

Appendix B Fluid/Material Matrix

If a potentially corrosive fluid, or a piping material, is not found in the fluid/material matrix, then the reference materials listed in Appendix A should be directly reviewed. If the references cannot satisfactorily resolve the issue, then a special study may be required to determine material compatibility and acceptable use. If doubt of material suitability remains after the study due to exceptional conditions, a report should be submitted to HQUSACE (CEMP-EG).

B-1. Use of the Fluid/Material Matrix

The following matrix is arranged alphabetically according to the list of fluids typically found or used at hazardous and toxic waste remediation sites. Unless otherwise noted, the liquids are considered pure. All percentages shown are expressed in percent by weight.

a. Corrosion Resistivity

The matrix provides the temperature above ambient conditions of 15EC (60EF) at which corrosion or chemical resistivity of a material is acceptable for use with an identified fluid. For metals, an acceptable corrosion rate is less than 1.27 mm (50 mils) penetration per year. For non-metals and other materials, acceptability is considered based on the material's resistance to solvation or chemical reaction. Although materials may be corrosion resistant below the listed temperatures, other physical or mechanical properties of that material may preclude its acceptability for a specific use. A thorough evaluation considering all physical and mechanical properties of a material for its intended use is required.

b. Temperature Correlation

The matrix temperatures are provided in both the metric and IP units (degrees C and degrees F, respectively). Materials with unsatisfactory chemical resistance or corrosion rates at temperatures above ambient temperatures are indicated with a "U". Matrix entries for materials with insufficient information are left blank.

B-2. Material Abbreviations

ABS	- Acrylonitrile-butadiene-styrene
CPVC	- Chlorinated polyvinyl chloride
Resins	
Furan	- Furfural alcohol
Polyester	- Bisphenol A-fumarate
HDPE	- High density polyethylene
PP	- Polypropylene
PTFE	- Teflon ¹
PVC Type 2	- Polyvinyl chloride Type 2
PVDF	- Polyvinylidene fluoride
Butyl	- Butyl rubber GR-1 (IIR)
EPDM	- Ethylene-propylene-diene
EPT	- Ethylene-propylene terpolymer
FEP	- Perfluoroethylenepropylene
FKM	- Fluoroelastomer
Neoprene ²	- Polychloroprene
Nitrile	- Butadiene-acrylonitrile
N-Rubber	- Natural rubber
PFA	- Perfluoroalkoxyalkane copolymer
PVDC	- Polyvinylidene chloride
SBR Styrene	- Butadiene-styrene-elastomer

B-3. Matrix

Data contained within this matrix was obtained primarily from Schweitzer, Corrosion Resistance Tables, 4th Edition, see Appendix A for the complete reference information.

¹ Teflon is a registered trademark of E.I. DuPont.

² Neoprene is a registered trademark of E.I. DuPont.

Table B-1. Fluid/Material Matrix

FLUID/MATERIAL	Acetic Acid 10%	Acetic Acid 20%	Acetic Acid 50%	Acetic Acid 80%	Acetic Acid Glacial	Acetone	Aluminum Chloride, Aq.
METALS							
Aluminum	65 (150)	87 (190)	76 (170)	76 (170)	98 (210)	260 (500)	U
Bronze	93 (200)	U	U	U	U	204 (400)	U
Carbon Steel	U	U	U	U	U	149 (300)	U
Copper	38 (100)	U	U	U	U	60 (140)	26 (80)
Ductile Iron, Pearlitic							
Hastelloy C	149 (300)	149 (300)	149 (300)	149 (300)	293 (560)	93 (200)	98 (210)
Inconel	26 (80)	32 (90)	54 (130)	32 (90)	104 (220)	87 (180)	U
Monel	26 (80)	98 (210)	93 (200)	93 (200)	143 (290)	87 (180)	U
Nickel	32 (90)	32 (90)	60 (140)	49 (120)	U	87 (180)	149 (300)
304 SS	93 (200)	104 (220)	104 (220)	110 (230)	98 (210)	87 (180)	U
316 SS	216 (420)	204 (400)	204 (400)	110 (230)	204 (400)	204 (400)	U
NON-METALS							
ABS	38 (100)	54 (130)	53 (130)	U	U	U	60 (140)
CPVC	32 (90)	82 (180)	U	U	U	U	93 (200)
Resins - Epoxy	82 (190)	43 (110)	43 (110)	43 (110)		43 (110)	
- Furan	127 (260)	121 (230)	93 (200)	93 (200)	132 (270)	93 (200)	127 (260)
- Polyester	104 (220)	93 (200)	71 (160)	71 (160)	U	U	93 (200)
- Vinyl Ester	93 (200)	93 (200)	82 (180)	65 (150)	65 (150)	U	127 (260)
HDPE	60 (140)	60 (140)	60 (140)	26 (80)	38 (100)	49 (120)	60 (140)
PP	104 (220)	104 (220)	93 (200)	93 (200)	85 (190)	104 (220)	93 (200)
PTFE	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)
PVC Type 2	38 (100)	60 (140)	32 (90)	U	U	U	60 (140)
PVDF	149 (300)	149 (300)	149 (300)	87 (190)	87 (190)	U	149 (300)
OTHER MATERIALS							
Butyl	65 (150)	65 (150)	43 (110)	43 (110)	32 (90)	71 (160)	65 (150)
EPDM	149 (300)	60 (140)	60 (140)	60 (140)	149 (300)	149 (300)	149 (300)
EPT	U	U	U	U	U	U	82 (180)
FEP	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)
FKM	82 (180)	93 (200)	82 (180)	82 (180)	U	U	204 (400)
Borosilicate Glass	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	121 (250)	121 (250)
Neoprene	71 (160)	71 (160)	71 (160)	71 (160)	U	U	93 (200)
Nitrile	93 (200)	93 (200)	93 (160)	98 (210)	38 (100)	U	93 (200)
N-Rubber	65 (150)	26 (80)	U	U	U	U	60 (140)
PFA	93 (200)	93 (200)	93 (200)	93 (200)	121 (250)	93 (200)	93 (200)
PVDC	60 (140)	49 (120)	54 (130)	54 (130)	60 (140)	32 (90)	65 (150)
SBR Styrene	U	U	U	U	U	93 (200)	

Notes: U = unsatisfactory
XX (XX) = degrees C (degrees F)

Table B-1. Fluid/Material Matrix

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FLUID/MATERIAL	Aluminum Sulfate (Sat.)	Ammonia (Anhydrous)	Ammonia Hydroxide 10%	Ammonia Hydroxide 25%	Ammonia Hydroxide (Sat.)	Ammonium Nitrate	Benzene
METALS							
Aluminum	U	82 (180)	176 (350)	176 (350)	176 (350)	176 (350)	98 (210)
Bronze	98 (210)	26 (80)	U	U	U	U	204 (400)
Carbon Steel	U	204 (400)	98 (210)	98 (210)	98 (210)	U	60 (140)
Copper	26 (80)	26 (80)	U	U	U	U	38 (100)
Ductile Iron, Pearlitic	26 (80)				85 (185)		
Hastelloy C	98 (210)	298 (570)	98 (210)	398 (570)	398 (570)	32 (90)	98 (210)
Inconel	U	298 (570)	32 (90)	26 (80)	32 (90)	32 (90)	98 (210)
Monel	98 (210)	298 (570)	U	U	U	U	98 (210)
Nickel	98 (210)	32 (90)	U	U	149 (300)	32 (90)	98 (210)
304 SS	98 (210)	249 (480)	98 (210)	110 (230)	98 (210)	98 (210)	110 (230)
316 SS	98 (210)	298 (570)	98 (210)	110 (230)	98 (210)	149 (300)	204 (400)
NON-METALS							
ABS	60 (140)	U	26 (80)	32 (90)	26 (80)	60 (140)	U
CPVC	93 (200)	82 (180)	93 (200)	82 (180)	82 (180)	93 (200)	U
Resins - Epoxy	149 (300)	U	87 (190)	60 (140)	71 (160)	121 (250)	82 (180)
- Furan	127 (260)	127 (260)	82 (180)	127 (260)	93 (200)	127 (260)	127 (260)
- Polyester	93 (200)	104 (220)	60 (140)	38 (100)		104 (220)	U
- Vinyl Ester	121 (250)	104 (220)	66 (150)	66 (150)		121 (250)	U
HDPE	60 (140)	60 (140)	60 (140)	60 (140)	60 (10)	60 (140)	U
PP	104 (220)	104 (220)	104 (220)	93 (200)	93 (200)	93 (200)	60 (140)
PTFE	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)
PVC Type 2	60 (140)	32 (90)	60 (140)	60 (140)	60 (140)	60 (140)	U
PVDF	149 (300)	138 (280)	138 (280)	138 (280)	138 (280)	138 (280)	65 (150)
OTHER MATERIALS							
Butyl	87 (190)	U	87 (190)	87 (190)	87 (190)	82 (180)	U
EPDM	149 (300)	149 (300)	98 (210)	38 (100)	149 (300)	149 (300)	U
EPT	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)	82 (180)	U
FEP	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)
FKM	198 (380)	U	87 (190)	87 (190)	87 (190)	U	204 (400)
Borosilicate Glass	121 (250)		122 (250)	122 (250)	122 (250)	93 (200)	121 (250)
Neoprene	93 (200)	93 (200)	90 (200)	93 (200)	98 (210)	93 (200)	U
Nitrile	93 (200)	87 (190)	93 (200)	93 (200)	98 (210)	82 (180)	U
N-Rubber	65 (150)	U	26 (80)	U	32 (90)	76 (170)	U
PFA	104 (220)	93 (200)	138 (280)	138 (280)	138 (280)	93 (200)	93 (200)
PVDC	82 (180)		U	U	U	49 (120)	26 (80)
SBR Styrene		93 (200)					U

Notes:

U = unsatisfactory

XX (XX) = degrees C (degrees F)

