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# Submittal Package

# PVC Schedule 40

# DWV System

[Updated October 17, 2019]

SUBMITTAL PACKAGE

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# SUBMITTAL FOR CHARLOTTE PIPE® PVC SCHEDULE 40 SOLID WALL PIPE AND PVC DWV FITTING SYSTEM

Date: \_\_\_\_\_

Job Name: \_\_\_\_\_

Location: \_\_\_\_\_

Engineer: \_\_\_\_\_

Contractor: \_\_\_\_\_

**Scope:**

This specification covers PVC Schedule 40 solid wall pipe and PVC DWV fittings used in sanitary drain, waste and vent (DWV), sewer and storm drainage applications. This system is intended for use in non-pressure applications where the operating temperature will not exceed 140° F.

**Specification:**

Pipe shall be manufactured from virgin rigid PVC (polyvinyl chloride) vinyl compounds with a cell class of 12454 as identified in ASTM D 1784. PVC Schedule 40 pipe shall be Iron Pipe Size (IPS) conforming to ASTM D 1785 and ASTM D 2665. Injection molded PVC DWV fittings shall conform to ASTM D 2665. Fabricated PVC DWV fittings shall conform to ASTM F 1866. All pipe and fittings shall be manufactured in the United States. All systems shall utilize a separate waste and vent system. Pipe and fittings shall conform to NSF International Standard 14.

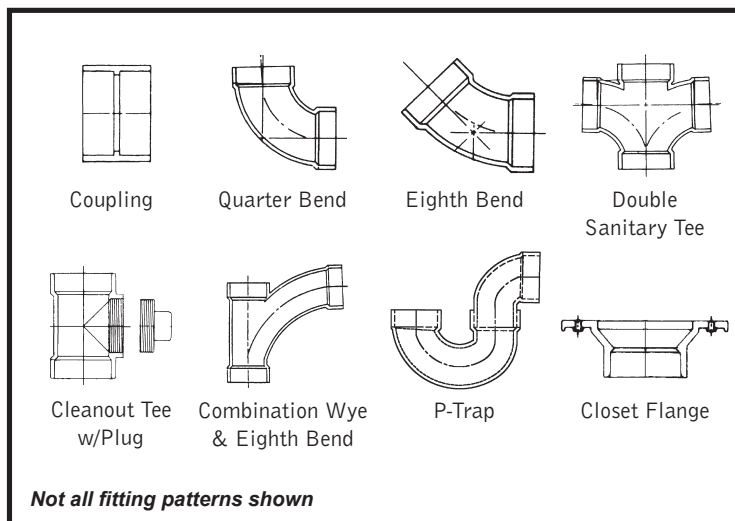
**Installation:**

Installation shall comply with the latest installation instructions published by Charlotte Pipe and Foundry and shall conform to all applicable plumbing, fire, and building code requirements. Buried pipe shall be installed in accordance with ASTM D 2321 and ASTM F 1668. Solvent cement joints shall be made in a two-step process with primer conforming to ASTM F 656 and solvent cement conforming to ASTM D 2564. The system shall be protected from chemical agents, fire-stopping materials, thread sealant, plasticized-vinyl products or other aggressive chemical agents not compatible with PVC compounds. The system shall be hydrostatically tested after installation.

**WARNING!** Never test with or transport/store compressed air or gas in PVC pipe or fittings. Doing so can result in explosive failures and cause severe injury or death.

**Referenced Standards:**

- ASTM D 1784: Rigid Vinyl Compounds
- ASTM D 1785: PVC Plastic Pipe, Schedule 40
- ASTM D 2665: PVC Drain, Waste and Vent Pipe and Fittings
- ASTM D 2564: Solvent Cements for PVC Pipe and Fittings
- ASTM D 2321: Underground Installation of Thermoplastic Pipe (non-pressure applications)
- ASTM F 656: Primers for PVC Pipe and Fittings
- ASTM F 1668: Procedures for Buried Plastic Pipe
- ASTM F 1866: Fabricated PVC DWV Fittings
- NSF Standard 14: Plastic Piping Components and Related Materials



<b>PVC Schedule 40 DWV Pipe</b>						
<b>PVC Schedule 40 DWV Pipe</b>						
PVC SCHEDULE 40 (WHITE)		PLAIN END		PVC 1120		ASTM D 2665
PART NO.	NOM. SIZE	UPC # 611942-	QTY. PER SKID	AVG. OD (IN.)	MIN. WALL (IN.)	WT. PER 100 FT. (LBS.)
PVC 7100*	1 1/4"x10'	03945	2120'	1.660	.140	42.4
PVC 7100*	1 1/4"x20'	03946	4240'	1.660	.140	42.4
PVC 7112*	1 1/2"x10'	03947	1650'	1.900	.145	51.8
PVC 7112*	1 1/2"x20'	03948	3300'	1.900	.145	51.8
PVC 7200*	2"x10'	03949	1110'	2.375	.154	69.5
PVC 7200*	2"x20'	03950	2220'	2.375	.154	69.5
PVC 7300*	3"x10'	03951	1130'	3.500	.216	144.2
PVC 7300*	3"x20'	03952	1000'	3.500	.216	144.2
PVC 7400†	4"x10'	03953	670'	4.500	.237	205.5
PVC 7400†	4"x20'	03954	1340'	4.500	.237	205.5
PVC 7500†	5"x20'	04837	760'	5.563	.258	272.5
PVC 7600†	6"x10'	03955	330'	6.625	.280	361.2
PVC 7600†	6"x20'	03956	660'	6.625	.280	361.2
PVC 7800†	8"x10'	13087	180'	8.625	.322	543.6
PVC 7800†	8"x20'	03958	360'	8.625	.322	543.6
PVC 7910†	10"x20'	03959	220'	10.750	.365	770.7
PVC 7912†	12"x20'	03961	120'	12.750	.406	1019.0
PVC 7914†	14"x20'	04862	60'	14.000	.437	1205.0
PVC 7916†	16"x20'	04918	60'	16.000	.500	1575.7

\* Dual Marked ASTM D 1785 & ASTM D 2665.  
† Triple Marked ASTM D 1785 & ASTM D 2665 & ASTM F 480.

# Product Certification



This is to certify that all Plastic Pipe and Fittings manufactured by Charlotte Pipe and Foundry Company are manufactured in the United States and conform to the following standards:

## **PVC SCH. 40 SOLID WALL PIPE**

ASTM D 1784, ASTM D 1785, ASTM D 2665  
FHA UM 79a  
FEDERAL SPECIFICATION L-P-320a  
NSF STANDARD 14 AND 61

## **PVC SCH. 40 DWV CELLULAR CORE PIPE**

ASTM D 4396, ASTM F 891  
NSF STANDARD NO. 14

## **PVC SCH. 40 DWV FITTINGS**

ASTM D 1784, ASTM D 2665, ASTM D 3311,  
ASTM F1866  
FHA UM 79a  
FEDERAL SPECIFICATION L-P-320a  
NSF STANDARD NO. 14

## **ConnecTite® PUSH-FIT DWV FITTINGS**

ASME A112.4.4, IAPMO IGC 334  
NSF STANDARD NO. 14

## **PVC SDR-21 AND SDR-26 PRESSURE PIPE**

ASTM D 1784, ASTM D 2241  
NSF STANDARD NO. 14 AND 61

## **PVC SCH. 40 PRESSURE FITTINGS**

ASTM D 1784, ASTM D 2466  
NSF STANDARD 14 AND 61

## **PVC SCH. 40 WELL CASING PIPE**

ASTM D 1784, ASTM F 480  
NSF STANDARD NO. 14 AND 61

## **PVC SCH. 80 PIPE**

ASTM D 1784, ASTM D 1785  
NSF STANDARD NO. 14 AND 61

## **PVC SCH. 80 FITTINGS**

ASTM D 1784, ASTM D 2467  
ASTM D 2464 ASTM F 1970  
NSF STANDARD NO. 14 AND 61

## **PVC SDR 35 SEWER MAIN PIPE**

ASTM D 1784, ASTM D 3034, SDR 35  
ASTM D 3212, ASTM F 477

## **PVC SEWER AND DRAIN PIPE**

ASTM D 1784, ASTM D 2729

## **PVC THIN WALL PIPE & FITTINGS**

ASTM D 1784, ASTM D 2949  
NSF STANDARD NO. 14

## **CPVC FLOWGUARD GOLD® CTS PIPE & FITTINGS**

ASTM D 1784, ASTM D 2846  
FHA UM-61a  
NSF STANDARD NO. 14 AND 61  
CSA LISTED ON SPECIFIED ITEMS

## **CPVC CHEMDRAIN® SCH. 40 PIPE & FITTINGS**

ASTM D 1784, ASTM F 2618  
NSF STANDARD 14

## **ABS SCH. 40 DWV CELLULAR CORE PIPE**

ASTM D 3965, ASTM F 628  
NSF STANDARD NO. 14

## **ABS PLUS® SCH. 40 DWV CELLULAR CORE PIPE**

ASTM D 3965, ASTM D 4396, ASTM F 1488

## **ABS SCH. 40 DWV FITTINGS**

ASTM D 3965, ASTM D 2661, ASTM D 3311  
FHA UM 79a  
FEDERAL SPECIFICATION L-P-322b  
NSF STANDARD NO. 14

CHARLOTTE PIPE AND FOUNDRY COMPANY

## Physical Properties of Charlotte Pipe® ABS and PVC Materials\*

PROPERTY	UNITS	ABS	ASTM NO.	PVC	ASTM NO.
Specific Gravity	g/cc	1.05	D 792	1.40	D 792
Tensile Strength (73°F) Minimum	Psi	4,500	D 638	7,000	D 638
Modulus of Elasticity in Tension (73°F) Minimum	Psi	240,000	D 638	400,000	D 638
Flexural Strength (73°F)	Psi	10,585	D 790	14,000	D 790
Izod Impact (notched at 73°F) Minimum	ft lb/ in. of notch	6.00	D 256	0.65	D 256
Hardness (Durometer D)		70	D 2240	80 ± 3	D 2240
Hardness (Rockwell R)		100	D 785	110 - 120	D 785
Compressive Strength (73°F)	Psi	7,000	D 695	9,600	D 695
Hydrostatic Design Stress	Psi	N/A		2,000	D 1598
Coefficient of Linear Expansion	in./ in./ °F	5.5 x 10 <sup>-5</sup>	D 696	3.0 x 10 <sup>-5</sup>	D 696
Heat Distortion Temperature at 264 psi Minimum	degrees F	180	D 648	158	D 648
Coefficient of Thermal Conductivity	BTU/ hr/sq ft/ °F/ in.	1.1	C 177	1.2	C 177
Specific Heat	BTU/ °F/lb	0.35	D 2766	0.25	D 2766
Water Absorption (24 hrs at 73°F)	% weight gain	0.40	D 570	.05	D 570
Cell Classification - Pipe		42222	D 3965	12454	D 1784
Cell Classification - Fittings		32222	D 3965	12454	D 1784
Burning Rate				Self Ext.	D 635

\*Above data is based upon information provided by the raw material manufacturers. It should be used only as a recommendation and not as a guarantee of performance.

