

CPVC Schedule 40/80 Pipe & Fitting Specifications & Pipe Dimensions

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CPVC Schedule 40 & Schedule 80 Pipe Specifications

APPLICATION

Corrosion resistant pressure pipe, IPS sizes 1/4" through 24", for use at temperatures up to and including 200°F. Pressure resistant to most acids, bases, salts, aliphatic solutions, oxidants, and halogens. Chemical resistance data is available and properties and flammability characteristics. Typical applications include: chemical processing, plating, high purity application applications involving hot corrosive fluid transfer.

SCOPE

This specification outlines minimum manufacturing requirements for Chlorinated Polyvinyl Chloride (CPVC) Schedule 40 & 80 applications where the fluid conveyed does not exceed 200°F. This pipe meets and or exceeds the industry standards and the National Sanitation Foundation (NSF).

CPVC MATERIALS

The material used in the manufacture of the pipe shall be a rigid chlorinated polyvinyl chloride (CPVC) compound, Type IV shall be light gray in color as specified, and shall be approved by NSF use with potable water.

DIMENSIONS

CPVC Schedule 40 & Schedule 80 pipe shall be manufactured in strict accordance to the requirements of ASTM F441 for pipe. In compliance to this standard, shall also meet or exceed the test requirements for materials, workmanship, burst pressure, flange tapered sockets to create an interference type fit, which meet or exceed the dimensional requirements and the minimum soot flame spread rating of < 25 and a Smoke Development rating of < 50 when tested for surface burning characteristics in accordance to ASTM E84.

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ASTM STANDARD D
CPVC 4120

Pipe sizes shown are

CPVC Schedule 40 Pipe Dimensions					
PIPE SIZE	O.D.	AVE. I.D.	MIN WALL	NOM. WEIGHT (Wt./ft.)	MAX. W.P. PSI
1/4"	.540	.344	.088	.096	780
3/8"	.675	.473	.091	.128	620

CPVC Schedule 80 Pipe Dimensions					
PIPE SIZE	O.D.	AVE. I.D.	MIN WALL	NOM. WEIGHT (Wt./ft.)	MAX. W.P. PSI
1/4"	.540	.282	.119	.117	1130
3/8"	.675	.403	.126	.162	920

1/2"	.840	.602	.109	.190	600
3/4"	1.050	.804	.113	.253	480
1"	1.315	1.029	.133	.371	450
1-	1.660	1.360	.140	.502	370
1/4"					
1-	1.900	1.590	.145	.599	330
1/2"					
2"	2.375	2.047	.154	.803	280
2-	2.875	2.445	.203	1.267	300
1/2"					
3"	3.500	3.042	.216	1.660	260
3-	4.000	3.521	.226	1.996	240
1/2"					
4"	4.500	3.998	.237	2.363	220
5"	5.563	5.016	.258	2.874	190
6"	6.625	6.031	.280	4.164	180
8"	8.625	7.942	.322	6.268	160
10"	10.750	9.976	.365	8.886	140
12"	12.750	11.889	.406	11.751	130
14"	14.000	13.073	.437	13.916	130
16"	16.000	14.940	.500	18.167	130
18"	18.000	16.809	.562	22.965	130
20"	20.000	18.743	.593	29.976	120
24"	24.000	22.544	.687	37.539	120

1/2"	.840	.526	.147	.238	850
3/4"	1.050	.722	.154	.322	690
1"	1.315	.936	.179	.473	630
1-	1.660	1.255	.191	.654	520
-1/4"					
1-	1.900	1.476	.200	.793	470
1/2"					
2"	2.375	1.913	.218	1.097	400
2-	2.875	2.290	.276	1.674	420
1/2"					
3"	3.500	2.864	.300	2.242	370
3-	4.000	3.326	.318	2.735	350
1/2"					
4"	4.500	3.786	.337	3.277	320
5"	5.563	4.768	.375	4.078	290
6"	6.625	5.709	.432	6.258	280
8"	8.625	7.565	.500	9.506	250
10"	10.750	9.493	.593	14.095	230
12"	12.750	11.294	.687	19.392	230
14"	14.000	12.410	.750	23.261	220
16"	16.000	14.213	.843	29.891	220
18"	18.000	16.014	.937	37.419	220
20"	20.000	17.814	1.031	45.879	220
24"	24.000	21.418	1.218	64.959	210

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The pressure ratings given are for water, non-shock, @ 73°F. The following temperature de-rating factors are to be applied at elevated temperatures.

OPERATING TEMPERATURE (°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

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

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

THE MAXIMUM SERVICE TEMPERATURE FOR CPVC IS 200°F.

Solvent cemented joints should be utilized when working at or near maximum service temperature.

Threading of Schedule 40 CPVC pipe is not a recommended practice due to its limited strength. Threading of Schedule 40 CPVC pipe **requires a 50% reduction in pressure rating stated for plain end pipe @ 73°F.**

Chemical resistance data should be referenced for proper material selection at elevated temperatures.

