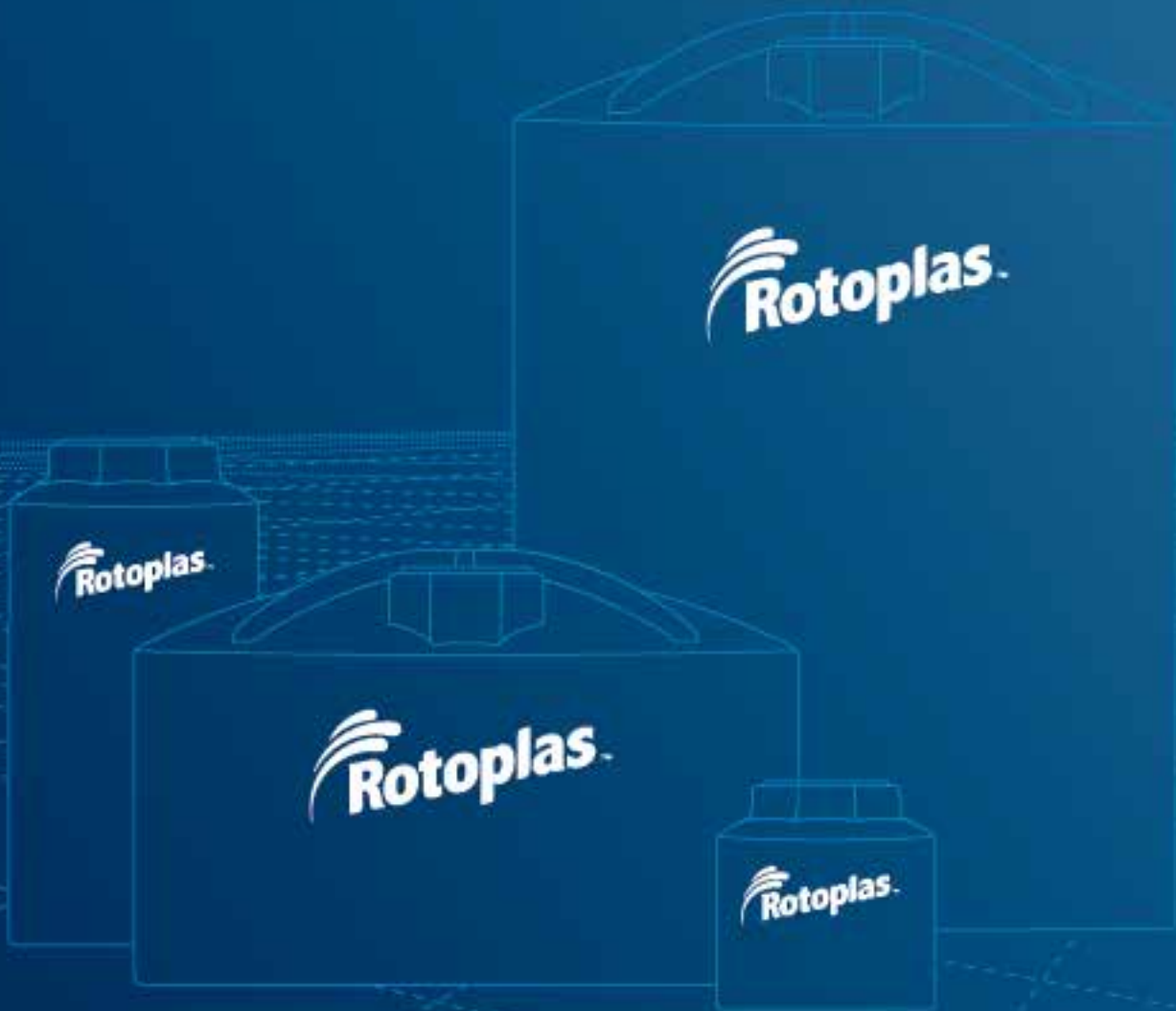




# Chemical Resistance Guide for high density polyethylene



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## Glossary

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## I. Important Considerations

### A. Characteristics of the resin.

In the guidelines hereby it is implied that every tank is manufactured with high density polyethylene which characteristics are as follows:

