	–
Nickel Sulfate $NiSO_4$	NR	10[D]	–	All[D]	All[D]	All[D]	0-3[D]	0-2[D]	0-3[D]	–	0-6[D]	All[D]	All[D]	–	All[D]	–	10[D]	0-3[C]
Nitric Acid <70% HNO_3	NR	0-7[B]	0-2[B]	0-6*	0-7[E]	0-7*	0-5[A]	NR	NR	NR	0-6[A]	0-7[B]	0-7[B]	0-5[A]	0-7*	0-7[E]	0-3*	0-7[E]
Nitric Acid >70% HNO_3	NR	NR	NR	7-9[D]	7-9[D]	8[C]9[B]	NR	NR	NR	NR	NR	10[C]	10[C]	NR	NR	–	7*	10[D]
Nitrobenzene $C_6H_5NO_2$	10[E]	10[D]	–	All[E]	All[E]	All[E]	10[D]	NR	NR	NR	All[E]	All[E]	All[E]	–	All[E]	All[E]	All[E]	All[E]
Oxalic Acid $(HOOC)_2 \cdot 2H_2O$	NR	NR	–	All[A]	All[C]	All[C]	0-5[D]	NR	NR	All[D]	All[D]	All[D]	All[D]	–	All[D]	NR	NR	All[D]
Phenol C_6H_5OH	All[B]	10[D]	10[B]	All[D]	All[D]	All[D]	All[D]	All[B]	All[E]	All[E]	All[E]	All[D]	All[D]	–	All[D]	All[A]	All[D]	All[D]
Phosphoric Acid H_3PO_4	NR	NR	0-5[C]	All[D]	All[D]	All[D]	All[D]	NR	NR	All[D]	0-8[D]	All[A]	All[A]	1-9[B]	8-9[D]	NR	1*	0-5[D]
Phthalic Acid C_6H_4 $(COOH)_2$	10[D]	10[E]	10[D]	1[E]10[E]	1[E]10[D]	1[E]10[D]	10[D]	10[E]	10[E]	10[E]	10[E]	All[D]	All[D]	–	–	1[A]10[A]	1[A]10[A]	All[D]
Picric Acid $C_6H_2(NO_2)_3OH$	NR	10[A]	–	All[A]	All[A]	All[A]	NR	NR	10[A]	All[D]	All[D]	All[C]	All[C]	–	All[D]	All[D]	All[D]	All[D]