Table B-1. Fluid/Material Matrix

FLUID/MATERIAL	Bleach 12.5% Active Cl	Calcium Chloride Dilute	Calcium Chloride (Sat.)	Calcium Hydroxide 10%	Calcium Hydroxide 20%	Calcium Hydroxide 30%	Calcium Hydroxide (Sat.)
METALS							
Aluminum	U	15 (60)	38 (100)	26 (80)	26 (80)	26 (80)	U
Bronze			98 (210)				
Carbon Steel	U	15 (60)	60 (140)	26 (80)	U	U	26 (80)
Copper		15 (60)	98 (210)	98 (210)	98 (210)	98 (210)	98 (210)
Ductile Iron, Pearlitic			98 (210)				
Hastelloy C		93 (200)	176 (350)	76 (170)	76 (170)	76 (170)	
Inconel		15 (60)	26 (80)	98 (210)	98 (210)	98 (210)	32 (90)
Monel		98 (210)	176 (350)	98 (210)	98 (210)	98 (210)	93 (200)
Nickel		15 (60)	26 (80)	98 (210)	98 (210)	98 (210)	93 (200)
304 SS		65 (150)	26 (80)	98 (210)	98 (210)	98 (210)	93 (200)
316 SS	U	60 (140)	98 (210)	98 (210)	98 (210)	98 (210)	
NON-METALS							
ABS	U	60 (140)	60 (140)			60 (140)	60 (140)
CPVC	93 (200)	82 (180)	82 (180)	76 (170)	76 (170)	76 (170)	98 (210)
Resins - Epoxy		93 (200)	87 (190)	98 (210)	93 (200)	93 (200)	82 (180)
- Furan		127 (260)	127 (260)	104 (220)	104 (220)	104 (220)	127 (260)
- Polyester		104 (220)	104 (220)	82 (180)	71 (160)	71 (160)	71 (160)
- Vinyl Ester		82 (180)	82 (180)	82 (180)	98 (210)	98 (210)	
HDPE	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)
PP	60 (140)	104 (220)	104 (220)	93 (200)	93 (200)	93 (200)	104 (220)
PTFE	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)
PVC Type 2	60 (140)	60 (140)	60 (140)				60 (140)
PVDF	138 (280)	138 (280)	138 (280)	132 (270)	132 (270)	149 (300)	138 (280)
OTHER MATERIALS							
Butyl	65 (150)	87 (190)	87 (190)	87 (190)	87 (190)	87 (190)	87 (190)
EPDM	149 (300)	98 (210)	98 (210)	98 (210)	98 (210)	98 (210)	149 (300)
EPT	U	82 (180)	82 (180)	82 (180)	82 (180)	82 (180)	98 (210)
FEP	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)
FKM	204 (400)	143 (290)	149 (300)	149 (300)	149 (300)	149 (300)	204 (400)
Borosilicate Glass		122 (250)	121 (250)	U	U	U	U
Neoprene	32 (90)	93 (200)	93 (200)	104 (220)	104 (220)	104 (220)	104 (220)
Nitrile	U	93 (200)	82 (180)	82 (180)	76 (170)	82 (180)	82 (180)
N-Rubber	32 (90)	65 (150)	65 (150)	93 (200)	93 (200)	93 (200)	93 (200)
PFA		93 (200)	93 (200)	93 (200)	93 (200)	93 (200)	93 (200)
PVDC		82 (180)	138 (280)	71 (160)	71 (160)	71 (160)	71 (160)
SBR Styrene	93 (200)		93 (200)	93 (200)	93 (200)	93 (200)	93 (200)

Notes: U = unsatisfactory
XX (XX) = degrees C (degrees F)

Table B-1. Fluid/Material Matrix

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FLUID/MATERIAL	Calcium Hypochlorite 30%	Calcium Hypochlorite (Sat.)	Chlorine Water (Sat.)	Chlorobenzene	Chloroform	Chlorophenol, 5% Aq.	Copper Sulfate
METALS							
Aluminum	U	U	26 (80)	65 (150)	76 (170)		U
Bronze	U	U	U	204 (400)	204 (400)		U
Carbon Steel	U	U	U	98 (210)	U	15 (60)	U
Copper	U	U	U	32 (90)	26 (80)		U
Ductile Iron, Pearlitic							
Hastelloy C			98 (210)	176 (350)	98 (210)		98 (210)
Inconel		U	32 (90)	98 (210)	98 (210)		32 (90)
Monel	U	U	U	204 (400)	98 (210)		32 (90)
Nickel		U	U	49 (120)	98 (210)		32 (90)
304 SS	U	U	U	98 (210)	98 (210)	176 (350)	98 (210)
316 SS		26 (80)	U	138 (280)	98 (210)	176 (350)	204 (400)
NON-METALS							
ABS		60 (140)	60 (140)	U	U		60 (140)
CPVC	82 (180)	93 (204)	98 (210)	U	U	U	98 (210)
Resins - Epoxy			U	87 (190)	43 (110)		98 (210)
- Furan	U		127 (260)	127 (260)	116 (240)	104 (220)	127 (260)
- Polyester	98 (210)		104 (220)	U	U		104 (220)
- Vinyl Ester		82 (180)	82 (180)	43 (110)	U		116 (240)
HDPE		60 (140)	60 (140)	U	26 (80)		60 (140)
PP	65 (170)	98 (210)	60 (140)	U	U		93 (200)
PTFE	93 (200)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)
PVC Type 2	60 (140)	60 (140)	60 (140)	U	U	U	60 (140)
PVDF	93 (200)	138 (280)	104 (220)	104 (220)	121 (250)	65 (150)	138 (280)
OTHER MATERIALS							
Butyl	U	65 (150)	U	U	U		87 (190)
EPDM	154 (310)	149 (300)	15 (60)	U	U		149 (300)
EPT		U	26 (80)	U	U		82 (180)
FEP		204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)
FKM	204 (400)	204 (400)	87 (190)	204 (400)	204 (400)		204 (400)
Borosilicate Glass		121 (250)	93 (200)	121 (250)	121 (250)		121 (200)
Neoprene	26 (80)	15 (60)	U	U	U		93 (200)
Nitrile	U	U	U	U	U		93 (200)
N-Rubber	U	32 (90)	65 (150)	U	U		65 (150)
PFA		93 (200)		93 (200)	93 (200)		93 (200)
PVDC		49 (120)	82 (180)	26 (80)	U		82 (180)
SBR Styrene		U			U		93 (200)

Notes:

U = unsatisfactory

XX (XX) = degrees C (degrees F)

Table B-1. Fluid/Material Matrix

FLUID/MATERIAL	Crude Oil	Cumene	Detergent Solution	Dichlorobenzene	Diesel Fuels	Ethyl Alcohol	Esters, General
METALS							
Aluminum	38 (100)			15 (60)	32 (90)	98 (210)	
Bronze	38 (100)				32 (90)	204 (400)	204 (400)
Carbon Steel	38 (100)			15 (60)	87 (190)	116 (240)	
Copper	26 (80)		15 (60)			38 (100)	
Ductile Iron, Pearlitic							
Hastelloy C	32 (90)	71 (160)		176 (350)	93 (200)	98 (210)	
Inconel						26 (80)	
Monel	149 (300)					98 (210)	
Nickel						93 (200)	
304 SS	98 (210)		82 (180)	26 (80)	32 (90)	93 (200)	
316 SS	98 (210)		82 (180)	43 (110)	32 (90)	93 (200)	204 (400)
NON-METALS							
ABS	32 (90)			U		49 (120)	
CPVC	98 (210)		71 (160)	U	38 (100)	82 (180)	U
Resins - Epoxy	149 (300)	60 (140)	121 (250)	87 (190)	122 (250)	66 (150)	71 (160)
- Furan		121 (250)		127 (260)	122 (250)	127 (260)	122 (250)
- Polyester	104 (220)	60 (140)		32 (90)	93 (200)	32 (90)	
- Vinyl Ester	121 (250)	60 (140)	49 (120)	43 (110)	104 (220)	38 (100)	66 (150)
HDPE	49 (120)		60 (140)	U	49 (120)	60 (140)	26 (80)
PP	65 (150)		65 (150)	65 (150)	38 (100)	82 (180)	
PTFE	243 (470)	149 (300)	243 (470)	243 (470)	243 (470)	243 (470)	244 (470)
PVC Type 2	60 (140)		60 (140)	U		60 (140)	U
PVDF	138 (280)			49 (120)	138 (280)	138 (280)	76 (170)
OTHER MATERIALS							
Butyl	U					88 (190)	
EPDM	U	U	143 (290)	U	U	144 (290)	
EPT	U		98 (210)	U	U	82 (180)	
FEP	204 (400)		204 (400)	204 (400)	204 (400)	204 (400)	204 (400)
FKM	149 (300)	209 (140)	204 (400)	82 (180)	204 (400)	176 (350)	
Borosilicate Glass			93 (200)	93 (200)		93 (200)	
Neoprene	U	U	71 (160)	U	26 (80)	93 (200)	
Nitrile	82 (180)	U	87 (190)	U	93 (200)	82 (180)	
N-Rubber	U			U	U	66 (150)	
PFA	93 (200)		93 (200)		93 (200)	93 (200)	
PVDC	65 (150)			U	49 (120)	66 (150)	26 (80)
SBR Styrene	U		93 (200)		93 (200)	93 (200)	

Notes: U = unsatisfactory
XX (XX) = degrees C (degrees F)