**A1. Average flow index 2.0 g/10 min, ASTM D-1238 method**

**A2. Average physical density 0.942 g/cm<sup>3</sup>, ASTM D-1505 method**

**A3. The resin contains UV stabilizers.**

**A4. The resin complies with FDA regulation according to section 21 CFR 177-1520.**

### B. Requeriments.

In order to conduct storage suggestions for specific chemical substance within the polyethylene tank not included in the Chemical Resistance Guide hereby, the following information should be provided:

**B1.** MSDS of the chemical species to be stored.

**B2.** Technical data sheet of the chemical species to store.

**B3.** Operational temperature interval of the substance to store

### C. Technical foundation of the chemical resistance guide

**C1.** Suggestions contained in this chemical resistance guides are made based on experience and knowledge from the High Density Resin manufacturer, particularly Equistar Chemical Company over its own resistance.

### D. ASTM Standard used for chemical resistance analysis.

**D1.** By means of the ASTM D 543 Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents, it is possible to know with certainty if polyethylene will chemically resist the substance which will be stored in a tank manufactured with such resin and while follow-up shall be given whenever a customer or plant requires so. It is worth mentioning that this sort of analysis would take at least some months as waiting period in order to get results and since they are costly, the plant shall absorb the costs.

### E. Durability of tanks

**E1.** The durability of a tank manufactured with polyethylene shall not be considered as constant or defined since it is AFFECTED by different factors such as:

- Stored substance.
- Concentration of stored substance
- Air temperature.
- Temperature at which the substance is stored.
- Solar radiation.
- Whether the tank shall be installed indoors.
- Whether the tank shall be installed outdoors.
- Profile of thicknesses of the tank.
- Content of UV additives.
- Tanks shall not be used for reaction mediums.

## F. Warranties

In case of manufacturing defect of every tank ask for the warranty policy.

## G. Support consideration according to densities

Color, support nomenclature	Density (g/cm3) of the chemical to store
Standard	Less than 1.20
20% Support	1.21 - 1.50
40% Support	1.51 - 1.90
Not suggested	Greater than 1.90

## High Density Polyethylene Chemical Resistance Guide

	Chemical or solvent	Resistance to chemical attack			Suggested package type		suggested connection		Support (%) (SPG)	
		Concentration	68F°	140F°	v: Viton	e: EPDM	PP:Polypropylene	Other	Temperature 68F°	Temperature 140F°
1	Acetone		S	S	—	e	PP	—	1.2	1.2
2	Acrylic emulsions		NS	NS	—	—	—	—	NS	NS
3	Alcohols from coconut oil		S	S	v	—	PP	—	1.2	1.2
4	Allyl alcohol	All	NS	NS	—	e	PP	—	NS	NS
5	Aluminum chloride	Dilute	S	S	v	e	PP	—	1.9	1.9
6	Aluminum chloride	Concentrated	S	S	v	e	PP	—	1.9	1.9
7	Aluminum fluoride	Concentrated	S	S	v	e	PP	—	1.9	1.9
8	Aluminum hydroxide		S	S	v	—	PP	—	1.5	1.5
9	Aluminum sulphate	Concentrated	S	S	v	—	PP	—	1.9	NS
10	Ammonia	Concentrated	S	S	—	e	PP	—	1.2	1.2
11	Ammonium carbonate		S	S	v	e	PP	Stainless Steel.	1.9	1.9
12	Ammonium chloride	Saturated	S	S	v	e	PP	—	1.5	1.5
13	"Ammonium fluoride CoPPER fluoride/ Cuprous fluoride"	Up to 20 %	S	S	v	e	PP	—	1.9	1.9
14	Ammonium hydroxide	diluted	S	S	v	e	PP	—	1.9	1.9
15	Ammonium Metaphosphate	Saturated	S	S	v	e	PP	—	1.9	1.9
16	Ammonium nitrate	Saturated	S	S	v	e	PP	—	1.5	1.5
17	Ammonium sulphate	Saturated	S	S	v	e	PP	—	1.9	1.9
18	Ammonium sulphide	Saturated	S	S	—	e	PP	—	1.9	1.9
19	Ammonium thiocyanate	Saturated	ND	ND	—	—	—	—	ND	ND
20	Amyl Acetate	100%	NS	NS	—	—	—	—	NS	NS
21	Amyl alcohol	100%	S	S	v	e	PP	—	1.2	1.2
22	Amyl chloride	100%	ND	ND	—	—	—	—	ND	ND
23	Aniline	100%	S	NS	—	e	PP	Stainless Steel.	1.2	NS
24	Antimony chloride	All	NS	NS	—	—	—	—	NS	NS
25	Any metal bisulfates	Concentrated	S	S	—	—	PP	—	1.9	1.9
26	Aqua regia		NS	NS	v	—	PP	—	NS	NS
27	Arsenic Acid	100%	ND	ND	—	—	—	—	ND	ND
28	Baits		NS	NS	—	—	—	—	NS	NS