Corrosion Resistance
continued

	Ductile Iron/ Carbon Steel	Type 400 Series	17-4PH	CF-8M	CD-4MCuN (Durcomet 100)	CN-7M (Durimet 20)	Inconel CY-40	Monel M-35-1	Nickel CZ-100	N-7M (Chlorimet 2)	CW-6M (Chlorimet 3)	Duriron	Durichlor 51/ Superchlor 77	Stellite 6	Durco DC-8 (10 mpy or less)	Titanium	Titainium-Pd	Zirconium 702 Zirconium 705
Potassium Bisulfate $KHSO_4$	NR	NR	NR	1^{D}	All^{D}	All^{D}	NR	All^{D}	All^{A}	All^{D}	All^{D}	All^{D}	All^{D}	–	All^{D}	$1^{A}10^{A}$	$1^{A}10^{A}$	All^{D}
Potassium Chloride KCl	NR	0-3^{A}	0-3^{A}	NR	0-3^{D}	0-3^{C}	0-3^{D}	0-3^{D}	0-3^{D}	0-3^{D}	All^{D}	0-3^{D}	All^{D}	NR	All^{D}	All^{D}	All^{D}	All^{D}
Potassium Hydroxide KOH	0-5^{B}	0-5^{D}	0-3^{B}	0-5^{D}	All^{E}	0-8^{E}	All^{D}	0-6^{D}	All^{E}	All^{D}	All^{D}	0-3^{B}	0-3^{B}	–	All^{D}	0-3^{C}	0-3^{C}	All^{D}
Potassium Nitrate KNO_3	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	NR	All^{D}	All^{D}	All^{D}	8^{A}	All^{D}	All^{D}	All^{D}	All^{D}
Potassium Sulfate K_2SO_4	0-2^{C}	1^{A}	1^{A}	0-2^{D}	All^{D}	All^{D}	0-2^{D}	0-2^{D}	0-2^{D}	All^{D}	All^{D}	All^{D}	All^{D}	1^{A}	All^{D}	All^{D}	All^{D}	All^{D}
Propane C_3H_8	All^{D}	All^{D}	All^{B}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{A}	All^{D}	All^{D}	All^{D}	All^{D}
Sea Water	NR	NR	NR	10^{A}+	10^{B}+	10^{A}+	10^{A}	10^{B}	10^{A}	10^{C}	10^{E}	10^{C}	10^{C}	10^{A}	All^{D}	10^{D}	All^{D}	10^{D}
Silver Nitrate $AgNO_3$	NR	1-9^{D}	–	0-7^{D}	0-7^{D}	0-6^{D}	10^{A}	NR	NR	0-6^{D}	0-6^{A}	0-9^{D}	0-9^{D}	–	–	0-2^{B}	0-2^{B}	1^{A}
Sodium Acetate $NaC_2H_3O_2$	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	–	–	All^{D}	All^{D}	All^{D}
Sodium Aluminate $Na_2Al_2O_3$ or $NaAlO_2$	0-4^{D}	–	–	0-4^{D}	0-4^{D}	0-4^{D}	0-5^{D}	0-5^{D}	0-5^{D}	1^{A}	1^{A}	NR	NR	–	–	0-3*	0-3*	–
Sodium Bicarbonate $NaHCO_3$	0-2^{D}	0-2^{D}	0-2^{B}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	0-2^{D}	All^{D}	All^{D}	All^{D}	–	All^{C}	All^{D}	All^{D}	All^{D}
Sodium Bichromate $Na_2Cr_2O_7$	All^{D}	All^{D}	All^{B}	All^{D}	All^{D}	All^{D}	All^{C}	–	–	–	All^{C}	All^{D}	All^{D}	–	All^{D}	All^{C}	All^{C}	All^{C}
