+GF+

HARVEL®

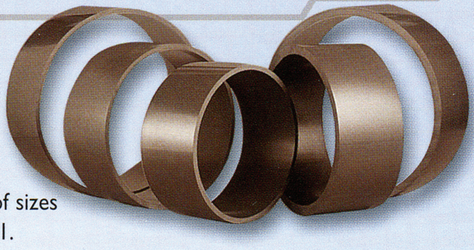
Engineering & Installation Guide

PVC and CPVC extruded pipe, duct, and machining stock.

THE QUALITY LINE

Quick Reference Guide

PVC Corrosion Resistant Pressure Pipe

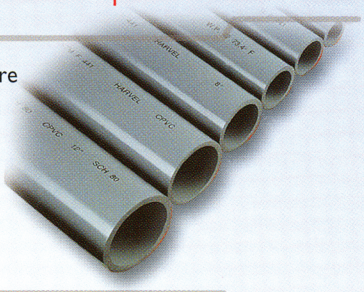


GF Harvel has expanded its original "quality line" of PVC pipe to include sizes 1/8" through 24" in Schedules 40, 80 and 120 as well as a broad range of sizes in SDR 13.5, 21, 26 and 41.

GF Harvel CPVC Fire Sprinkler

Since the inception of BlazeMaster® CPVC into the fire sprinkler industry more than twenty years ago, GF Harvel has been a select producer and an integral part of the product's outstanding success.

CPVC Corrosion Resistant Pressure Pipe

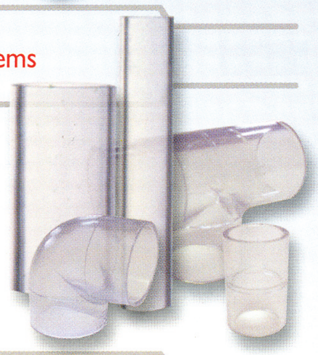


Featuring superior high-temperature strength and chemical resistance, GF Harvel CPVC is used in a wide variety of piping system applications.

GF Harvel HydroKing® CTS CPVC Plumbing Pipe
GF Harvel FlowGuard Gold® CTS CPVC Plumbing Pipe

GF Harvel HydroKing® and GF Harvel FlowGuard Gold® CTS CPVC plumbing pipe features outstanding corrosion resistance for hot and cold water plumbing applications.

GF Harvel Clear™ PVC Piping Systems



GF Harvel Clear™ Rigid PVC piping provides a versatile, cost-effective choice for semiconductor, sight-glass and dual-containment applications, where visual monitoring of the process is critical.

PVC Corrosion Resistant Duct

GF Harvel PVC duct provides long-lasting, cost-effective solutions for industrial and institutional corrosive fume exhaust and drain applications.

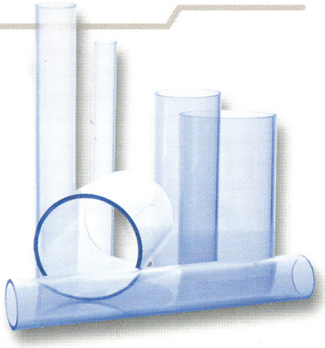
GF Harvel LXT® Ultra-pure Water Systems

GF Harvel LXT® low-extractable piping for ultra-pure water systems offers fast, low-cost and reliable installations in semi-conductor, electronics, biotechnology and other industries.

CPVC Corrosion Resistant Duct

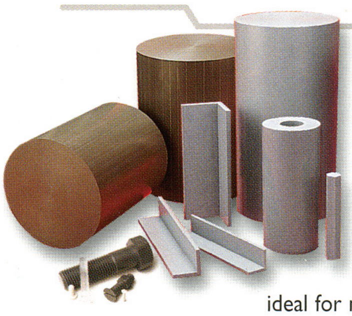
Superior flammability characteristics, as well as resistance to corrosion and chemical attack make GF Harvel seamless extruded CPVC duct ideally suited for large-diameter hot fume handling and drain applications.

GF Harvel EnviroKing®UV Clear PVC Piping



GF Harvel EnviroKing®UV Clear PVC piping is a cost-effective solution for photobioreactors and other green energy applications.

Machining Stock & Fabrication Products



GF Harvel extrudes PVC, CPVC and clear PVC in a wide range of sizes and shapes including hollow round bar and solid round, hex, rectangular and square bar, as well as angle and welding rod. Outstanding clarity and superior machining characteristics make GF Harvel machining stock and fabrication products ideal for numerous fabrication and decorative uses.

Advantages of Harvel PVC and CPVC Products

Consistency/Quality – developed, processed, and designed to consistently meet and/or exceed industry standards for strength and durability

Chemically Resistant over a broad range of chemicals, concentrations and reagent mixtures

Strength - high tensile strength and well balanced physical properties provides long-term pressure bearing capability for aggressive fluid handling applications

Corrosion Resistant – Immune to electrolytic, galvanic and vapor phase corrosion

Clean, non-contaminating materials for use in potable water and other applications where contamination of fluids conveyed is critical

Lightweight – minimizes labor, handling and jobsite mechanical equipment; greatly reducing installation related costs

Simple Joining Methods – leak-free dependable joints via solvent cement joining minimizes equipment requirements and reduces installation costs

Rigid – requires fewer hangers and supports compared to other plastic pipe materials

Smooth Surfaces – reduce friction loss and provide good abrasion resistance

Low Thermal Conductivity – provides good insulation qualities with low heat transfer; less energy use overtime

Good electrical insulation values

Ease of Fabrication – can be easily machined, heat formed, welded, and subjected to a variety of other joining and fabrication techniques

Safety – industry regulated for toxological compliance (NSF Std 61); exhibit good fire performance characteristics (will not independently support combustion)

Typical Applications of Harvel Piping Products

Harvel PVC and CPVC piping products can be found in applications in the following industries where water, chemical and corrosive fluid production, transfer and mixing are utilized:

Chemical Process Industries: Chemical processing - Industrial waste - Laboratory Semiconductor - Pulp & Paper - Electroplating - Electronics Metal Treating - Chlor-Alkali - Fertilizer - Color industries - Textile - Mining - Air Pollution Control - Photo Finishing - Printing

Industrial Processing: Plant Water Distribution - Cooling Water - Waste-Water - Process Water - Reclaim - Waste Treatment - HVAC Pollution Control - Brine Production & Disposal

Power Generation: Boiler Feed Water - Atomic Energy - Fly Ash Slurries - Coal Mining - Gas Industry - Oil Refining Cooling Water - Water and Waste Water Treatment

Food and Beverage: Potable Water - Bottled Water - Ultra Pure Water - Food Processing - Meat Packing - Poultry Farming & Processing Distilled Water - Ice Production & Equipment

High Purity Applications- Semiconductor - Pharmaceutical Biotechnology - Chemical Manufacturing - Health Care - Universities - Clean Room Applications - Wet Bench Construction - Ultrapure Water

Water and Waste Water: Water Treatment - Waste Water Treatment - Reclaim Aeration - Desalination - Detention & Collection - Water Resource Conservation - Ground Remediation - Well Casing & Well Monitoring

Aquaculture: Life Support Systems - Public Aquariums - Fish Hatcheries - Lobster Ponds - Fish Ladders - Fish Farming etc.

Recreational: Water Parks - Theme Parks - Fountains - Water Features - Swimming Pools

Agricultural/Irrigation: Commercial Irrigation - Golf Courses - Farming - Genetic Engineering - Greenhouses

General Services: Hot and Cold Water Plumbing - Municipal Water - Process Water - Commercial Roof Drain - Bridge Drain - Industrial Parks - Shopping Centers - Surface Drainage - Landfill Marine Applications - Drain Waste & Vent

Fire Protection: NFPA 13 Light Hazard, 13R & 13D - Fire Sprinkler Systems found in Highrise Office Buildings - Hotels Motels - Dormitories - Apartments - Nursing Homes - Hospitals - Single Family Residences

Specialty Applications: Visual Leak Detection - Dual Containment - Decorative Applications - Civil Defense - Naval Military Applications - Fire Resistive Construction

Harvel PVC and CPVC Materials

PVC

Polyvinyl Chloride (PVC) is an amorphous thermoplastic material that can be formulated or "compounded" to target a specific application. Minor ingredients must be blended with PVC resin to create a PVC compound that is processable into a finished product. The physical properties of PVC can be altered considerably to provide desirable properties by compounding techniques. Additives such as impact modifiers, stabilizers, lubricants, processing aids, pigments and other ingredients can be modified to obtain desirable properties. As such, PVC is available in a wide range of products from flexible tubing, film packaging materials, and vinyl siding, through various blends that can be used to produce rigid PVC pressure piping.

Harvel Plastics, Inc. blends its own PVC compounds that are optimized specifically for Harvel's quality line of rigid PVC piping products. Harvel utilizes several different PVC compounds formulated specifically for the production of different PVC product lines. This ensures tight control over consistency and quality in the end product, which has been optimized for chemical resistance and pressure bearing capability. Harvel PVC materials are listed by NSF International to NSF STD 61, toxicology, as being safe for use in potable water applications. ASTM Standard D1784, Standard Specification for rigid polyvinyl Chloride) (PVC) compounds and chlorinated (polyvinyl Chloride) (CPVC) compounds calls out minimum physical property requirements of compounds that are used in the production of PVC pipe and fittings. This standard classifies the physical properties through a "Cell Classification" system that calls out base resin, minimum impact strength, tensile strength, modulus of elasticity, heat deflection temperature under load, and flammability when tested per applicable ASTM standards. Unplasticized or rigid PVC compound used for the manufacture of pipe and fittings, has a Cell Classification of 12454 per ASTM D1784, and is also known as Type I Grade I PVC or PVC 1120. Refer to Physical Properties section, Chemical Resistance Data, and Industry Standards & Test Methods section for additional information.

PVC Cell Classification 12454 = PVC Type I, Grade I = Rigid (unplasticized) PVC = PVC 1120 = H707 PVC (Harvel tradename)

Harvel® PVC Product Line

Schedule 40, Schedule 80 & Schedule 120 PVC Pressure Pipe
SDR Series Pressure Pipe (SDR 13.5, SDR 21, SDR 26 & SDR41)
Harvel Clear™ PVC Schedule 40 & Schedule 80 Pipe
PVC Duct
PVC Machining Shapes (solid bar, hollow bar, angle and other machine stock)
Harvel LXT® UPW Piping
Custom Dimensions and Colors

CPVC

Chlorinated polyvinyl chloride (CPVC) is created by subjecting PVC resin to a post chlorination reaction that results in additional chlorine atoms on the base molecule. This results in an amorphous thermoplastic material similar to PVC with added advantages: a higher heat distortion temperature and improved fire performance properties at relatively low cost compared to alternate materials. As with PVC, the physical properties of CPVC can be altered considerably to provide desirable properties by compounding techniques. Due to its higher heat distortion temperature, Harvel CPVC can be used in piping applications at temperatures up to 60°F higher than PVC piping, having a maximum service temperature for pressure applications of 200°F. Harvel CPVC provides an economic solution for piping utilized in process piping, hot water and similar service applications where operating conditions exceed the recommended temperature limits of PVC. This greatly expands the application range for thermoplastic pipe, providing an economical solution for piping used in elevated temperature service.