For storage of corrosive substances

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■ ND = No data available

## High Density Polyethylene Chemical Resistance Guide

	Chemical or solvent	Resistance to chemical attack			Suggested package type		suggested connection		Support (%) (SPG)	
		Concentration	68F°	140F°	v: Viton	e: EPDM	PP:Polypropylene	Other	Temperature 68F°	Temperature 140F°
29	Barium carbonate	Saturated	S	S	v	e	PP	—	1.9	1.9
30	Barium chloride	Saturated	S	S	v	e	PP	—	1.9	1.9
31	Barium hydroxide	up to 35%	S	S	v	e	PP	—	1.5	1.5
32	Barium sulphide	Saturated	S	S	v	e	PP	—	1.9	1.9
33	Beer		S	ND	v	e	PP	—	1.2	ND
34	Benzene		NS	NS	—	—	—	—	NS	NS
35	Benzoic Acid	All	ND	ND	—	—	—	—	ND	ND
36	Bismuth carbonate	Saturated	S	S	—	—	PP	—	1.9	1.9
37	Black liquor		S	S	v	e	PP	—	1.9	1.9
38	Bleach	10%	S	S	v	—	PP	—	1.5	1.5
39	Bleaching agents		S	S	v	—	PP	—	1.5	1.5
40	Borax	Saturated	ND	ND	v	e	PP	—	ND	ND
41	Boric Acid	Concentrated	S	S	v	e	PP	—	1.5	1.5
42	Bromic Acid		NS	NS	v	e	PP	—	1.5	1.5
43	Butandiol	100%	ND	ND	—	—	—	—	ND	ND
44	Butyric Acid	All	ND	ND	—	—	—	—	ND	ND
45	Calcium bisulfate	All	S	S	—	—	PP	—	1.9	1.9
46	Calcium carbonate	Saturated	S	S	v	e	PP	—	1.9	1.9
47	Calcium chlorate	Saturated	S	S	—	e	PP	—	1.9	1.9
48	Calcium chloride	Saturated	S	S	v	e	PP	—	1.5	1.5
49	Calcium hydroxide/slaked lime	Saturated	ND	ND	—	—	—	—	ND	ND
50	Calcium hypochlorite/Calcium	Concentrated	S	S	v	e	PP	—	1.9	1.9
51	Oxychloride	Sun bleaching	S	S	v	e	PP	—	1.2	1.2
52	Calcium nitrate	50%	S	S	v	e	PP	—	1.5	1.5
53	Calcium sulfate		S	S	v	e	PP	—	1.9	1.9
54	Camphor Oil		ND	ND	—	—	—	—	ND	ND
55	Carbon dioxide	Saturated solution	S	S	v	e	—	—	1.2	1.2

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## High Density Polyethylene Chemical Resistance Guide