## Solvent Cements

Pipe and Fitting System	Diameter (in.)	Solvent Cement Standard	Cement Color (common usage, check local code)	Description	Primer (common usage, check local code)
ABS DWV	1½ - 6	ASTM D 2235	Black	Regular or Medium-Bodied	Not Recommended
ABS Plus® Foam Core Pipe	1½ - 4	ASTM D 2235	Black	Regular or Medium-Bodied	Not Recommended
FlowGuard Gold® CTS CPVC	½ - 2	ASTM F 493	Yellow	Regular-Bodied	Optional
CPVC Sch. 80	½ - 2	ASTM F 493	IPS 714 or Oatey CPVC Heavy Duty Orange	Heavy-Bodied	IPS P-70 or Oatey Industrial Grade
CPVC Sch. 80	2½ - 8	ASTM F 493	IPS 714 or Oatey CPVC Heavy Duty Orange	Heavy-Bodied	IPS P-70 or Oatey Industrial Grade
CPVC Sch. 40 ChemDrain	1¼ - 8	ASTM F 493	ChemDrain Mustard Yellow (Required)	Heavy-Bodied	6" and larger: IPS P-70 or Oatey Industrial Grade required
PVC DWV or Sch. 40 Pressure	½ - 4	ASTM D 2564	Clear	Regular or Medium-Bodied	Required ASTM F 656
PVC DWV or Sch. 40 Pressure	6 - 16	ASTM D 2564	Clear or Grey	Medium or Heavy-Bodied	Required ASTM F 656
PVC Sch. 80	¼ - 2	ASTM D 2564	Grey	Medium or Heavy-Bodied	Required ASTM F 656
PVC Sch. 80	2½ - 16	ASTM D 2564	Grey	Heavy-Bodied	IPS P-70 or Oatey Industrial Grade

**NOTICE:** Aerosol or spray-on type primers/solvent cements are not recommended. The practice of aggressively scouring the pipe and fittings with both primer and solvent cement is an integral part of the joining process. Not working the primer or solvent cement into the pipe or fitting could cause potential system failure or property damage.

### WARNING

Primers and cements are extremely flammable and may be explosive. Do not store or use near open flame or elevated temperatures, which may result in injury or death.

- Solvent fumes created during the joining process are heavier than air and may be trapped in newly installed piping systems.
- Ignition of the solvent vapors caused by spark or flame may result in injury or death from explosion or fire.
- Read and obey all manufacturers' warnings and any instructions pertaining to primers and cements.
- Provide adequate ventilation to reduce fire hazard and to minimize inhalation of solvent vapors when working with cements, primers and new piping systems.

## Applicator Types

Nominal Pipe Size (in.)	Applicator Type		
	Dauber	Brush Width (in.)	Swab Length (in.)
¼	A	½	NR
⅜	A	½	NR
½	A	½	NR
¾	A	1	NR
1	A	1	NR
1¼	A	1	NR
1½	A	1 - 1½	NR
2	A	1 - 1½	NR
2½	NR	1½ - 2	NR
3	NR	1½ - 2½	NR
4	NR	2 - 3	3
6	NR	3 - 5	3
8	NR	4 - 6	7
10	NR	6 - 8	7
12	NR	6 - 8	7
14	NR	7 - 8	7
16	NR	8+	8

A = Acceptable

NR = Not Recommended

**NOTICE:** Rollers are not recommended.

# Chemical Resistance

The following table gives the chemical resistance of ABS, PVC and CPVC thermoplastic piping materials and three commonly used seal materials. The information shown is based upon laboratory tests conducted by the manufacturers of the materials, and it is intended to provide a general guideline on the resistance of these materials to various chemicals.

**NOTICE:** This table is not a guarantee, and any piping systems using products made of these materials should be tested under actual service conditions to determine their suitability for a particular purpose. See website for most current data: [www.charlottepipe.com](http://www.charlottepipe.com)

**CAUTION**

PVC, ABS and CPVC piping systems have very different chemical resistance. Review manufacturer's literature for all chemicals coming into contact with the piping materials prior to use.

Number = Maximum Recommended Temp. (°F)\*\*      CF = Consult Factory      NR = Not Recommended      • • = Incomplete Data

Chemical Name	Pipe & Fitting Materials Recommended Max. Temp (°F)			Seal Materials Recommended Max. Temp. (°F)		
	ABS	PVC	CPVC	Viton ®	EPDM	Neoprene
Acetaldehyde .....	NR	NR	NR	NR	200	NR
Acetamide .....	120	• •	• •	NR	200	NR
Acetate Solvent, Crude .....	NR	NR	NR	NR	200	NR
Acetate Solvent, Pure .....	NR	NR	NR	NR	200	NR
Acetic Acid, 10% .....	120	140‡	180‡	73	200	NR
Acetic Acid, 20% .....	NR	140‡	180‡	NR	200	NR
Acetic Acid, 50% .....	NR	NR	NR	NR	140	NR
Acetic Acid, 80% .....	NR	NR	NR	NR	140	NR
Acetic Acid, Glacial .....	NR	NR	NR	NR	73	NR
Acetic Anhydride .....	NR	NR	NR	NR	NR	73
Acetone .....	NR	NR	NR	NR	200	NR
Acetonitrile .....	NR	NR	NR	NR	NR	73
Acetophenone .....	NR	NR	NR	NR	140	NR
Acetyl Chloride .....	NR	NR	NR	185	NR	NR
Acetylene .....	140§	140§	180§	200	200	73
Acetyl Nitrile.....	NR	NR	NR	NR	NR	NR
Acrylic Acid .....	NR	NR	NR	NR	NR	NR
Acrylonitrile.....	NR	73	NR	NR	100	NR
Adipic Acid (Sat'd) .....	• •	140	180	160	140	140
Alcohol, Allyl .....	NR	NR	NR	73	73	73
Alcohol, Amyl.....	NR	NR	NR	160	200	140
Alcohol, Benzyl .....	NR	NR	NR	140	NR	NR
Alcohol, Butyl .....	NR	100	NR	200	140	140
Alcohol, Diacetone .....	NR	NR	NR	NR	70	NR
Alcohol, Ethyl (Ethanol) Up to 5% .....	73	140	180	200	200	160
Alcohol, Ethyl (Ethanol) Over 5%.....	NR	140	180	NR	200	140
Alcohol, Hexyl (Hexanol) .....	NR	100	NR	200	NR	NR
Alcohol, Isopropyl (Isopropanol).....	NR	140	NR	160	160	73
Alcohol, Methyl (Methanol).....	NR	140	140	NR	160	160
Alcohol, Octyl (1-n-Octanol) .....	NR	100	73	73	NR	NR
Alcohol, Propyl (Propanol).....	NR	140	NR	200	200	140
Allyl Alcohol .....	NR	NR	NR	100	70	73
Allyl Chloride .....	NR	NR	NR	NR	NR	NR
Alums .....	140	140	180	200	100	100
Aluminum Acetate.....	140	• •	180	NR	200	NR

Acrylonitrile-Butadiene-Styrene Polyvinyl Chloride Type 1 Grade 1 Chlorinated Polyvinyl Chloride Type IV Grade 1  
 Fluorocarbon Elastomer (Viton ® is a registered trademark of the DuPont Co.) Ethylene Propylene Diene Monomer  
 \*\* Maximum recommended temperature, for chemical resistance, under normal conditions. § Non-pressure, vent-only, applications when chemical is in gas form.  
 ‡ Must use solvent cement specially formulated for hypochlorite or caustic chemical service (IPS Weld-On 724 or equal).

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	ABS	PVC	CPVC	Viton ®	EPDM	Neoprene
Aluminum Ammonium .....	••	140	180	200	200	160
Aluminum Chloride.....	140	140	180	200	200	160
Aluminum Chrome .....	••	140	180	200	200	160
Aluminum Fluoride .....	NR	73	180	200	200	160
Aluminum Hydroxide .....	140	140‡	180‡	200	200	100
Aluminum Nitrate .....	140	140	180	100	200	100
Aluminum Oxychloride .....	140	140	180	NR	••	••
Aluminum Potassium Sulfate .....	140	140	180	200	200	160
Aluminum Sulfate .....	140	140	180	185	200	140
Amines, General .....	NR	NR	NR	NR	NR	NR
Ammonia, Aqueous.....	NR	140	NR	NR	175	150
Ammonia, Gas .....	140§	140§	NR	NR	140	140
Ammonia, Aqua, 10% .....	••	73	NR	NR	140	••
Ammonia, (25% Aqueous Solution) .....	140	NR	NR	NR	140	••
Ammonia Hydroxide .....	73	100‡	NR	NR	175	150
Ammonia Liquid (Concentrated) .....	NR	NR	NR	NR	140	73
Ammonium Acetate .....	••	140	180	73	140	140
Ammonium Benzoate.....	••	••	180	••	••	••
Ammonium Bifluoride .....	••	140	180	200	200	••
Ammonium Bisulfide.....	140	140	180	••	••	••
Ammonium Carbonate .....	140	140	180	200	200	140
Ammonium Chloride .....	120	140	180	200	200	160
Ammonium Citrate .....	120	••	180	NR	73	73
Ammonium Dichromate .....	120	73	••	NR	73	100
Ammonium Fluoride, 10% .....	120	140	180	140	200	100
Ammonium Fluoride, 25% .....	120	73	180	140	200	73
Ammonium Hydroxide, <10% .....	73	140‡	NR	70	200	160
Ammonium Hydroxide, >10% .....	73	73‡	NR	NR	200	150
Ammonium Metaphosphate.....	120	140	180	200	200	••
Ammonium Nitrate .....	120	140	180	100	200	160
Ammonium Persulphate .....	120	140	73	••	200	73
Ammonium Phospate .....	120	140	73	185	200	140
Ammonium Sulfamate .....	120	••	180	••	••	••
Ammonium Sulfate .....	120	140	180	200	200	160
Ammonium Sulfide .....	120	73	180	200	200	••