Sodium Bisulfate $NaHSO_4$	NR	10^{C}	NR	0-5^{A}	All^{D}	All^{D}	1^{D}	0-4^{D}	0-5^{D}	All^{D}	All^{D}	All^{D}	All^{D}	–	All^{D}	0-3^{A}	0-3^{A}	All^{D}
Sodium Bisulfite $NaHSO_3$	NR	NR	NR	0-4^{A}	All^{D}	All^{D}	0-4^{A}	0-2^{B}	0-4^{D}	0-4^{D}	All^{D}	NR	NR	–	All^{D}	All^{D}	All^{D}	All^{D}
Sodium Bromide NaBr	NR	NR	NR	–	0-5^{D}	0-5^{D}	0-6^{D}	0-5^{D}	0-6^{D}	0-6^{D}	0-6^{D}	NR	NR	–	–	10^{A}	10^{A}	10^{A}
Sodium Carbonate Na_2CO_3	0-4^{D}	0-3^{D}	0-4^{B}	0-4^{D}	0-4^{D}	0-4^{D}	0-4^{D}	0-4^{D}	0-4^{D}	0-4^{D}	0-4^{D}	0-4^{C}	0-4^{C}	–	–	0-4^{D}	0-4^{D}	10^{D}
Sodium Chlorate $NaClO_3$	NR	–	0-7^{D}	0-7^{D}	0-7^{D}	0-7^{D}	0-6^{D}	0-6^{D}	0-6^{D}	0-7^{D}	0-7^{D}	0-7^{D}	All^{D}	–	All^{D}	0-4^{A}	0-4^{A}	All^{D}
Sodium Chloride NaCl	0-3^{B}	NR	0-3^{D}	0-3^{D}	0-3^{D}	0-3^{D}	0-3^{D}	All^{D}	0-3^{D}	0-3^{D}	All^{D}	0-4^{D}	All^{D}	NR	All^{D}	All^{D}	All^{D}	All^{D}
Sodium Chlorite $NaClO_2$	NR	NR	NR	0-4^{A}	0-4^{B}	1^{D}	NR	NR	NR	NR	1^{A}	0-5^{A}	0-5^{B}	–	–	0-3^{D}	0-3^{D}	–
Sodium Citrate $C_6H_5O_7Na_3$	10^{A}	10^{A}	–	0-4^{D}	0-4^{D}	0-4^{D}	–	10^{A}	10^{A}	0-5^{A}	0-5^{A}	10^{D}	10^{D}	–	–	$6^{B}10^{A}$	$5^{B}10^{A}$	–
Sodium Cyanide NaCN	All^{D}	0-2^{D}	All^{A}	All^{B}	All^{D}	All^{D}	All^{A}	NR	1^{A}	10^{B}	10^{B}	–	–	–	–	All^{D}	All^{D}	All^{D}
Sodium Fluoride NaF	NR	NR	NR	1^{E}	1^{D}	$1^{D}10^{C}$	10^{A}	$1^{D}10^{C}$	1^{D}	$1^{A}10^{D}$	$1^{A}10^{D}$	NR	NR	–	–	$1^{A}10^{A}$	$1^{A}10^{A}$	0-2^{B}
Sodium Hydroxide NaOH	0-5^{B}	0-3^{D}	0-7^{B}	0-5^{D}	All^{E}	0-7^{E}	All^{D}	All*	All^{E}	All^{D}	All^{D}	0-5^{C}	0-5^{C}	1^{A}	All^{E}	0-7^{D}	0-7^{D}	All^{D}
Sodium Hypochlorite NaOCl	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0-2^{B}	1^{B}	All^{C}	NR	0-2^{A}	All^{C}	All^{D}	1^{D}
Sodium Nitrate $NaNO_3$	All^{B}	10^{A}	0-9^{D}	0-9^{E}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	NR	All^{D}	All^{D}	All^{D}	All^{B}	All^{D}	All^{D}	All^{D}	All^{D}
Sodium Nitrite $NaNO_2$	0-6^{D}	0-6^{D}	0-6^{D}	0-6^{D}	0-6^{D}	0-6^{D}	0-6^{D}	0-6^{D}	0-6^{D}	0-6^{D}	0-6^{D}	0-6^{D}	0-6^{D}	–	–	10^{D}	10^{D}	0-6^{D}
Sodium Perchlorate $NaClO_4$	10^{A}	–	–	0-9^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	All^{D}	–	All^{D}	All^{D}	All^{D}	–