	Chemical or solvent	Resistance to chemical attack			Suggested package type		suggested connection		Support (%) (SPG)	
		Concentration	68F°	140F°	v: Viton	e: EPDM	PP:Polypropylene	Other	Temperature 68F°	Temperature 140F°
56	Carbon dioxide	Aqueous solution	S	S	v	e	—	—	1.2	1.2
57	Carbon disulfide		ND	ND	v	e	PP	—	ND	ND
58	Carbon tetrachloride		NS	NS	—	—	—	—	NS	NS
59	Carbonic Acid	Concentrated	S	S	—	—	—	—	1.2	1.2
60	Castor Oil		ND	ND	—	—	—	—	NS	NS
61	Chl goldform	100%	NS	NS	—	—	—	—	NS	NS
62	Chloric ethylene	100%	NS	NS	—	—	—	—	NS	NS
63	Chlorine	Liquid	NS	NS	—	—	—	—	NS	NS
64	Chlorine Benzene	Any	NS	NS	—	—	—	—	NS	NS
65	Chloro sulfonic Acid	Any	NS	NS	—	—	—	—	NS	NS
66	ChlUrinated water	2%	NS	NS	v	—	PP	—	1.2	1.2
67	Chrome bisulfate	Saturated	S	S	—	—	PP	—	1.9	1.9
68	Chromic Acid	Any	NS	NS	—	—	—	—	NS	NS
69	Cider		S	S	v	—	PP	—	1.2	1.2
70	Citric Acid	Saturated	S	S	v	e	PP	—	1.5	1.5
71	Combustible Oil		NS	NS	—	—	—	—	NS	NS
72	Common vinegar	Common	S	S	v	e	PP	—	1.2	1.2
73	Concentrated glue		ND	ND	—	—	—	—	ND	ND
74	CoPPer chloride	Saturated	S	S	v	e	PP	—	1.9	1.9
75	CoPPer nitrate	Saturated	S	S	v	—	PP	—	1.5	1.5
76	CoPPer sulfate/Cuprous Sulfate	diluted	S	S	v	e	PP	—	1.9	1.9
77	Cottonseed Oil		S	S	v	—	PP	—	1.2	1.2
78	Cresol/Hydroxytoluene	100%	NS	NS	—	—	—	—	NS	NS
79	Cuprous chloride	Saturated	S	S	v	e	PP	—	1.9	1.9
80	Cyclohexane		NS	NS	—	—	—	—	NS	NS
81	Cyclohexanena		NS	NS	—	—	—	—	NS	NS
82	Dextrin	Saturated	S	S	—	—	PP	—	1.2	1.2

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	Chemical or solvent	Resistance to chemical attack			Suggested package type		suggested connection		Support (%) (SPG)	
		Concentration	68F°	140F°	v: Viton	e: EPDM	PP:Polypropylene	Other	Temperature 68F°	Temperature 140F°
83	Dextrose	Saturated	S	S	v	—	PP	—	1.9	1.9
84	Diazo salts		ND	ND	—	—	—	—	ND	ND
85	Dibutyl phthalate (DBP)		NS	NS	—	—	—	—	NS	NS
86	Dichlgoldethylene(DCE)	Any	NS	NS	—	—	—	—	NS	NS
87	Dichlgoldpropylene	100%	NS	NS	—	—	—	—	NS	NS
88	Dietilen glycol	100%	NS	NS	—	—	—	—	NS	NS
89	Dietilen glycol	Diluted	S	S	v	e	PP	—	1.2	1.2
90	Dimethylamine	Any	NS	NS	—	—	—	—	NS	NS
91	Diocetyl phthalate		NS	NS	—	—	—	—	NS	NS
92	DiPotassium chromate	40%	S	S	v	e	PP	—	1.9	1.9
93	Ethyl Acetate	100%	NS	NS	—	—	—	—	NS	NS
94	Ethyl alcohol/Ethanol	Any	S	S	v	e	PP	—	1.2	1.2
95	Ethyl chloride	Any	NS	NS	—	—	—	—	NS	NS
96	Ethyl ether		NS	NS	—	—	—	—	NS	NS
97	Etilen Glycol	Saturated	S	S	v	e	PP	—	1.2	1.2
98	Ferric chloride	Saturated	S	S	v	e	PP	—	1.9	1.9
99	FerroPotassium cyanide	40%	ND	ND	—	—	—	—	ND	ND
100	FerroSodium cyanide	Saturated	S	S	v	e	PP	—	1.5	1.5
101	Ferrous chloride	Saturated	S	S	v	e	PP	—	1.9	1.9
102	Ferrous sulphate		S	S	v	e	PP	—	1.9	1.9
103	Flaxseed Oil		NS	NS	—	—	—	—	NS	NS
104	Fluorine		NS	NS	—	—	—	—	NS	NS
105	Formaldehyde	40%	S	S	v	e	PP	—	1.5	1.5
106	Formic Acid	100%	S	S	—	e	PP	—	1.9	1.9
107	Fruit pulp		S	S	v	—	—	—	1.2	1.2
108	Fruitful	Saturated	S	S	v	e	PP	—	1.9	1.9
109	Fuming sulfuric acid		NS	NS	—	—	—	—	NS	NS