Harvel utilizes several different CPVC compounds formulated specifically for the production of different CPVC end products. Refer to Physical Properties section, Chemical Resistance Data, and Industry Standards & Test Methods section for additional information. Harvel utilizes CPVC materials listed by NSF International to NSF STD 61, toxicology, as being safe for use in potable water applications. The Cell Classification call out for most CPVC piping materials per ASTM D1784 is as follows:

CPVC Cell Classification 23447 = CPVC Type IV, Grade I = Rigid (unplasticized) CPVC = CPVC

Harvel® CPVC Product Line

Schedule 40 & Schedule 80 CPVC Pressure Pipe
CPVC Duct
CPVC Machining Shapes (solid bar, hollow bar, angle and other machine stock)
CTS CPVC Hot and Cold Water Plumbing Pipe
Harvel CPVC Fire Sprinkler Pipe
Harvel FlameTech™

NOTE Although PVC and CPVC are similar in nature they are not the same. Care should be used when investigating chemical resistance, joining/fabrication techniques, and service applications. Harvel utilizes several different PVC and CPVC compounds for the production of different product lines. Different compounds may exhibit slight variations in actual physical properties and resultant cell classifications as compared to those stated. Contact Harvel Tech Services for additional information if necessary.

HARVEL

Dimensions & Pressure Ratings

Dimensions & Pressure Ratings

PVC Pipe

Schedule 40 Dimensions

Nom. Pipe Size (in.)	O.D.	Average I.D.	Min. Wall	Nom. Wt./Ft.	Max. W.P. PSI*
1/8	0.405	0.249	0.068	0.051	810
1/4	0.540	0.344	0.088	0.086	780
3/8	0.675	0.473	0.091	0.115	620
1/2	0.840	0.602	0.109	0.170	600
3/4	1.050	0.804	0.113	0.226	480
1	1.315	1.029	0.133	0.333	450
1-1/4	1.660	1.360	0.140	0.450	370
1-1/2	1.900	1.590	0.145	0.537	330
2	2.375	2.047	0.154	0.720	280
2-1/2	2.875	2.445	0.203	1.136	300
3	3.500	3.042	0.216	1.488	260
3-1/2	4.000	3.521	0.226	1.789	240
4	4.500	3.998	0.237	2.118	220
5	5.563	5.016	0.258	2.874	190
6	6.625	6.031	0.280	3.733	180
8	8.625	7.942	0.322	5.619	160
10	10.750	9.976	0.365	7.966	140
12	12.750	11.889	0.406	10.534	130
14	14.000	13.073	0.437	12.462	130
16	16.000	14.940	0.500	16.286	130
18	18.000	16.809	0.562	20.587	130
20	20.000	18.743	0.593	24.183	120
24	24.000	22.544	0.687	33.652	120

Schedule 80 Dimensions

Nom. Pipe Size (in.)	O.D.	Average I.D.	Min. Wall	Nom. Wt./Ft.	Max. W.P. PSI*
1/8	0.405	0.195	0.095	0.063	1,230
1/4	0.540	0.282	0.119	0.105	1,130
3/8	0.675	0.403	0.126	0.146	920
1/2	0.840	0.526	0.147	0.213	850
3/4	1.050	0.722	0.154	0.289	690
1	1.315	0.936	0.179	0.424	630
1-1/4	1.660	1.255	0.191	0.586	520
1-1/2	1.900	1.476	0.200	0.711	470
2	2.375	1.913	0.218	0.984	400
2-1/2	2.875	2.290	0.276	1.500	420
3	3.500	2.864	0.300	2.010	370
3-1/2	4.000	3.326	0.318	2.452	350
4	4.500	3.786	0.337	2.938	320
5	5.563	4.768	0.375	4.078	290
6	6.625	5.709	0.432	5.610	280
8	8.625	7.565	0.500	8.522	250
10	10.750	9.493	0.593	12.635	230
12	12.750	11.294	0.687	17.384	230
14	14.000	12.410	0.750	20.852	220
16	16.000	14.213	0.843	26.810	220
18	18.000	16.014	0.937	33.544	220
20	20.000	17.814	1.031	41.047	220
24	24.000	21.418	1.218	58.233	210

Schedule 120 Dimensions

Nom. Pipe Size (in.)	O.D.	Average I.D.	Min. Wall	Nom. Wt./Ft.	Max. W.P. PSI*
1/2	0.840	0.480	0.170	0.236	1010
3/4	1.050	0.690	0.170	0.311	770
1	1.315	0.891	0.200	0.464	720
1-1/4	1.660	1.204	0.215	0.649	600
1-1/2	1.900	1.423	0.225	0.787	540
2	2.375	1.845	0.250	1.111	470
2-1/2	2.875	2.239	0.300	1.615	470
3	3.500	2.758	0.350	2.306	440
4	4.500	3.574	0.437	3.713	430
6	6.625	5.434	0.562	7.132	370
8	8.625	7.189	0.718	11.277	380

SDR 13.5 - Max W.P. 315 PSI*(all sizes)

Nom. Pipe Size (in.)	O.D.	Average I.D.	Min. Wall	Nom. Wt./Ft.
1/2	0.840	0.696	0.062	0.110

SDR 21 - Max W.P. 200 PSI*(all sizes)

Nom. Pipe Size (in.)	O.D.	Average I.D.	Min. Wall	Nom. Wt./Ft.
3/4	1.050	0.910	0.060	0.136
1	1.315	1.169	0.063	0.180
1-1/4	1.660	1.482	0.079	0.278
1-1/2	1.900	1.700	0.090	0.358
2	2.375	2.129	0.113	0.550
2-1/2	2.875	2.581	0.137	0.797
3	3.500	3.146	0.167	1.168
3-1/2	4.000	3.597	0.190	1.520
4	4.500	4.046	0.214	1.927
5	5.563	5.001	0.265	2.948
6	6.625	5.955	0.316	4.185
8	8.625	7.756	0.410	7.069

SDR 26 - Max W.P. 160 PSI*(all sizes)

Nom. Pipe Size (in.)	O.D.	Average I.D.	Min. Wall	Nom. Wt./Ft.
1	1.315	1.175	0.060	0.173
1-1/4	1.660	1.512	0.064	0.233
1-1/2	1.900	1.734	0.073	0.300
2	2.375	2.173	0.091	0.456
2-1/2	2.875	2.635	0.110	0.657
3	3.500	3.210	0.135	0.966
3-1/2	4.000	3.672	0.154	1.250
4	4.500	4.134	0.173	1.569
5	5.563	5.108	0.214	2.411
6	6.625	6.084	0.255	3.414
8	8.625	7.921	0.332	5.784
10	10.750	9.874	0.413	8.971
12	12.750	11.711	0.490	12.620
14	14.000	12.860	0.538	15.205
16	16.000	14.696	0.615	19.877
18	18.000	16.533	0.692	25.156
20	20.000	18.370	0.769	31.057
24	24.000	22.043	0.923	44.744

SDR 41 - Max W.P. 100 PSI*(all sizes)

Nom. Pipe Size (in.)	O.D.	Average I.D.	Min. Wall	Nom. Wt./Ft.
18	18.000	17.061	0.439	16.348
20	20.000	18.956	0.488	20.196
24	24.000	22.748	0.585	29.064

CPVC Pipe

Schedule 40 Dimensions

Nom. Pipe Size (in.)	O.D.	Average I.D.	Min. Wall	Nom. Wt./Ft.	Max. W.P. PSI*
1/4	0.540	0.344	0.088	0.096	780
3/8	0.675	0.473	0.091	0.128	620
1/2	0.840	0.602	0.109	0.190	600
3/4	1.050	0.804	0.113	0.253	480
1	1.315	1.029	0.133	0.371	450
1-1/4	1.660	1.360	0.140	0.502	370
1-1/2	1.900	1.590	0.145	0.599	330
2	2.375	2.047	0.154	0.803	280
2-1/2	2.875	2.445	0.203	1.267	300
3	3.500	3.042	0.216	1.660	260
3-1/2	4.000	3.521	0.226	1.996	240
4	4.500	3.998	0.237	2.363	220
6	6.625	6.031	0.280	4.164	180
8	8.625	7.942	0.322	6.268	160
10	10.750	9.976	0.365	8.886	140
12	12.750	11.889	0.406	11.751	130
14	14.000	13.073	0.437	13.916	130
16	16.000	14.940	0.500	18.167	130
18	18.000	16.809	0.562	22.965	130

Schedule 80 Dimensions

Nom. Pipe Size (in.)	O.D.	Average I.D.	Min. Wall	Nom. Wt./Ft.	Max. W.P. PSI*
1/4	0.540	0.282	0.119	0.117	1,130
3/8	0.675	0.403	0.126	0.162	920
1/2	0.840	0.526	0.147	0.238	850
3/4	1.050	0.722	0.154	0.322	690
1	1.315	0.936	0.179	0.473	630
1-1/4	1.660	1.255	0.191	0.654	520
1-1/2	1.900	1.476	0.200	0.793	470
2	2.375	1.913	0.218	1.097	400
2-1/2	2.875	2.290	0.276	1.674	420
3	3.500	2.864	0.300	2.242	370
3-1/2	4.000	3.326	0.318	2.735	350
4	4.500	3.786	0.337	3.277	320
6	6.625	5.709	0.432	6.258	280
8	8.625	7.565	0.500	9.506	250
10	10.750	9.493	0.593	14.095	230
12	12.750	11.294	0.687	19.392	230
14	14.000	12.410	0.750	23.261	220
16	16.000	14.213	0.843	29.891	220
18	18.000	16.014	0.937	37.419	220

NOTE *Pressure ratings are for water, non-shock, @73°F. Threaded pipe requires a 50% reduction in the pressure ratings stated for plain-end pipe @ 73°F. Threading recommended for Schedule 80 or heavier walls only. Maximum service temperature for PVC is 140°F. Maximum service temperature for CPVC is 200°F. The pressure rating of the pipe must be derated when working at elevated temperatures.

Chemical resistance data should be referenced for proper material selection and possible de-rating when working with fluids other than water. Refer to chemical resistance and installation data. All PVC piping is produced from NSF approved compounds conforming to ASTM D1784 and is NSF listed for potable water use.

ASTM Standard D1784 Material equivalents:
Cell classification 12454 = PVC Type I Grade I = PVC1120
Cell classification 23447 = CPVC Type IV Grade I = CPVC4120

Schedule 40, 80 & 120 PVC pipe is manufactured in strict compliance with ASTM D1785. Schedule 40 & 80 PVC pipe is manufactured in strict compliance with ASTM F441

Temperature De-rating

The pressure ratings given are for water, non-shock, @ 73°F. The following temperature de-rating factors are to be applied to the working pressure ratings (W.P.) listed when operating at elevated temperatures.

Multiply the working pressure rating of the selected pipe at 73°F, by the appropriate de-rating factor to determine the maximum working pressure rating of the pipe at the elevated temperature chosen.

Solvent-cemented joints should be utilized when working at or near maximum temperatures of the material selected. Harvel Plastics does not recommend the use of standard threaded connections at temperatures above 110°F for PVC or at temperatures above 150°F for CPVC; use specialty reinforced adapters, flanged joints, unions or roll grooved couplings where disassembly is necessary at elevated temperatures.

Threading of Schedule 40 pipe (PVC or CPVC) is not a recommended practice due to insufficient wall thickness. Thread only Schedule 80 or heavier walls. Threading requires a 50% reduction in pressure rating stated for plain end pipe @73°F.