Table B-1. Fluid/Material Matrix

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FLUID/MATERIAL	Ethers, General	Ethyl Benzene	Ethylene Glycol	Ferric Chloride, 50% Aq.	Ferric Nitrate (Sat.)	Ferric Sulfate	Formaldehyde Dilute
METALS							
Aluminum	32 (90)	66 (150)	38 (100)	U		U	
Bronze	93 (200)	U	171 (340)	U	U	U	66 (150)
Carbon Steel	93 (200)	U	38 (100)	U	U	U	
Copper	26 (80)		38 (100)	U	U	26 (80)	
Ductile Iron, Pearlitic			149 (300)				
Hastelloy C	93 (200)	116 (240)	299 (570)	98 (210)	66 (150)	66 (150)	98 (210)
Inconel	32 (90)		98 (210)	26 (80)	U	U	98 (210)
Monel	32 (90)	82 (180)	98 (210)	U	U	26 (80)	98 (210)
Nickel	26 (80)		98 (210)	U	U	U	98 (210)
304 SS	93 (200)	20 (70)	98 (210)	U		26 (80)	298 (570)
316 SS	92 (200)	66 (150)	171 (340)	U	60 (140)	93 (200)	110 (230)
NON-METALS							
ABS	U		60 (140)			60 (140)	38 (100)
CPVC	U		98 (210)	82 (180)	82 (180)	82 (180)	60 (140)
Resins - Epoxy	32 (90)	U	149 (300)	122 (250)	93 (200)	93 (200)	44 (110)
- Furan	32 (90)	98 (210)	127 (260)	116 (240)	122 (250)	127 (260)	71 (160)
- Polyester		U	104 (220)	104 (220)	93 (200)	104 (220)	26 (80)
- Vinyl Ester	82 (180)	U	98 (210)	98 (210)	93 (200)	93 (200)	66 (150)
HDPE	U	20 (70)	60 (140)	60 (140)			60 (140)
PP	U	U	110 (230)	98 (210)	93 (200)	93 (200)	93 (200)
PTFE	244 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	149 (300)
PVC Type 2	U	U	60 (140)		60 (140)	60 (140)	60 (140)
PVDF	49 (120)	60 (140)	138 (280)	138 (280)	138 (280)	138 (280)	49 (120)
OTHER MATERIALS							
Butyl	U		88 (190)	71 (160)		88 (190)	
EPDM		U	149 (300)	149 (300)	144 (290)	138 (280)	60 (140)
EPT	U	U	82 (180)	82 (180)	82 (180)	82 (180)	82 (180)
FEP	204 (400)	49 (120)	204 (400)	204 (400)		204 (400)	204 (400)
FKM	U	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	110 (230)
Borosilicate Glass	66 (170)		122 (250)	138 (280)		93 (200)	
Neoprene	U	U	71 (160)	71 (160)		93 (200)	60 (140)
Nitrile	49 (120)	U	93 (200)	82 (180)	82 (180)	93 (200)	U
N-Rubber	U	U	66 (150)	66 (150)		66 (150)	
PFA	93 (200)		93 (200)	93 (200)		93 (200)	93 (200)
PVDC			82 (180)	60 (140)	49 (120)	66 (150)	60 (140)
SBR Styrene			93 (200)	93 (200)			93 (200)

Notes:

U = unsatisfactory

XX (XX) = degrees C (degrees F)

Table B-1. Fluid/Material Matrix

FLUID/MATERIAL	Formic Acid 5%	Formic Acid 10-85%	Formic Acid Anhydrous	Fuel Oil	Gasohol	Gasoline, Leaded	Gasoline, Refined
METALS							
Aluminum	U	98 (210)	98 (210)	60 (140)	66 (150)	38 (100)	98 (210)
Bronze		98 (210)	98 (210)	176 (350)	66 (150)	38 (100)	93 (200)
Carbon Steel		U	U	93 (200)	66 (150)	38 (100)	93 (200)
Copper	66 (150)	98 (210)	98 (210)	26 (80)	66 (150)	38 (100)	32 (90)
Ductile Iron, Pearlitic							
Hastelloy C	98(210)	98 (210)	98 (210)	93 (200)	66 (150)	38 (100)	93 (200)
Inconel	66 (150)	98 (210)	98 (210)	60 (140)		26 (80)	
Monel	66 (150)	98 (210)	98 (210)	82 (180)	66 (150)	38 (100)	38 (100)
Nickel	66 (150)	98 (210)	98 (210)	82 (180)		38 (100)	38 (100)
304 SS	66 (150)	104 (220)	54 (130)	122 (250)		32 (90)	132 (270)
316 SS	66 (150)	204 (400)	98 (210)	71 (160)	66 (150)	32 (90)	98 (210)
NON-METALS							
ABS		U	U		U	U	U
CPVC	26 (80)	60 (140)	76 (170)			U	66 (150)
Resins - Epoxy	38 (100)	20 (70)	32 (90)	122 (250)		122 (250)	66 (150)
- Furan	104 (220)	127 (260)	U	122 (250)		122 (250)	127 (260)
- Polyester	66 (150)	66 (150)	38 (100)	26 (80)		32 (90)	26 (80)
- Vinyl Ester	82 (180)	38 (100)	U	93 (200)		44 (110)	82 (180)
HDPE	60 (140)	60 (140)	71 (160)	93 (200)		U	U
PP	66 (150)	98 (210)	82 (180)	76 (170)	U	U	U
PTFE	243 (470)	243 (470)	243 (470)	243 (470)	93 (200)	243 (470)	243 (470)
PVC Type 2		32 (90)		60 (140)	60 (140)		U
PVDF	122 (250)	122 (250)	60 (140)	138 (280)	138 (280)	138 (280)	
OTHER MATERIALS							
Butyl	66 (150)	66 (150)	66 (150)	U			
EPDM	98 (210)	149 (300)	32 (90)	U	U	U	
EPT	93 (200)	82 (180)	98 (210)			U	U
FEP	204 (400)	204 (400)	204 (400)	204 (400)		204 (400)	204 (400)
FKM	82 (180)	88 (190)	66 (150)	199 (390)	32 (100)	88 (190)	82 (180)
Borosilicate Glass	122 (250)	122 (250)	122 (250)	122 (250)		71 (160)	122 (250)
Neoprene	93 (200)	71 (160)	38 (100)	93 (200)		32 (90)	32 (90)
Nitrile	U	U	U	104 (220)	26 (80)	88 (190)	93 (200)
N-Rubber		U	U	U		U	U
PFA	93 (200)	93 (200)	93 (200)	93 (200)		93 (200)	93 (200)
PVDC	66 (150)	66 (150)	66 (150)	49 (120)		71 (160)	32 (90)
SBR Styrene						U	U

Notes: U = unsatisfactory
XX (XX) = degrees C (degrees F)

Table B-1. Fluid/Material Matrix

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FLUID/MATERIAL	Gasoline, Unleaded	Glycols	Heptane	Hexane	Hydrochloric Acid, Dilute	Hydrochloric Acid 20%	Hydrochloric Acid 35%
METALS							
Aluminum	98 (210)	26 (80)	38 (100)	26 (80)	U	U	U
Bronze	176 (350)	38 (100)	176 (350)	176 (350)	U	U	U
Carbon Steel	176 (350)	26 (80)	176 (350)	176 (350)	U	U	U
Copper	32 (90)		26 (80)		U	U	U
Ductile Iron, Pearlitic							
Hastelloy C	160 (320)		93 (200)	122 (250)	82 (180)	66 (150)	66 (150)
Inconel	26 (80)	38 (100)	93 (200)		32 (90)	26 (80)	U
Monel	38 (100)	38 (100)	93 (200)	38 (100)	32 (90)	26 (80)	U
Nickel	38 (100)		98 (210)	26 (80)	32 (90)	26 (80)	U
304 SS	26 (80)	38 (100)	122 (250)	122 (250)	U	U	U
316 SS	26 (80)	26 (80)	176 (350)	122 (250)	U	U	U
NON-METALS							
ABS	U	60 (140)	54 (130)	U	32 (90)	32 (90)	60 (140)
CPVC	U	82 (180)	82 (180)	66 (150)	82 (180)	82 (180)	66 (150)
Resins - Epoxy	122 (250)	149 (300)	66 (150)	82 (180)	88 (190)	93 (200)	32 (90)
- Furan	138 (280)		98 (210)	66 (150)	127 (260)	127 (260)	122 (250)
- Polyester	32 (90)	104 (220)	93 (200)	32 (90)	88 (190)	88 (190)	54 (130)
- Vinyl Ester	38 (100)	98 (210)	98 (210)	71 (160)	110 (230)	104 (220)	82 (180)
HDPE	60 (140)	60 (140)	44 (110)	26 (80)	71 (160)	60 (140)	60 (140)
PP	U	66 (150)	26 (80)	44 (110)	104 (220)	104 (220)	104 (220)
PTFE	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)
PVC Type 2		60 (140)	60 (140)	20 (70)	60 (140)	60 (140)	60 (140)
PVDF	138 (280)	138 (280)	138 (280)	138 (280)	138 (280)	138 (280)	138 (280)
OTHER MATERIALS							
Butyl		66 (150)		U	49 (120)	U	U
EPDM	U	149 (300)	U	U	149 (300)	38 (100)	32 (90)
EPT	U	98 (210)	U	U	98 (210)	U	U
FEP	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)
FKM	82 (180)	204 (400)	176 (350)	210 (410)	176 (350)	176 (350)	176 (350)
Borosilicate Glass	76 (170)		122 (250)	122 (250)	122 (250)	122 (250)	122 (250)
Neoprene	93 (200)	71 (160)	93 (200)	93 (200)	66 (150)	82 (180)	82 (180)
Nitrile	93 (200)	104 (220)	82 (180)	104 (220)	66 (150)	54 (130)	U
N-Rubber	U	49 (120)	U	U	60 (140)	66 (150)	82 (180)
PFA	93 (200)	93 (200)	93 (200)	93 (200)	122 (250)	122 (250)	122 (250)
PVDC	66 (150)		66 (150)	66 (150)	82 (180)	82 (180)	82 (180)
SBR Styrene	U		U	U			U

Notes:

U = unsatisfactory

XX (XX) = degrees C (degrees F)

Table B-1. Fluid/Material Matrix

FLUID/MATERIAL	Hydrochloric Acid 38%	Hydrochloric Acid 50%	Hydrofluoric Acid, Dilute	Hydrofluoric Acid 30%	Hydrofluoric Acid 40%	Hydrofluoric Acid 50%	Hydrofluoric Acid 70%
METALS							
Aluminum	U	U	U	U	U	U	U
Bronze	U	U	66 (150)	60 (140)	26 (80)	U	U
Carbon Steel	U	U	U	U	U	U	U
Copper	U	U	66 (150)	60 (140)	26 (80)	U	U
Ductile Iron, Pearlitic							
Hastelloy C	60 (150)	26 (80)	98 (210)	98 (210)	93 (200)	110 (230)	93 (200)
Inconel	U	U	26 (80)	U	U	U	U
Monel	U	U	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)
Nickel	U	U	44 (110)	76 (170)	60 (140)	71 (160)	38 (100)
304 SS	U	U	U	U	U	U	U
316 SS	U	U	U	U	U	U	U
NON-METALS							
ABS	60 (140)	54 (130)	U	U	U	U	U
CPVC	76 (170)	82 (180)	26 (80)	U	76 (170)	U	32 (90)
Resins - Epoxy	60 (140)	104 (220)	U	U	U	U	U
- Furan	122 (250)	32 (90)	127 (260)	U	U	U	
- Polyester	U	32 (90)	38 (100)	32 (90)	U		
- Vinyl Ester	82 (180)	60 (140)	71 (160)	U	U	U	U
HDPE	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)	U
PP	93 (200)	44 (110)	93 (200)	82 (180)	93 (200)	93 (200)	93 (200)
PTFE	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)
PVC Type 2	60 (140)	60 (140)	32 (90)	54 (130)	66 (150)	20 (70)	
PVDF	138 (280)	138 (280)	138 (280)	127 (260)	116 (240)	104 (220)	98 (210)
OTHER MATERIALS							
Butyl	U	54 (130)	176 (350)	176 (350)	66 (150)	66 (150)	66 (150)
EPDM	60 (140)		15 (60)	15 (60)	15 (60)	U	U
EPT	32 (90)	U	98 (210)	60 (140)	U	U	U
FEP	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)
FKM	176 (350)	138 (280)	98 (210)	98 (210)	176 (350)	176 (350)	176 (350)
Borosilicate Glass	122 (250)	122 (250)	U	U	U	U	U
Neoprene	32 (90)	U	93 (200)	93 (200)	93 (200)	93 (200)	93 (200)
Nitrile	U	93 (200)	U	U	U	U	U
N-Rubber	82 (180)	82 (90)	38 (100)	38 (100)	32 (90)	38 (100)	U
PFA	93 (200)	93 (200)	93 (200)	93 (200)	93 (200)	93 (200)	93 (200)
PVDC	82 (180)	82 (180)	82 (180)	71 (160)	76 (170)	66 (150)	
SBR Styrene	U	U	U	U	U	U	U