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	Chemical or solvent	Resistance to chemical attack			Suggested package type		suggested connection		Support (%) (SPG)	
		Concentration	68F°	140F°	v: Viton	e: EPDM	PP:Polypropylene	Other	Temperature 68F°	Temperature 140F°
110	Furfural	Saturated	S	S	v	—	PP	—	1.9	1.9
111	Gin	100%	NS	NS	—	—	—	—	NS	NS
112	Glucose		NS	NS	—	—	—	—	NS	NS
113	Glycerin/Glycerol		ND	ND	—	—	—	—	ND	ND
114	Glycol		S	S	v	e	PP	—	1.5	1.5
115	Glycolic acid	30%	S	S	v	e	PP	—	1.9	1.9
116	Glyphosate		S	S	v	—	PP	—	1.9	1.9
117	Grape sugar	Saturated	S	S	v	e	PP	—	1.5	1.5
118	Heptane		S	S	v	e	PP	—	1.5	1.5
119	Hydrobromic Acid	50%	S	S	v	e	—	—	1.9	1.9
120	Hydrochloric acid	up to 75%	S	S	v	—	—	—	1.9	1.9
121	Hydrofluoric acid	up to Saturated	S	S	—	—	PP	—	1.2	1.2
122	Hydrogen peroxide	30%	S	S	v	e	PP	—	1.9	1.9
123	Hydrogen peroxide	90%	S	NS	v	—	PP	—	1.2	NS
124	Hydroquinone/Benzene-1	100%	NS	NS	—	—	—	—	NS	NS
125	Inks		S	S	—	e	PP	—	1.2	1.2
126	Iodine solutions	Any	NS	NS	—	—	—	—	NS	NS
127	Iron nitrate/ferric nitrate	Saturated	S	S	v	e	PP	—	1.9	1.9
128	Lactic acid	10 - 90%	S	S	v	e	PP	—	1.5	1.5
129	Latex		ND	ND	—	—	—	—	ND	ND
130	Lead Acetate	Saturated	S	S	—	e	PP	—	1.9	1.9
131	Liquid bromine	100%	NS	NS	—	—	—	—	NS	NS
132	Lubricating Oils		NS	NS	—	—	—	—	NS	NS
133	Magnesium carbonate	Saturated	S	S	v	e	PP	—	1.9	1.9
134	Magnesium chloride	Saturated	S	S	v	e	PP	—	1.9	1.9
135	Magnesium hydroxide	Saturated	S	S	v	e	PP	—	1.2	1.2
136	Magnesium nitrate	Saturated	S	S	v	e	PP	—	1.9	1.9