Chemical resistance data should be referenced for proper material selection and possible pressure de-rating when working with fluids other than water. Refer to Harvel's chemical resistance guide for additional information.

PVC Pipe

Operating Temp (°F)	De-Rating Factor
73	1.00
80	0.88
90	0.75
100	0.62
110	0.51
120	0.40
130	0.31
140	0.22

EX: 10" PVC SCHEDULE 80 @ 120°F = ?
230 psi x 0.40 = 92 psi max. @ 120°F

CPVC Pipe

Operating Temp (°F)	De-Rating Factor
73-80	1.00
90	0.91
100	0.82
110	0.72
120	0.65
130	0.57
140	0.50
150	0.42
160	0.40
170	0.29
180	0.25
200	0.20

EX: 10" CPVC SCHEDULE 80 @ 120°F = ?
230 psi x 0.65 = 149.5 psi max. @ 120°F

HARVEL®

Tolerances and Skid Quantities

Outside Diameters and Tolerances

Nom. Pipe Size (in.)	Outside Diam.	Tolerances For Max. and Min. Diameter (out-of-roundness) Average.	Sch. 40	Sch. 80	Sch. 120	SDRs 21, 26 & 41	SDR 13.5
1/8	0.405	±0.004	±0.008	±0.008		±0.015	
1/4	0.540	±0.004	±0.008	±0.008		±0.015	
3/8	0.675	±0.004	±0.008	±0.008		±0.015	
1/2	0.840	±0.004	±0.008	±0.008	±0.008	±0.015	±0.008
3/4	1.050	±0.004	±0.010	±0.010	±0.010	±0.015	±0.010
1	1.315	±0.005	±0.010	±0.010	±0.010	±0.015	±0.010
1-1/4	1.660	±0.005	±0.012	±0.012	±0.012	±0.015	±0.012
1-1/2	1.900	±0.006	±0.012	±0.012	±0.012	±0.030	±0.012
2	2.375	±0.006	±0.012	±0.012	±0.012	±0.030	±0.012
2-1/2	2.875	±0.007	±0.015	±0.015	±0.015	±0.030	±0.015
3	3.500	±0.008	±0.015	±0.015	±0.015	±0.030	±0.015
3-1/2	4.000	±0.008	±0.050	±0.015	±0.015	±0.050	
4	4.500	±0.009	±0.050	±0.015	±0.015	±0.050	
5	5.563	±0.010	±0.050	±0.030	±0.030	±0.050	
6	6.625	±0.011	±0.050	±0.035	±0.035	±0.050	
8	8.625	±0.015	±0.075	±0.075	±0.045	±0.075	
10	10.750	±0.015	±0.075	±0.075	±0.050	±0.075	
12	12.750	±0.015	±0.075	±0.075	±0.060	±0.075	
14	14.000	±0.015	±0.100	±0.100		±0.100	
16	16.000	±0.019	±0.160	±0.160		±0.160	
18	18.000	±0.019	±0.180	±0.180		±0.180	
20	20.000	±0.023	±0.200	±0.200		±0.200	
24	24.000	±0.031	±0.240	±0.240		±0.240	

Specifications applicable to Schedule 40, 80 and 120 piping are described in ASTM D1785
Specifications applicable to SDR 41, 26, 21 and 13.5 piping are described in ASTM D2241

Pallet & Truck Load Quantities

Pcs./ Size (in.)	Ft./ Skid	Skid Skid	Plain Dim.	Schd. 40 & SDR's Plain End Skids/ Truck	Schd. 40 & SDR's Belled End Skids/ Truck	Schd. 80 Plain End Skids/ Truck	Schd. 80 Belled End Skids/ Truck
1/2	285	5700	44 x 08	32	N/A	32	N/A
3/4	263	5260	43 x 10	28	N/A	24	N/A
1	214	4280	44 x 12	24	N/A	20	N/A
1-1/4	118	2360	43 x 11	28	28	28	28
1 1/2	103	2060	43 x 12	28	28	28	28
2	83	1660	44 x 14	28	28	24	24
2-1/2	54	1080	44 x 14	28	28	24	24
3	42	840	42 x 16	24	24	24	24
4	26	520	44 x 16	24	24	24	24
5	20	400	42 x 19	20	20	20	20
6	17	340	43 x 21	16	16	16	16
8	11	220	36 x 27	12	12	12	12
10	7	140	43 x 23	12	12	12	12
12	5	100	36 x 27	12	12	12	12
14	5	100	42 x 31	12	12	12	12
16	3	60	48 x 19	10	10	10	10
*18	3	60	54 x 21	8	8	8	8
*18	2	40	36 x 21	8	8	8	8
20	2	40	40 x 23	16	16	16	16
24	2	40	48 x 28	12	12	12	12

***NOTE**: Skid quantities for 18" pipe vary; i.e. One row on truck = One skid of 3 pcs and one skid of 2 pcs= 8 skids of 3pcs and 8 skids of 2pcs per truck

Wall Thickness and Tolerances

Nominal Pipe Size	Schedule 40 Minimum	Schedule 40 Tolerance	Schedule 80 Minimum	Schedule 80 Tolerance	Schedule 120 Minimum	Schedule 120 Tolerance	SDR 41 Minimum	SDR 41 Tolerance	SDR 26 Minimum	SDR 26 Tolerance	SDR 21 Minimum	SDR 21 Tolerance	SDR 13.5 Minimum	SDR 13.5 Tolerance
1/8	0.068	+0.020	0.095	+0.020										
1/4	0.088	+0.020	0.119	+0.020										
3/8	0.091	+0.020	0.126	+0.020										
1/2	0.109	+0.020	0.147	+0.020	0.170	+0.020							0.062	+0.020
3/4	0.113	+0.020	0.154	+0.020	0.170	+0.020					0.060	+0.020	0.078	+0.020
1	0.133	+0.020	0.179	+0.021	0.200	+0.024			0.060	+0.020	0.063	+0.020	0.097	+0.020
1-1/4	0.140	+0.020	0.191	+0.023	0.215	+0.026			0.064	+0.020	0.079	+0.020	0.123	+0.020
1-1/2	0.145	+0.020	0.200	+0.024	0.225	+0.027			0.073	+0.020	0.090	+0.020	0.141	+0.020
2	0.154	+0.020	0.218	+0.026	0.250	+0.030			0.091	+0.020	0.113	+0.020	0.176	+0.020
2-1/2	0.203	+0.024	0.276	+0.033	0.300	+0.036			0.110	+0.020	0.137	+0.020	0.213	+0.026
3	0.216	+0.026	0.300	+0.036	0.350	+0.042			0.135	+0.020	0.167	+0.020	0.259	+0.031
3-1/2	0.226	+0.027	0.318	+0.038	0.350	+0.042			0.154	+0.020	0.190	+0.023		
4	0.237	+0.028	0.337	+0.040	0.437	+0.052			0.173	+0.020	0.214	+0.026		
5	0.258	+0.031	0.375	+0.045	0.500	+0.060			0.214	+0.027	0.265	+0.032		
6	0.280	+0.034	0.432	+0.052	0.562	+0.067			0.255	+0.031	0.316	+0.038		
8	0.322	+0.039	0.500	+0.060	0.718	+0.086			0.332	+0.040	0.410	+0.049		
10	0.365	+0.044	0.593	+0.071	0.843	+0.101			0.413	+0.050				
12	0.406	+0.049	0.687	+0.082	1.000	+0.120			0.490	+0.059				
14	0.437	+0.053	0.750	+0.090					0.538	+0.064				
16	0.500	+0.060	0.843	+0.101					0.615	+0.074				
18	0.562	+0.067	0.937	+0.112			0.439	+0.061	0.692	+0.083				
20	0.593	+0.071	1.031	+0.124			0.488	+0.068	0.769	+0.092				
24	0.687	+0.082	1.218	+0.146			0.585	+0.082	0.923	+0.111				

Physical Properties of PVC & CPVC Pipe

GENERAL	PVC Value	CPVC Value	Test Method
Cell Classification	12,454	23,447	ASTM D1784
Maximum Service Temp.	140°F	200°F	
Color	White, Dark Gray	Medium Gray	
Specific Gravity, (g/cu.cm @ 73°F)	1.40 +/-.02	1.52 +/-.02	ASTM D792
Water Absorption % increase 24 hrs @ 25°C	0.05	0.03	ASTM D570
Hardness, Rockwell	110 - 120	117 - 119	ASTM D785
Poisson's Ratio @ 73°F	0.410	0.386	
Hazen-Williams Factor	C =150	C = 150	
MECHANICAL			
Tensile Strength, psi @ 73°F	7,450	7.320	ASTM D638
Tensile Modulus of Elasticity, psi @ 73°F	420,000	360,000	ASTM D638
Flexural Strength, psi @ 73°F	14,450	13,000	ASTM D790
Flexural Modulus, psi @ 73°F	360,000	360,000	ASTM D790
Compressive Strength, psi @ 73°F	9,600	10,000	ASTM D695
Izod Impact, notched, ft-lb/in @ 73°F	0.75	2.0	ASTM D256
THERMAL			
Coefficient of Linear Expansion (in/in/°F)	2.9×10^{-5}	3.4×10^{-5}	ASTM D696
Coefficient of Thermal Conductivity			ASTM C177
Calories • cm/second • cm^2 • °C	3.5×10^{-4}	3.27×10^{-4}	
BTU • inches/hour • $Ft.^2$ • °F	1.02	0.95	
Watt/m/K	0.147	0.137	
Heat Deflection Temperature Under Load (264 psi, annealed)	170	226	ASTM D648
ELECTRICAL			
Dielectric Strength, volts/mil	1,413	1,250	ASTM D149
Dielectric Constant, 60Hz, 30°F	3.70	3.70	ASTM D150
Volume Resistivity, ohm/cm @ 95°C	1.2×10^{12}	3.4×10^{12}	ASTM D257
Harvel PVC & CPVC Pipe is non-electrolytic			
FIRE PERFORMANCE			
Flammability Rating	V-0	V-0, 5VB, 5VA	UL-94
Flame Spread Index	<10	<10	
Flame Spread	0-25	<25	ULC
Smoke Generation	80-225	<50	ULC
Flash Ignition Temp.	730°F	900°F	
Average Time of Burning (sec.)	<5	<5	ASTM D635
Average Extent of Burning (mm)	<10	<10	
Burning Rate (in/min)	Self Extinguishing	Self Extinguishing	
Softening Starts (approx.)	250°F	295°F	
Material Becomes Viscous	350°F	395°F	
Material Carbonizes	425°F	450°F	
Limiting Oxygen Index (LOI)	43	60	ASTM D2863
Clean Room Materials Flammability Test	N/A	FPI= 1.20 SDI = 0.09	FM 4910

NOTE The physical properties shown above pertain to Harvel PVC (SDR Series, Schedule 40, 80 & 120) and Harvel CPVC (Schedule 40 and 80) industrial pipe. The physical properties shown for CPVC pipe are considered general CPVC physical properties. Harvel utilizes several CPVC compounds for the production of different CPVC product lines. Different CPVC compounds may exhibit slight variations in actual physical properties as compared to those stated. Physical properties shown pertain to product lines stated. Refer to appropriate Specialty Piping Systems section for physical properties of specialty pipe (i.e. Harvel Clear™, Harvel LXT®, Harvel CTS CPVC, Harvel Fire Sprinkler Pipe, Harvel FlameTech™, etc. Contact Harvel tech services for additional information if necessary.