Notes: U = unsatisfactory
XX (XX) = degrees C (degrees F)

Table B-1. Fluid/Material Matrix

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5 May 99

FLUID/MATERIAL	Hydrofluoric Acid 100%	Hydrogen Peroxide, Dilute	Hydrogen Peroxide 30%	Hydrogen Peroxide 50%	Hydrogen Peroxide 90%	Hydrogen Sulfide, Aq. Soln.	Jet Fuel JP-4
METALS							
Aluminum	U	176 (350)	176 (350)	15 (60)	176 (350)		76 (170)
Bronze	72 (160)	U	U	U	32 (90)		204 (400)
Carbon Steel	66 (150)	U	U	U	U		76 (170)
Copper	U	U	U	U	U		
Ductile Iron, Pearlitic							
Hastelloy C	98 (210)	93 (200)	38 (100)	38 (100)	93 (200)	149 (300)	38 (100)
Inconel	49 (120)	66 (150)	60 (140)	26 (80)	32 (90)	93 (200)	32 (90)
Monel	98 (210)	49 (120)	15 (60)	32 (90)	32 (90)	98 (210)	32 (90)
Nickel	49 (120)	76 (170)			32 (90)	93 (200)	26 (80)
304 SS	U	98 (210)	98 (210)	93 (200)	93 (200)	U	38 (100)
316 SS	26 (80)	216 (420)	204 (400)	204 (400)	204 (400)	93 (200)	204 (400)
NON-METALS							
ABS	U	26 (80)	U	U	U	60 (140)	
CPVC	U	U	82 (180)	82 (180)	82 (180)	82 (180)	93 (200)
Resins - Epoxy	U	66 (150)	60 (140)	U	U	149 (300)	66 (150)
- Furan	138 (280)	U	U		26 (80)	127 (260)	60 (140)
- Polyester		66 (150)	32 (90)	U	U		26 (80)
- Vinyl Ester	U	60 (140)	76 (170)	44 (110)	66 (150)	71 (160)	82 (180)
HDPE		49 (120)	60 (140)	60 (140)	26 (80)	60 (140)	
PP	93 (200)	38 (100)	38 (100)	66 (150)	44 (110)	82 (180)	20 (70)
PTFE	243 (470)	243 (470)	243 (470)	243 (470)	244 (470)	243 (470)	243 (470)
PVC Type 2			U	38 (100)	U	60 (140)	60 (140)
PVDF	93 (200)	122 (250)	122 (250)	122 (250)	49 (120)	104 (220)	122 (250)
OTHER MATERIALS							
Butyl	U	U	U	U	U		U
EPDM	U	38 (100)	38 (100)	38 (100)	38 (100)	60 (140)	U
EPT	U	26 (80)	U	U	U	82 (180)	U
FEP	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)
FKM	20 (70)	176 (350)	176 (350)	176 (350)	122 (250)	U	204 (400)
Borosilicate Glass	U	122 (250)	122 (250)	122 (250)	122 (250)	44 (110)	82 (180)
Neoprene	U	U	U	U	U		U
Nitrile	U	32 (90)	32 (90)	U	U	U	93 (200)
N-Rubber	U	26 (80)	U	U	U		U
PFA	93 (200)	93 (200)	93 (200)	93 (200)	93 (200)		93 (200)
PVDC	U	49 (120)	49 (120)	54 (130)	49(120)	71 (160)	26 (80)
SBR Styrene	U	93 (200)					U

Notes:

U = unsatisfactory

XX (XX) = degrees C (degrees F)

Table B-1. Fluid/Material Matrix

FLUID/MATERIAL	Jet Fuel JP-5	Kerosene	Ketones, General	Lime Slurry	Lubricating Oil	Machine Oil	Methyl Alcohol
METALS							
Aluminum	38 (100)	76 (170)	38 (100)		66 (150)		66 (150)
Bronze	204 (400)	176 (350)	38 (100)	66 (150)			188 (370)
Carbon Steel	38 (100)	176 (350)	93 (200)	66 (150)	66 (150)	98 (210)	98 (210)
Copper		32 (90)			32 (90)		98 (210)
Ductile Iron, Pearlitic							
Hastelloy C	38 (100)	98 (210)	38 (100)	49 (120)		98 (210)	122 (250)
Inconel	26 (80)	32 (90)					98 (210)
Monel	38 (100)	76 (170)	38 (100)	66 (150)	38 (100)		98 (210)
Nickel	26 (80)	98 (210)	38 (100)				98 (210)
304 SS	38 (100)	204 (400)	122 (250)		66 (150)	98 (210)	122 (250)
316 SS	204 (400)	204 (400)	132 (270)	66 (150)	66 (150)	98 (210)	176 (350)
NON-METALS							
ABS		32 (90)	U		38 (100)		U
CPVC	60 (140)	82 (180)	U		82 (180)	82 (180)	66 (150)
Resins - Epoxy	66 (150)	122 (250)	U	93 (200)	110 (230)		32 (90)
- Furan	66 (150)	122 (250)	38 (100)				122 (250)
- Polyester	32 (90)	66 (150)		98 (210)			66 (150)
- Vinyl Ester	49 (120)	132 (270)	U	82 (180)	93 (200)		38 (100)
HDPE		26 (80)	26 (80)		U		60 (140)
PP	20 (70)	32 (90)	44 (110)		20 (70)	44 (110)	88 (190)
PTFE	243 (470)	243 (470)	243 (470)	82 (180)	243 (470)	243 (470)	243 (470)
PVC Type 2	60 (140)	60 (140)	U		60 (140)	60 (140)	60 (140)
PVDF	122 (250)	127 (260)	44 (110)		138 (280)	93 (200)	138 (280)
OTHER MATERIALS							
Butyl	U	U			U	U	88 (190)
EPDM	U	U	U	38 (100)	U	U	149 (300)
EPT	U	U			U	204 (400)	60 (140)
FEP	204 (400)	204 (400)	204 (400)		204 (400)	60 (140)	204 (400)
FKM	204 (400)	204 (400)	U		204 (400)	93 (200)	U
Borosilicate Glass	82 (180)	122 (250)	122 (250)		70 (160)		122 (250)
Neoprene	U	93 (200)	U	82 (180)	93 (200)	93 (200)	104 (220)
Nitrile	93 (200)	110 (230)	U		104 (220)		104 (220)
N-Rubber	U	U			U		71 (160)
PFA	93 (200)	93 (200)	93 (200)		93 (200)		93 (200)
PVDC	32 (90)	49 (120)	32 (90)		49 (120)		71 (160)
SBR Styrene	U	U			U		93 (200)

Notes: U = unsatisfactory
XX (XX) = degrees C (degrees F)

Table B-1. Fluid/Material Matrix

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5 May 99

FLUID/MATERIAL	Methyl Ethyl Ketone (MEK)	Methyl Isobutyl Ketone	Methylene Chloride	Mineral Oil	Mixed Acids	Motor Oil	Naphtha
METALS							
Aluminum	60 (140)	66 (150)	98 (210)	76 (170)	U		82 (180)
Bronze	176 (350)	176 (350)	204 (400)		U	38 (100)	204 (400)
Carbon Steel	93 (200)	66 (150)	38 (100)	38 (100)	U	122 (250)	32 (90)
Copper	32 (90)	32 (90)	32 (90)	32 (90)		66 (150)	32 (90)
Ductile Iron, Pearlitic							
Hastelloy C	98 (210)	93 (200)	98 (210)				93 (200)
Inconel	98 (210)	93 (200)	98 (210)	38 (100)	32 (90)	32 (90)	66 (150)
Monel	93 (200)	93 (200)	98 (210)	38 (100)	U	32 (90)	49 (120)
Nickel		93 (200)	98 (210)	38 (100)	U		49 (120)
304 SS	66 (150)	93 (200)	98 (210)	32 (90)	66 (150)	122 (250)	122 (250)
316 SS	176 (350)	176 (350)	204 (400)	176 (350)	66 (150)	122 (250)	98 (210)
NON-METALS							
ABS	U	U	U	38 (100)		32 (90)	60 (140)
CPVC	U	U	U	82 (180)	93 (200)	82 (180)	60 (140)
Resins - Epoxy	32 (90)	60 (140)	20 (70)	110 (230)		26 (80)	104 (220)
- Furan	76 (170)	122 (250)	138 (280)		U		127 (260)
- Polyester	U	U	U	98 (210)			66 (150)
- Vinyl Ester	U	U	U	122 (250)		122 (250)	98 (210)
HDPE	U		U	26 (80)			26 (80)
PP	66 (150)	26 (60)	20 (70)	44 (110)	U	U	44 (110)
PTFE	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)
PVC Type 2	U	U	U	60 (140)	20 (70)	60 (140)	60 (140)
PVDF	U	44 (110)	49 (120)	122 (250)		122 (250)	138 (280)
OTHER MATERIALS							
Butyl	38 (100)	26 (80)	U	U			U
EPDM	149 (300)	15 (60)	U	U		U	U
EPT	U	U	U	U		U	U
FEP	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)
FKM	U	U	20 (70)	210(410)	38 (100)	88 (190)	204 (400)
Borosilicate Glass	122 (250)	122 (250)	122 (250)	76 (170)		160 (320)	93 (200)
Neoprene	U	U	U	93 (200)	U		U
Nitrile	U	U	U	82 (180)	U	88 (190)	60 (140)
N-Rubber	U	U	U	U			U
PFA	93 (200)	93 (200)	93 (200)	93 (200)	93 (200)	93 (200)	93 (200)
PVDC	U	26 (80)	U	49 (120)			66 (150)
SBR Styrene	U		U	U			U