Acrylonitrile-Butadiene-Styrene Polyvinyl Chloride Type 1 Grade 1 Chlorinated Polyvinyl Chloride Type IV Grade 1  
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Chemical Name	Pipe & Fitting Materials Recommended Max. Temp (°F)			Seal Materials Recommended Max. Temp. (°F)		
	ABS	PVC	CPVC	Viton®	EPDM	Neoprene
Ammonium Thiocyanate .....	120	140	180	185	••	73
Ammonium Tartrate.....	120	140	180	••	••	••
Amyl Acetate .....	NR	NR	NR	NR	73	NR
Alcohol, Amyl.....	NR	NR	NR	185	200	140
Amyl Chloride .....	NR	NR	NR	200	NR	NR
Aniline .....	NR	NR	NR	NR	140	NR
Aniline Chlorohydrate.....	NR	NR	••	••	••	••
Aniline Hydrochloride.....	NR	NR	NR	185	••	NR
Anthraquinone Sulfonic Acid.....	••	140	••	200	••	••
Anti-Freeze (See Alcohols, Glycols & Glycerin)						
Antimony Trichloride .....	••	140	180	185	140	140
Aqua Regia.....	NR	NR	73	100	NR	NR
Aromatic Hydrocarbons .....	NR	NR	NR	73	NR	NR
Argon.....	••	••	••	200	200	100
Arsenic Acid .....	••	140	73	200	185	NR
Aryl Sulfonic Acid .....	••	140	••	185	140	••
Asphalt .....	NR	NR	NR	180	NR	NR
Barium Carbonate .....	120	140	180	200	200	160
Barium Chloride .....	120	140	180	200	200	160
Barium Hydroxide .....	120	140	180	200	180	150
Barium Nitrate.....	120	73	180	200	200	160
Barium Sulfate.....	120	140	180	200	200	160
Barium Sulfide .....	120	140	180	200	140	160
Beer .....	120	140	180	200	200	140
Beet Sugar Liquids .....	120	140	180	185	200	160
Benzaldehyde .....	NR	NR	NR	NR	200	NR
Benzalkonium Chloride.....	NR	NR	NR	••	••	••
Benzene .....	NR	NR	NR	150	NR	NR
Benzene, Benzol .....	NR	NR	NR	200	200	••
Benzene Sulfonic Acid .....	NR	NR	NR	185	NR	100
Benzoic Acid, (Sat'd) .....	140	140	73	••	NR	160
Benzyl Chloride .....	NR	NR	NR	200	NR	NR
Benzyl Alcohol .....	NR	NR	NR	140	NR	NR
Biodiesel Fuel.....	NR	73	NR	200	NR	NR
Bismuth Carbonate .....	140	140	180	••	••	73

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PVC, ABS and CPVC piping systems have very different chemical resistance. Review manufacturer's literature for all chemicals coming into contact with the piping materials prior to use.

Chemical Name	Pipe & Fitting Materials Recommended Max. Temp (°F)			Seal Materials Recommended Max. Temp. (°F)		
	ABS	PVC	CPVC	Viton ®	EPDM	Neoprene
Black Liquor .....	73	140	180	200	180	73
Bleach (12.5% Sodium Hypochlorite) .....	NR	73‡	180‡	200	140	140
Bleach (5.5% Sodium Hypochlorite) .....	73	140‡	140‡	200	140	140
Borax .....	140	140	180	185	140	140
Boric Acid .....	140	140	180	185	140	140
Breeders Pellets, Deriv. Fish.....	140	140	180	••	••	••
Brine, Acid .....	73	73	180	200	200	160
Bromic Acid .....	73	140	180	73	73	••
Bromine .....	NR	NR	NR	73	NR	NR
Bromine, Liquid .....	NR	NR	NR	73	NR	NR
Bromine, Vapor 25%.....	NR	140	••	••	NR	••
Bromine, Water.....	NR	73	73	185	NR	NR
Bromine, Water, (Sat'd).....	NR	73	73	••	••	••
Bromobenzene .....	NR	NR	NR	150	NR	NR
Bromotoluene.....	NR	NR	NR	NR	NR	NR
Butadiene.....	NR	140	73	185	NR	140
Butane .....	NR	140	••	185	NR	73
Butanol, Primary.....	NR	NR	NR	••	••	••
Butanol, Secondary .....	NR	NR	NR	••	••	••
Butyl Acetate .....	NR	NR	NR	NR	140	NR
Butyl Alcohol .....	73	100	NR	75	200	140
Butyl Carbitol.....	••	••	NR	••	••	••
Butyl Cellosolve (2-butoxyethanol) .....	NR	73	NR	NR	140	••
Butynediol.....	NR	73	••	••	••	••
Butylene .....	NR	73	••	100	NR	NR
Butyl Phenol .....	NR	73	••	••	••	NR
Butyl Pthalate .....	NR	NR	NR	73	••	••
Butyl Stearate.....	NR	73	73	200	NR	NR
Butyric Acid .....	NR	NR	NR	73	140	NR
Cadmium Acetate .....	••	••	180	••	••	••
Cadmium Chloride.....	••	••	180	••	••	••
Cadmium Cyanide.....	••	140	180	••	••	73
Cadmium Sulfate.....	••	••	180	••	••	••
Caffeine Citrate .....	••	73	••	••	••	••
Calcium Acetate .....	NR	73	180	••	R	••

Acrylonitrile-Butadiene-Styrene Polyvinyl Chloride Type 1 Grade 1 Chlorinated Polyvinyl Chloride Type IV Grade 1  
 Fluorocarbon Elastomer (Viton ® is a registered trademark of the DuPont Co.) Ethylene Propylene Diene Monomer  
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Chemical Name	Pipe & Fitting Materials Recommended Max. Temp (°F)			Seal Materials Recommended Max. Temp. (°F)		
	ABS	PVC	CPVC	Viton ®	EPDM	Neoprene
Calcium Bisulfide .....	NR	NR	180	185	••	••
Calcium Bisulfite .....	NR	140	180	185	NR	73
Calcium Carbonate .....	140	140	180	200	200	73
Calcium Chlorate .....	140	140	180	185	140	73
Calcium Chloride .....	140	140	180	200	200	160
Calcium Hydroxide .....	140	140‡	180‡	200	200	70
Calcium Hypochlorite .....	140	140‡	180‡	185	73	••
Calcium Nitrate .....	140	140	180	200	200	100
Calcium Oxide .....	140	140	180	••	200	160
Calcium Sulfate .....	140	140	180	200	200	160
Camphor Crystals .....	NR	73	••	200	200	NR
Cane Sugar Liquors .....	120	140	180	200	200	160
Caprolactam .....	NR	••	NR	••	••	••
Caprolactone .....	NR	••	NR	••	••	••
Caprylic Acid .....	NR	••	NR	••	••	••
Carbitol™ .....	NR	NR	NR	73	140	73
Carbon Bisulfide .....	NR	NR	NR	••	••	••
Carbon Dioxide, Wet .....	140	140	180	200	200	160
Carbon Dioxide, Dry .....	140	140	180	200	200	160
Carbon Disulfide .....	NR	NR	NR	200	NR	NR
Carbonic Acid .....	••	140	180	200	200	73
Carbon Monoxide .....	140	140	180	200	200	73
Carbon Tetrachloride .....	NR	NR	NR	185	NR	NR
♠Castor Oil .....	NR	140	NR	200	NR	200
Caustic Potash .....	140	140	CF	NR	140	160
Caustic Soda .....	NR	73‡	CF	NR	70	100
Cellosolve .....	NR	73	NR	NR	140	••
Cellosolve Acetate .....	NR	••	NR	NR	140	NR
Chloracetic Acid .....	73	73	180	NR	73	••
Chloracetyl Chloride .....	NR	73	••	••	••	••
Chloral Hydrate .....	••	140	180	NR	NR	73
Chloramine .....	NR	73	••	NR	NR	NR
Chloric Acid, 20% .....	••	140	180	140	••	140
Chlorinated Solvents, Wet or Dry .....	NR	NR	NR	200	NR	NR
Chlorinated Water, by Cl <sub>2</sub> Gas, Up to 3500 ppm ..	140	140	CF	185	100	NR

Acrylonitrile-Butadiene-Styrene Polyvinyl Chloride Type 1 Grade 1 Chlorinated Polyvinyl Chloride Type IV Grade 1

Fluorocarbon Elastomer (Viton ® is a registered trademark of the DuPont Co.) Ethylene Propylene Diene Monomer

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♠Castor oil may cause environmental stress cracking in high-stress areas such as plastic threaded connections.

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Chemical Name	Pipe & Fitting Materials Recommended Max. Temp (°F)			Seal Materials Recommended Max. Temp. (°F)		
	ABS	PVC	CPVC	Viton ®	EPDM	Neoprene
Chlorinated Water, by Cl <sub>2</sub> Gas, Above 3500 ppm	R NR	NR	185	NR	NR	
Chlorinated Water, by Sodium Hypochlorite .....	140	140	200	200	200	200
Chlorine Gas, Dry .....	NR	NR	NR	185	NR	NR
Chlorine Gas, Wet .....	NR	NR	NR	185	NR	NR
Chlorine, Liquid (See Sodium Hypochlorite) .....						
Chlorine, trace in air.....	••	••	180§	••	••	••
Chlorine Dioxide (sat'd aqueous sol.).....	••	••	180	••	••	••
Chlorine Water, (Sat'd).....	••	140	180	200	73	••
Chlorobenzene .....	NR	NR	NR	73	NR	NR
Chlorobenzene Chloride.....	NR	NR	NR	200	••	••
Chloroform.....	NR	NR	NR	73	NR	NR
Chloropicrin .....	NR	NR	NR	••	••	••
Chlorosulfonic Acid.....	••	73	73	NR	NR	NR
Chromic Acid, 10% .....	73	140‡	180‡	140	70	NR
Chromic Acid, 30% .....	NR	73‡	180‡	140	NR	NR
Chromic Acid, 40% .....	NR	73‡	180‡	140	NR	NR
Chromic Acid, 50% .....	NR	73‡	140‡	140	NR	NR
Chromium Nitrate .....	••	••	180	••	••	••
Chromium Potassium Nitrate .....	73	73	73	200	140	160
Citric Acid (Sat'd) .....	140	140	180	200	200	140
Citrus Oils .....	••	••	NR	••	••	••
Coconut Oil .....	NR	140	NR	185	NR	100
Coke Oven Gas .....	NR	NR	NR	185	70	••
Copper Acetate, (Sat'd) .....	73	73	73	140	100	160
Copper Carbonate.....	120	140	180	185	200	••
Copper Chloride .....	73	140	180	200	200	160
Copper Cyanide .....	73	140	180	185	200	160
Copper Fluoride .....	73	140	180	185	200	140
Copper Nitrate .....	120	140	180	200	200	160
Copper Salts.....	140	140	180	••	••	••
Copper Sulfate .....	140	140	180	200	200	160
Corn Oil .....	73	140	NR	200	NR	NR
Corn Syrup.....	120	140	180	185	••	100
Cottonseed Oil .....	120	140	NR	185	NR	••
Creosote.....	NR	NR	NR	73	NR	NR