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	Chemical or solvent	Resistance to chemical attack			Suggested package type		suggested connection		Support (%) (SPG)	
		Concentration	68F°	140F°	v: Viton	e: EPDM	PP:Polypropylene	Other	Temperature 68F°	Temperature 140F°
137	Magnesium sulphate	Saturated	S	S	v	e	PP	—	1.9	1.9
138	Maleic acid		ND	ND	—	—	—	—	ND	ND
139	Malic acid	Saturated	S	S	v	—	PP	—	1.9	1.9
140	"Mercurous nitrate/ Mercury(I) nitrate"	Saturated	ND	ND	—	—	—	—	ND	ND
141	Methyl alcohol/Methanol	Any	S	S	—	e	PP	—	1.2	1.2
142	Methyl bromide/Bromomethane		NS	NS	—	—	—	—	NS	NS
143	Methyl chloride		NS	NS	—	—	—	—	NS	NS
144	Methyl ethyl ketone/Butane	100%	NS	NS	—	—	—	—	NS	NS
145	Methylene chloride	100%	NS	NS	—	—	—	—	NS	NS
146	Milk		S	S	v	e	PP	—	1.2	1.2
147	Mineral Oils		S	NS	v	—	PP	—	1.2	NS
148	Naphtha	100%	NS	NS	—	—	—	—	NS	NS
149	Naphthalene		NS	NS	—	—	—	—	NS	NS
150	Nickel chloride	Saturated	S	S	v	e	PP	—	1.9	1.9
151	Nickel nitrate	Concentrated	S	S	v	e	PP	—	1.5	1.5
152	Nickel sulphate	Saturated	S	S	v	e	PP	—	1.9	1.9
153	Nitric acid	Up to 30%	S	S	v	—	PP	—	1.5	1.5
154	Nitrobenzene	100%	NS	NS	—	—	—	—	NS	NS
155	Oils and Fatty Acids		NS	NS	—	—	—	—	1.2	1.2
156	Orange extract		S	S	v	e	PP	—	1.2	1.2
157	Oxalic acid	Saturated	S	S	v	e	PP	—	1.9	1.9
158	Perborate-potassium	Saturated	S	S	—	—	PP	—	1.9	1.9
159	Perchloric acid	10%	ND	ND	—	—	—	—	ND	ND
160	PerPotassium chlorate	10%	S	S	—	e	PP	—	1.9	1.9
161	Petroleum ether		NS	NS	—	—	—	—	NS	NS
162	Phenol/carbolic acid	Concentrated	NS	NS	—	—	—	—	NS	NS
163	Phosphoric Acid	Up to 30%	S	S	v	e	PP	—	1.9	1.9

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		Concentration	68F°	140F°	v: Viton	e: EPDM	PP:Polypropylene	Other	Temperature 68F°	Temperature 140F°
164	Phosphorus Pentoxide		ND	ND	—	—	—	—	ND	ND
165	Photographic solutions		S	S	v	e	PP	—	1.2	1.2
166	Picric acid	Any	NS	NS	—	—	—	—	NS	NS
167	Potassium bicarbonate	Saturated	S	S	v	e	PP	—	1.9	1.9
168	Potassium borate	1%	S	S	—	e	PP	—	1.9	1.9
169	Potassium bromate	100%	S	S	v	e	PP	—	1.9	1.9
170	Potassium bromide	Saturated	S	S	v	e	PP	—	1.9	1.9
171	Potassium carbonate		S	S	v	e	PP	—	1.9	1.9
172	Potassium chlorate	Saturated	S	S	v	e	PP	—	1.9	1.9
173	Potassium chloride	Saturated	S	S	v	e	PP	—	1.9	1.9
174	Potassium chromate	40%	S	S	v	e	PP	—	1.5	1.5
175	Potassium cyanide	Saturated	S	S	v	e	PP	—	1.9	1.9
176	Potassium fluoride	2%	S	S	v	e	PP	—	1.9	1.9
177	Potassium hydroxide	Saturated	S	S	v	e	PP	—	1.9	1.9
178	Potassium nitrate	Saturated	S	S	v	e	PP	—	1.9	1.9
179	Potassium permanganate		NS	NS	—	—	—	—	NS	NS
180	Potassium sulfite	Concentrated	S	S	v	e	PP	—	1.9	1.9
181	Potassium sulphate	Concentrated	S	S	v	e	PP	—	1.9	1.9
182	Potassium sulphide	Concentrated	S	S	v	e	PP	—	1.9	1.9
183	Potassium thiosulfate		S	S	v	e	PP	—	1.2	1.2
184	Propargyl alcohol		S	S	v	e	PP	—	1.2	1.2
185	Propilen Glycol	50%	S	S	v	—	PP	—	1.2	1.2
186	Propyl alcohol		S	S	v	e	PP	—	1.2	1.2
187	Sea water		S	S	v	e	PP	—	1.2	1.2
188	Silver nitrate solution		S	S	v	e	PP	—	1.9	1.9
189	SOAP solution	Concentrated	S	S	v	e	PP	—	1.5	1.5
190	Sodium Acetate	Saturated	S	S	—	e	PP	—	1.2	1.2