Notes:

U = unsatisfactory

XX (XX) = degrees C (degrees F)

Table B-1. Fluid/Material Matrix

FLUID/MATERIAL	Naphthalene	Nitric Acid 5%	Nitric Acid 10%	Nitric Acid 20%	Nitric Acid 30%	Nitric Acid 40%	Nitric Acid 50%
METALS							
Aluminum	98 (210)	U	U	U	U	U	U
Bronze	38 (100)	U	U	U	U	U	U
Carbon Steel	82 (180)	U	U	U	U	U	U
Copper	38 (100)	U	U	U	U	U	U
Ductile Iron, Pearlitic							
Hastelloy C	93 (200)	98 (210)	98 (210)	88 (190)	88 (190)	82 (180)	110 (230)
Inconel	98 (210)	32 (90)	32 (90)	26 (80)	26 (80)	26 (80)	26 (80)
Monel	98 (210)	U	U	U	U	U	U
Nickel	98 (210)	U	U	U	U	U	U
304 SS	204 (400)	98 (210)	160 (320)	149 (300)	98 (210)	98 (210)	93 (200)
316 SS	204 (400)	98 (210)	98 (210)	144 (290)	149 (300)	104 (220)	93 (200)
NON-METALS							
ABS	U	60 (140)	60 (140)	54 (130)	U	U	U
CPVC	U	82 (180)	82 (180)	71 (160)	93 (200)	82 (180)	82 (180)
Resins - Epoxy	93 (200)	71 (160)	60 (140)	38 (100)	U	U	U
- Furan	127 (260)	93 (200)	26 (80)	U	U	U	U
- Polyester	82 (180)	71 (160)	66 (150)	38 (100)	26 (80)	98 (210)	26 (80)
- Vinyl Ester	98 (210)	82 (180)	66 (150)	66 (150)	38 (100)	98 (210)	U
HDPE	26 (80)	60 (140)	60 (140)	60 (140)	60 (140)	U	U
PP	98 (210)	60 (140)	93 (200)	60 (140)	66 (150)	66 (150)	66 (150)
PTFE	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)
PVC Type 2	U	38 (100)	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)
PVDF	138 (280)	93 (200)	93 (200)	82 (180)	82 (180)	82 (180)	82 (180)
OTHER MATERIALS							
Butyl		71 (160)	71 (160)	71 (160)	49 (120)	38 (100)	U
EPDM	U	15 (160)	15 (160)	15 (160)	15 (60)	U	U
EPT	U	U	U	U	U	U	U
FEP	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)
FKM	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)
Borosilicate Glass		204 (400)	204 (400)	204 (400)	15 (60)	204 (400)	15 (60)
Neoprene	U	U	U	U	U	U	U
Nitrile	U	U	U	U	U	U	U
N-Rubber	U	U	U	U	U	U	U
PFA	93 (200)	93 (200)	93 (200)	93 (200)	93 (200)	93 (200)	93 (200)
PVDC		32 (90)	54 (130)	66 (150)	66 (150)	49 (120)	49 (120)
SBR Styrene		U	U	U	U	U	U

Notes: U = unsatisfactory
XX (XX) = degrees C (degrees F)

Table B-1. Fluid/Material Matrix

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5 May 99

FLUID/MATERIAL	Nitric Acid 70%	Nitric Acid 100% (Anhydrous)	Oil and Fats	Oxalic Acid 5%	Oxalic Acid 10%	Oxalic Acid 50%	Oxalic Acid (Sat.)
METALS							
Aluminum	U	32 (90)	66 (150)	88 (190)	44 (110)	88 (190)	54 (130)
Bronze	U	U	66 (150)	98 (210)	98 (210)	98 (210)	98 (210)
Carbon Steel	U	U	66 (150)	U	U	U	U
Copper	U	U		98 (210)	98 (210)	98 (210)	98 (210)
Ductile Iron, Pearlitic							
Hastelloy C	93 (200)	26 (80)	122 (250)	98 (210)	98 (210)	98 (210)	98 (210)
Inconel	U	U		98 (210)	98 (210)	98 (210)	26 (80)
Monel	U	U		98 (210)	98 (210)	66 (150)	32 (90)
Nickel	U	U	15 (60)	32 (90)	38 (100)	49 (120)	98 (210)
304 SS	98 (210)	26 (80)	66 (150)	U	U	U	U
316 SS	204 (400)	44 (110)	122 (250)	176 (350)	176 (350)	176 (350)	U
NON-METALS							
ABS	U	U	60 (140)	60 (140)	38 (100)	38 (100)	38 (100)
CPVC	82 (180)	U	98 (210)	60 (140)	88 (190)	98 (210)	93 (200)
Resins - Epoxy	U	U		132 (270)	132 (270)	132 (270)	132 (270)
- Furan	U	U	122 (250)	88 (190)	93 (200)		
- Polyester			104 (220)	104 (220)	104 (220)	104 (220)	104 (220)
- Vinyl Ester	U	U	98 (210)	98 (210)	93 (200)	98 (210)	98 (210)
HDPE	U	U	U	60 (140)	60 (140)	60 (140)	60 (140)
PP	U	U	82 (180)	71 (160)	66 (150)	66 (150)	60 (140)
PTFE	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)
PVC Type 2	60 (140)	U	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)
PVDF	49 (120)	66 (150)	144 (290)	71 (160)	66 (150)	93 (200)	60 (140)
OTHER MATERIALS							
Butyl	32 (90)	U		76 (170)	88 (190)	66 (150)	66 (150)
EPDM	U	U		154 (310)	149 (300)	149 (300)	144 (290)
EPT	U	U	U	60 (140)	60 (140)	60 (140)	98 (210)
FEP	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)
FKM	88 (190)	88 (190)	82 (180)	204 (400)	204 (400)	204 (400)	204 (400)
Borosilicate Glass	204 (400)	132 (270)	93 (200)	122 (250)	122 (250)	122 (250)	122 (250)
Neoprene	U	U	26 (80)	93 (200)	93 (200)	38 (100)	U
Nitrile	U	U	93 (200)	U	U	U	20 (70)
N-Rubber	U	U		66 (150)	66 (150)	66 (150)	66 (150)
PFA	122 (250)	26 (80)	93 (200)				
PVDC	U	U	66 (150)	82 (180)	76 (170)	76 (170)	49 (120)
SBR Styrene	U	U					

Notes:

U = unsatisfactory

XX (XX) = degrees C (degrees F)

Table B-1. Fluid/Material Matrix

FLUID/MATERIAL	Petroleum Oils, Refined	Petroleum Oils, Sour	Phenol	Phenol 10%	Phosphoric Acid 5%	Phosphoric Acid 10%	Phosphoric Acid 25-50%
METALS							
Aluminum	32 (90)	U	98 (210)	66 (150)	U	38 (100)	U
Bronze	26 (80)	U	U	38 (100)	U	U	65 (150)
Carbon Steel			98 (210)	93 (200)		U	U
Copper	32 (90)	U	U	49 (120)	32 (90)	U	U
Ductile Iron, Pearlitic							
Hastelloy C			299 (570)	176 (350)	32 (90)	98 (210)	98 (210)
Inconel			299 (570)	49 (120)	26 (80)	93 (200)	98 (210)
Monel	32 (90)	U	299 (570)	104 (220)	26 (80)	26 (80)	26 (80)
Nickel			299 (570)	93 (200)		26 (80)	26 (80)
304 SS	26 (80)	26 (80)	299 (570)	93 (200)	93 (200)	88 (190)	98 (210)
316 SS	26 (80)	26 (80)	299 (570)	93 (200)	98 (210)	144 (290)	93 (200)
NON-METALS							
ABS			U	U		60 (140)	38 (100)
CPVC	82 (180)	82 (180)	60 (140)	32 (90)	98 (210)	82 (180)	82 (180)
Resins - Epoxy			U	U	38 (100)	71 (160)	60 (140)
- Furan			98 (210)	U		122 (250)	121 (250)
- Polyester			U	U		104 (220)	104 (220)
- Vinyl Ester	93 (200)	93 (200)	U	38 (100)	98 (210)	93 (200)	93 (200)
HDPE	26 (80)	26 (80)	38 (100)	38 (100)	60 (140)	60 (140)	60 (140)
PP	66 (150)	32 (90)	82 (180)	93 (200)	82 (180)	122 (250)	98 (210)
PTFE	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)
PVC Type 2			U	U		60 (140)	60 (140)
PVDF	127 (260)	122 (250)	93 (200)	98 (210)	132 (270)	138 (280)	121 (250)
OTHER MATERIALS							
Butyl			66 (150)	66 (150)	66 (150)	66 (150)	87 (190)
EPDM	U		15 (60)	26 (80)	149 (300)	149 (300)	60 (140)
EPT	U	U	26 (80)	26 (80)	82 (180)	82 (180)	82 (180)
FEP	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)
FKM	88 (190)	88 (190)	98 (210)	216 (420)	204 (400)	204 (400)	87 (190)
Borosilicate Glass			93 (200)	93 (200)	149 (300)	149 (300)	149 (300)
Neoprene	38 (100)		U	U	93 (200)	93 (200)	82 (180)
Nitrile	82 (180)	82 (180)	U	U	U	U	U
N-Rubber	U		U	26 (80)	66 (150)	66 (150)	65 (150)
PFA					93 (200)	93 (200)	93 (200)
PVDC			U	26 (80)	76 (170)	82 (180)	49 (120)
SBR Styrene	U	U	U	U	93 (200)	93 (200)	

Notes: U = unsatisfactory
XX (XX) = degrees C (degrees F)