Chemical Resistance

The following information is provided as a general guide for the selection of piping systems subjected to various chemical substances. The recommendations stated are based on information provided by our raw material suppliers and is believed to be reliable. This information is based one or more of the following: actual chemical immersion testing, chemical structure comparison to substances that have been tested, past field experience, and various other sources.

It is well known that both PVC and CPVC thermoplastic piping products are generally immune to most types of corrosion typically experienced with metallic underground piping systems. The effects of galvanic and electrochemical corrosion are non-existent since both of these materials are non-conductors.

When compared to other piping materials, both PVC and CPVC piping products also exhibit exceptional chemical resistance to a wide variety of corrosive reagents and mixtures found in the chemical processing industries. This fact has been well demonstrated for over 30 years in numerous chemical-processing applications. In general, both PVC and CPVC are inert to most mineral acids, bases, salts, and paraffinic hydrocarbons.

Factors such as percentage of chemical concentration, combinations of chemical substances, temperature, pressure, external system stress, and product quality can affect chemical resistance. Although extensive research has been conducted over the years to better define use parameters, the possible combinations of chemical mixtures and their resultant reaction when mixed are endless. Therefore the following chemical resistance data is by no means complete. The absence of a specific chemical or solution from the chemical resistance chart does not imply that Harvel products are not suitable for use with that substance. When test data on chemical resistance to particular chemicals under specific operating conditions is not available, Harvel Plastics, Inc. recommends that chemical immersion testing be performed, and if successful, a small test assembly be constructed to test the product under actual use conditions (appropriate care and safety precautions must be followed with all in-service testing).

DISCLAIMER OF LIABILITY

As the conditions or methods of use are beyond our control, we do not assume any responsibility and expressly disclaim any liability for any use of this material. Information contained herein is believed to be true and accurate but all statements or suggestions are made without warranty, expressed or implied, regarding accuracy of the information, the hazards connected with the use of the material or the results to be obtained from the use thereof. Compliance with all applicable federal, state and local laws and regulations remains the responsibility of the user.

Caution Areas

- Chlorinated and aromatic hydrocarbons, esters, or ketones are not recommended for use with PVC or CPVC thermoplastic piping materials. Although the chemical resistance of PVC and CPVC compounds is similar, they are not always the same. Caution should be used when comparing the chemical resistance properties of PVC Type I, PVC Type 11, PVC Clear, and CPVC as differences in chemical resistance exist.
- When investigating the chemical compatibility of a piping system, it is important to note that the piping system components must also be investigated for compatibility. Gaskets, o-rings, valve seats, solvent cements, and other components should be evaluated for compatibility and approved by their respective manufacturers for use with the fluid medium prior to use.
- Caution should be exercised when selecting thread paste compounds, lubricants, cleaning and wetting agents (surfactants), and other chemical substances that come into contact with the system for compatibility as well.
- The majority of the chemical resistance data provided in the following charts is based on chemical immersion testing run under non-pressurized conditions. Depending on the hazards of the chemical used, an additional pressure de-rating factor is typically applied to the standard working pressure rating of the product (shown for water). Standard temperature de-rating factors must also be applied to pressure applications at elevated temperatures.
- Applications involving certain oils, surfactants, and greases may result in environmental stress cracking. Environmental stress cracking occurs when the piping and components are weakened by contact with these chemicals, and failures are propagated by external stress (i.e. pressure, expansion/contraction, installation. etc.) on the system.
- Certain substances called out on the following pages reference chemicals in a gaseous state. These substances are not recommended for pressure service. They are shown to provide the chemical resistance of PVC and CPVC when coming into contact with these substances. (i.e. exposure to or immersion in these substances). Harvel Plastics does not recommend the use of its PVC and CPVC products for the testing, transporting or storing of compressed air or gases.
- Harvel Clear™ maintains its physical properties when exposed to many substances. However, exposure to certain chemicals can affect the clarity of the product over time. Certain nitrogen-containing organics, bleaches, oxidative agents and acids will result in discoloration. When investigating Harvel Clear for potential use in chemical applications testing under actual use conditions is recommended.

Chemical attack to the plastic generally appears as a swelling whereby the incompatible substance is absorbed into the piping resulting in softening and eventual degradation of physical properties. The rate of decomposition is related to the concentration of the chemicals present and temperature/stress issues related to the operational parameters of the system.

Past experience has shown that in many cases both PVC and CPVC have been used successfully in contaminated water monitoring/recovery systems where very low levels (PPM/PPB range) of certain incompatible substances are present. In many instances the life expectancy of the system is adequate enough to provide a cost effective piping solution for contaminated ground water recovery projects. This is a complicated issue due to the variety of substances being extracted and their method of extraction. However, since most remediation projects involve low pressure/vacuum type applications for a limited recovery period, the use of PVC; CPVC can provide a viable piping solution for these types of applications.

NOTE The data furnished herein is based on information provided by manufacturers of the raw material and is believed to be reliable. this information may be considered as a basis for recommendation only, and not as a guarantee for its accuracy, suitability for particular applications, or the results to be obtained there from. Materials should be tested under actual service conditions to determine suitability for a particular purpose.

R = Recommended NR = Not Recommended

C = Caution, actual testing suggested; suspect @ certain stress levels ? = Incomplete Data; actual testing required

CHEMICAL REAGENT	PVC Type I 1120 (12454) 73°F	140°F	PVC Clear 2110 (12454) 73°F	140°F	CPVC Type IV, Grade I 4120 (23447) 73°F	140°F	180°F
Acetaldehyde	NR	NR	NR	NR	NR	NR	NR
Acetamide	NR	NR	NR	NR	NR	NR	NR
Acetic Acid, 10%	R	R	R	R	R	R	R
Acetic Acid, 20%	R	R	R	NR	NR	NR	NR
Acetic Acid, Glacial	R	NR	NR	NR	NR	NR	NR
Acetic Acid, pure	NR	NR	NR	NR	NR	NR	NR
Acetic Anhydride	NR	NR	NR	NR	NR	NR	NR
Acetone, < 5%	?	?	NR	NR	R	R	R
Acetone, > 5%	NR	NR	NR	NR	NR	NR	NR
Acetyl Nitrile	NR	NR	NR	NR	NR	NR	NR
Acetylene	R	R	R	R	C	C	C
Acrylic Acid	NR	NR	NR	NR	NR	NR	NR
Adipic Acid; sat. in water	R	R	R	R	R	R	R
Allyl Alcohol, 96%	R	NR	NR	NR	C	C	C
Allyl Chloride	NR	NR	NR	NR	NR	NR	NR
Alum, all varieties	R	R	R	R	R	R	R
Aluminum Acetate	R	R	R	R	R	R	R
Aluminum Alum	R	R	R	R	R	R	R
Aluminum Chloride	R	R	R	R	R	R	R
Aluminum Fluoride	R	R	R	R	R	R	R
Aluminum Hydroxide	R	R	R	R	R	R	R
Aluminum Nitrate	R	R	R	R	R	R	R
Aluminum Oxylchloride	R	R	R	R	?	?	?
Aluminum Sulfate	R	R	R	R	R	R	R
Amines	NR	NR	NR	NR	NR	NR	NR
Ammonia (gas;dry)	R	R	R	R	NR	NR	NR
Ammonia (liquid)	NR	NR	NR	NR	NR	NR	NR
Ammonium Acetate	R	R	R	R	R	R	R
Ammonium Alum	R	R	R	R	R	R	R
Ammonium Bisulfate	R	R	?	?	R	R	R
Ammonium Carbonate	R	R	R	R	R	R	R
Ammonium Chloride	R	R	R	R	R	R	R
Ammonium Dichromate	R	?	?	?	R	R	R
Ammonium Fluoride, < 25%	R	NR	NR	NR	R	R	R
Ammonium Fluoride, > 25%	?	NR	NR	NR	R	R	R
Ammonium Hydroxide	R	R	R	R	NR	NR	NR
Ammonium Metaphosphate	R	R	R	R	R	R	R
Ammonium Nitrate	R	R	R	R	R	R	R
Ammonium Persulfate	R	R	R	R	R	?	?
Ammonium Phosphate	R	R	R	R	R	R	C
Ammonium Sulfate	R	R	R	R	R	R	R
Ammonium Sulfide	R	R	R	R	R	R	R

CHEMICAL REAGENT	PVC Type I 1120 (12454) 73°F	140°F	PVC Clear 2110 (12454) 73°F	140°F	CPVC Type IV, Grade I 4120 (23447) 73°F	140°F	180°F
Ammonium Tartrate	R	R	R	R	R	R	R
Ammonium Thiocyanate	R	R	R	R	R	R	R
Amyl Acetate	NR	NR	NR	NR	NR	NR	NR
Amyl Alcohol	R	NR	NR	NR	C	C	NR
Amyl Chloride	NR	NR	NR	NR	NR	NR	NR
Aniline	NR	NR	NR	NR	NR	NR	NR
Aniline Chlorohydrate	NR	NR	NR	NR	NR	NR	NR
Aniline Hydrochloride	NR	NR	NR	NR	NR	NR	NR
Anthraquinone	?	?	?	?	?	?	?
Anthraquinone Sulfonic Acid	R	R	R	R	?	?	?
Antimony Trichloride	R	R	R	R	R	R	R
Aqua Regia	NR	NR	NR	NR	R	NR	NR
Aromatic Hydrocarbons	NR	NR	NR	NR	NR	NR	NR
Arsenic Acid, 80%	R	R	R	R	R	R	R
Arsenic Trioxide (powder)	R	?	?	?	R	NR	NR
Arylsulfonic Acid	R	R	R	NR	?	?	?
Barium Carbonate	R	R	R	R	R	R	R
Barium Chloride	R	R	R	R	R	R	R
Barium Hydroxide, 10%	R	R	R	R	R	R	R
Barium Nitrate	R	?	?	?	R	R	R
Barium Sulfate	R	R	R	R	R	R	R
Barium Sulfide	R	R	R	R	R	R	R
Beer	R	R	R	R	R	R	R
Beet Sugar Liquors	R	R	R	R	R	R	R
Benzaldehyde; 10%	R	NR	NR	NR	NR	NR	NR
Benzaldehyde; > 10%	NR	NR	NR	NR	NR	NR	NR
Benzalkonium Chloride	R	?	?	?	NR	NR	NR
Benzene	NR	NR	NR	NR	NR	NR	NR
Benzoic Acid	R	R	R	R	R	C	NR
Benzyl Alcohol	NR	NR	NR	NR	NR	NR	NR
Benzyl Chloride	NR	NR	NR	NR	NR	NR	NR
Bismuth Carbonate	R	R	R	R	R	R	R
Black Liquor	R	R	R	R	R	R	R
Bleach (15% CL)	R	R	R	R	R	R	R
Borax	R	R	R	R	R	R	R
Boric Acid	R	R	R	R	R	R	R
Brine (acid)	R	?	?	?	R	R	R
Bromic Acid	R	R	R	R	R	R	R
Bromine Liquid	NR	NR	NR	NR	NR	NR	NR
Bromine Vapor, 25%	R	R	R	R	NR	NR	NR
Bromine Water	R	R	NR	NR	?	?	?
Bromobenzene	NR	NR	NR	NR	NR	NR	NR
Bromotoluene	NR	NR	NR	NR	NR	NR	NR
Butadiene	R	R	NR	NR	C	C	C
Butane	R	R	NR	NR	C	C	C