Corrosion Resistance
continued

	Ductile Iron/ Carbon Steel	Type 400 Series	17-4PH	CF-8M	CD-4MCuN (Durcomet 100)	CN-7M (Durimet 20)	Inconel CY-40	Monel M-35-1	Nickel CZ-100	N-7M (Chlorimet 2)	CW-6M (Chlorimet 3)	Duriron	Durichlor 51/ Superchlor 77	Stellite 6	Durco DC-8 (10 mpy or less)	Titanium	Titainium-Pd	Zirconium 702 Zirconium 705
Sodium Peroxide Na_2O_2	All[A]	1[A]	1[A]	All[D]	1[D]	All[D]	1[D]	1[D]	1[D]	1[D]	1[D]	1[D]	1[D]	–	–	All[D]	–	All[D]
Sodium Phosphate Na_2HPO_4 (dibasic) NaH_2PO_4 (mono)	0-6[B]	NR	–	0-6[D]	0-6[D]	0-6[D]	0-6[D]	0-6[D]	0-6[D]	0-6[D]	0-6[D]	All[D]	All[D]	–	All[D]	0-6[D]	0-6[D]	All[D]
Sodium Silicate $2Na_2O \bullet SiO_2$	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[E]	1[D]	All[D]	All[D]	All[D]	–	–	All[D]	All[D]	All[D]
Sodium Sulfate Na_2SO_4	All[B]	–	0-2[C]	All[D]	All[D]	All[D]	0-3[D]	0-3[D]	0-3[D]	All[D]	All[D]	All[D]	All[D]	1[A]	All[D]	All[D]	All[D]	All[D]
Sodium Sulfide Na_2S	NR	NR	NR	0-4[D]	0-5[D]	0-5[D]	All[D]	0-5[E]	All[D]	2[A]	0-5[D]	0-4[C]	0-4[C]	–	–	0-5[D]	0-5[D]	NR
Sodium Sulfite Na_2SO_3	NR	1[D]	–	0-5[D]	All[D]	All[D]	0-3[D]	0-2[D]	0-3[D]	NR	All[D]	NR	NR	–	All[D]	All[D]	All[D]	All[D]
Stannic Chloride $SnCl_4$	NR	NR	NR	NR	NR	NR	10[D]	10[A]	10[D]	NR	NR	0-2[B]	All[D]	NR	All[D]	0-3[D]	0-3[D]	0-3[D]
Stannous Chloride $SnCl_2$	NR	NR	–	NR	NR	1[D]	10[E]	10[E]	10[E]	NR	All[C]	All[D]	All[D]	NR	–	10[A]	10[A]	All[D]
Stearic Acid $CH_3(CH_2)_{16}$ COOH	NR	10[D]	10[B]	10[E]	All[D]	All[D]	10[E]	10[E]	10[E]	All[D]	All[D]	All[D]	All[D]	–	All[D]	All[D]	All[D]	All[D]
Styrene $C_6H_5CH{:}CH_2$	All[B]	All[A]	All[A]	All[B]	All[D]	All[C]	All[A]	All[A]	All[A]	All[A]	All[A]	All[D]	All[D]	–	–	All[D]	All[D]	All[D]
Sulfur S	10[E]	10[E]	–	10[E]	10[D]	10[D]	10[E]	10[E]	10[E]	10[E]	9-10[E]	10[E]	10[E]	–	10[E]	10[E]	10[E]	All[E]
Sulfur Chloride S_2Cl_2	10[D]	10[A]	NR	NR	10[E]	10[E]	10[E]	NR	10[E]	All[D]	9-10[E]	NR	All[D]	NR	–	NR	NR	All[D]
Sulfuric Acid <70% H_2SO_4	NR	NR	NR	NR	1[D]	0-7[C]	NR	0-6[D]	0-2[A]	0-7*	0-7[C]	0-7[C]	0-7[D]	0-7[A]	0-7[C]	NR	1[C]	0-7[D]
Sulfuric Acid >70% H_2SO_4	NR	NR	NR	10[A]	8-10[B]	7-10[C]	NR	NR	NR	7-10*	7-10[C]	7-10[E]	7-10[E]	7-10[A]	7-9[C]	NR	NR	NR
Sulfurous Acid H_2SO_3	NR	NR	0-2[A]	0-2[A]	0-2[A]	0-2[D]	10[A]	NR	NR	NR	All[D]	NR	NR	NR	–	All[B]	All[B]	All[D]
Tartaric Acid $HOOC(CHOH)_2$ COOH	NR	0-5[D]	–	0-5[D]	All[D]	All[D]	All[C]	All[D]	0-6[B]	All[D]	All[D]	All[D]	All[D]	All[D]	–	All[D]	All[D]	All[D]
Thionyl Chloride $SOCl_2$	NR	NR	NR	10[A]	10[B]	10[B]	NR	NR	NR	9-10[C]	1[C]	10[D]	10[D]	–	–	NR	NR	–
Titanium Tetrachloride $TiCl_4$	10[A]	10[A]	10[A]	10[A]	10[A]	10[A]	10[E]	10[A]	–	NR	10[A]	10[A]	10[A]	–	–	10[E]	10[E]	10[A]
Toluene $C_6H_5CH_3$	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[C]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]	All[D]
Tributyl Phosphate $(C_4H_9)_3$ PO_4	10[A]	–	–	10[A]	10[A]	1[C]10[A]	–	10[E]	10[A]	–	10[E]	10[D]	10[D]	–	–	–	–	–
Trichloroethylene CHCl: CCl_2	9-10[D]	5[D]	–	9-10[D]	All[D]	All[D]	9-10[D]	9-10[D]	9-10[D]	9-10[D]	9-10[D]	All[D]	All[D]	10[A]	–	All[D]	All[D]	5-10[D]
Triethanolamine $(HOCH_2CH_2)_3$ N	All[D]	All[D]	All[E]	All[E]	All[E]	All[E]	10[B]	10[A]	10[A]	All[A]	All[A]	All[E]	All[E]	All[A]	All[D]	10[B]	10[B]	All[E]
Vegetable Oil	10[E]	10[E]	10[E]	9-10[E]	9-10[E]	9-10[E]	10[E]	10[E]	9-10[E]	10[E]	10[E]	10[E]	10[E]	–	–	10[D]	–	10[D]
Vinyl Acetate $CH_3COOCH : CH_2$	10[B]	–	–	10[B]	10[B]	1[C]10[B]	10[B]	10[E]	10[B]	–	8[E]10[B]	10[D]	10[D]	–	–	–	–	–
Xylene C_6H_4 $(CH_3)_2$	All[D]	All[D]	All[D]	All[E]	All[E]	All[E]	All[D]	All[D]	All[D]	All[E]	All[E]	All[D]	All[D]	All[A]	All[D]	All[D]	All[D]	All[D]
Zinc Chloride $ZnCl_2$	NR	NR	NR	NR	0-8[B]	0-8[B]	All[B]	0-7[C]	0-5[B]	All[D]	All[D]	0-4[C]	All[D]	NR	All[D]	All[D]	0-7[E]	All[D]
Zinc Sulfate $ZnSO_4$	NR	0-5[A]	0-5[A]	All[C]	All[D]	All[B]	All[C]	All[D]	All[B]	All[D]	All[D]	All[D]	All[D]	–	All[D]	All[D]	0-4[D]	All[D]