General Specifications for Standard CPVC Schedule 40 and Schedule 80

Scope

This specification is applicable to fabricated fittings, as constructed by Harrison Machine & Plastic Corporation, as the fitting configurations.

Materials of Construction

(CPVC) Chlorinated Polyvinyl Chloride

Fittings are to be manufactured from CPVC material which meets or exceeds the requirements of ASTM D-1784, Type IV. Pressure pipe used in fabrication must conform to ASTM D-441 and listed by the National Sanitation Foundation (NSF). Sheet stock material (where used) must conform to ASTM D-1784, cell classification 23447B, Type IV, Grade 1, manufactured by Harrison Machine & Plastic Corporation.

Solvent Cement and Welding Rod (CPVC)

All solvent cements used, to conform to ASTM D-2564, listed by NSF for potable use applications.

Welding rod used in the manufacture of the above fittings, shall conform to ASTM D-1784, cell class 23447B for CPVC.

Assembly and Construction Procedures

Fittings shall be Butt Fusion (machine) welded where feasible or hand welded (fillet welded) by qualified and experienced welders. CPVC fittings will be gray in color (this color code applies to both pressure and drainage patterns).

Dimensional Specifications

All cataloged fittings to be constructed in accordance with Harrison Machine and Plastic Corporation, published drawings and customer specifications.

All female sockets shall have an interference fit with corresponding size pipe. **Refer to Table 2**

Component cut length dimension tolerances of $\pm .500$ "

Angle (change of direction tolerances of $\pm 2^\circ$)

Product Quality

All fitting welds (hand and machine) shall be 100% spark tested.

Fiberglass reinforced fittings shall be as free as possible from visual defects such as foreign inclusions, air bubbles or surface imperfections.

Random inspection performed daily by floor supervisor.

TABLE 1 Pertains to pipe stock used in fabrication Maximum Working Pressure (psi) @ 73°F										
Size	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"

TABLE 2 Tapered Belled/Socket Dimension: Schedule 8		
	Socket Entrance	Socket

Sch 40	220	180	160	140	130	130	130	130	130	130
Sch 80	320	280	250	230	230	220	220	220	220	220

Nominal Pipe Size	I.D. Minimum	I.D. Maximum	I.D. Minimum
4"	4.509"	4.527"	4.480"
6"	6.636"	6.658"	6.600"
8"	8.640"	8.670"	8.590"
10"	10.761"	10.791"	10.720"
12"	12.763"	12.793"	12.720"
14"	14.030"	14.045"	13.980"
16"	16.037"	16.052"	15.980"
18"	18.041"	18.056"	17.980"
20"	20.045"	20.060"	19.980"
24"	24.060"	24.075"	24.000"

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General Specifications for Standard CPVC Schedule 40 & Schedule 80 Fittings

Scope

This specification is applicable to fabricated fittings, as constructed by Harrison Machine & Plastic Corporation, as the fitting configurations.

Materials of Construction

(CPVC) Chlorinated Polyvinyl Chloride

Fittings are to be manufactured from CPVC material which meets or exceeds the requirements of ASTM D-1784, cell classification 23447B, Type IV, Grade 1, for pressure pipe used in fabrication must conform to ASTM F-441 and listed by the National Sanitation Foundation (NSF). Sheet stock material (where used) must conform to ASTM D-1784, cell classification 23447B, Type IV, Grade 1, manufactured by Harrison Machine & Plastic Corporation.

Solvent Cement and Welding Rod (CPVC)

All solvent cements used, conform to ASTM D-2564, listed by NSF for potable use applications.

Welding rod used in the manufacture of the above fittings, shall conform to ASTM D-1784, cell class 23447B, and shall be light gray in color.

Assembly/Construction Procedures

Fittings shall be Butt Fusion (machine) welded where feasible or hand welded (fillet welded) by qualified and experienced personnel.

All pressure fittings, with the exception of formed elbows, couplings, reducer couplings and reducer bushings will be 100% tested to the base pressure rating of the fitting to meet or exceed the desired performance pressure rating of the corresponding diameter.

CPVC Schedule 40 & Schedule 80 fittings will be light gray in color. This color code applies to both pressure and drain fittings.

Dimensional Specifications

All cataloged fittings to be constructed in accordance with Harrison Machine and Plastic Corporation, published draw customer specifications.

All female sockets shall have an interference fit with corresponding size pipe. **Refer to Table 2**

Component cut length tolerances of $\pm.500$ ".

Angle (change of direction) tolerances of $\pm 2^\circ$.