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		Concentration	68F°	140F°	v: Viton	e: EPDM	PP:Polypropylene	Other	Temperature 68F°	Temperature 140F°
191	PSodium benzoate	35%	S	S	v	e	PP	—	1.5	1.5
192	Sodium bicarbonate	Saturated	S	S	v	e	PP	—	1.9	1.9
193	Sodium bisulfite	Saturated	S	S	v	e	PP	—	1.9	1.9
194	Sodium Bisulphate	Saturated	S	S	v	e	PP	—	1.9	1.9
195	Sodium borate		S	S	v	e	PP	—	1.9	1.9
196	Sodium carbonate	Concentrated	S	S	v	e	PP	—	1.9	1.9
197	Sodium chlorate	Saturated	S	S	v	e	PP	—	1.9	1.9
198	Sodium chloride	Saturated	S	S	v	e	PP	—	1.2	1.2
199	Sodium cyanide		ND	ND	v	e	PP	—	ND	ND
200	Sodium dichromate	Saturated	S	S	v	e	PP	—	1.9	1.9
201	Sodium fluoride	80%	S	S	v	—	PP	—	1.9	1.9
202	Sodium hydroxide/ caustic soda	20%	S	S	v	e	PP	—	1.9	1.9
203	Sodium hypochlorite		S	S	v	e	PP	—	1.9	1.9
204	Sodium nitrate		S	S	v	e	PP	—	1.9	1.9
205	Solutions for metal plating	Bronze	S	ND	v	—	PP	—	1.9	ND
206	Solutions for metal plating	CoPPer	S	ND	v	—	PP	—	1.9	ND
207	Solutions for metal plating	Tin	S	ND	v	—	PP	—	1.9	ND
208	Solutions for metal plating	Indium	S	ND	—	—	—	—	1.9	ND
209	Solutions for metal plating	Nickel	S	ND	v	—	PP	—	1.9	ND
210	Solutions for metal plating	Gold	S	ND	v	e	PP	—	1.9	ND
211	Solutions for metal plating	Silver	S	ND	v	—	PP	—	1.9	ND
212	Solutions for metal plating	Lead	S	ND	v	—	PP	—	1.9	ND
213	Solutions for metal plating	Rhodium	S	ND	v	e	PP	—	1.9	ND
214	Solutions for metal plating	Zinc	S	ND	v	—	PP	—	1.9	ND
215	Stannous chloride	Saturated	S	S	v	—	PP	—	1.9	1.9
216	Starch solution	Saturated	S	S	v	e	PP	—	1.2	1.2
217	Stearic Acid	100%	S	S	v	e	PP	—	1.5	1.5

For storage of corrosive substances

- NS = No satisfactory, it is suggested to use PEAD for this application
- ND = No data available

## High Density Polyethylene Chemical Resistance Guide

	Chemical or solvent	Resistance to chemical attack			Suggested package type		suggested connection		Support (%) (SPG)	
		Concentration	68F°	140F°	v: Viton	e: EPDM	PP:Polypropylene	Other	Temperature 68F°	Temperature 140F°
218	Sulfuric acid	Up to 99%	S	S	v	e	PP	—	1.9	1.9
219	Sulfurous acid		S	S	v	e	PP	—	1.9	1.9
220	Sulphur dioxide		ND	ND	—	—	—	—	ND	ND
221	Sulphur trioxide		ND	ND	—	—	—	—	ND	ND
222	Sulphur/Sulfur	Colloidal	NS	NS	—	—	—	—	NS	NS
223	Synthetic detergents		S	S	v	e	PP	—	1.2	1.2
224	Tannic acid	10%	S	S	v	e	PP	—	1.9	1.9
225	Tartaric acid	10%	ND	ND	—	—	—	—	ND	ND
226	Tetraethyl lead		ND	ND	—	—	—	—	ND	ND
227	Tetrahydrofuran-THF	100%	NS	NS	—	—	—	—	NS	NS
228	Toluene/methylbenzene		NS	NS	—	—	—	—	NS	NS
229	Transformer Oil		NS	NS	—	—	—	—	NS	NS
230	Trichlgoldacetic acid		ND	ND	—	—	—	—	ND	ND
231	Trichloroethylene		NS	NS	—	—	—	—	NS	NS
232	Triethanolamine	100%	NS	NS	—	—	—	—	NS	NS
233	Trisodium phosphate(TSP)	Saturated	S	S	v	—	PP	—	1.9	1.9
234	Turpetine		NS	NS	v	—	—	—	NS	NS
235	UAN		S	NS	—	—	—	—	1.2	1.2
236	Urea	Up to 30%	S	NS	—	—	—	—	1.2	1.2
237	Urine		S	S	v	e	PP	—	1.2	1.2
238	Vanilla		S	S	v	e	PP	—	1.2	1.2
239	Whisky		S	S	v	e	PP	—	1.2	NS
240	Wines		S	S	v	e	PP	—	1.2	1.2
241	Xylene		NS	NS	v	e	—	—	NS	NS
242	Yeast		S	S	v	e	PP	—	1.2	1.2
243	Zinc chloride	Saturated	S	S	v	e	PP	—	1.9	1.9
244	Zinc sulfate	Saturated	S	S	v	e	PP	—	1.9	1.9