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	ABS	PVC	CPVC	Viton ®	EPDM	Neoprene
Cresol .....	NR	NR	NR	100	NR	NR
Cresylic Acid, 50% .....	NR	140	NR	185	NR	NR
Crotonaldehyde.....	NR	NR	NR	NR	NR	73
Crude Oil .....	NR	73	180	200	NR	NR
Cumene .....	••	••	••	200	NR	NR
Cupric Fluoride.....	73	140	180	••	200	••
Cupric Sulfate .....	140	140	180	200	200	160
Cuprous Chloride.....	73	140	180	200	200	70
Cyclohexane .....	NR	NR	NR	185	NR	NR
Cyclohexanol .....	NR	NR	NR	185	NR	NR
Cyclohexanone .....	NR	NR	NR	NR	73	NR
Decalin.....	NR	NR	NR	••	••	••
D-Limonene.....	••	••	NR	••	••	••
Desocyphedrine .....	••	73	••	••	••	••
Detergents w/non-ionic surfactants .....	73	140	NR	200	200	160
Dextrine .....	••	140	180	200	NR	••
Dextrose .....	120	140	180	200	140	160
Diacetone Alcohol .....	NR	NR	NR	NR	73	NR
Diazo Salts.....	••	140	180	••	••	••
Dibutoxy Ethyl Phthalate.....	NR	NR	NR	200	73	NR
Dibutyl Ethyl Phthalate.....	NR	NR	NR	200	73	NR
Dibutyl Phthalate .....	NR	NR	NR	NR	73	NR
Dibutyl Sebacate .....	NR	NR	NR	NR	73	NR
Dichlorobenzene .....	NR	NR	NR	200	NR	NR
Dichloroethylene.....	NR	NR	NR	200	NR	NR
Diesel Fuels .....	NR	73	NR	200	NR	NR
Diethylamine .....	NR	NR	NR	NR	73	••
Diethyl Cellosolve .....	NR	••	NR	200	NR	100
Diethyl Ether.....	NR	NR	NR	NR	NR	••
Diglycolic Acid .....	NR	140	••	73	73	••
Dill Oil .....	••	••	NR	••	••	••
Dimethylamine .....	NR	140	NR	NR	140	NR
Dimethylformamide .....	NR	NR	NR	NR	NR	NR
Dimethyl Hydrazine .....	NR	NR	NR	NR	••	••
Diocyl Phthalate (DEHP).....	NR	NR	NR	73	73	NR

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Chemical Name	Pipe & Fitting Materials Recommended Max. Temp (°F)			Seal Materials Recommended Max. Temp. (°F)		
	ABS	PVC	CPVC	Viton ®	EPDM	Neoprene
Dioxane .....	NR	NR	NR	NR	73	NR
Dioxane, 1.4 .....	NR	NR	NR	NR	73	••
Disodium Phosphate .....	120	140	180	••	200	••
Distilled Water .....	140	140	180	200	200	160
Divinylbenzene.....	NR	NR	NR	200	NR	••
Dry Cleaning Fluid.....	NR	NR	NR	200	NR	NR
Dursban TC .....	NR	••	NR	••	••	••
EDTA, Tetrasodium, Aqueous Solution.....	140	140	180	200	200	160
Epsom Salt .....	120	140	180	••	200	••
Epichlorohydrin.....	NR	NR	NR	••	••	••
Esters .....	NR	NR	NR	••	••	••
Ethanol, Up to 5% .....	NR	140	180	••	200	160
Ethanol, Over 5%.....	NR	140	NR	••	200	160
Ethers .....	NR	NR	NR	NR	••	NR
Ethyl Acetate .....	NR	NR	NR	NR	73	NR
Ethyl Acetoacetate .....	NR	NR	NR	NR	100	••
Ethyl Acrylate.....	NR	NR	NR	NR	73	NR
Ethyl Benzene .....	NR	NR	NR	73	NR	NR
Ethyl Chloride .....	NR	NR	NR	140	73	73
Ethyl Chloroacetate.....	NR	NR	NR	••	••	••
Ethylene Bromide .....	NR	NR	NR	73	NR	NR
Ethylene Chloride .....	NR	NR	NR	70	••	••
Ethylene Chlorohydrin .....	NR	NR	NR	NR	73	73
Ethylene Diamine .....	NR	NR	NR	••	73	100
Ethylene Dichloride .....	NR	NR	NR	120	NR	NR
Ethyl Ether .....	NR	NR	NR	NR	NR	NR
Ethylene Glycol, Up to 50% .....	73	140	180	200	200	160
Ethylene Glycol, Over 50% .....	73	140	NR	200	200	160
Ethylene Oxide .....	NR	NR	NR	NR	NR	NR
Fatty Acids.....	140	140	73	185	NR	140
Ferric Acetate .....	NR	73	180	••	••	••
Ferric Chloride.....	120	140	180	200	200	160
Ferric Hydroxide .....	140	140	180	180	180	100
Ferric Nitrate.....	140	140	180	200	200	160
Ferric Sulfate.....	140	140	180	185	200	140

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	ABS	PVC	CPVC	Viton ®	EPDM	Neoprene
Ferrous Chloride.....	140	140	180	200	200	••
Ferrous Hydroxide.....	140	73	180	180	180	••
Ferrous Nitrate.....	140	73	140	200	180	160
Ferrous Sulfate.....	140	140	180	200	200	160
Fish Solubles .....	140	140	180	73	NR	••
Fluorine Gas.....	NR	NR	NR	NR	NR	NR
Fluoboric Acid.....	••	140	73	140	140	160
Fluorosilicic Acid, 30%.....	73	140	73	200	140	100
Formaldehyde, 35% .....	NR	140	NR	NR	140	140
Formalin (37% to 50% Formaldehyde).....	NR	140	NR	NR	140	140
Formic Acid, Up to 25% .....	••	73	180	NR	200	140
Formic Acid, Anhydrous .....	••	73	NR	NR	••	100
Freon F- 11.....	••	140§	73§	73	NR	NR
Freon F-12.....	••	140§	73§	NR	NR	130
Freon F-21.....	••	NR	NR	NR	NR	NR
Freon F-22 .....	••	NR	NR	NR	NR	130
Freon F-113.....	••	140§	••	130	NR	130
Freon F-114.....	••	140§	••	NR	NR	73
Fructose.....	120	140	180	200	175	160
Fruit Juices.....	73	140	180	200	200	200
Furfural .....	NR	NR	NR	NR	140	73
Gallic Acid .....	••	140	73	185	73	73
Gas, Manufactured .....	NR	73§	NR	••	••	••
Gas, Natural.....	NR	140§	••	185	NR	140
Gasoline, Unleaded .....	NR	NR	NR	200	NR	NR
Gasoline, Sour.....	NR	NR	NR	73	NR	NR
Gelatin .....	120	140	150	200	200	160
Gin.....	NR	140	NR	••	••	••
Glucose .....	120	140	180	200	200	160
Glycerine.....	120	140	180	200	200	160
Glycerine, Glycerol .....	120	140	180	200	200	••
Glycol, Ethylene, Up to 50% .....	73	140	180	200	200	200
Glycol, Ethylene, Over 50% .....	73	140	NR	200	200	200
Glycol, Polyethylene (Carbowax) .....	••	140	140	200	180	73
Glycol, Polypropylene.....	73	NR	NR	200	200	200

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	ABS	PVC	CPVC	Viton ®	EPDM	Neoprene
Glycol, Propylene, Up to 25% .....	73	140	180	200	200	73
Glycol, Propylene, Up to 50% .....	73	140	NR	200	200	73
Glycolic Acid .....	••	140	NR	NR	••	73
Glycol Ethers.....	NR	140	NR	••	••	••
Grape Sugar, Juice .....	73	140	180	185	200	160
Green Liquor .....	140	140	180	••	150	70
Halocarbons Oils .....	NR	NR	NR	200	NR	NR
Heptane .....	73	140	NR	185	NR	73
Hexane.....	NR	73	73	73	NR	73
Hexanol .....	NR	100	NR	160	NR	73
Hydraulic Oil .....	NR	73	••	200	NR	73
Hydrazine.....	NR	NR	NR	NR	70	••
Hydrobromic Acid, Dilute.....	73	140	180	185	200	73
Hydrobromic Acid, 20% .....	73	140	73	185	140	73
Hydrobromic Acid, 50% .....	NR	140	73	185	140	73
Hydrochloric Acid, Dilute.....	73	140	180	200	140	73
Hydrochloric Acid, 20%.....	NR	140‡	180‡	200	140	73
Hydrochloric Acid Conc., 37% .....	NR	140‡	180‡	160	100	73
Hydrocyanic Acid, 10% .....	140	140	••	185	200	••
Hydrofluoric Acid, <10% .....	NR	140	140	150	73	100
Hydrofluoric Acid, 30% .....	NR	73	140	200	NR	NR
Hydrofluoric Acid, 40% .....	NR	73	NR	100	NR	NR
Hydrofluoric Acid, 50% .....	NR	NR	NR	73	NR	NR
Hydrofluoric Acid, 100% .....	NR	NR	NR	NR	NR	NR
Hydrofluosilicic Acid, 50% .....	NR	140	140	200	140	••
Hydrogen .....	140§	140§	73§	200	200	160
Hydrogen Cyanide.....	••	140	••	••	••	73
Hydrogen Fluoride.....	NR	NR	NR	NR	73	NR
Hydrogen Peroxide, Dilute .....	73	140	73	200	73	NR
Hydrogen Peroxide, 36% .....	NR	140	73	200	NR	NR
Hydrogen Peroxide, 50% .....	NR	140	73	200	NR	NR
Hydrogen Peroxide, 90% .....	NR	NR	NR	200	NR	NR
Hydrogen Phosphide .....	••	140	••	••	73	••
Hydrogen Sulfide, Dry .....	••	140	180	140	100	NR
Hydrogen Sulfide, Aqueous Sol. ....	••	140	180	140	100	NR

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	ABS	PVC	CPVC	Viton®	EPDM	Neoprene
Hydroquinone .....	••	140	••	185	NR	NR
Hydroxylamine Sulfate .....	••	140	••	••	73	73
Hypochlorous Acid .....	73	140	CF	73	73	••
Iodine .....	NR	NR	NR	73	73	NR
Iodine Solution, 10%.....	NR	NR	NR	200	150	••
Iodine in Alcohol .....	NR	NR	NR	••	••	••
Iron Salts.....	••	••	180	••	••	••
Isopropanol .....	NR	140	NR	••	••	••
Isopropyl Alcohol.....	NR	140	140	160	160	73
Isopropyl Ether .....	NR	NR	NR	NR	NR	NR
Isooctane .....	NR	NR	NR	185	NR	73
Jet Fuel.....	NR	NR	NR	200	NR	NR
Kerosene .....	NR	NR	NR	200	NR	73
Ketones .....	NR	NR	NR	NR	NR	NR
Kraft Liquor.....	73	140	180	100	••	73
Lactic Acid, 25%.....	NR	140	100	200	140	73
Lactic Acid, 80%.....	NR	100	73	200	140	73
Lard Oil .....	73	140	NR	185	NR	73
Lauric Acid .....	••	140	••	100	••	••
Lauryl Chloride .....	••	140	••	200	140	••
Lead Acetate .....	••	140	180	NR	200	160
Lead Chloride.....	••	140	180	140	NR	73
Lead Nitrate.....	••	140	180	200	175	140
Lead Sulfate.....	••	140	180	200	200	140
Lemon Oil .....	••	140	NR	200	NR	73
Ligroine .....	NR	NR	NR	100	••	73
Lime Sulfur.....	••	140	180	185	200	100
Limonene .....	••	••	NR	••	••	••
Linoleic Acid.....	••	140	180	140	73	••
Linoleic Oil.....	••	140	180	73	••	••
Linseed Oil .....	73	140	NR	200	73	73
Linseed Oil, Blue .....	73	73	NR	200	••	••
Liqueurs.....	NR	140	NR	••	200	160
Lithium Bromide (Brine).....	••	140	180	200	••	••
Lithium Chloride .....	••	140	180	140	100	••