Product Quality

All fitting welds (hand and machine) shall be 100% spark tested

Fiberglass reinforced fittings shall be as free as possible from visual defects such as foreign inclusions, air bubbles or

Random inspection performed daily by floor supervisor

Size	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
Sch 40	220	180	160	140	130	130	130	130	130	130
Sch 80	320	280	250	230	230	220	220	220	220	220

Nominal Pipe Size	Socket Entrance	
	I.D. Minimum	I.D. Maximum
4"	4.509"	4.527"
6"	6.636"	6.658"
8"	8.640"	8.670"
10"	10.761"	10.791"
12"	12.763"	12.793"
14"	14.030"	14.045"
16"	16.037"	16.052"
18"	18.041"	18.056"
4"	20.045"	20.060"
24"	24.060"	24.075"

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Solvent Cement Joining Recommendations (Large Diameter CPVC Joints)

These guidelines specifically address recommended procedures required in successfully making solvent weld joints for the final important steps in making the system either a success or a failure. It is important that these instructions are carefully followed.

Important to all successful solvent weld joints there are "FOUR" important ingredients:

1. It is essential that surfaces to be cemented are clean and free of foreign material. If permitted to remain, grease, dirt, or oil will reduce the strength of the bond.
2. Joining surfaces (pipe & fitting) must be dissolved and made soft.
3. Sufficient cement must be applied to fill gaps between pipe & fitting.
4. Assembly of pipe & fitting must be made while the surfaces are both wet and fluid.

Large diameter joints are very similar to those for smaller diameters, in that both have tapered sockets. Tapered socket joint at the top of the socket, resulting in a quality seal particularly in pressure applications. Tapered sockets, however the pipe is inserted into the fitting socket. Care must be taken to hold the pipe in place until the cement begins to set.

As with any solvent cemented joints, the pipe must be cut square and cleaned. Large diameter CPVC pipe may be cut with a hand saw is preferred over a finer blade which tends to heat the CPVC material as it cuts, resulting in a molten CPVC residue produced.

After the pipe is cut to length, the outside and inside edges are to be deburred. This can be easily achieved by scraping with a file and only takes a few moments, but is a critical step.

Two or more pipe fitters are strongly recommended when making large diameter joints due to the bulk and weight of the pipe.

Align the pipe & fitting as close to its final position as possible. Elevate both the pipe & fitting so that the entire circumference of the pipe & fitting is supported.

Mechanical devices, such as come-alongs, are strongly recommended to pull the pipe into the fitting socket. The use of a chain, enough to run the entire length of 20 foot joint(s) of pipe, must be laid out on either side of the joint, prior to assembly. The chain should extend approximately 1 foot beyond the pipe on each side. Cumbersome as it might appear, this method offers a more precise pull.

(Note: A chain sling may be used on the fittings providing it results in a "straight" pull.)

At this point, available manpower working in unison, is used to keep all components in place. Be sure the pipe & fitting are seated to the depth of the socket on the pipe, plus six inches, as an indication of pipe insertion depth. The two cable come-alongs and solvent the joint may be pulled together.

When the chains (cables) are in place joint preparation now takes place.

Using Cleaner, clean pipe and fitting surfaces with a cotton rag to remove any moisture and excessive dirt.

After properly cleaning pipe surfaces, using Primer and a 3" to 4" wide brush, liberally apply the primer so that it flows into the fitting socket. The primer should be applied to the pipe ends and to an area equal to the corresponding fitting surface, dirt and surface printing. A properly primed surface will have a uniform dull surface which will begin to soften.

Prime the fitting socket in the same manner as described above. A second coating of primer may then be needed on the fitting socket.

Using Heavy Bodied Cement, liberally apply the solvent, again using a 3" to 4" brush, to both the fitting socket and pipe surface areas, to be joined should be visible. A thick even coat is needed to fill the gap between pipe & fitting.

Note: It may be advisable to pour the primer and solvent into larger "wide-mouth" containers, prior to use to accommodate the large diameter pipe.

Important: It is advisable to utilize two or more pipe fitters. One will apply primer/solvent to the fitting socket surfaces must be fluid when making the joint.

Using the come-along, pull joint together, drawing the pipe into the fitting socket until the pipe has reached the fitting socket. At this point, the pipe is seated. At this point, the cement will ooze toward the bottom of the pipe and fill a small section in the joint. In very large diameter systems, **"Do not venture inside the system to inspect the joint or to clean the solvent. The**

Any excess solvent on the outside of the joint should also be removed, to avoid puddling and for appearance.

Continue come-along pressure, holding the pipe into the fitting socket for approximately 15 minutes (or until the solvent has cured).

Pressure test the system only after the joints have cured. Refer to curing schedules as defined by the solvent manufacturer.

The above are recommendations only. Site conditions vary greatly. Harrison Machine & Plastic Corporation cannot be held responsible for any accidents or injuries.

Equipment Needed for Installation/Assembly			
Tape Measure	Pipe Belt	File	Clean Cotton Rags
Come-Alongs	Primer	Patience	Pencil
Saw & Circular Blade		Cement	Cleaner

Buckets

3" to 4"
Brushes