Table B-1. Fluid/Material Matrix

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FLUID/MATERIAL	Phosphoric Acid 50-85%	Potassium Hydroxide 5%	Potassium Hydroxide 27%	Potassium Hydroxide 50%	Potassium Hydroxide 90%	Potassium Nitrate 1-5%	Potassium Nitrate 80%
METALS							
Aluminum	U	U	U	U	U	176 (350)	176 (350)
Bronze	U	32 (90)	15 (60)	32 (90)	26 (80)		98 (210)
Carbon Steel	U	98 (210)	93 (200)	32 (90)	26 (80)		54 (130)
Copper	U	38 (100)	32 (90)	98 (210)	26 (80)		32 (93)
Ductile Iron, Pearlitic							
Hastelloy C	98 (210)	98 (210)	127 (260)	127 (260)	65 (150)	98 (210)	98 (210)
Inconel	87 (190)	98 (210)	98 (210)	98 (210)	26 (80)	98 (210)	98 (210)
Monel	204 (400)	98 (210)	98 (210)	98 (210)	98 (210)	98 (210)	98 (210)
Nickel	U	98 (210)	98 (210)	98 (210)	98 (210)	98 (210)	98 (210)
304 SS	49 (120)	149 (300)	98 (210)	98 (210)	U	121 (250)	121 (250)
316 SS	204 (400)	176 (330)	176 (350)	171 (340)	176 (350)	176 (350)	176 (350)
NON-METALS							
ABS	54 (130)	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)
CPVC	82 (180)	82 (180)	82 (180)	82 (180)	127 (260)	82 (180)	82 (180)
Resins - Epoxy	43 (110)	93 (200)	82 (180)	98 (210)	65 (150)	127 (260)	149 (300)
- Furan	127 (260)	121 (250)	121 (250)	121 (250)	132 (270)		132 (270)
- Polyester	104 (220)	65 (150)	32 (90)	76 (170)		104 (220)	104 (220)
- Vinyl Ester	98 (210)	65 (150)	65 (150)	U	U	104 (220)	98 (210)
HDPE	38 (100)	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)
PP	98 (210)	98 (210)	65 (150)	82 (180)	65 (150)	56 (150)	56 (150)
PTFE	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)
PVC Type 2	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)
PVDF	121 (250)	98 (210)	104 (220)	98 (210)	98 (210)	138 (280)	138 (280)
OTHER MATERIALS							
Butyl	65 (150)	82 (180)	82 (108)	82 (180)	82 (180)		82 (180)
EPDM	60 (140)	149 (300)	149 (300)	149 (300)	149 (300)	149 (300)	149 (300)
EPT	82 (180)	98 (210)	98 (210)	98 (210)	98 (210)	82 (180)	82 (180)
FEP	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)
FKM	149 (300)	160 (320)	26 (80)	U	U	204 (400)	204 (400)
Borosilicate Glass	149 (300)	U	U	U	U	121 (250)	121 (250)
Neoprene	60 (140)	93 (200)	93 (200)	93 (200)	93 (200)	93 (200)	93 (200)
Nitrile	U	26 (80)	15 (60)	65 (150)	65 (150)	104 (220)	104 (220)
N-Rubber	43 (110)	38 (100)	38 (100)	38 (100)	38 (100)		65 (150)
PFA	93 (200)	93 (200)	93 (200)	93 (200)	93 (200)	93 (200)	93 (200)
PVDC	54 (130)	38 (100)	38 (100)	38 (100)	38 (100)	65 (150)	65 (150)
SBR Styrene		U	U	U	U	93 (200)	93 (200)

Notes:

U = unsatisfactory

XX (XX) = degrees C (degrees F)

Table B-1. Fluid/Material Matrix

FLUID/MATERIAL	Potassium Permanganate 10%	Potassium Permanganate 20%	Potassium Sulfate 10%	Propylene Glycol	Silicone Oil	Soap Solution 5%	Soap Solutions
METALS							
Aluminum	98 (210)	98 (210)	98 (210)	76 (170)	38 (100)		149 (300)
Bronze	93 (200)	26 (80)	26 (80)	98 (210)	176 (350)	176 (350)	176 (350)
Carbon Steel	26 (80)	26 (80)	98 (210)	98 (210)	38 (100)	65 (150)	76 (170)
Copper	26 (80)	26 (80)	65 (150)	32 (90)	38 (100)		26 (80)
Ductile Iron, Pearlitic							
Hastelloy C	98 (210)	98 (210)	98 (210)	32 (90)		38 (100)	32 (90)
Inconel	98 (210)	98 (210)	98 (210)	32 (90)		32 (90)	32 (90)
Monel	98 (210)	98 (210)	98 (210)	32 (90)		43 (110)	38 (100)
Nickel	98 (210)	98 (210)	98 (210)	32 (90)		65 (150)	60 (140)
304 SS	98 (210)	98 (210)	98 (210)	32 (90)	38 (100)	65 (150)	32 (90)
316 SS	175 (350)	176 (350)	176 (350)	98 (210)	38 (100)	65 (150)	32 (90)
NON-METALS							
ABS	U	32 (90)	60 (140)	32 (90)			
CPVC	87 (190)	60 (140)	82 (180)	U	87 (190)	83 (180)	82 (180)
Resins - Epoxy	65 (150)	65 (150)	121 (250)	98 (210)	26 (80)	32 (90)	
- Furan	127 (260)	71 (160)	121 (250)	121 (250)			
- Polyester	98 (210)	104 (220)	104 (220)	93 (200)		32 (90)	26 (80)
- Vinyl Ester	104 (220)	98 (210)	98 (210)	98 (210)		60 (140)	60 (140)
HDPE	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)
PP	65 (150)	60 (140)	104 (220)	60 (140)	60 (140)	60 (140)	82 (180)
PTFE	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)
PVC Type 2	60 (140)	32 (90)	60 (140)	U		32 (90)	26 (80)
PVDF	138 (280)	138 (280)	138 (280)	127 (260)	121 (250)	26 (80)	38 (100)
OTHER MATERIALS							
Butyl	54 (130)	54 (130)	82 (180)		U		65 (150)
EPDM	98 (210)	60 (140)	149 (300)		149 (300)	149 (300)	154 (310)
EPT	98 (210)	87 (190)	98 (210)	149 (300)	93 (200)	98 (210)	98 (210)
FEP	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)
FKM	71 (160)	71 (160)	204 (400)	149 (300)	204 (400)	204 (400)	204 (400)
Borosilicate Glass	121 (250)	121 (250)	121 (250)	98 (210)		93 (200)	93 (200)
Neoprene	38 (100)	38 (100)	93 (200)	32 (90)	15 (60)	93 (200)	93 (200)
Nitrile	49 (120)	U	104 (220)	82 (180)	104 (220)	104 (220)	110 (230)
N-Rubber	U	U	65 (150)		U	65 (150)	65 (150)
PFA	93 (200)	93 (200)	93 (200)			93 (200)	98 (210)
PVDC	54 (130)	54 (130)	76 (170)			76 (170)	82 (180)
SBR Styrene						93 (200)	93 (200)

Notes: U = unsatisfactory
XX (XX) = degrees C (degrees F)

Table B-1. Fluid/Material Matrix

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5 May 99

FLUID/MATERIAL	Sodium Aluminate	Sodium Bicarbonate 20%	Sodium Bisulfate	Sodium Carbonate	Sodium Chloride	Sodium Hydroxide 10%	Sodium Hydroxide 15%
METALS							
Aluminum	32 (90)	65 (150)	U	U	U	U	U
Bronze	U	32 (90)	38 (100)	38 (100)	98 (210)	87 (190)	98 (210)
Carbon Steel	65 (150)	38 (100)	49 (120)	49 (120)	71 (160)	98 (210)	98 (210)
Copper		26 (80)	38 (120)	38 (120)	98 (210)	98 (210)	98 (210)
Ductile Iron, Pearlitic		30 (86)			82 (180)	50 (122)	
Hastelloy C	65 (150)	98 (210)	98 (210)	98 (210)	98 (210)	109 (230)	98 (210)
Inconel		98 (210)	98 (210)	98 (210)	98 (210)	149 (300)	98 (210)
Monel	65 (150)	98 (210)	98 (210)	98 (210)	98 (210)	176 (350)	176 (350)
Nickel		98 (210)	98 (210)	98 (210)	98 (210)	98 (210)	209 (410)
304 SS	26 (80)	121 (250)	98 (210)	98 (210)	98 (210)	98 (210)	98 (210)
316 SS	60 (140)	176 (350)	176 (350)	176 (350)	176 (350)	176 (350)	149 (300)
NON-METALS							
ABS		60 (140)	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)
CPVC		98 (210)	98 (210)	98 (210)	98 (210)	87 (190)	82 (180)
Resins - Epoxy		121 (250)	149 (300)	149 (300)	98 (210)	87 (190)	93 (200)
- Furan		127 (260)	127 (260)	127 (260)	127 (260)	U	U
- Polyester	65 (150)	71 (160)	71 (160)	71 (160)	104 (220)	54 (130)	65 (150)
- Vinyl Ester	65 (150)	93 (200)	82 (180)	82 (180)	82 (180)	76 (190)	65 (150)
HDPE		60 (140)	60 (140)	60 (140)	60 (140)	60 (140)	76 (170)
PP		104 (220)	104 (220)	104 (220)	104 (220)	104 (220)	98 (210)
PTFE	149 (300)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)
PVC Type 2		60 (140)	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)
PVDF		138 (280)	138 (280)	138 (280)	138 (280)	98 (210)	98 (210)
OTHER MATERIALS							
Butyl		82 (180)	82 (180)	82 (180)	82 (180)	82 (180)	82 (180)
EPDM	93 (200)	149 (300)	149 (300)	149 (300)	149 (300)	149 (300)	149 (300)
EPT		82 (180)	82 (180)	82 (180)	82 (180)	98 (210)	98 (210)
FEP	38 (100)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)
FKM	93 (200)	204 (400)	87 (190)	87 (190)	204 (400)	15 (60)	15 (60)
Borosilicate Glass		121 (250)	121 (250)	121 (250)	121 (250)	U	U
Neoprene	65 (150)	93 (200)	93 (200)	93 (200)	93 (200)	93 (200)	93 (200)
Nitrile	82 (180)	104 (220)	93 (200)	93 (200)	109 (230)	71 (160)	71 (160)
N-Rubber		65 (150)	82 (180)	82 (180)	54 (130)	65 (150)	65 (150)
PFA		93 (200)	93 (200)	93 (200)	93 (200)	121 (250)	121 (250)
PVDC		82 (180)	82 (180)	82 (180)	82 (180)	32 (90)	32 (90)
SBR Styrene					93 (200)		U

Notes:

U = unsatisfactory

XX (XX) = degrees C (degrees F)

