

Technical

Sch. 80 CPVC Pipe & Fittings

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Chlorinated Polyvinyl Chloride (CPVC) is created by post chlorination of the PVC polymer. This produces up to a 15°C higher heat handling capability than PVC and greater fire resistance, plus a broad range of chemical resistance. CPVC is excellent for use in process piping, hot and cold water service, corrosive waste drainage and other elevated temperature applications. CPVC provides relatively low cost compared to alternative materials for similar applications. CPVC pipe is manufactured by extrusion and CPVC fittings are manufactured by injection moulding or fabrication. Spears produces a wide variety of CPVC pipe, fittings, valves, system accessories, and specialty systems.

Spears high quality CPVC compounds give optimum chemical corrosion resistance with a full range of pressure handling capabilities. Spears PVC materials are certified by NSF International to applicable standards, including NSF Standard 61 for use in potable water service, certified lead-free, and to ASTM STD D1784, Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds that specifies Cell Classification for minimum physical property requirements. These include resin type, impact strength, tensile strength, modulus elasticity in tension, heat deflection temperature and flammability. Spears minimum CPVC Cell Classification is 23447 for rigid (unplasticized) CPVC.

The ASTM Type and Grade is CPVC Type 4, Grade 1 and the typical long and short term strength designation of material for pressure piping is CPVC 4120.

Performance Engineered & Tested

Spears Schedule 80 CPVC pipe and fitting designs combine years of proven experience with computer generated stress analysis to yield the optimum physical structure and performance for each fitting. Material reinforcement is uniformly placed in stress concentration areas for substantially improved pressure handling capability. Resulting products are subjected to numerous verification tests to ensure the very best CPVC piping products are available.

Full 8mm (1/4") through to 300mm (12") Availability

Spears comprehensive line of CPVC fittings offers a variety of configurations in Schedule 80 sizes 8mm (1/4") through to 300mm (12").

Exceptional Chemical & Corrosion Resistance

Unlike metal, CPVC fittings and pipe never rust, scale, or pit, and will provide many years of maintenance-free service and extended system life.

Higher Temperature Ratings

High temperature CPVC thermoplastics can handle fluids at service temperatures of up to 93°C, allowing a wide range of process applications, including hot corrosive liquids.

Higher Flow Capacity

Smooth interior walls result in lower pressure loss and higher volume than conventional metal fittings.

Lower Installation Costs

Substantially lower material costs than steel alloys or lined steel, combined with lighter weight and ease of installation, can reduce installation costs by as much as 60% over conventional metal systems.

American Bureau of Shipping (ABS) Type Approved Product

Spears Schedule 80 CPVC pipe and fittings are ABS Type Approved for marine and offshore applications in nominal pipe sizes through to 300mm (12"). Type Approval details and restrictions are specified in ABS Certificate # 10-HS539421-1-PDA available on the ABS website www.eagle.org or from the Waterworks Technical Department

Not for use with Compressed Air or Gases

Waterworks does not recommend the use of thermoplastic piping products for systems to transport or store compressed air or gases, or the testing of thermoplastic piping systems with compressed air or gases in above or below ground locations. The use of our product in compressed air or gas systems automatically voids any warranty for such products, and its use against our recommendation is entirely the responsibility and liability of the installer.

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CPVC Physical Properties

GENERAL	CPVC Value	Test Method
Cell Classification	23447	ASTM D 1784
Maximum Service Temp.	93°C	
Colour	Medium Gray	
Specific Gravity (g/cu.cm @ 23°C)	1.51	ASTM D 792
Water Absorption % Increase 24hrs @ 25°C	0.03	ASTM D 570
Hardness, Rockwell	117-119	ASTM D 785
Poisson's Ratio @ 23°C	0.370	
MECHANICAL		
TENSILE STRENGTH, PSI @ 23°C	7,900	ASTM D 638
Tensile Modulus of Elasticity, PSI @ 23°C	426,000	ASTM D 638
Flexural Strength, PSI @ 23°C	15,000	ASTM D 790
Flexural Modulus, PSI @ 23°C	360,000	ASTM D 790
Compressive Strength, PSI @ 23°C	10,000	ASTM D 695
Izod impact, notched, ft-lb/in @ 23°C	3	ASTM D 256
THERMAL		
Coefficient of Linear Expansion (in/in/°F)	3.2x10 ⁻⁵	ASTM D 696
Coefficient of Thermal Conductivity		ASTM C 177
Calories . cm/second . cm ² . °C	3.27x10 ⁻⁴	
BTU . inches/hour . Ft.2 . °F	0.95	
Watt/m/K	0.137	
Heat Deflection Temperature		
Under Load (264 PSI, annealed)	235	ASTM D 648
ELECTRICAL		
Dielectric Strength, volts/mil	1,250	ASTM D 149
Dielectric Constant, 60Hz, 30°F	3.70	ASTM D 150
Volume Resistivity, ohm/cm @ 95°C	3.4X10 ¹²	ASTM D 257
Spears PVC & CPVC Pipe is non-electrolytic		
FIRE PERFORMANCE		
Flammability Rating	V-0, 5VB, 5VA	UL-94
Flame Spread Index	<10	
Flame Spread	<25	ULC
Smoke Generation	<50	ULC
Flash Ignition Temp.	482°C	
Average time of burning (sec.)	<5	ASTM D 635
Average extent of burning (mm)	<10	
Burning Rate (in/mm)	Self Extinguishing	
Softening Starts (approx.)	146°C	
Material Becomes Viscous	202°C	
Material Carbonizes	232°C	
Limiting Oxygen Index (LOI)	60	ASTM D 2863