Acrylonitrile-Butadiene-Styrene Polyvinyl Chloride Type 1 Grade 1 Chlorinated Polyvinyl Chloride Type IV Grade 1  
Fluorocarbon Elastomer (Viton® is a registered trademark of the DuPont Co.) Ethylene Propylene Diene Monomer  
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# Chemical Resistance

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Chemical Name	Pipe & Fitting Materials Recommended Max. Temp (°F)			Seal Materials Recommended Max. Temp. (°F)		
	ABS	PVC	CPVC	Viton ®	EPDM	Neoprene
Lithium Sulfate .....	••	140	180	••	••	••
Lubricating Oil, Petroleum Based .....	NR	140	180	160	NR	NR
Lux Liquid.....	••	NR	••	••	••	••
Lye Solutions.....	••	140	180	••	••	••
Machine Oil.....	NR	140	180	140	NR	NR
Magnesium Carbonate .....	120	140	180	200	170	140
Magnesium Chloride .....	120	140	180	170	170	160
Magnesium Citrate .....	120	140	180	200	175	••
Magnesium Fluoride .....	120	••	180	200	140	••
Magnesium Hydroxide .....	120	140	180	200	200	••
Magnesium Nitrate.....	120	140	180	••	200	••
Magnesium Oxide .....	120	••	180	••	140	160
Magnesium Salts, Inorganic.....	120	••	180	200	160	160
Magnesium Sulfate.....	120	140	180	200	180	180
Maleic Acid.....	140	140	180	200	NR	73
Maleic Acid (Sat'd) .....	140	140	180	200	73	NR
Malic Acid .....	140	140	180	••	••	••
Manganese Sulfate .....	120	140	180	200	175	160
Mercuric Acid .....	••	••	180	••	••	••
Mercuric Chloride.....	••	140	140	185	200	140
Mercuric Cyanide .....	••	140	180	73	73	73
Mercuric Sulfate .....	••	140	180	73	73	••
Mercurous Nitrate.....	••	140	180	73	73	NR
Mercury.....	••	140	180	185	200	140
Methane.....	140§	140§	180§	185	NR	73
Methanol.....	NR	140	140	NR	160	160
Methoxyethyl Oleate .....	NR	73	••	••	••	••
Methyl Amine.....	NR	NR	NR	100	73	73
Methyl Bromide.....	NR	NR	NR	185	NR	NR
Methyl Cellosolve .....	NR	NR	NR	NR	NR	NR
Methyl Chloride.....	NR	NR	NR	73	NR	NR
Methyl Chloroform .....	NR	NR	NR	73	NR	NR
Methyl Ethyl Ketone .....	NR	NR	NR	NR	NR	NR
Methyl Formate.....	NR	••	NR	NR	100	73
Methyl Isobutyl Ketone .....	NR	NR	NR	NR	NR	NR

Acrylonitrile-Butadiene-Styrene Polyvinyl Chloride Type 1 Grade 1 Chlorinated Polyvinyl Chloride Type IV Grade 1  
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Chemical Name	Pipe & Fitting Materials Recommended Max. Temp (°F)			Seal Materials Recommended Max. Temp. (°F)		
	ABS	PVC	CPVC	Viton ®	EPDM	Neoprene
Methyl Methacrylate .....	NR	NR	NR	NR	NR	NR
Methyl Sulfate.....	NR	73	73	••	••	••
Methyl Sulfuric Acid .....	••	140	73	NR	73	73
Methylene Bromide.....	NR	NR	NR	73	NR	NR
Methylene Chloride.....	NR	NR	NR	73	NR	NR
Methylene Chlorobromide .....	NR	NR	NR	NR	NR	NR
Methylene Iodine .....	NR	NR	NR	••	200	••
Methylisobutyl Carbinol .....	NR	NR	NR	73	73	73
Milk.....	140	140	73	200	200	200
Mineral Oil.....	73	140	180	200	NR	73
Molasses .....	120	140	180	185	100	150
Monochloroacetic Acid, 50% .....	73	140	73	70	NR	NR
Monoethanolamine .....	NR	NR	NR	185	70	NR
Motor Oil .....	73	140	180	200	NR	NR
Muriatic Acid, Up to 37% HCl.....	NR	140	180	160	100	73
Naphtha .....	NR	NR	NR	150	NR	NR
Naphthalene.....	NR	NR	NR	180	NR	NR
n-Heptane .....	NR	NR	NR	200	NR	73
Natural Gas.....	NR	140§	••	185	NR	140
Nickel Acetate.....	73	73	180	NR	73	••
Nickel Chloride.....	73	140	180	200	200	160
Nickel Nitrate .....	73	140	180	200	180	••
Nickel Sulfate .....	73	140	180	200	200	160
Nicotine .....	NR	140	••	••	••	NR
Nicotinic Acid .....	NR	140	180	••	73	140
Nitric Acid, 10% .....	NR	140‡	140‡	NR	73	73
Nitric Acid, 30% .....	NR	140‡	140‡	NR	NR	NR
Nitric Acid, 40% .....	NR	140‡	140‡	NR	NR	NR
Nitric Acid, 50% .....	NR	73‡	100‡	NR	NR	NR
Nitric Acid, 70% .....	NR	NR	73‡	NR	NR	NR
Nitric Acid, 100% .....	NR	NR	NR	NR	NR	NR
Nitric Acid, Fuming.....	NR	NR	NR	NR	NR	NR
Nitrobenzene .....	NR	NR	NR	73	NR	••
Nitroglycerine .....	NR	NR	NR	••	••	••
Nitrous Acid, 10%.....	NR	73	••	100	••	••

Acrylonitrile-Butadiene-Styrene Polyvinyl Chloride Type 1 Grade 1 Chlorinated Polyvinyl Chloride Type IV Grade 1  
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Chemical Name	Pipe & Fitting Materials Recommended Max. Temp (°F)			Seal Materials Recommended Max. Temp. (°F)		
	ABS	PVC	CPVC	Viton ®	EPDM	Neoprene
Nitrous Oxide .....	73§	73§	••	73	••	NR
Nitroglycol .....	NR	NR	••	••	••	73
Nonionic Surfactants .....	140	140	NR	200	200	160
1-Octanol .....	NR	••	NR	••	••	••
Ocenol .....	NR	••	••	••	••	••
Oils, Vegetable.....	NR	140	NR	200	NR	••
Oleic Acid.....	140	140	180	185	73	73
Oleum .....	NR	NR	NR	NR	NR	NR
Olive Oil .....	73	140	NR	150	NR	NR
Oxalic Acid (Sat'd) .....	••	140	140	100	150	100
Oxalic Acid, 20%.....	73	140	180	100	150	100
Oxalic Acid, 50%.....	••	140	73	100	150	100
Oxygen .....	140§	140§	180§	185	200	140
Ozonated Water.....	••	73	73	NR	73	73
Ozone.....	140§	140§	180§	185	200	NR
Palm Oil.....	••	••	••	73	NR	••
Palmitic Acid, 10% .....	73	140	73	185	73	NR
Palmitic Acid, 70% .....	NR	NR	73	185	••	NR
Paraffin.....	73	140	••	200	NR	140
Peanut Oil .....	••	••	••	150	NR	••
Pentachlorophenol .....	NR	NR	NR	200	NR	NR
Peppermint Oil .....	NR	73	73	73	73	73
Peracetic Acid, 40% .....	NR	NR	NR	••	••	••
Perchloric Acid, 10%.....	NR	73	180	200	73	140
Perchloric Acid, 70%.....	NR	NR	180	200	73	73
Perchloroethylene .....	NR	NR	NR	200	NR	NR
Perphosphate.....	••	140	170	73	73	••
Petrolatum .....	••	140	180	••	••	••
Petroleum Oils, Sour.....	••	73	180	200	NR	••
Petroleum Oils, Refined.....	73	140	180	200	NR	••
Phenol.....	NR	NR	NR	200	73	NR
Phenylhydrazine .....	NR	NR	NR	NR	NR	••
Phenylhydrazine Hydrochloride .....	NR	NR	NR	••	••	••
Phosgene, Liquid .....	NR	NR	NR	NR	73	••
Phosgene, Gas .....	NR	NR	NR	NR	73	••

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Chemical Name	Pipe & Fitting Materials Recommended Max. Temp (°F)			Seal Materials Recommended Max. Temp. (°F)		
	ABS	PVC	CPVC	Viton ®	EPDM	Neoprene
Phosphoric Acid, 10% .....	73	140‡	180‡	200	140	140
Phosphoric Acid, 50% .....	NR	140‡	180‡	160	160	160
Phosphoric Acid, 85% .....	NR	140‡	180‡	160	160	160
Phosphoric Anhydride .....	••	73	73	••	••	••
Phosphorous Pentoxide .....	••	73	180	200	200	••
Phosphorous, Red .....	NR	70	••	••	••	••
Phosphorus Trichloride .....	NR	NR	NR	••	••	NR
Phosphorous, Yellow .....	NR	73	••	••	••	••
Photographic Solutions .....	••	140	180	185	••	100
Phthalic Acid, 10% .....	73	73	••	140	••	NR
Picric Acid .....	NR	NR	NR	140	140	70
Pine Oil .....	NR	NR	NR	73	NR	NR
Plating Solutions, Brass.....	••	140	180	140	73	140
Plating Solutions, Cadmium.....	••	140	180	180	180	140
Plating Solutions, Chrome .....	••	140	180	180	180	NR
Plating Solutions, Copper .....	••	140	180	180	180	140
Plating Solutions, Gold .....	••	140	180	180	73	73
Plating Solutions, Indium .....	••	••	••	140	73	140
Plating Solutions, Lead.....	••	140	180	180	180	140
Plating Solutions, Nickel .....	••	140	180	180	180	140
Plating Solutions, Rhodium.....	••	140	180	73	120	73
Plating Solutions, Silver .....	••	140	180	140	120	140
Plating Solutions, Tin .....	••	140	180	140	180	140
Plating Solutions, Zinc .....	••	140	180	140	73	180
POE Oils (Polyolester).....	NR	NR	NR	NR	NR	NR
Polyethylene Glycol (Carbowax) .....	••	140	140	200	180	73
Polypropylene Glycol.....	73	NR	NR	200	200	200
Potash.....	140	140	180	200	170	160
Potassium Acetate .....	••	••	180	••	••	••
Potassium Alum .....	••	140	180	200	200	160
Potassium Aluminum Sulfate .....	••	140	180	200	200	160
Potassium Amyl Xanthate .....	••	73	••	••	••	••
Potassium Bicarbonate .....	140	140	180	200	170	160
Potassium Bichromate .....	140	140	180	200	170	••
Potassium Bisulfate, Sat'd .....	••	140	180	200	180	73