HARVEL®

R = Recommended NR = Not Recommended

C = Caution, actual testing suggested; suspect @ certain stress levels ? = Incomplete Data; actual testing required

CHEMICAL REAGENT	PVC Type I 1120 (12454) 73°F	PVC Type I 1120 (12454) 140°F	PVC Clear 2110 (12454) 73°F	PVC Clear 2110 (12454) 140°F	CPVC Type IV, Grade I 4120 (23447) 73°F	CPVC Type IV, Grade I 4120 (23447) 140°F	CPVC Type IV, Grade I 4120 (23447) 180°F
Butanol, primary	R	R	NR	NR	C	C	C
Butanol, secondary	R	NR	NR	NR	C	C	C
Butyl Acetate	R	NR	NR	NR	NR	NR	NR
Butyl Carbitol	?	?	?	?	NR	NR	NR
Butyl Mercaptan	NR	NR	NR	NR	NR	NR	NR
Butyl Phenol	R	NR	R	NR	NR	NR	NR
Butyl Stearate	R	?	?	?	NR	NR	NR
ButylCellosolve	R	?	?	?	NR	NR	NR
Butyne Diol	R	?	?	?	?	?	?
Butyric Acid ,< 1%	R	NR	NR	NR	R	R	R
Butyric Acid, > 1%	R	NR	NR	NR	NR	NR	NR
Cadmium Acetate	R	R	?	?	R	R	R
Cadmium Chloride	R	R	?	?	R	R	R
Cadmium Cyanide	R	R	R	R	R	R	R
Cadmium Sulfate	?	?	?	?	R	R	R
Caffeine Citrate	R	?	?	?	R	R	R
Calcium Acetate	R	R	R	R	R	R	R
Calcium Bisulfide	R	R	R	R	R	R	R
Calcium Bisulfite	R	R	R	R	R	R	R
Calcium Bisulfite Bleach Liquor	R	?	?	?	R	R	R
Calcium Carbonate	R	R	R	R	R	R	R
Calcium Chlorate	R	R	?	?	R	R	R
Calcium Chloride	R	R	R	R	R	R	R
Calcium Hydroxide	R	R	R	R	R	R	R
Calcium Hypochlorite	R	R	R	R	R	R	R
Calcium Nitrate	R	R	R	R	R	R	R
Calcium Oxide	R	R	?	?	R	R	R
Calcium Sulfate	R	R	R	R	R	R	R
Camphor (crystals)	R	?	?	?	NR	NR	NR
Cane Sugar Liquors	R	R	R	R	R	R	R
Caprolactam	?	?	?	?	NR	NR	NR
Caprolactone	?	?	?	?	NR	NR	NR
Carbitol	R	?	?	?	NR	NR	NR
Carbon Dioxide	R	R	R	R	R	R	R
Carbon Dioxide (aqueous solution)	R	R	?	?	R	R	R
Carbon Disulfide	NR	NR	NR	NR	NR	NR	NR
Carbon Monoxide	R	R	R	R	R	R	R
Carbon Tetrachloride	R	NR	NR	NR	NR	NR	NR
Carbonic Acid	R	R	R	R	R	R	R
Carene 500	R	?	NR	NR	?	?	?
Castor oil	R	R	R	R	C	C	C
Caustic Potash	R	R	R	R	R	R	R
Caustic Soda	R	R	R	R	R	R	R
Cellosolve	R	NR	R	NR	NR	NR	NR
Cellosolve Acetate	R	?	R	?	NR	NR	NR
Chloral Hydrate	R	R	R	R	NR	NR	NR
Chloramine	R	?	?	?	R	R	R

CHEMICAL REAGENT	PVC Type I 1120 (12454) 73°F	PVC Type I 1120 (12454) 140°F	PVC Clear 2110 (12454) 73°F	PVC Clear 2110 (12454) 140°F	CPVC Type IV, Grade I 4120 (23447) 73°F	CPVC Type IV, Grade I 4120 (23447) 140°F	CPVC Type IV, Grade I 4120 (23447) 180°F
Chloric Acid, up to 20%	R	R	R	R	R	R	R
Chloride Water	R	R	R	R	R	R	R
Chlorinated Solvents	NR	NR	NR	NR	NR	NR	NR
Chlorinated Water (Hypochlorite)	R	R	R	R	R	R	R
Chlorine (dry liquid)	NR	NR	NR	NR	NR	NR	NR
Chlorine (liquid under pressure)	NR	NR	NR	NR	NR	NR	NR
Chlorine Dioxide, aqueous (sat'd 0.1%)	?	?	?	?	R	?	?
Chlorine Gas (dry)	NR	NR	NR	NR	NR	NR	NR
Chlorine Gas (wet)	NR	NR	NR	NR	NR	NR	NR
Chlorine Water (sat'd 0.3%)	R	R	R	R	R	R	R
Chlorine(trace in air)	R	?	R	?	R	R	R
Chloroacetic Acid	R	R	R	NR	NR	NR	NR
Chloroacetyl Chloride	R	?	R	?	NR	NR	NR
Chlorobenzene	NR	NR	NR	NR	NR	NR	NR
Chloroform	NR	NR	NR	NR	NR	NR	NR
Chloropicrin	NR	NR	NR	NR	NR	NR	NR
Chlorosulfonic Acid	R	NR	R	NR	NR	NR	NR
Chlorox Bleach Solution	R	?	?	?	C	C	C
Chrome Alum	R	R	R	R	R	R	R
Chromic Acid, 10%	R	R	R	R	R	R	R
Chromic Acid, 40%	?	?	?	?	R	R	R
Chromic Acid, 50%	NR	NR	NR	NR	?	?	?
Chromic Acid/ Sulfuric Acid/water- 50%/15%/35%	R	NR	?	?	?	?	?
Chromic/Nitric Acid (15%/35%)	R	R	?	?	R	C	NR
ChromiumNitrate	R	?	?	?	R	R	R
Citric Acid	R	R	R	R	R	R	R
Citrus Oils	?	?	?	?	NR	NR	NR
Coconut Oil	R	R	?	?	NR	NR	NR
Copper Acetate	R	R	R	R	R	R	R
Copper Carbonate	R	R	R	R	R	R	R
Copper Chloride	R	R	R	R	R	R	R
Copper Cyanide	R	R	R	R	R	R	R
Copper Fluoride	R	R	R	R	R	R	R
Copper Nitrate	R	R	R	R	R	R	R
Copper Sulfate	R	R	R	R	R	R	R
Corn Oil	R	?	R	?	NR	NR	NR
Corn Syrup	R	R	R	R	R	R	R
Cottonseed Oil	R	R	R	R	NR	NR	NR
Creosote	NR	NR	NR	NR	NR	NR	NR

R = Recommended   NR = Not Recommended

C = Caution, actual testing suggested; suspect @ certain stress levels   ? = Incomplete Data; actual testing required

CHEMICAL REAGENT	PVC Type I 1120 (12454) 73°F	PVC Type I 1120 (12454) 140°F	PVC Clear 2110 (12454) 73°F	PVC Clear 2110 (12454) 140°F	CPVC Type IV, Grade I 4120 (23447) 73°F	CPVC Type IV, Grade I 4120 (23447) 140°F	CPVC Type IV, Grade I 4120 (23447) 180°F
Cresylic Acid,50%	R	R	R	NR	NR	NR	NR
Crotonaldehyde	NR	NR	NR	NR	NR	NR	NR
Crude Oil	R	R	R	NR	NR	NR	NR
Cumene	?	?	?	?	NR	NR	NR
Cupric Fluoride	R	R	R	R	R	R	R
Cupric Sulfate	R	R	R	R	R	R	R
Cuprous Chloride	R	R	R	R	R	R	R
Cyclanones	R	R	?	?	?	?	?
Cyclohexane	NR	NR	NR	NR	NR	NR	NR
Cyclohexanol	NR	NR	NR	NR	NR	NR	NR
Cyclohexanone	NR	NR	NR	NR	NR	NR	NR
D.D.T. (Xylene Base)	NR	NR	NR	NR	NR	NR	NR
Desocyephedrine Hydrochloride	R	?	R	?	?	?	?
Detergents	R	R	R	R	C	C	C
Dextrin	R	R	R	R	R	R	R
Dextrose	R	R	R	R	R	R	R
Diacetone Alcohol	R	?	?	?	C	?	?
Diazo Salts	R	R	R	R	?	?	?
Dibutoxy Ethyl Phthalate	NR	NR	NR	NR	NR	NR	NR
Dibutyl Phthalate	NR	NR	NR	NR	NR	NR	NR
Dibutyl Sebacate	R	NR	?	?	NR	NR	NR
Dichlorobenzene	NR	NR	NR	NR	NR	NR	NR
Dichloroethylene	NR	NR	NR	NR	NR	NR	NR
Diesel Fuels	R	R	R	R	NR	NR	NR
Diethyl Ether	R	?	R	?	NR	NR	NR
Diethylamine	NR	NR	NR	NR	NR	NR	NR
Diglycolic Acid	R	R	R	R	NR	NR	NR
Dill Oil	?	?	?	?	NR	NR	NR
Dimethyl Hydrazine	NR	NR	NR	NR	NR	NR	NR
Dimethylamine	R	R	NR	NR	NR	NR	NR
Dimethylformamide	NR	NR	NR	NR	NR	NR	NR
Dioctylphthalate	NR	NR	NR	NR	NR	NR	NR
Dioxane (1, 4)	NR	NR	NR	NR	NR	NR	NR
Disodium Phosphate	R	R	R	R	R	R	R
Distilled Water	R	R	R	R	R	R	R
EDTA, Tetrasodium	?	?	?	?	R	R	R
Ethyl Ester (ethyl acrylate)	NR	NR	NR	NR	NR	NR	NR
Epsom Salt	R	?	R	?	R	R	R
Esters	NR	NR	NR	NR	NR	NR	NR
Ethanol, > 5%	R	R	R	NR	C	C	C
Ethanol, up to 5%	R	R	R	NR	R	R	R
Ethers	NR	NR	NR	NR	NR	NR	NR
Ethyl Acetate	NR	NR	NR	NR	NR	NR	NR
Ethyl Acrylate	NR	NR	NR	NR	NR	NR	NR
Ethyl Alcohol	R	R	R	NR	C	C	C
Ethyl Chloride	NR	NR	NR	NR	NR	NR	NR
Ethyl Chloroacetate	NR	NR	NR	NR	NR	NR	NR
Ethyl Ether	NR	NR	NR	NR	NR	NR	NR
Ethylene Bromide	NR	NR	NR	NR	NR	NR	NR