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Sch. 80 CPVC Pipe Dimensions, Weight, & Maximum Working Pressure

CPVC Sch. 80 Pipe Sizing & Pressure Ratings					
Nominal Pipe Size (mm)	Outside Diameter (mm)	Average Inside Diameter (mm)	Minimum Wall Thickness (mm)	Nominal Weight (kg/m)	Maximum Working Pressure (PSI)*
8	13.72	7.16	3.02	0.38	1130
10	17.15	10.24	3.2	0.52	920
15	21.34	13.36	3.73	0.76	850
20	26.67	18.34	3.91	1.03	690
25	33.4	23.77	4.55	1.51	630
32	42.16	31.88	4.85	2.09	520
40	48.26	37.49	5.08	2.54	470
50	60.33	48.59	5.54	3.51	400
65	73.03	58.17	7.01	5.35	420
80	88.9	72.75	7.62	7.17	370
100	114.3	96.16	8.56	10.49	320
150	168.28	145.01	10.97	20.02	280
200	219.08	192.15	12.7	30.41	250
250	273.05	241.12	15.06	45.09	230
300	323.85	286.87	17.45	62.04	230

CPVC Temperature De-rating

The pressure ratings given above are for water, non-shock, at 23°C. The specified de-rating factors for CPVC are suitable for pipe conveying water at elevated temperatures. To determine elevated temperature ratings, multiply the above maximum working pressure but the factor shown in the table below at the selected temperature. For example, 50mm CPVC Schedule 80 @ 49°C = 400 PSI x 0.65 = 260 PSI maximum at 49°C.

When working near maximum specified temperatures, solvent cement joints are recommended in place of threaded connections. Where disassembly is required at elevated temperatures use flanges or unions.

Only Schedule 80 or heavier wall thickness pipe (PVC or CPVC) should be threaded. Do not thread standard series 1 PVC pipe. Threading requires a 50% reduction in the pipe's specified pressure rating at 23°C.

Operating Temp (°C)	De-rating Factor
23-27	1
32	0.91
38	0.82
43	0.72
49	0.65
54	0.57
60	0.5
66	0.42
71	0.4
77	0.29
82	0.25
93	0.2

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Hangers and Supports*

The following hanger support spacing recommendations are according to size, schedule, and operating temperatures. The below table is only intended as a guide.

Nominal Pipe Size (mm)	Temperature						
	16°C	38°C	49°C	60°C	71°C	82°C	93°C
	Spacing (m)						
8	1.35	1.20	1.20	1.00	0.75	0.60	C
10	1.50	1.35	1.35	1.20	0.75	0.75	C
15	1.65	1.50	1.35	1.35	0.90	0.75	C
20	1.65	1.65	1.50	1.35	0.90	0.75	C
25	1.80	1.80	1.65	1.50	1.00	0.90	0.45
32	1.95	1.80	1.80	1.65	1.00	0.90	0.45
40	2.10	1.95	1.80	1.65	1.00	1.00	0.60
50	2.10	2.10	1.95	1.80	1.20	1.00	0.60
65	2.40	2.25	2.25	1.95	1.35	1.20	0.75
80	2.40	2.40	2.25	2.10	1.35	1.20	0.75
100	2.60	2.60	2.60	2.25	1.50	1.35	0.75
150	3.00	2.70	2.60	2.25	1.50	1.35	0.75
200	3.35	3.20	3.00	2.60	1.80	1.65	1.00
250	3.50	3.35	3.20	2.70	1.95	1.80	1.20
300	3.80	3.65	3.50	3.20	2.25	1.95	1.35

*Please refer to the 'PVC Pressure Pipe & Fittings Technical Information' for further specifications on Hangers and Supports.

For more technical information of Schedule 80 CPVC Pipe and Fittings please refer to the 'PVC Pressure Pipe & Fittings Technical Information'.