Acrylonitrile-Butadiene-Styrene Polyvinyl Chloride Type 1 Grade 1 Chlorinated Polyvinyl Chloride Type IV Grade 1  
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Chemical Name	Pipe & Fitting Materials Recommended Max. Temp (°F)			Seal Materials Recommended Max. Temp. (°F)		
	ABS	PVC	CPVC	Viton ®	EPDM	Neoprene
Potassium Borate .....	140	140	180	200	200	••
Potassium Bromate.....	140	140	180	200	••	140
Potassium Bromide.....	140	140	180	200	170	160
Potassium Carbonate .....	140	140	180	200	170	160
Potassium Chlorate.....	140	140	180	140	140	100
Potassium Chloride.....	140	140	180	200	200	160
Potassium Chromate.....	140	140	180	200	170	70
Potassium Cyanide.....	140	140	180	185	140	160
Potassium Dichromate .....	140	140	180	200	170	••
Potassium Ethyl Xanthate.....	••	73	••	••	••	••
Potassium Ferricyanide.....	140	140	180	140	140	150
Potassium Ferrocyanide .....	140	140	180	140	140	150
Potassium Fluoride .....	140	140	180	200	140	••
Potassium Hydroxide, 25% .....	73	140‡	180‡	NR	180	140
Potassium Hydroxide, 50% .....	73	140‡	180‡	NR	180	NR
Potassium Hypochlorite .....	••	73‡	180‡	73	NR	••
Potassium Iodide .....	••	73	180	180	140	160
Potassium Nitrate.....	140	140	180	200	200	140
Potassium Perborate.....	140	140	180	73	73	73
Potassium Perchlorate, (Sat'd).....	140	140	180	150	140	••
Potassium Permanganate, 10%.....	140	140	180	140	200	100
Potassium Permanganate, 25%.....	140	140	180	140	140	100
Potassium Persulphate, (Sat'd).....	73	140	180	200	200	140
Potassium Phosphate .....	73	••	180	180	180	180
Potassium Sulfate.....	73	140	180	200	200	140
Potassium Sulfite.....	73	140	180	200	200	140
Potassium Tripolyphosphate .....	••	••	180	100	••	73
Propane .....	140§	140§	73§	73	NR	73
Propanol .....	NR	140	NR	200	200	140
Propargyl Alcohol.....	NR	140	NR	140	140	NR
Propionic Acid, Up to 2% .....	NR	••	180	••	••	NR
Propionic Acid, Over 2%.....	NR	••	NR	••	••	NR
Propyl Alcohol.....	NR	140	NR	200	200	140
Propylene Dichloride.....	NR	NR	NR	73	NR	NR
Propylene Glycol, Up to 25% .....	73	140	180	200	200	73

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	ABS	PVC	CPVC	Viton ®	EPDM	Neoprene
Propylene Glycol, Up to 50% .....	73	140	NR	200	200	73
Propylene Oxide.....	NR	NR	NR	NR	73	NR
Pyridine .....	NR	NR	NR	NR	73	NR
Pyrogallia Acid.....	••	73	••	••	••	73
Quaternary Ammonium Salts .....	NR	140	NR	73	••	73
Radon Gas.....	140§	140§	140§	200	200	200
Rayon Coagulating Bath .....	••	140	NR	••	••	••
Reverse Osmosis Water .....	140	140	180	200	200	200
Salicylic Acid.....	••	140	180	185	200	NR
Sea Water.....	140	140	180	200	200	200
Selenic Acid .....	••	140	••	NR	73	73
Silicic Acid.....	••	140	••	200	140	140
Silicone Oil.....	••	100	180	200	140	200
Silver Chloride .....	140	••	180	73	73	73
Silver Cyanide .....	140	140	180	140	140	73
Silver Nitrate .....	140	140	180	200	200	160
Silver Sulfate .....	140	140	180	200	170	73
Soaps.....	140	140	180	200	200	140
Sodium Acetate .....	120	140	180	NR	170	NR
Sodium Aluminate.....	120	••	180	200	200	140
Sodium Alum .....	120	140	180	200	170	140
Sodium Arsenate .....	120	140	180	200	140	73
Sodium Benzoate.....	120	140	180	200	200	NR
Sodium Bicarbonate .....	120	140	180	200	200	160
Sodium Bichromate .....	120	140	180	200	140	73
Sodium Bisulfate.....	120	140	180	200	200	140
Sodium Bisulfite.....	120	140	180	200	200	140
Sodium Borate .....	120	73	180	140	140	100
Sodium Bromide.....	120	140	180	200	200	73
Sodium Carbonate.....	120	140	180	200	140	140
Sodium Chlorate.....	120	73	180	100	140	140
Sodium Chloride.....	120	140	180	200	140	160
Sodium Chlorite .....	120	NR	180	NR	NR	••
Sodium Chromate.....	120	140	180	140	140	73
Sodium Cyanide.....	120	73	180	140	140	140

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Chemical Name	Pipe & Fitting Materials Recommended Max. Temp (°F)			Seal Materials Recommended Max. Temp. (°F)		
	ABS	PVC	CPVC	Viton ®	EPDM	Neoprene
Sodium Dichromate .....	120	140	180	200	140	NR
Sodium Ferricyanide.....	120	140	180	140	140	••
Sodium Ferrocyanide.....	120	140	180	140	140	••
Sodium Fluoride.....	120	73	140	140	140	73
Sodium Formate.....	••	••	180	••	••	••
Sodium Hydroxide, 15%.....	120	140‡	CF	NR	180	160
Sodium Hydroxide, 30%.....	73	73‡	CF	NR	140	160
Sodium Hydroxide, 50%.....	73	73‡	CF	NR	140	160
Sodium Hydroxide, 70%.....	NR	73‡	CF	NR	140	160
Sodium Hypobromite.....	••	••	180	••	••	••
Sodium Hypochlorite, Sat'd, 12.5%.....	NR	73‡	180‡	140	NR	NR
Sodium Iodide.....	••	••	180	140	140	140
Sodium Metaphosphate.....	120	73	180	73	73	••
Sodium Nitrate.....	120	140	180	200	200	140
Sodium Nitrite.....	120	140	180	200	170	140
Sodium Palmitate.....	••	140	180	••	••	••
Sodium Perborate.....	120	140	180	73	73	73
Sodium Perchlorate.....	120	140	180	••	••	••
Sodium Peroxide.....	NR	140	180	185	140	73
Sodium Phosphate, Alkaline.....	73	140	180	200	170	140
Sodium Phosphate, Acid.....	73	140	180	200	170	140
Sodium Phosphate, Neutral.....	73	140	180	200	170	140
Sodium Silicate.....	••	••	180	200	200	140
Sodium Sulfate.....	73	140	180	200	140	140
Sodium Sulfide.....	73	140	180	200	140	140
Sodium Sulfite.....	73	140	180	200	140	140
Sodium Thiosulfate.....	73	140	180	200	200	160
Sodium Tripolyphosphate.....	••	••	180	••	••	••
Solicaldehyde.....	NR	NR	••	••	••	••
Sour Crude Oil.....	NR	73	180	200	NR	NR
Soybean Oil.....	NR	140	180	200	NR	73
Soybean Oil, Epoxidized.....	NR	NR	NR	200	NR	NR
Stannic Chloride.....	120	140	180	200	100	NR
Stannous Chloride.....	120	140	180	200	73	160
Stannous Sulfate.....	••	••	180	••	••	••

Acrylonitrile-Butadiene-Styrene Polyvinyl Chloride Type 1 Grade 1 Chlorinated Polyvinyl Chloride Type IV Grade 1  
 Fluorocarbon Elastomer (Viton ® is a registered trademark of the DuPont Co.) Ethylene Propylene Diene Monomer  
 \*\* Maximum recommended temperature, for chemical resistance, under normal conditions. § Non-pressure, vent-only, applications when chemical is in gas form.  
 ‡ Must use solvent cement specially formulated for hypochlorite or caustic chemical service (IPS Weld-On 724 or equal).



# Chemical Resistance

The following table gives the chemical resistance of ABS, PVC and CPVC thermoplastic piping materials and three commonly used seal materials. The information shown is based upon laboratory tests conducted by the manufacturers of the materials, and it is intended to provide a general guideline on the resistance of these materials to various chemicals. **NOTICE:** This table is not a guarantee, and any piping systems using products made of these materials should be tested under actual service conditions to determine their suitability for a particular purpose. See website for most current data: [www.charlottepipe.com](http://www.charlottepipe.com)

Number = Maximum Recommended Temp. (°F)\*\*      CF = Consult Factory      NR = Not Recommended      •• = Incomplete Data

Chemical Name	Pipe & Fitting Materials Recommended Max. Temp (°F)			Seal Materials Recommended Max. Temp. (°F)		
	ABS	PVC	CPVC	Viton ®	EPDM	Neoprene
Starch.....	140	140	180	200	170	160
Stearic Acid.....	••	140	73	100	NR	73
Stoddard's Solvent.....	NR	NR	NR	185	NR	NR
Strontium Chloride.....	••	••	180	••	••	••
Styrene Monomer.....	NR	NR	NR	NR	NR	NR
Succinic Acid.....	••	140	••	73	73	••
Sugar Syrup.....	73	140	180	180	180	••
Sulfamic Acid.....	NR	NR	180	NR	NR	73
Sulfate Liquors.....	••	••	••	73	73	••
Sulfite Liquor.....	••	••	180	140	140	73
Sulfur.....	••	140	73	200	••	73
Sulfur Chloride.....	NR	NR	180	140	NR	NR
Sulfur Dioxide, Dry.....	73§	140§	NR	100	73	NR
Sulfur Dioxide, Wet.....	73§	73§	NR	140	140	••
Sulfur Trioxide.....	••	140	180	140	73	NR
Sulfur Trioxide, Gas.....	140§	140§	••	140	73	NR
Sulfuric Acid, 10%.....	120	140‡	180‡	200	140	160
Sulfuric Acid, 20%.....	120	140‡	180‡	200	140	160
Sulfuric Acid, 30%.....	NR	140‡	180‡	200	200	160
Sulfuric Acid, 50%.....	NR	140‡	180‡	200	200	160
Sulfuric Acid, 60%.....	NR	140‡	180‡	200	200	73
Sulfuric Acid, 70%.....	NR	140‡	180‡	200	NR	NR
Sulfuric Acid, 80%.....	NR	73‡	180‡	180	NR	NR
Sulfuric Acid, 90%.....	NR	NR	140‡	160	NR	NR
Sulfuric Acid, 93%.....	NR	NR	73‡	160	NR	NR
Sulfuric Acid, 98%.....	NR	NR	73‡	160	NR	NR
Sulfuric Acid, 100%.....	NR	NR	NR	160	NR	NR
Sulfurous Acid.....	NR	140	180	NR	NR	NR
Surfactants, Nonionic.....	140	140	NR	200	200	160
Tall Oil.....	••	140	180	73	NR	73
Tannic Acid, 10%.....	NR	140	180	100	73	100
Tannic Acid, 30%.....	NR	••	73	••	••	••
Tanning Liquors.....	140	140	180	200	••	73
Tar.....	NR	NR	NR	185	NR	73
Tartaric Acid.....	140	140	73	73	NR	73

Acrylonitrile-Butadiene-Styrene Polyvinyl Chloride Type 1 Grade 1 Chlorinated Polyvinyl Chloride Type IV Grade 1

Fluorocarbon Elastomer (Viton ® is a registered trademark of the DuPont Co.) Ethylene Propylene Diene Monomer

\*\* Maximum recommended temperature, for chemical resistance, under normal conditions. § Non-pressure, vent-only, applications when chemical is in gas form.

