



Critical Collapse Pressures

The **Critical Collapse Pressure** is directly related to the pipe wall thickness and represents the maximum allowable external load. External loads can result from conditions such as buried pipe soil loads; underwater applications; vacuum service; and pipe installed on pump suction lines. The actual external load being applied to the pipe is the difference between the external pressure and the internal pressure. As a result, a pressurized pipe can withstand a greater external load than an empty pipe.

Critical Collapse Pressure Rating of Various PVC and CPVC Pipe & Duct @ 73°F with No Safety Factor in PSI (Inches of Water)

Size(in.)	Duct	SDR 41	SDR 26	SDR 21	SCH 40	SCH 80	SCH 120
2	N/A	17* (470)	74* (2,048)	126* (3,487)	316 (8,746)	939 (25,989)	1309 (36,230)
2-1/2	N/A	17* (470)	74* (2,048)	126* (3,487)	451 (12,483)	975 (26,986)	1309 (36,230)
3	N/A	17* (470)	74* (2,048)	126* (3,487)	307 (8,497)	722 (19,983)	1128 (31,221)
3-1/2	N/A	17* (470)	74* (2,048)	126* (3,487)	217 (6,006)	578 (15,998)	N/A
4	N/A	17* (470)	74* (2,048)	126* (3,487)	190 (5,259)	451 (12,482)	1128 (31,221)
5	N/A	17* (470)	74* (2,048)	126* (3,487)	117 (3,238)	361 (10,000)	N/A
6	N/A (470)	17* (2,048)	74* (3,487)	126* (2,491)	90 (9,493)	343 (19,983)	722
6 x 1/8	5.2 (144)	N/A	N/A	N/A	N/A	N/A	N/A
6 x 3/16	0.7 (426)	N/A	N/A	N/A	N/A	N/A	N/A
8	10.0 (193)	17* (470)	74* (2,048)	126* (3,487)	58 (1,605)	235 (6,504)	N/A
10	5.4 (100)	17* (470)	74* (2,048)	126* (3,487)	49 (1,605)	217 (6,504)	N/A
12	3.0 (60)	17* (470)	74* (2,048)	126* (3,487)	42 (1,162)	199 (5,508)	N/A
14	2.5 (45)	17* (470)	74* (2,048)	126* (3,487)	40 (1,107)	194 (5,369)	N/A
16	1.6 (30)	17* (470)	74* (2,048)	126* (3,487)	40 (1,107)	181 (5,010)	N/A
18	1.0 (26)	17* (470)	74* (2,048)	126* (3,487)	33 (913)	162 (4,484)	N/A
20	1.3 (28)	17* (470)	74* (2,048)	126* (3,487)	28 (775)	157 (4,346)	N/A
24	1.0 (20)	17* (470)	74* (2,048)	126* (3,487)	25 (692)	150 (4,152)	N/A

1 psi = 2.036 inches of mercury

* SDR Pipe carries the same collapse ratings for all sizes due to the wall thickness/O.D. ratio

Standard temperature de-rating factors must be applied for use at elevated temperatures (see following Temperature Limitations section). Multiply the collapse pressure rating @ 73°F from the chart by the appropriate material de-rating factor.

Solvent-cemented connections are preferred over threaded or flanged joining in vacuum applications to reduce potential for leaks.

Temperature Limitations

PVC & CPVC

The maximum operating temperature for PVC pipe is 140°F and the maximum operating pressure for CPVC pipe is 200°F. As temperatures increase, impact strength typically increases while tensile strength and pipe stiffness decrease resulting in reduced applicable pressure ratings. Physical properties of PVC and CPVC pipe are generally specified at 73°F per applicable ASTM material test standards. The maximum allowable pressure at elevated temperatures is determined by multiplying the 73°F pressure rating by the applicable material de-rating factor for the elevated use temperature shown in the following chart:

De-Rating Factors

PVC Pipe		CPVC Pipe	
Temp (°F)	Working De-Rating Factor	Temp (°F)	Working De-Rating Factor
73	1.00	73-80	1.00
80	0.88	90	0.91
90	0.75	100	0.82
100	0.62	110	0.72
110	0.51	120	0.65
120	0.40	130	0.57
130	0.31	140	0.50
140	0.22	150	0.42
---	---	160	0.40
---	---	170	0.29
---	---	180	0.25
---	---	200	0.20

Appropriate temperature de-rating factors must be applied at temperatures other than 73°F based on the material selected.

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

Weatherability

When standard rigid PVC or CPVC pipe is exposed to UV radiation from sunlight the following conditions have been noted:

- A color change, slight increase in tensile strength, slight increase in modulus of tensile elasticity, and a slight decrease in impact strength may occur.
- Material directly exposed to UV radiation results in extremely shallow penetration depths (frequently less than 0.001 inch).
- The effects of UV exposure do not continue when exposure to UV is terminated.
- The effects of UV exposure do not penetrate even thin shields such as paint coatings, or wrapping.

It is recommended that PVC and CPVC piping products exposed to the direct affects of sunlight be painted with a light colored acrylic or latex paint that is chemically compatible with the PVC/CPVC products. Check with paint manufacture for compatibility. Oil-based paints should NOT be used.

Additional consideration should be given to the affects of expansion/contraction caused by heat absorption from sunlight in outdoor applications.