Table B-1. Fluid/Material Matrix

FLUID/MATERIAL	Sodium Hydroxide 30%	Sodium Hydroxide 50%	Sodium Hydroxide 70%	Sodium Hydroxide Soln. (Conc.)	Sodium Hypochlorite 20%	Sodium Hypochlorite (Conc.)	Sodium Hyposulfite 5%
METALS							
Aluminum	U	U	U	U	26 (80)	U	
Bronze	38 (100)	60 (140)	32 (90)	26 (80)	26 (80)	U	
Carbon Steel	98 (210)	38 (100)	98 (210)	143 (290)	U	U	
Copper	32 (90)	60 (140)	65 (150)	26 (80)	26 (80)	U	32 (90)
Ductile Iron, Pearlitic		127 (260)	127 (260)				
Hastelloy C	98 (210)	98 (210)	104 (220)	49 (120)	U	54 (130)	32 (90)
Inconel	149 (300)	149 (300)	98 (210)	26 (80)	U	U	26 (80)
Monel	98 (210)	149 (300)	143 (290)	176 (350)	26 (80)	U	26 (80)
Nickel	149 (300)	149 (300)	98 (210)	93 (200)	U	U	26 (80)
304 SS	98 (210)	98 (210)	109 (230)	32 (90)	U	26 (80)	U
316 SS	98 (210)	176 (350)	109 (230)	176 (350)	U	26 (80)	U
NON-METALS							
ABS	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)	
CPVC	82 (180)	82 (180)	82 (180)	87 (190)	87 (190)	82 (180)	
Resins - Epoxy	93 (200)	93 (200)	121 (250)		26 (80)		
- Furan	U	U	127 (260)	U	U	U	
- Polyester	65 (150)	104 (220)			U	60 (140)	82 (180)
- Vinyl Ester	65 (150)	104 (220)	U		82 (180)	38 (100)	98 (210)
HDPE	76 (170)	76 (170)	60 (140)		60 (140)	60 (140)	60 (140)
PP	98 (210)	104 (220)	104 (220)	60 (140)	49 (120)	43 (110)	
PTFE	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)
PVC Type 2	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)	
PVDF	98 (210)	104 (220)	71 (160)	65 (150)	138 (280)	138 (280)	127 (260)
OTHER MATERIALS							
Butyl	82 (180)	87 (190)	82 (180)		54 (130)	32 (90)	
EPDM	154 (310)	149 (300)	149 (300)	149 (300)	71 (160)	60 (140)	60 (140)
EPT	98 (210)	93 (200)	87 (190)	26 (80)	U	U	
FEP	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)
FKM	15 (60)	15 (60)	15 (60)	15 (60)	193 (380)	204 (400)	82 (180)
Borosilicate Glass	U	U	U	U	121 (250)	65 (140)	121 (250)
Neoprene	93 (200)	93 (200)	93 (200)	93 (200)	U	U	
Nitrile	71 (160)	65 (150)	71 (160)	65 (150)	U	U	
N-Rubber	65 (150)	65 (150)	65 (140)	65 (140)	32 (90)	32 (90)	
PFA	121 (250)	121 (250)	26 (80)		93 (200)		
PVDC	60 (140)	65 (150)	54 (80)	U	54 (130)	49 (120)	
SBR Styrene	U	U	U	U			

Notes: U = unsatisfactory
XX (XX) = degrees C (degrees F)

Table B-1. Fluid/Material Matrix

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5 May 99

FLUID/MATERIAL	Sodium Nitrate	Sodium Phosphate Acid	Sodium Phosphate Alkaline	Sodium Phosphate Neutral	Sodium Sulfite 10%	Sour Crude Oil	Sulfonated Detergents
METALS							
Aluminum	176 (350)	U	U	U	98 (210)		
Bronze	38 (100)	98 (210)	32 (90)	98 (210)	U		
Carbon Steel	65 (150)		65 (150)		26 (80)		
Copper	43 (110)	26 (80)	32 (90)	32 (90)	26 (80)		
Ductile Iron, Pearlitic							
Hastelloy C	32 (90)	98 (210)	98 (210)	98 (210)	98 (210)	65 (150)	65 (150)
Inconel	93 (200)	98 (210)	98 (210)	98 (210)	98 (210)		
Monel	98 (210)	98 (210)	98 (210)	98 (210)	98 (210)		
Nickel	98 (210)	98 (210)	98 (210)	98 (210)	98 (210)		
304 SS	98 (210)	98 (210)	98 (210)	98 (210)	98 (210)		
316 SS	176 (350)	98 (210)	98 (210)	98 (210)	98 (210)		
NON-METALS							
ABS	60 (140)	60 (140)			60 (140)		
CPVC	82 (180)	76 (170)	82 (180)	82 (180)	82 (180)	87 (190)	76 (170)
Resins - Epoxy	149 (300)	U	U	U	121 (250)	87 (190)	121 (250)
- Furan	71 (160)	121 (250)		U	121 (250)		121 (250)
- Polyester	104 (220)	98 (210)			93 (200)	104 (220)	93 (200)
- Vinyl Ester	98 (210)	109 (320)	98 (210)	98 (210)	98 (210)	127 (260)	98 (210)
HDPE	60 (140)	32 (90)	26 (80)	26 (80)	60 (140)	26 (80)	
PP	98 (210)	93 (200)	98 (210)	93 (200)	60 (140)	65 (150)	49 (120)
PTFE	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)
PVC Type 2	60 (140)	60 (140)				60 (140)	
PVDF	138 (280)	138 (280)	138 (280)	138 (280)	138 (280)	138 (280)	
OTHER MATERIALS							
Butyl	82 (180)	93 (200)	82 (180)	93 (200)	87 (190)		
EPDM	138 (280)	98 (210)	98 (210)	98 (210)	60 (140)	U	
EPT	82 (180)	98 (210)	98 (210)	98 (210)	98 (210)	U	
FEP	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)
FKM	15 (60)	87 (190)	82 (180)	87 (190)	87 (190)	U	
Borosilicate Glass	121 (250)	98 (210)	93 (200)	98 (210)	U		98 (210)
Neoprene	93 (200)	60 (140)	93 (200)	60 (140)	87 (190)		
Nitrile	65 (150)	82 (180)	93 (200)	82 (180)	87 (190)	60 (140)	
N-Rubber	65 (150)	71 (160)	71 (160)	71 (160)	65 (150)		
PFA	93 (200)	93 (200)	93 (200)	93 (200)	93 (200)	93 (200)	
PVDC	65 (150)	65 (150)	65 (150)	65 (150)	65 (150)	65 (150)	
SBR Styrene							

Notes:

U = unsatisfactory

XX (XX) = degrees C (degrees F)

Table B-1. Fluid/Material Matrix

FLUID/MATERIAL	Sulfuric Acid 10%	Sulfuric Acid 30%	Sulfuric Acid 50%	Sulfuric Acid 60%	Sulfuric Acid 70%	Sulfuric Acid 80%	Sulfuric Acid 90%
METALS							
Aluminum	U	U	U	U	U	U	U
Bronze	U	U	U	U	U	U	U
Carbon Steel	U	U	U	U	U	U	U
Copper	U	U	U	U	U	U	U
Ductile Iron, Pearlitic						32 (90)	
Hastelloy C	98 (210)	87 (190)	109 (230)	127 (260)	93 (200)	116 (240)	87 (190)
Inconel	U	U	U	U	U	U	U
Monel	26 (80)	26 (80)	49 (120)	54 (130)	26 (80)	26 (80)	U
Nickel	26 (80)	26 (80)	32 (90)	32 (90)	U	U	U
304 SS	U	U	U	U	U	32 (90)	26 (80)
316 SS	U	U	U	U	U	43 (110)	26 (80)
NON-METALS							
ABS	60 (140)	32 (90)	54 (130)	U	U	U	U
CPVC	82 (180)	82 (180)	82 (180)	87 (190)	93 (200)	116 (240)	U
Resins - Epoxy	60 (140)	49 (1230)	43 (110)	43 (110)	43 (110)	U	U
- Furan	121 (250)	121 (250)	127 (260)	121 (250)	127 (260)	U	U
- Polyester	104 (220)	104 (220)	104 (220)	71 (160)	71 (160)	U	U
- Vinyl Ester	93 (200)	82 (180)	98 (210)	87 (190)	82 (180)	U	U
HDPE	60 (140)	60 (140)	60 (140)	26 (80)	26 (80)	U	U
PP	93 (200)	93 (200)	93 (200)	98 (210)	82 (180)	76 (170)	82 (180)
PTFE	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)
PVC Type 2	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)	U	U
PVDF	121 (240)	104 (220)	104 (220)	116 (240)	104 (220)	93 (200)	98 (210)
OTHER MATERIALS							
Butyl	82 (180)	82 (180)	65 (150)		38 (100)	38 (100)	U
EPDM	60 (140)	60 (140)	60 (140)		60 (140)	15 (60)	U
EPT	93 (200)	60 (140)	98 (210)		98 (210)	38 (100)	26 (80)
FEP	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)
FKM	176 (350)	176 (350)	176 (350)		176 (350)	176 (350)	176 (350)
Borosilicate Glass	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)
Neoprene	93 (200)	93 (200)	93 (200)		93 (200)	U	U
Nitrile	60 (140)	60 (140)	93 (200)		U	15 (60)	U
N-Rubber	65 (150)	65 (150)	38 (100)		U	U	U
PFA	121 (250)	121 (250)	121 (250)	121 (250)	121 (250)	121 (250)	121 (250)
PVDC	49 (120)	26 (80)	U	U	U	U	U
SBR Styrene	U	U	U		U	U	U

Notes: U = unsatisfactory
XX (XX) = degrees C (degrees F)