‡ Must use solvent cement specially formulated for hypochlorite or caustic chemical service (IPS Weld-On 724 or equal).

# Chemical Resistance

The following table gives the chemical resistance of ABS, PVC and CPVC thermoplastic piping materials and three commonly used seal materials. The information shown is based upon laboratory tests conducted by the manufacturers of the materials, and it is intended to provide a general guideline on the resistance of these materials to various chemicals.

**NOTICE:** This table is not a guarantee, and any piping systems using products made of these materials should be tested under actual service conditions to determine their suitability for a particular purpose. See website for most current data: [www.charlottepipe.com](http://www.charlottepipe.com)

Number = Maximum Recommended Temp. (°F)\*\* CF = Consult Factory NR = Not Recommended •• = Incomplete Data

**CAUTION**

PVC, ABS and CPVC piping systems have very different chemical resistance. Review manufacturer's literature for all chemicals coming into contact with the piping materials prior to use.

Chemical Name	Pipe & Fitting Materials Recommended Max. Temp (°F)			Seal Materials Recommended Max. Temp. (°F)		
	ABS	PVC	CPVC	Viton ®	EPDM	Neoprene
Terpenes.....	NR	••	NR	••	••	••
Tetrachloroethylene.....	NR	NR	NR	200	NR	NR
Tetraethyl Lead.....	NR	73	••	73	NR	••
Tetrahydrodurane.....	NR	NR	NR	••	••	••
Tetrahydrofuran.....	NR	NR	NR	NR	NR	NR
Tetralin.....	NR	NR	NR	NR	NR	NR
Tetra Sodium Pyrophosphate.....	••	140	180	••	••	••
Texanol.....	••	••	NR	••	••	••
Thionyl Chloride.....	NR	NR	NR	••	••	NR
Thread Cutting Oils.....	73	73	••	73	NR	••
Titanium Tetrachloride.....	NR	NR	NR	185	NR	NR
Toluene, Toluol.....	NR	NR	NR	73	NR	NR
Toluene-Kerosene, 25%-75%.....	NR	NR	NR	73	NR	NR
Tomato Juice.....	73	73	73	200	200	140
Toxaphene-Xylene, 90%-100%.....	NR	NR	NR	73	NR	NR
Transformer Oil.....	NR	140	180	200	NR	73
Transmission Fluid, Type A.....	NR	NR	180	200	NR	73
Tributyl Phosphate.....	NR	NR	NR	NR	73	NR
Tributyl Citrate.....	NR	NR	NR	NR	73	73
Trichloroacetic Acid, ≤ 20%.....	NR	140	NR	NR	NR	NR
Trichloroethane.....	NR	NR	NR	185	NR	NR
Trichloroethylene.....	NR	NR	NR	185	NR	NR
Triethanolamine.....	73	73	73	NR	160	NR
Triethylamine.....	NR	73	NR	200	160	73
Trimethylpropane.....	NR	73	••	••	180	160
Trisodium Phosphate.....	73	140	180	185	73	73
Turpentine.....	NR	140	NR	150	NR	NR
Urea.....	73	140	180	185	200	140
Urine.....	140	140	180	73	200	140
Vaseline.....	NR	NR	NR	73	NR	140
Vegetable Oil.....	73	140	NR	200	NR	73
Vinegar.....	73	140	180	200	140	NR
Vinyl Acetate.....	NR	NR	NR	NR	73	NR
Water.....	140	140	180	200	200	160
Water, Acid Mine.....	140	140	180	••	200	200

Acrylonitrile-Butadiene-Styrene Polyvinyl Chloride Type 1 Grade 1 Chlorinated Polyvinyl Chloride Type IV Grade 1  
 Fluorocarbon Elastomer (Viton ® is a registered trademark of the DuPont Co.) Ethylene Propylene Diene Monomer  
 \*\* Maximum recommended temperature, for chemical resistance, under normal conditions. § Non-pressure, vent-only, applications when chemical is in gas form.

# Chemical Resistance

The following table gives the chemical resistance of ABS, PVC and CPVC thermoplastic piping materials and three commonly used seal materials. The information shown is based upon laboratory tests conducted by the manufacturers of the materials, and it is intended to provide a general guideline on the resistance of these materials to various chemicals. **NOTICE:** This table is not a guarantee, and any piping systems using products made of these materials should be tested under actual service conditions to determine their suitability for a particular purpose. See website for most current data: [www.charlottepipe.com](http://www.charlottepipe.com)

Number = Maximum Recommended Temp. (°F)\*\* CF = Consult Factory NR = Not Recommended •• = Incomplete Data

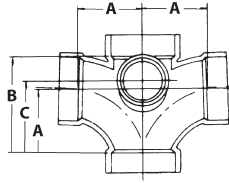
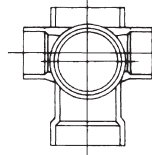
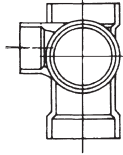
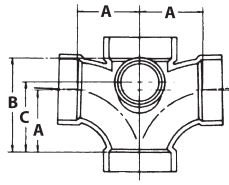
Chemical Name	Pipe & Fitting Materials Recommended Max. Temp (°F)			Seal Materials Recommended Max. Temp. (°F)		
	ABS	PVC	CPVC	Viton ®	EPDM	Neoprene
Water, Deionized .....	140	140	180	200	200	200
Water, Demineralized .....	140	140	180	200	200	200
Water, Distilled .....	140	140	180	200	200	200
Water, Potable.....	140	140	180	200	200	200
Water, Salt.....	140	140	180	200	200	200
Water, Sea .....	140	140	180	200	200	200
Water, Sewage .....	140	140	180	200	200	200
Water, Spa .....	NR	140	180	200	200	200
Water, Swimming Pool .....	140	140	180	200	200	200
WD 40 .....	NR	••	NR	••	••	••
Whiskey .....	NR	140	180	140	200	140
White Liquor .....	73	140	180	180	200	140
Wines.....	NR	140	180	140	170	140
Xylene.....	NR	NR	NR	150	NR	NR
Zinc Acetate.....	••	140	180	73	180	160
Zinc Bromide .....	••	140	180	••	••	••
Zinc Carbonate.....	120	••	180	73	73	73
Zinc Chloride.....	120	140	180	200	180	180
Zinc Nitrate .....	120	140	180	200	180	••
Zinc Phosphate.....	••	••	180	73	73	73
Zinc Sulfate .....	••	140	180	200	180	140

Acrylonitrile-Butadiene-Styrene Polyvinyl Chloride Type 1 Grade 1 Chlorinated Polyvinyl Chloride Type IV Grade 1  
Fluorocarbon Elastomer (Viton ® is a registered trademark of the DuPont Co.) Ethylene Propylene Diene Monomer  
\*\* Maximum recommended temperature, for chemical resistance, under normal conditions. § Non-pressure, vent-only, applications when chemical is in gas form.

**PART NO. PVC 438**

**Double Sanitary Tee with Side Inlet**  
(Sanitary Cross)  
ALL HUB

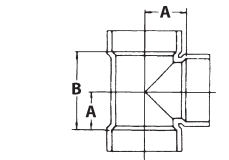
SIZE	A	B	C
3 x 3 x 3 x 3 x 2 (PVC)	3 <sup>1</sup> / <sub>16</sub>	4 <sup>7</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>16</sub>
4 x 4 x 4 x 4 x 2 (PVC)	3 <sup>7</sup> / <sub>8</sub>	6 <sup>1</sup> / <sub>8</sub>	5



**PART NO. PVC 439**

**Double Sanitary Tee with Left & Right Side Inlets**  
(Sanitary Cross)  
ALL HUB

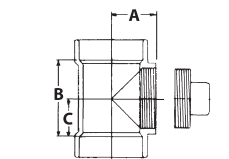
SIZE	A	B	C
3x3x3x3x2x2 (PVC)	3 <sup>1</sup> / <sub>16</sub>	4 <sup>7</sup> / <sub>8</sub>	3 <sup>1</sup> / <sub>16</sub>
4x4x4x4x2x2 (PVC)	3 <sup>7</sup> / <sub>8</sub>	6 <sup>1</sup> / <sub>8</sub>	5



**PART NO. 441**

**Vent Tee**  
ALL HUB

SIZE	A	B
1 <sup>1</sup> / <sub>2</sub> (PVC)	1 <sup>3</sup> / <sub>16</sub>	2 <sup>3</sup> / <sub>8</sub>
1 <sup>1</sup> / <sub>2</sub> (ABS)	1 <sup>7</sup> / <sub>32</sub>	2 <sup>13</sup> / <sub>32</sub>
2	1 <sup>1</sup> / <sub>2</sub>	3
3 (PVC)	1 <sup>7</sup> / <sub>8</sub>	3 <sup>3</sup> / <sub>4</sub>
3 (ABS)	1 <sup>5</sup> / <sub>16</sub>	3 <sup>3</sup> / <sub>4</sub>
4 (PVC)	2 <sup>1</sup> / <sub>2</sub>	5