Composition

Durco Designation	Composition								
	Cr	Ni	Mo	Cu	Si	Mn	C	Fe	Co
Ductile Iron					2.75 max		3.0 min	Bal	
Carbon Steel	0.50 max	0.5 max	0.20 max	0.30 max	0.60 max	1.00 max	0.30 max	Bal	
17-4PH	15.5-17.5	3.0-5.0		3.0-5.0	1.0 max	1.0 max	0.07 max	Bal	
Durco CF-8M	18.0-21.0	9.0-12.0	2.0-3.0		2.00 max	1.50 max	0.08 max	Bal	
Durcomet 100	24.5-26.5	4.75-6.00	1.75-2.25	2.75-3.25	1.00 max	1.00 max	0.04 max	Bal	
Durimet 20	19.0-22.0	27.5-30.5	2.0-3.0	3.0-4.0	1.50 max	1.50 max	0.07 max	Bal	
Durcomet 5	20.0-22.0	15.0-17.0			4.0-6.0	1.50 max	.025 max	Bal	
Durco CK-3M	19.5-20.5	17.5-19.5	6.0-7.0	0.5-1.0	1.00 max	1.2 max	.025 max	Bal	
Durco CY-40	14.0-17.0	Bal			3.00 max	1.50 max	0.40 max	11.00 max	
Durco M-35		Bal		26.0-33.0	1.25 max	1.50 max	0.35 max	3.50 max	
Nickel CZ-100		95.0 min		1.25 max	2.00 max	1.50 max	1.00 max	3.00 max	
Chlorimet 2	1.00 max	Bal	30.0-33.0		1.00 max	1.00 max	0.07 max	3.00 max	
Chlorimet 3	17.0-20.0	Bal	17.0-20.0		1.00 max	1.00 max	0.07 max	3.00 max	
Duriron	0.50 max		0.50 max	0.50 max	14.20-14.75	1.50 max	0.70-1.10	Bal	
Durichlor 51M	3.25-5.00		0.40-0.60	0.50 max	14.20-14.75	1.50 max	0.75-1.15	Bal	
Superchlor 77	4.00-4.50		3.00-3.30	0.12 max.	15.50-16.00	1.00 max	0.80-0.95	Bal	
Stellite 6	27.0-31.0	3.0 max	1.5 max		1.5 max	1.0 max	0.9-1.4	3.0 max	Bal
Durco DC-8	Proprietary Cobalt Base Alloy								Bal
Titanium	N, 0.05 max; H, 0.015 max; O, 0.40 max						0.10 max	0.25 max	
Titanium-Pd	N, 0.05 max; H, 0.015 max; O, 0.40 max; Pd, 0.12 min						0.10 max	0.25 max	
Zirconium	N, 0.03 max; H, 0.005 max; O, 0.25 max; Hf, 4.5 max						0.10 max	0.30 max	
Zirconium 5	N, 0.03 max; H, 0.005 max; O, 0.30 max; Hf, 4.5 max; Cb, 2.0-3.0						0.10 max	0.30 max	