CHEMICAL REAGENT	PVC Type I 1120 (12454) 73°F	PVC Type I 1120 (12454) 140°F	PVC Clear 2110 (12454) 73°F	PVC Clear 2110 (12454) 140°F	CPVC Type IV, Grade I 4120 (23447) 73°F	CPVC Type IV, Grade I 4120 (23447) 140°F	CPVC Type IV, Grade I 4120 (23447) 180°F
Ethylene Chlorohydrin	NR	NR	NR	NR	NR	NR	NR
Ethylene Diamine	NR	NR	NR	NR	NR	NR	NR
Ethylene Dichloride	NR	NR	NR	NR	NR	NR	NR
Ethylene Glycol	R	R	R	R	C	C	C
Ethylene Oxide	NR	NR	NR	NR	NR	NR	NR
Fatty Acids	R	R	R	R	C	C	C
Ferric Acetate	R	NR	?	?	R	R	R
Ferric Chloride	R	R	R	R	R	R	R
Ferric Hydroxide	R	R	R	R	R	R	R
Ferric Nitrate	R	R	R	R	R	R	R
Ferric Sulfate	R	R	R	R	R	R	R
Ferrous Chloride	R	R	R	R	R	R	R
Ferrous Hydroxide	R	?	R	?	R	R	R
Ferrous Nitrate	R	?	R	?	R	R	R
Ferrous Sulfate	R	R	R	R	R	R	R
Fish Solubles	R	R	R	R	?	?	?
Fluorine Gas	R	NR	NR	NR	NR	NR	NR
Fluorine Gas (wet)	R	NR	R	NR	NR	NR	NR
Fluoroboric Acid	R	R	R	R	?	?	?
Fluorosilisic Acid, 25%	R	R	R	R	R	C	C
Formaldehyde	R	R	NR	NR	NR	NR	NR
Formic Acid, < 25%	R	NR	R	NR	R	R	R
Formic Acid, > 25%	?	?	?	?	C	?	NR
Freon 11	R	R	NR	NR	NR	NR	NR
Freon 113	R	?	R	?	NR	NR	NR
Freon 114	R	?	R	?	NR	NR	NR
Freon 12	R	R	R	R	NR	NR	NR
Freon 21	NR	NR	NR	NR	NR	NR	NR
Freon 22	NR	NR	NR	NR	NR	NR	NR
Fructcose	R	R	R	R	R	R	R
Fruit juices & pulp	R	R	R	R	R	R	R
Furfural	NR	NR	NR	NR	NR	NR	NR
Gallic Acid	R	R	R	R	?	?	?
Gas (Coke Oven)	NR	NR	NR	NR	?	?	?
Gasoline	NR	NR	NR	NR	NR	NR	NR
Gasoline, HighOctane	NR	NR	NR	NR	NR	NR	NR
Gasoline, Jet Fuel	NR	NR	NR	NR	NR	NR	NR
Glucose	R	R	R	R	R	R	R
Glycerine	R	R	R	R	R	R	R
Glycol	R	R	R	R	C	C	C
Glycol Ethers	?	?	?	?	NR	NR	NR
Glycolic Acid	R	R	R	R	?	?	?
Grape Sugar	R	R	R	R	R	R	R
Green Liquor	R	R	?	?	R	R	R
Halocarbon Oils	?	?	?	?	NR	NR	NR
Heptane	R	R	R	NR	C	?	?
Hercolyn	R	?	?	?	?	?	?
Hexane	R	NR	NR	NR	C	C	C
Hexanol, Tertiary	R	R	R	NR	C	C	C

HARVEL®

R = Recommended NR = Not Recommended

C = Caution, actual testing suggested; suspect @ certain stress levels ? = Incomplete Data; actual testing required

CHEMICAL REAGENT	PVC Type I 1120 (12454) 73°F	PVC Type I 1120 (12454) 140°F	PVC Clear 2110 (12454) 73°F	PVC Clear 2110 (12454) 140°F	CPVC Type IV, Grade I 4120 (23447) 73°F	CPVC Type IV, Grade I 4120 (23447) 140°F	CPVC Type IV, Grade I 4120 (23447) 180°F
Hydrazine	NR	NR	NR	NR	NR	NR	NR
Hydrobromic Acid, 20%	R	R	R	R	?	?	?
Hydrochloric Acid, 10%	R	R	R	R	R	R	R
Hydrochloric Acid, 30%	R	R	R	R	R	R	R
Hydrochloric Acid, 36%	R	R	R	R	R	R	C
Hydrochloric Acid, Concentrated	R	R	R	NR	?	?	?
Hydrochloric Acid, pickling	R	R	R	R	R	R	R
Hydrocyanic Acid	R	R	R	R	?	?	?
Hydrofluoric Acid, 3%	R	R	R	R	R	?	?
Hydrofluoric Acid, 48%	R	NR	R	NR	NR	NR	NR
Hydrofluoric Acid, 50%	R	NR	NR	NR	NR	NR	NR
Hydrofluoric Acid, 70%	NR	NR	NR	NR	NR	NR	NR
Hydrofluorsilicic Acid, 30%	R	R	R	R	R	?	C
Hydrogen	R	R	R	R	C	C	C
Hydrogen Peroxide, 30%	R	R	R	R	R	?	?
Hydrogen Peroxide, 90%	R	R	R	R	?	?	?
Hydrogen Phosphide	R	R	NR	NR	?	?	?
Hydrogen Sulfide	R	R	R	R	R	R	R
Hydroquinone	R	R	R	R	R	R	R
Hydroxylamine Sulfate	R	R	R	R	?	?	?
Hypochlorite (Potassium & Sodium)	R	?	R	?	R	R	R
Hypochlorous Acid	R	R	R	R	R	R	R
Iodine	NR	NR	NR	NR	R	R	R
Iodine Solution, 10%	NR	NR	NR	NR	?	?	?
Isopropanol	?	?	?	?	C	C	C
Kerosene	R	R	R	R	C	C	C
Ketones	NR	NR	NR	NR	NR	NR	NR
Kraft Liquors	R	R	R	R	R	R	R
Lactic Acid, 25%	R	R	R	R	R	R	R
Lactic Acid, 80%	R	?	?	?	R	C	C
Lard Oil	R	R	R	R	C	C	C
Lauric Acid	R	R	R	R	C	C	C
Lauryl Chloride	R	?	R	NR	NR	NR	NR
Lead Acetate	R	R	R	R	R	R	R
Lead Chloride	R	R	R	R	R	R	R
Lead Nitrate	R	R	R	R	R	R	R
Lead Sulfate	R	R	R	R	R	R	R
Lemon Oil	?	?	?	?	NR	NR	NR
Limonene	?	?	?	?	NR	NR	NR
Linoleic Acid	R	R	R	R	C	C	C
Linoleic Oil	R	R	R	NR	C	C	C
Linseed Oil	R	R	R	R	NR	NR	NR
Liquors	R	R	?	?	?	?	?
Lithium Bromide	R	R	R	R	R	R	R
Lithium Sulfate	R	R	R	R	R	R	R
Lubricating Oils, ASTM#1	R	R	R	R	?	?	?
Lubricating Oils, ASTM#2	R	R	R	R	?	?	?
Lubricating Oils, ASTM#3	R	R	R	NR	?	?	?
Lux Liquid	R	NR	R	NR	?	?	?
Machine Oil	R	R	R	R	C	C	C
Magnesium Carbonate	R	R	R	R	R	R	R
Magnesium Chloride	R	R	R	R	R	R	R
Magnesium Citrate	R	R	?	?	R	R	R
Magnesium Fluoride	R	R	R	R	R	R	R
Magnesium Hydroxide	R	R	R	R	R	R	R
Magnesium Nitrate	R	R	R	R	R	R	R
Magnesium Oxide	R	R	R	R	R	R	R
Magnesium Salts	R	R	R	R	R	R	R
Magnesium Sulfate	R	R	R	R	R	R	R
Maleic Acid, 50%	R	R	R	R	R	R	R
Manganese Chloride	R	R	R	R	R	R	R
Manganese Sulfate	R	R	R	R	R	R	R
Mercural Ointment, Blue 5%	R	?	R	?	?	?	?
Mercuric Chloride	R	R	R	R	R	R	R
Mercuric Cyanide	R	R	R	R	R	R	R
Mercuric Sulfate	R	R	R	R	R	R	R
Mercurous Nitrate	R	R	R	R	R	R	R
Mercury	R	R	R	R	R	R	R
Mercury Ointment, Ammoniated	R	?	R	?	?	?	?
Methanol, <10%	R	R	R	R	R	R	R
Methanol, >10%	R	R	R	R	NR	NR	NR
Methoxyethyl Oleate	R	?	R	?	NR	NR	NR
Methyl Cellosolve	NR	NR	NR	NR	NR	NR	NR
Methyl Chloride	NR	NR	NR	NR	NR	NR	NR
Methyl Ethyl Ketone	NR	NR	NR	NR	NR	NR	NR
Methyl Formate	?	?	?	?	NR	NR	NR
Methyl Iso-Butyl Ketone	NR	NR	NR	NR	NR	NR	NR
Methyl Methacrylate	R	?	R	?	NR	NR	NR
Methyl Salicylate	R	?	R	?	NR	NR	NR
Methyl Sulfate	R	NR	R	NR	?	?	?
Methyl Sulfuric Acid	R	R	R	R	?	?	?
Methylamine	NR	NR	NR	NR	NR	NR	NR
Methylene Bromide	NR	NR	NR	NR	NR	NR	NR

R = Recommended NR = Not Recommended

C = Caution, actual testing suggested; suspect @ certain stress levels ? = Incomplete Data; actual testing required

CHEMICAL REAGENT	PVC Type I 1120 (12454) 73°F	PVC Type I 1120 (12454) 140°F	PVC Clear 2110 (12454) 73°F	PVC Clear 2110 (12454) 140°F	CPVC Type IV, Grade I 4120 (23447) 73°F	CPVC Type IV, Grade I 4120 (23447) 140°F	CPVC Type IV, Grade I 4120 (23447) 180°F
Methylene Chloride	NR	NR	NR	NR	NR	NR	NR
Methylene Chlorobromide	NR	NR	NR	NR	NR	NR	NR
Methylene Iodine	NR	NR	NR	NR	NR	NR	NR
Milk	R	R	R	R	R	R	?
Mineral Oil	R	R	R	?	R	?	?
Molasses	R	R	R	R	R	R	R
Monoethanolamine	NR	NR	NR	NR	NR	NR	NR
Motor Oil	R	R	R	R	R	?	?
Muriatic Acid	R	R	R	R	R	R	C
Naphtha	R	R	R	NR	C	C	C
Naphthalene	NR	NR	NR	NR	NR	NR	NR
Natural Gas	R	R	R	R	C	C	C
Nickel Acetate	R	?	R	?	R	R	R
Nickel Chloride	R	R	R	R	R	R	R
Nickel Nitrate	R	R	R	R	R	R	R
Nickel Sulfate	R	R	R	R	R	R	R
Nicotine	R	R	R	R	R	R	R
Nicotine Acid	R	R	R	R	R	R	R
Nitric Acid, 10%	R	R	R	NR	R	R	R
Nitric Acid, 25%	R	R	R	NR	R	R	R
Nitric Acid, 25-35%	R	R	R	NR	R	C	C
Nitric Acid, 60%	R	R	R	NR	R	?	NR
Nitric Acid, 68%	R	NR	NR	NR	R	?	NR
Nitric Acid, Anhydrous	NR	NR	NR	NR	NR	NR	NR
Nitrobenzene	NR	NR	NR	NR	NR	NR	NR
Nitroglycerine	NR	NR	NR	NR	NR	NR	NR
Nitroglycol	NR	NR	NR	NR	?	?	?
Nitrous Oxide	R	NR	R	NR	R	R	R
Ocenol	R	R	?	?	?	?	?
Octanol (1)	R	R	R	R	C	NR	NR
Oil, Sour Crude	R	R	R	R	NR	NR	NR
Oils & Fats	R	R	R	R	C	C	C
Oils, Edible	R	R	R	R	NR	NR	NR
Oleic Acid	R	R	R	R	C	C	C
Oleum	NR	NR	NR	NR	NR	NR	NR
Olive Oil	R	R	R	R	NR	NR	NR
Oxalic Acid, sat'd	R	R	R	R	R	C	C
Oxygen	R	R	R	R	R	R	R
Ozone	R	R	R	R	R	R	R
Ozonized water	R	R	R	R	R	?	?
Palm Oil	R	R	R	R	NR	NR	NR
Palmitic Acid, 10%	R	R	R	R	C	C	C
Palmitic Acid, 70%	R	NR	?	NR	C	C	C
Paraffin	R	R	?	?	R	R	?
Peanut Oil	R	R	R	R	NR	NR	NR
Peracetic Acid, 40%	R	NR	?	NR	NR	NR	NR
Perchloric Acid, 10%	R	R	R	R	R	?	?
Perchloric Acid, 15%	R	NR	NR	NR	?	?	?
Perchloric Acid, 70%	R	NR	NR	NR	?	?	?
Perphosphate	R	?	R	?	?	?	?