Table B-1. Fluid/Material Matrix

EM-1110-1-4008

5 May 99

FLUID/MATERIAL	Sulfuric Acid 95%	Sulfuric Acid 98%	Sulfuric Acid 100%	Sulfuric Acid 103%	Sulfuric Acid, Fuming	Sulfurous Acid	Tetrachloroethane
METALS							
Aluminum	U	U	U		32 (90)	187 (370)	15 (60)
Bronze	U	U	U		U	U	
Carbon Steel	32 (90)	38 (100)	43 (110)			U	26 (80)
Copper		U	U		U	38 (100)	15 (60)
Ductile Iron, Pearlitic	49 (120)	121 (250)	163 (325)				
Hastelloy C	143 (290)	98 (210)	87 (190)		32 (90)	187 (370)	71 (160)
Inconel	U	U	U	U	U	32 (90)	
Monel	U	U	U	U	U	U	
Nickel	U	U	U		U	U	
304 SS	32 (90)	26 (80)	26 (80)	U	32 (90)	U	26 (80)
316 SS	98 (210)	98 (210)	98 (210)	32 (90)	98 (210)	65 (150)	15 (60)
NON-METALS							
ABS	U	U	U	U	U	60 (140)	
CPVC	U	U	U	U	15 (60)	82 (180)	U
Resins - Epoxy	U	U	U	U	U	116 (240)	32 (90)
- Furan	U	U	U		U	71 (160)	71 (160)
- Polyester	U	U				43 (110)	
- Vinyl Ester	U	U	U	U	U	49 (120)	49 (120)
HDPE	U	U	U	U	U	60 (140)	U
PP	15 (60)	49 (120)	U	U	U	82 (180)	15 (60)
PTFE	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)	243 (470)
PVC Type 2	U	U	U	U	U	60 (140)	U
PVDF	98 (210)	60 (140)	U	U	U	121 (250)	121 (250)
OTHER MATERIALS							
Butyl	U	U	U	U		65 (150)	
EPDM	U	U	U	U	U	U	U
EPT	U	U	U	U		82 (180)	U
FEP	204 (400)	204 (400)	204 (400)	204 (400)	204 (400)	216 (420)	204 (400)
FKM	176 (350)	198 (390)	87 (190)		93 (200)	204 (400)	93 (200)
Borosilicate Glass	204 (400)	204 (400)	204 (400)	204 (400)		109 (230)	
Neoprene	U	U	U	U	U	U	U
Nitrile	U	U		U	U	15 (60)	U
N-Rubber	U	U	U	U		U	U
PFA	121 (250)	93 (200)			26 (80)	98 (210)	
PVDC	U	U	U	U	U	26 (80)	
SBR Styrene	U	U	U	U	U		U

Notes:

U = unsatisfactory

XX (XX) = degrees C (degrees F)

Table B-1. Fluid/Material Matrix

FLUID/MATERIAL	Tetrachloroethylene	Thread Cutting Oil	Toluene	Transformer Oil	Transformer Oil DTE/30	1,1,1 Trichloroethane	Trichloroethylene
METALS							
Aluminum	98 (210)		98 (210)	26 (80)	65 (150)		149 (300)
Bronze	32 (90)		176 (350)	32 (90)	65 (150)		26 (80)
Carbon Steel		82 (180)	176 (350)	26 (80)	65 (150)	26 (80)	26 (80)
Copper	32 (90)		98 (210)				26 (80)
Ductile Iron, Pearlitic							
Hastelloy C			98 (210)	32 (90)	65 (150)		98 (210)
Inconel			98 (210)				98 (210)
Monel			98 (210)	32 (90)	65 (150)		187 (370)
Nickel			98 (210)	32 (90)			98 (210)
304 SS		65 (150)	98 (210)	32 (90)		32 (90)	98 (210)
316 SS		65 (150)	176 (350)	32 (90)	65 (150)		187 (370)
NON-METALS							
ABS	U		U			U	U
CPVC	U	38 (100)	U	82 (180)	82 (180)	U	U
Resins - Epoxy	U		65 (150)	109 (230)			60 (140)
- Furan	121 (250)		127 (260)			26 (80)	82 (180)
- Polyester	43 (110)		U	104 (220)			U
- Vinyl Ester	49 (120)		49 (120)	149 (300)		U	U
HDPE	U		U	60 (140)	60 (140)	U	U
PP	U	49 (120)	15 (60)	43 (110)	65 (150)	U	15 (60)
PTFE	243 (470)	243 (470)	243 (470)	243 (470)	149 (300)	243 (470)	243 (470)
PVC Type 2	U		U			U	U
PVDF	121 (250)	93 (200)	98 (210)			49 (120)	127 (260)
OTHER MATERIALS							
Butyl			U	U			U
EPDM	U	U	U	U	U	U	U
EPT	U	U	U	U		U	U
FEP	204 (400)	204 (400)	204 (400)	204 (400)		204 (400)	204 (400)
FKM	204 (400)		204 (400)	204 (400)		26 (80)	204 (400)
Borosilicate Glass		98 (210)	121 (250)	32 (90)		93 (200)	132 (370)
Neoprene			U	54 (130)	U	U	U
Nitrile	U	15 (60)	65 (150)	104 (220)	60 (140)	U	U
N-Rubber			U	U			U
PFA	93 (200)		98 (210)	93 (200)			93 (200)
PVDC		49 (120)	28 (80)			32 (90)	26 (80)
SBR Styrene			U	U			U

Notes: U = unsatisfactory
XX (XX) = degrees C (degrees F)

Table B-1. Fluid/Material Matrix

EM-1110-1-4008

5 May 99

FLUID/MATERIAL	Turpentine	Water, Acid Mine	Water, Demineralized	Water, Distilled	Water, Potable	Water, Salt	Water, Sea
METALS							
Aluminum	87 (190)	U	82 (180)	U	98 (210)	U	38 (100)
Bronze	176 (350)	U		93 (200)	98 (210)	121 (250)	121 (250)
Carbon Steel	26 (80)	U	U	U		26 (80)	32 (90)
Copper	26 (80)	U		32 (90)	98 (210)	26 (80)	26 (80)
Ductile Iron, Pearlitic					30 (86)	32 (90)	32 (90)
Hastelloy C	38 (100)	32 (90)	93 (200)	298 (570)	98 (210)	149 (300)	298 (570)
Inconel	26 (80)	32 (90)	60 (140)	15 (60)		26 (80)	26 (80)
Monel	43 (110)			U	98 (210)	121 (250)	121 (250)
Nickel	26 (80)	U	93 (200)	26 (80)		26 (80)	32 (90)
304 SS	93 (200)	49 (120)	227 (440)	121 (250)	98 (210)	26 (80)	26 (80)
316 SS	176 (340)	49 (120)	227 (440)	121 (250)	98 (210)	121 (250)	121 (250)
NON-METALS							
ABS	U	60 (140)	60 (140)	60 (140)	26 (80)	60 (140)	32 (90)
CPVC	60 (140)	82 (180)	82 (180)	82 (180)	98 (210)	82 (180)	82 (180)
Resins - Epoxy	65 (150)	149 (300)	121 (250)	98 (210)		98 (210)	149 (300)
- Furan			121 (250)	93 (200)			121 (250)
- Polyester	26 (80)		71 (160)	93 (200)	98 (210)	82 (180)	104 (220)
- Vinyl Ester	65 (150)	98 (210)	98 (210)	98 (210)	98 (210)	82 (180)	82 (180)
HDPE	U	60 (140)	60 (140)	60 (140)		60 (140)	60 (140)
PP	26 (80)	104 (220)	104 (220)	104 (220)	82 (180)	104 (220)	104 (220)
PTFE	243 (470)	243 (470)	243 (470)	243 (470)	204 (400)	243 (470)	243 (470)
PVC Type 2	U	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)	60 (140)
PVDF	138 (280)	104 (220)	138 (280)	138 (280)	138 (280)	138 (280)	138 (280)
OTHER MATERIALS							
Butyl	U		60 (140)			87 (190)	
EPDM	U	93 (200)	121 (250)	149 (300)	121 (250)	121 (250)	121 (250)
EPT	U	98 (210)	98 (210)	98 (210)		93 (200)	93 (200)
FEP	204 (400)	204 (400)	204 (400)	204 (400)		204 (400)	204 (400)
FKM	209 (410)	87 (290)	87 (190)	87 (190)	149 (300)	87 (190)	87 (190)
Borosilicate Glass	121 (250)	98 (210)		121 (250)	98 (210)	98 (210)	98 (210)
Neoprene	U	98 (210)	98 (210)	93 (200)	82 (180)	98 (210)	98 (210)
Nitrile	104 (220)	98 (210)	98 (210)	98 (210)	82 (180)	98 (210)	98 (210)
N-Rubber	U		65 (150)	65 (150)		65 (150)	
PFA	93 (200)	93 (200)	93 (200)	93 (200)		93 (200)	93 (200)
PVDC	49 (120)	82 (180)	76 (170)	76 (170)	76 (170)	82 (180)	76 (170)
SBR Styrene	U	93 (200)	98 (210)	93 (200)		93 (200)	93 (200)

Notes:

U = unsatisfactory

XX (XX) = degrees C (degrees F)

Table B-1. Fluid/Material Matrix

FLUID/MATERIAL	Water, Sewage	Xylene	Zinc Chloride		
METALS					
Aluminum		93 (200)	U		
Bronze	32 (90)	121 (250)	U		
Carbon Steel	32 (90)	93 (200)	U		
Copper	32 (90)	93 (200)	U		
Ductile Iron, Pearlitic			U		
Hastelloy C		149 (300)	121 (250)		
Inconel		93 (200)	26 (80)		
Monel		39 (200)	93 (200)		
Nickel		93 (200)	93 (200)		
304 SS	32 (90)	93 (200)	U		
316 SS	32 (90)	93 (200)	93 (200)		
NON-METALS					
ABS	26 (80)	U	60 (140)		
CPVC	82 (180)	U	82 (180)		
Resins - Epoxy		60 (140)	121 (250)		
- Furan		127 (260)	127 (260)		
- Polyester		32 (90)	121 (250)		
- Vinyl Ester		60 (140)	82 (180)		
HDPE	60 (140)	U	60 (140)		
PP	104 (220)	15 (60)	93 (200)		
PTFE	243 (470)	243 (470)	243 (470)		
PVC Type 2	60 (140)	U	60 (140)		
PVDF	121 (250)	98 (210)	127 (260)		
OTHER MATERIALS					
Butyl		U	87 (190)		
EPDM	98 (210)	U	149 (300)		
EPT	60 (140)	U	82 (160)		
FEP	204 (400)	227 (440)	204 (400)		
FKM	87 (190)	204 (400)	204 (400)		
Borosilicate Glass		121 (250)	98 (210)		
Neoprene	71 (160)	U	71 (160)		
Nitrile	87 (190)	U	104 (220)		
N-Rubber		U	65 (150)		
PFA	93 (200)	93 (200)	93 (200)		
PVDC	76 (170)	U	76 (170)		
SBR Styrene		U			

Notes: U = unsatisfactory
XX (XX) = degrees C (degrees F)