For storage of corrosive substances

- NS = No satisfactory, it is suggested to use PEAD for this application
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## Glossary

### II. Polyethylene Degradation

#### H. High Density polyethylene degradation

High density polyethylene degradation refers to the chemical and physical alteration experienced by its structure due to environment and operation conditions, resulting in the loss of original properties mainly mechanical.

This changes might be physical such as discoloration, surface shine loss, sticky cracks formation, surface erosion and loss of properties such as resistance to tension or elongation, or it might be chemical changes consistent in chain rupture, changes in substituents, cross-linking reaction occurrence, etc.

The main types of polymeric degradation are:

#### H1. Photodegradation

Photodegradation of a polymer starts whenever a ray of UV light starts a reaction by free radicals within the polymer molecule. Since there is presence of free radicals within the chain, these work as precursors of the latter's division, thus smaller chains are formed resulting in a detriment to the mechanic properties and for that matter a life span reduction of the product. Due to the aforementioned it is important to consider the content of UV absorbers in type and proper concentration.

#### H2. Thermal degradation.

Thermal degradation is created, just as photogeneration due to free radicals formation which break existing links between polymer chains, the aforementioned is due to temperature increase.

#### H3. Generation created by liquid exposition.

Such degradation is created by the contact of the polymer and a liquid, the penetration of such liquids into the material builds swelling, intermolecular hydrogen bridge rupture, chain division and rupture of unstable links, so the material becomes softer and weaker; this process is directly affected by air temperature and the stored liquid.

#### H4. Biodegradation

Biodegradation addresses transformation and deterioration produced in the polymer due to enzyme and microorganism action with bacteria, fungi and algae.

### III. Dilutions Definitions

#### I1. Dilution.

It is the result of the mix between two or more different substances where their coupling does not produce a chemical reaction. A substance (solute) dilutes in another (solvent) forming a single phase.

#### I2. Solute.

Dilution component found in lesser amount.

#### I3. Solvent.

Component of a dilution found in greater amount.

#### I4. Watery dilution

Solvent is water and solute might be a solid, fluid or gas

#### I5. Saturated solution.

Dilution containing the maximum amount of solute which solvent might dilute at that particular pressure and temperature, that is to say, if more solute is added, it will not dilute. Based on the aforementioned, the following cases might occur:

- If the solute is a solid in a liquid solvent, the excess shall precipitate.
- If the solute is a liquid in a liquid solvent, the excess shall be separated from solvent depending upon the density of materials
- If the solute is a gas in a liquid solvent, the solute excess shall leak in bubble form.

#### I6. Concentration.

Amount of solute found diluted in a certain amount of solvent, or, the amount of solute diluted in a certain amount of solution. The concentration of a solution shall be expressed in the rate between solute and solvent as generally indicated in percentage.

#### I7. Methods to express concentration of solutions

Mass percentage (m/m): Amount of grams of solute diluted in 100 grams of solution.

Percentage in volume (V/V): Volume in milliliters of solute diluted in 100 milliliters of solution.

Percentage per million (ppm): Amount of milligrams of solute diluted in 1 liter (or + kilogram) of solution.





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