CHEMICAL REAGENT	PVC Type I 1120 (12454) 73°F	PVC Type I 1120 (12454) 140°F	PVC Clear 2110 (12454) 73°F	PVC Clear 2110 (12454) 140°F	CPVC Type IV, Grade I 4120 (23447) 73°F	CPVC Type IV, Grade I 4120 (23447) 140°F	CPVC Type IV, Grade I 4120 (23447) 180°F
Petroleum Liquifier	R	R	R	R	?	?	?
Petroleum Oils (Sour)	R	NR	R	NR	C	C	C
Phenol	NR	NR	NR	NR	R	R	R
Phenylhydrazine	NR	NR	NR	NR	NR	NR	NR
Phenylhydrazine Hydrochloride	NR	NR	NR	NR	NR	NR	NR
Phosgene, Gas	R	?	R	?	NR	NR	NR
Phosgene, Liquid	NR	NR	NR	NR	NR	NR	NR
Phosphoric Acid, up to 85%	R	R	R	R	R	R	R
Phosphorous Pentoxide	R	NR	R	NR	R	R	R
Phosphorous Trichloride	NR	NR	NR	NR	NR	NR	NR
Phosphorous, (Yellow)	R	NR	R	NR	R	R	R
Photographic Solutions: Dektal Developer	R	R	R	R	?	?	?
Photographic Solutions: DK #3	R	R	R	R	?	?	?
Photographic Solutions: Kodak Fixer	R	R	R	R	?	?	?
Photographic Solutions: Kodak Short Stop	R	R	R	R	?	?	?
Picric Acid	NR	NR	NR	NR	NR	NR	NR
Plating Solutions: Brass	R	R	R	R	R	R	R
Plating Solutions: Cadmium	R	R	R	R	R	R	R
Plating Solutions: Copper	R	R	R	R	R	R	R
Plating Solutions: Gold	R	R	R	R	R	R	R
Plating Solutions: Indium	R	R	R	R	R	R	R
Plating Solutions: Lead	R	R	R	R	R	R	R
Plating Solutions: Nickel	R	R	R	R	R	R	R
Plating Solutions: Rhodium	R	R	R	R	R	R	R
Plating Solutions: Silver	R	R	R	R	R	R	R
Plating Solutions: Tin	R	R	R	R	R	R	R
Plating Solutions: Zinc	R	R	R	R	R	R	R
Polyethylene Glycol	?	?	?	?	NR	NR	NR
Potash (Sat.Aq.)	R	R	?	?	R	R	R
Potassium Acetate	R	R	R	R	R	R	R

R = Recommended NR = Not Recommended

C = Caution, actual testing suggested; suspect @ certain stress levels ? = Incomplete Data; actual testing required

CHEMICAL REAGENT	PVC Type I 1120 (12454) 73°F	PVC Type I 1120 (12454) 140°F	PVC Clear 2110 (12454) 73°F	PVC Clear 2110 (12454) 140°F	CPVC Type IV, Grade I 4120 (23447) 73°F	CPVC Type IV, Grade I 4120 (23447) 140°F	CPVC Type IV, Grade I 4120 (23447) 180°F
Potassium Alum	R	R	R	R	R	R	R
Potassium Amyl Xanthate	R	NR	NR	NR	?	?	?
Potassium Bicarbonate	R	R	R	R	R	R	R
Potassium Bichromate	R	R	R	R	R	R	R
Potassium Bisulfate	R	R	R	R	R	R	R
Potassium Borate	R	R	R	R	R	R	R
Potassium Bromate	R	R	R	R	R	R	R
Potassium Bromide	R	R	R	R	R	R	R
Potassium Carbonate	R	R	R	R	R	R	R
Potassium Chlorate	R	R	R	R	R	R	R
Potassium Chloride	R	R	R	R	R	R	R
Potassium Chromate	R	R	R	?	R	R	R
Potassium Cyanate	R	R	R	R	R	R	R
Potassium Cyanide	R	R	R	R	R	R	R
Potassium Dichromate	R	R	R	R	R	R	R
Potassium Ethyl Xanthate	R	NR	NR	NR	?	?	?
Potassium Ferricyanide	R	R	R	R	R	R	R
Potassium Ferrocyanide	R	R	R	R	R	R	R
Potassium Fluoride	R	R	R	R	R	R	R
Potassium Hydroxide	R	R	R	R	R	R	R
Potassium Hypochlorite	R	R	R	R	R	R	R
Potassium Iodide	R	R	R	R	R	R	R
Potassium Nitrate	R	R	R	R	R	R	R
Potassium Perborate	R	R	R	R	R	R	R
Potassium Perchlorate	R	R	R	R	R	R	R
Potassium Permanganate, 10%	R	R	R	R	R	R	R
Potassium Permanganate, 25%	R	NR	R	NR	R	R	C
Potassium Persulfate	R	R	R	R	R	?	?
Potassium Phosphate	R	R	R	R	R	R	R
Potassium Sulfate	R	R	R	R	R	R	R
Potassium Sulfide	R	R	R	R	R	R	R
Potassium Sulfite	R	R	R	R	R	R	R
Potassium Tripolyphosphate	R	R	R	R	R	R	R
Propane	R	R	R	R	C	C	C
Propane Gas	R	R	R	R	C	C	C
Propanol, 0.5%	R	R	R	?	R	?	R
Propanol, > 0.5%	R	R	R	NR	C	C	C
Propargyl Alcohol	R	R	R	NR	C	C	C
Propionic Acid, 2%	?	?	?	?	R	R	R
Propionic Acid, > 2%	?	?	?	?	NR	NR	NR
Propylene Dichloride	NR	NR	NR	NR	NR	NR	NR
Propylene Glycol, 25%	?	?	?	?	C	C	C
Propylene Glycol, > 25%	?	?	?	?	NR	NR	NR
Propylene Oxide	NR	NR	NR	NR	NR	NR	NR
Pyridine	NR	NR	NR	NR	NR	NR	NR
Pyrogallic Acid	R	NR	R	NR	?	?	?
Rayon Coagulating Bath	R	R	R	R	?	?	?
Refinery Crudes	R	R	?	?	C	C	C
Rochelle Salts	R	R	?	?	R	R	R
Salicylic Acid	R	R	R	R	R	R	R
Santicizer	NR	NR	NR	NR	?	?	?
Sea Water	R	R	R	R	R	R	R
Selenic Acid	R	R	R	?	?	?	?
Sewage	R	R	R	R	R	R	R
Silicic Acid	R	R	R	R	R	?	?
Silicone Oil	?	?	?	?	R	?	?
Silver Chloride	R	R	R	R	R	R	R
Silver Cyanide	R	R	R	R	R	R	R
Silver Nitrate	R	R	R	R	R	R	R
Silver Sulfate	R	R	R	R	R	R	R
Soaps	R	R	R	R	R	R	R
Sodium Acetate	R	R	R	R	R	R	R
Sodium Alum	R	R	R	R	R	R	R
Sodium Arsenate	R	R	R	R	R	?	?
Sodium Benzoate	R	R	R	R	R	R	R
Sodium Bicarbonate	R	R	R	R	R	R	R
Sodium Bichromate	R	R	R	R	R	R	R
Sodium Bisulfate	R	R	R	R	R	R	R
Sodium Bisulfite	R	R	R	R	R	R	R
Sodium Borate	R	R	R	R	R	R	R
Sodium Bromide	R	R	R	R	R	R	R
Sodium Carbonate	R	R	R	R	R	R	R
Sodium Chlorate	R	NR	R	NR	R	R	R
Sodium Chloride	R	R	R	R	R	R	R
Sodium Chlorite	NR	NR	NR	NR	R	R	R
Sodium Chromate	R	R	R	R	R	R	R
Sodium Cyanide	R	R	R	R	R	R	R
Sodium Dichromate	R	R	R	R	R	R	R
Sodium Ferricyanide	R	R	R	R	R	R	R
Sodium Ferrocyanide	R	R	R	R	R	R	R
Sodium Fluoride	R	R	R	R	R	R	R
Sodium Formate	?	?	?	?	R	R	R
Sodium Hydroxide, 50%	R	R	R	R	R	R	R
Sodium Hypobromite	R	R	R	R	R	R	R
Sodium Hypochlorite	R	R	R	R	R	R	R
Sodium Iodide	R	R	R	R	R	R	R
Sodium Metaphosphate	R	R	R	R	R	R	R

R = Recommended NR = Not Recommended

C = Caution, actual testing suggested; suspect @ certain stress levels ? = Incomplete Data; actual testing required