**PART NO. 444X**

**Cleanout Tee with Cleanout Plug**  
HUB X HUB X FPT

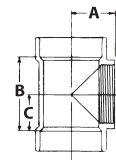
SIZE	A	B	C
1 <sup>1</sup> / <sub>2</sub>	1 <sup>15</sup> / <sub>16</sub>	2 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>16</sub>
2	2 <sup>1</sup> / <sub>4</sub>	3	1 <sup>1</sup> / <sub>2</sub>
3	2 <sup>1</sup> / <sub>16</sub>	3 <sup>3</sup> / <sub>8</sub>	1 <sup>5</sup> / <sub>16</sub>
4	3 <sup>3</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>8</sub>	2 <sup>9</sup> / <sub>16</sub>
6 (PVC)	4	8	4
6 x 6 x 4** (PVC)	8	8	4
8 (PVC)	5 <sup>1</sup> / <sub>4</sub>	10 <sup>1</sup> / <sub>2</sub>	5 <sup>5</sup> / <sub>32</sub>
8 x 8 x 4 <sup>(F)</sup> (PVC)	7 <sup>3</sup> / <sub>4</sub>	9 <sup>1</sup> / <sub>4</sub>	4 <sup>5</sup> / <sub>8</sub>
8 x 8 x 6*** (PVC)	8 <sup>1</sup> / <sub>4</sub>	11 <sup>1</sup> / <sub>4</sub>	5 <sup>5</sup> / <sub>8</sub>
10 (PVC)	12 <sup>3</sup> / <sub>4</sub>	12 <sup>1</sup> / <sub>2</sub>	6 <sup>1</sup> / <sub>4</sub>
10 x 10 x 4 <sup>(F)</sup> (PVC)	8 <sup>7</sup> / <sub>8</sub>	9 <sup>3</sup> / <sub>4</sub>	4 <sup>7</sup> / <sub>8</sub>
10 x 10 x 6 <sup>(F)</sup> (PVC)	10 <sup>5</sup> / <sub>8</sub>	11 <sup>3</sup> / <sub>4</sub>	5 <sup>7</sup> / <sub>8</sub>
10 x 10 x 8 (PVC)	10 <sup>3</sup> / <sub>8</sub>	10 <sup>3</sup> / <sub>8</sub>	5 <sup>3</sup> / <sub>16</sub>
12 (PVC)	13 <sup>3</sup> / <sub>8</sub>	14 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>4</sub>
12 x 12 x 4 <sup>(F)</sup> (PVC)	9 <sup>1</sup> / <sub>16</sub>	10	5
12 x 12 x 6** (PVC)	9 <sup>5</sup> / <sub>16</sub>	12 <sup>1</sup> / <sub>8</sub>	6 <sup>1</sup> / <sub>16</sub>
12 x 12 x 8 (PVC)	11 <sup>5</sup> / <sub>32</sub>	10 <sup>1</sup> / <sub>4</sub>	6 <sup>1</sup> / <sub>32</sub>
12 x 12 x 10 <sup>(F)</sup> (PVC)	13 <sup>5</sup> / <sub>16</sub>	12 <sup>1</sup> / <sub>2</sub>	6 <sup>1</sup> / <sub>4</sub>

See Part No. 106  
for plug dimensions.

**PART NO. 445**

**Cleanout Tee**  
HUB X HUB X FPT

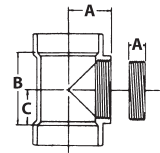
SIZE	A	B	C
1 <sup>1</sup> / <sub>2</sub> (PVC)	1 <sup>15</sup> / <sub>16</sub>	2 <sup>3</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>16</sub>
1 <sup>1</sup> / <sub>2</sub> (ABS)	1 <sup>31</sup> / <sub>32</sub>	2 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>4</sub>
2	2 <sup>1</sup> / <sub>4</sub>	3	1 <sup>1</sup> / <sub>2</sub>
3 (PVC)	2 <sup>1</sup> / <sub>16</sub>	3 <sup>3</sup> / <sub>8</sub>	1 <sup>5</sup> / <sub>16</sub>
3 (ABS)	2 <sup>1</sup> / <sub>16</sub>	3 <sup>13</sup> / <sub>16</sub>	1 <sup>5</sup> / <sub>16</sub>
4 (PVC)	3 <sup>3</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>8</sub>	2 <sup>9</sup> / <sub>16</sub>
4 (ABS)	3 <sup>3</sup> / <sub>8</sub>	5	2 <sup>1</sup> / <sub>2</sub>
6 (PVC)	4	8	4
8 (PVC)	5 <sup>1</sup> / <sub>4</sub>	10 <sup>1</sup> / <sub>2</sub>	5 <sup>5</sup> / <sub>32</sub>
8 x 8 x 4 <sup>(F)</sup> (PVC)	7 <sup>3</sup> / <sub>4</sub>	9 <sup>1</sup> / <sub>4</sub>	4 <sup>5</sup> / <sub>8</sub>
8 x 8 x 6 <sup>(F)</sup> (PVC)	8 <sup>1</sup> / <sub>4</sub>	11 <sup>1</sup> / <sub>4</sub>	5 <sup>5</sup> / <sub>8</sub>
10 (PVC)	8 <sup>1</sup> / <sub>4</sub>	12 <sup>1</sup> / <sub>2</sub>	6 <sup>1</sup> / <sub>4</sub>
10 x 10 x 4 <sup>(F)</sup> (PVC)	8 <sup>1</sup> / <sub>16</sub>	11 <sup>3</sup> / <sub>4</sub>	5 <sup>7</sup> / <sub>8</sub>
10 x 10 x 6 <sup>(F)</sup> (PVC)	10 <sup>5</sup> / <sub>8</sub>	11 <sup>3</sup> / <sub>4</sub>	5 <sup>7</sup> / <sub>8</sub>
10 x 10 x 8 (PVC)	10 <sup>3</sup> / <sub>8</sub>	10 <sup>3</sup> / <sub>8</sub>	5 <sup>3</sup> / <sub>16</sub>
12 (PVC)	9 <sup>1</sup> / <sub>4</sub>	14 <sup>3</sup> / <sub>8</sub>	7 <sup>3</sup> / <sub>16</sub>
12 x 12 x 4 <sup>(F)</sup> (PVC)	9 <sup>1</sup> / <sub>16</sub>	10	5
12 x 12 x 6 <sup>(F)</sup> (PVC)	9 <sup>5</sup> / <sub>16</sub>	12 <sup>1</sup> / <sub>8</sub>	6 <sup>1</sup> / <sub>16</sub>
12 x 12 x 8 (PVC)	11 <sup>5</sup> / <sub>32</sub>	10 <sup>1</sup> / <sub>4</sub>	6 <sup>1</sup> / <sub>32</sub>
12 x 12 x 10 <sup>(F)</sup> (PVC)	13 <sup>5</sup> / <sub>16</sub>	12 <sup>1</sup> / <sub>2</sub>	6 <sup>1</sup> / <sub>4</sub>



**PART NO. PVC 445X**

**Flush Cleanout Tee with Cleanout Plug**

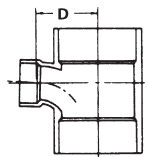
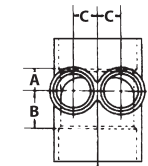
For dimensions see Part Numbers 445 and 110.



**PART NO. PVC 447**

**Horizontal Twin Tee**  
ALL HUB

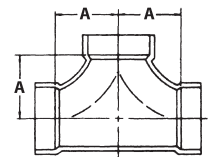
SIZE	A	B	C	D
3 x 3 x 1 <sup>1</sup> / <sub>2</sub> x 1 <sup>1</sup> / <sub>2</sub> (PVC)	7 <sup>7</sup> / <sub>8</sub>	1 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>32</sub>	2 <sup>9</sup> / <sub>16</sub>



**PART NO. 448**

**Two-Way Cleanout**  
ALL HUB

SIZE	A
3	4 <sup>1</sup> / <sub>16</sub>
4	4 <sup>15</sup> / <sub>16</sub>



<sup>(F)</sup> Fabricated

\*\* Assembled from two molded components

\*\*\* Assembled from three molded components

Note: If PVC or ABS is not listed for a specific size, that size fitting is available in PVC and ABS materials, and the dimensions listed are the same for both materials.

# LIMITED WARRANTY

Charlotte Pipe and Foundry Company® (Charlotte Pipe®) Products are warranted to be free from manufacturing defects and to conform to currently applicable ASTM standards for a period of five (5) years from date of delivery. Buyer's remedy for breach of this warranty is limited to replacement of, or credit for, the defective product. This warranty excludes any expense for removal or reinstallation of any defective product and any other incidental, consequential, or punitive damages. **This limited warranty is the only warranty made by seller and is expressly in lieu of all other warranties, express and implied, including any warranties of merchantability and fitness for a particular purpose.** No statement, conduct or description by Charlotte Pipe or its representative, in addition to or beyond this Limited Warranty, shall constitute a warranty. This Limited Warranty may only be modified in writing signed by an officer of Charlotte Pipe.

This Limited Warranty will not apply if:

- 1) The Products are used for purposes other than their intended purpose as defined by local plumbing and building codes, and the applicable ASTM standard.
- 2) The Products are not installed in good and workmanlike manner consistent with normal industry standards; installed in compliance with the latest instructions published by Charlotte Pipe and good plumbing practices; and installed in conformance with all applicable plumbing, fire and building code requirements.
- 3) This limited warranty does not apply when the products of Charlotte Pipe are used with the products of other manufacturers that do not meet the applicable ASTM or CISPI standards or that are not marked in a manner to indicate the entity that manufactured them.
- 4) In hubless cast iron installations, this warranty will not apply if products are joined with unshielded hubless couplings. Charlotte Pipe requires that its hubless cast iron pipe and fittings be joined only with shielded hubless couplings manufactured in accordance with CISPI 310, ASTM C 1277 and certified by NSF® International or with Heavy Duty Couplings meeting ASTM C 1540.
- 5) The Products fail due to defects or deficiencies in design, engineering, or installation of the piping system of which they are a part.
- 6) The Products have been the subject of modification; misuse; misapplication; improper maintenance or repair; damage caused by the fault or negligence of anyone other than Charlotte Pipe; or any other act or event beyond the control of Charlotte Pipe.

- 7) The Products fail due to the freezing of water in the Products.
- 8) The Products fail due to contact with chemical agents, fire stopping materials, thread sealant, plasticized vinyl products, or other aggressive chemical agents that are not compatible.
- 9) Pipe outlets, sound attenuation systems or other devices are permanently attached to the surface of Charlotte® PVC, ABS or CPVC products with solvent cement or adhesive glue.

Charlotte Pipe products are manufactured to the applicable ASTM or CISPI standard. Charlotte Pipe and Foundry **cannot** accept responsibility for the performance, dimensional accuracy, or compatibility of pipe, fittings, gaskets, or couplings not manufactured or sold by Charlotte Pipe and Foundry.


Any Charlotte Pipe products alleged to be defective **must** be made available to Charlotte Pipe at the following address for verification, inspection and determination of cause:

Charlotte Pipe and Foundry Company  
Attention: Technical Services  
2109 Randolph Road  
Charlotte, North Carolina 28207

**Purchaser must obtain a return materials authorization** and instructions for return shipment to Charlotte Pipe of any product claimed defective or shipped in error.

Any Charlotte Pipe product **proved** to be defective in manufacture will be replaced F.O.B. point of original delivery, or credit will be issued, at the discretion of Charlotte Pipe.


4/24/15



## WARNING

**Testing with or use of compressed air or gas in PVC / ABS / CPVC / Cast Iron pipe or fittings can result in explosive failures and cause severe injury or death.**

**AIR/GAS**



- NEVER test with or transport/store compressed air or gas in PVC / ABS / CPVC / Cast Iron pipe or fittings.
- NEVER test PVC / ABS / CPVC / Cast Iron pipe or fittings with compressed air or gas, or air over water boosters.
- ONLY use PVC / ABS / CPVC / Cast Iron pipe or fittings for water or approved chemicals.
- Refer to warnings on PPPA's website and ASTM D 1785.

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All products manufactured by  
Charlotte Pipe and Foundry Company  
are proudly made in the U.S.A.