Specifications and Properties

Durco Designation	Durco Symbol	ACI Designation	Equivalent Wrought Designation	ASTM Specifications*	DIN (WN)	Mechanical Properties			Typical Brinell Hardness
						Tensile Strength, min, psi	Yield Point min, psi	Elongation min, % in 2"	
Ductile Iron	DCI	None	None	A395	1693 (0.7043)	60,000	40,000	18	160
Carbon Steel	DS	None	Carbon Steel	A216, Gr. WCB	17245 (1.0619)	70,000	36,000	22	150
17-4PH	17-4	None	17-4PH	A564, Type 630	–	145,000	125,000	13	330
Durco CF-8M	D4	CF-8M	316	A744, Gr. CF-8M	17445(1.4408)	70,000	30,000	30	154
Durcomet 100	CD4M	CD-4MCu	Ferralium 255	A995, Gr. 1B	SEW 410 (1.4463)	100,000	70,000	16	224
Durimet 20	D20	CN-7M	Alloy 20	A744, Gr. CN-7M	(1.4500)	62,000	25,000	35	133
Durcomet 5	DV	None	None	None	–	90,000	40,000	30	175
Durco CK-3M	CK-3M	CK-3MCuN	254SMO	A744, Gr. CK-3MCuN	(1.4529)	80,000	38,000	35	195
Durco CY-40	DINC	CY-40	Inconel 600	A494, Gr. CY-40	17742 (2.4816)	70,000	28,000	30	147
Durco M-35	DMM	M-35-1	Monel 400	A494, Gr. M-35-1	17130 (2.4365)	65,000	25,000	25	130
Nickel CZ-100	DNI	CZ-100	Nickel 200	A494, Gr. CZ-100	17730 (2.4170)	50,000	18,000	10	118
Chlorimet 2	DC2	N-7M	Hastelloy B-2	A494, Gr. N-7M	(2.4882)	76,000	40,000	20	200
Chlorimet 3	DC3	CW-6M	Hastelloy C-276	A494, Gr. CW-6M	(2.4883)	72,000	40,000	25	200
Duriron	D	None	None	A518, Gr. 1	–	930# (A)	–	–	520
Durichlor 51	D51M	None	None	A518, Gr. 2	–	930# (A)	–	–	520
Superchlor 77	SD77	None	None	None	–	1600# (A)	–	–	520
Stellite 6	F6	None	Stellite 6	None	–	115,000	96,000	3	400
Durco DC-8	DC8	None	None	None	–	–	–	–	300
Titanium	Ti	None	Titanium	B367, Gr. C-3	17850 (3.7031)	65,000	55,000	12(B)	200
Titanium-Pd	Ti-Pd	None	Titanium-Pd	B367, Gr. C-8A	17850 (3.7032)	65,000	55,000	12(B)	200
Zirconium	Zr	None	Zirconium 702	B752, Gr. 702C	–	55,000	40,000	12(B)	190
Zirconium 5	Zr5	None	Zirconium 705	B752, Gr. 705C	–	70,000	40,000	12(B)	190

*Whenever an ASTM specification is cited, the Durco alloy will conform to the chemical and mechanical requirements of the latest edition of the specification. (A) Minimum transverse strength. (B) Minimum percent elongation in 1".

For further assistance with materials recommendations, call the Materials Engineering Department at (937) 226-4475 or fax your request to (937) 226-4476. You may also e-mail us at materials@flowserve.com.

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