CHEMICAL REAGENT	PVC Type I 1120 (12454) 73°F	PVC Type I 1120 (12454) 140°F	PVC Clear 2110 (12454) 73°F	PVC Clear 2110 (12454) 140°F	CPVC Type IV, Grade I 4120 (23447) 73°F	CPVC Type IV, Grade I 4120 (23447) 140°F	CPVC Type IV, Grade I 4120 (23447) 180°F
Sodium Nitrate	R	R	R	R	R	R	R
Sodium Nitrite	R	R	R	R	R	R	R
Sodium Perchlorate	R	R	R	R	R	R	R
Sodium Peroxide	R	R	R	R	R	R	R
Sodium Silicate	R	NR	R	NR	R	R	R
Sodium Sulfate	R	R	R	R	R	R	R
Sodium Sulfide	R	R	R	R	R	R	R
Sodium Sulfite	R	R	R	R	R	R	R
Sodium Thiosulfate	R	R	R	R	R	R	R
Sodium Tripolyphosphate	?	?	?	?	R	R	R
Sour Crude Oil	R	R	R	R	C	C	C
Soybean Oil	R	R	R	R	NR	NR	NR
Stannic Chloride	R	R	R	R	R	R	R
Stannous Chloride	R	R	R	R	R	R	R
Stannous Sulfate	R	R	R	R	R	R	R
Starch	R	R	R	R	R	R	R
Stearic Acid	R	R	R	R	R	?	?
Stoddards Solvent	NR	NR	NR	NR	C	C	C
Styrene	NR	NR	NR	NR	NR	NR	NR
Succinic Acid	R	R	R	R	R	R	R
Sugar	R	R	R	R	R	R	R
Sulfamic Acid	NR	NR	NR	NR	R	R	R
Sulfite Liquor	R	R	R	R	?	?	?
Sulfur	R	R	R	R	R	?	?
Sulfur Dioxide, dry	R	R	R	R	R	R	R
Sulfur Dioxide, wet	R	NR	NR	NR	R	R	R
Sulfur Trioxide	R	R	R	R	R	R	R
Sulfuric Acid, 70%	R	R	R	R	R	R	R
Sulfuric Acid, 80%	R	R	NR	NR	R	R	R
Sulfuric Acid, 85%	R	R	NR	NR	R	C	NR
Sulfuric Acid, 90%	R	NR	NR	NR	R	C	NR
Sulfuric Acid, 98%	?	NR	NR	NR	R	NR	NR
Sulfuric Acid, Fuming	NR	NR	NR	NR	NR	NR	NR
Sulfuric Acid, Pickling	R	R	?	?	R	R	R
Sulfurous Acid	R	R	R	R	?	?	?
Tall Oil	R	R	R	R	C	C	C
Tan Oil	R	R	R	R	?	?	?
Tannic Acid, 30%	R	R	R	R	R	?	?
Tanning Liquors	R	R	R	R	?	?	?
Tartaric Acid	R	R	R	R	R	?	?
Terpenes	?	?	?	?	NR	NR	NR
Terpineol	R	?	R	?	NR	NR	NR
Tetraethyl Lead	R	?	R	NR	?	?	?
Texanol	?	?	?	?	NR	NR	NR
Thionyl Chloride	NR	NR	NR	NR	NR	NR	NR
Thread Cutting Oil	R	?	R	?	C	C	C
Titanium Tetrachloride	R	NR	R	NR	?	?	?
Toluol or Toluene	NR	NR	NR	NR	NR	NR	NR
Transformer Oil	R	R	R	R	C	C	C
Tributyl Citrate	R	?	R	?	NR	NR	NR
Tributyl Phosphate	NR	NR	NR	NR	NR	NR	NR
Trichloroacetic Acid	R	?	R	?	NR	NR	NR
Trichloroethylene	NR	NR	NR	NR	NR	NR	NR
Triethanolamine	R	NR	R	NR	NR	NR	NR
Trilones	NR	NR	NR	NR	?	?	?
Trimethyl Propane	R	R	R	NR	?	?	?
Trimethylamine	R	NR	R	NR	?	?	?
Trisodium Phosphate	R	R	R	R	R	R	R
Turpentine	R	R	NR	NR	NR	NR	NR
Urea	R	R	R	R	R	R	R
Urine	R	R	R	R	R	R	R
Vaseline	NR	NR	NR	NR	?	?	?
Vegetable Oils	R	?	R	?	NR	NR	NR
Vinegar	R	R	R	R	R	R	R
Vinyl Acetate	NR	NR	NR	NR	NR	NR	NR
Water, Acid Mine	R	R	R	R	R	R	R
Water, Deionized	R	R	R	R	R	R	R
Water, Demineralized	R	R	R	R	R	R	R
Water, Distilled	R	R	R	R	R	R	R
Water, Fresh & Salt	R	R	R	R	R	R	R
Water, Swimming Pool	R	R	R	R	R	R	R
WD-40	?	?	?	?	C	C	C
Whiskey	R	R	R	R	R	R	R
White Liquor	R	R	R	R	R	R	R
Wines	R	R	R	R	R	R	R
Xylene or Xylol	NR	NR	NR	NR	NR	NR	NR
Zinc Acetate	R	R	R	R	R	R	R
Zinc Carbonate	R	R	R	R	R	R	R
Zinc Chloride	R	R	R	R	R	R	R
Zinc Nitrate	R	R	R	R	R	R	R
Zinc Sulfate	R	R	R	R	R	R	R

Industry Standards &Test Methods

Harvel's products are manufactured in strict compliance with applicable industry standards and specifications to ensure strength, durability and safety. Although not inclusive, the following list of internationally recognized standards, specifications, test methods and practices relate to PVC and CPVC thermoplastic piping products and related components.

ASTM STANDARD SPECIFICATIONS

ASTM D1784	Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
ASTM D1785	Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120
ASTM D6263	Standard Specification for Extruded Bars Made From Rigid Poly (Vinyl Chloride) (PVC) and Chlorinated Poly (Vinyl Chloride) (CPVC)
ASTM D2464	Standard Specification for Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D2467	Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D2241	Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure Rated Pipe (SDR Series)
ASTM F441	Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80
ASTM F442	Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR)
ASTM D2672	Standard Specification for Joints for IPS PVC Pipe Using Solvent Cement
ASTM D2846	Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems
ASTM D2466	Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
ASTM D3139	Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
ASTM D2665	Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings
ASTM F437	Standard Specification for Threaded Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
ASTM F438	Standard Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40
ASTM F439	Standard Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
ASTM F477	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F480	Standard Specification for Thermoplastic Well Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR), Schedule 40 and Schedule 80
ASTM F493	Standard Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings
ASTM F656	Standard Specification for Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings
ASTM F913	Standard Specification for Thermoplastic Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM D1866	Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Schedule 40 Drainage and DWV Fabricated Fittings

ASTM STANDARD TEST METHODS

ASTM D1598	Standard Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure
ASTM D1599	Standard Test Method for Resistance to Short-Time Hydraulic Pressure of Plastic Pipe & Fittings
ASTM D2837	Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials
ASTM D2412	Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
ASTM D2444	Standard Test Method for Determination of the Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)
ASTM D2564	Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems
ASTM D2152	Standard Test Method for Adequacy of Fusion by Acetone Immersion
ASTM D2122	Standard Test Method for Determining Dimensions of Thermoplastic Pipe & Fittings
ASTM F610	Standard Test Method for Evaluating the Quality of Molded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings by the Heat Reversion Technique

ASTM STANDARD PRACTICES

ASTM D2855	Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings
ASTM D2774	Standard Practice for Underground Installation of Thermoplastic Pressure Piping
ASTM D2321	Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM F402	Standard Practice for Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastics Pipe and Fittings
ASTM F690	Standard Practice for Underground Installation of Thermoplastic Pressure Piping Irrigation System
ASTM F1057	Standard Practice for Evaluating the Quality of Extruded Poly (Vinyl Chloride) (PVC) Pipe by the Heat Reversion Technique
ASTM F645	Standard Guide for Selection, Design, and Installation of Thermoplastic Water Pressure Systems

Industry Standards & Test Methods

TOXILOGICAL

NSF International NSF Standard 061	Drinking Water System Components - Health Effects
NSF International NSF Standard 14	Plastics Piping System Components and Related Materials
United States FDA Code of Federal Regulations	Title 21

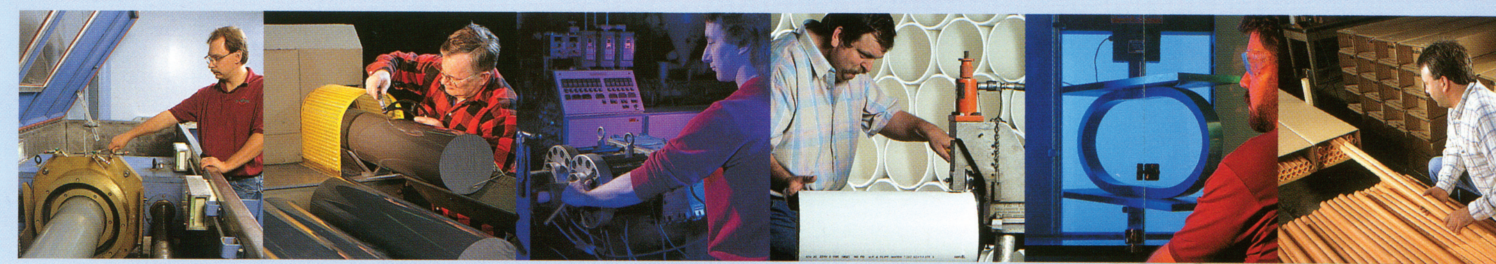
FIRE PERFORMANCE

ULC-S102.2-M88	Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Covering, and Miscellaneous Materials and Assemblies
UL 723	Test for Surface Burning Characteristics of Building Materials
UL1821	Thermoplastic Sprinkler Pipe and Fittings for Fire Protection Service
UL 1887	Standard for Safety for Fire Test of Plastic Sprinkler Pipe for Flame and Smoke Characteristics
UL 94	Test for Flammability of Plastic Materials for Parts in Devices and Appliances
FM1635	Plastic Pipe & Fittings for Automatic Sprinkler Systems
FM4910	Clean Room Materials Flammability Test Protocol
ASTM E84	Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM D635	Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position
ASTM E162	Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source
ASTM D2863	Standard Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)

OTHER

CSA Standard B137.3-99	Rigid Polyvinyl Chloride (PVC) Pipe for Pressure Applications

A commitment to excellence.



In a world of constant technological change, outstanding PVC and CPVC pipe extrusions can only be produced by a company with unique skills. Technical mastery, persistent dedication and testing without compromise – these are the elements that make GF Harvel an international leader in thermoplastic extrusions.

Key to GF Harvel's technological advantage are superbly equipped on-site laboratories at each of two manufacturing plants. These innovative facilities are in the forefront of product development; they also evolve the most careful, vigilant standards of product testing.

This means constant checking and rechecking of the blended materials that go into GF Harvel products. It also means applying a range of tests to completed products – tough trials that prove excellence beyond a doubt.

From the start, GF Harvel has been devoted to the quality of its products. Its comprehensive quality program has always been based on the continuous improvement tools of Total Quality Management (TQM) and Statistical Process Control (SPC). GF Harvel was the first in its industry to achieve ISO 9001 quality certification. ISO certification represents just one more benchmark for GF Harvel products – known throughout the industry for reliable quality.

GF Harvel's original headquarters factory was built more than 40 years ago in Easton, Pennsylvania and has since expanded to encompass a quarter of a million square feet. In Bakersfield, California, the plant, warehouse and distribution center, serve the US West and Pacific Rim, affirming the company's position as a worldwide leader. Wherever produced, GF Harvel pipe and extrusions embody the highest standards of quality. Today continuous dedication to those standards reinforces GF Harvel's reputation as "The Quality Line".

+GF+

HARVEL®

+GF+

HARVEL®

www.harvel.com

PPFA

ASTM

NSF®

ISO 9001 CERTIFIED

LPCB LOSS PREVENTION CERTIFICATION BOARD

UKAS QUALITY MANAGEMENT 007

Harvel Plastics, Inc.
Quality Systems Certificate Nos. 270/455
Assessed to ISO 9001

member iapd
international association
of plastics distribution

mmp mmp

주식회사 엠 엠 피
(Modern Maintenance Products Co.,Ltd)
http : //www.mmpkorea.com
E-mail : mmp@mmpkorea.com

본 사 : 경기도 시흥시 마유로 118번길 39
(정왕동, 시화공단 3라 715호)
T. 031)494-0889 F. 494-5163
부산영업소 : T. 051)319-2890 F. 319-2893
구미영업소 : T. 054)475-0612 F. 475-0619