## PVC Industrial Pipe: Schedule 80



# Application:

Corrosion resistant pressure pipe, IPS sizes 1/8" through 24", for use at temperatures up to and including 140°F. Pressure rating (210 psi to 1230 psi) varies with schedule, pipe size, and temperature as stated in Georg Fischer Harvel Engineering & Installation Guide (Product Bulletin 112/401). Generally resistant to most acids, bases, salts, aliphatic solutions, oxidants, and halogens. Chemical resistance data is available and should be referenced for proper material selection. Pipe exhibits excellent physical properties and flammability characteristics (independently tested flame and smoke characteristics-ULC). Typical applications include: chemical processing, plating, high purity applications, potable water systems, water and wastewater treatment, irrigation, agricultural, and other industrial applications involving corrosive fluid transfer.

# Scope:

This specification outlines minimum manufacturing requirements for Polyvinyl Chloride (PVC) Schedule 80 iron pipe size (IPS) pressure pipe. This pipe is intended for use in applications where the fluid conveyed does not exceed 140°F. This pipe meets and or exceeds the industry standards and requirements as set forth by the American Society for Testing and Materials (ASTM) and the National Sanitation Foundation (NSF International).

# PVC Materials:

The material used in the manufacture of the pipe shall be domestically produced rigid polyvinyl chloride (PVC) compound, Type I Grade I, with a Cell Classification of 12454 as defined in ASTM D1784, trade name designation H707 PVC. This compound shall be gray in color as specified, and shall be approved by NSF International for use with potable water (NSF Std 61).

# Dimensions:

PVC Schedule 80 pipe shall be manufactured in strict accordance to the requirements of ASTM D1785 for physical dimensions and tolerances. Each production run of pipe manufactured in compliance to this standard, shall also meet or exceed the test requirements for materials, workmanship, burst pressure, flattening, and extrusion quality defined in ASTM D1785. All belled-end pipe shall have tapered sockets to create an interference-type fit, which meet or exceed the dimensional requirements and the minimum socket length for pressure-type sockets as defined in ASTM D2672. All PVC Schedule 80 pipe must also meet the requirements of NSF Standard 14 and CSA Standard B137.3 rigid PVC pipe for pressure applications, and shall bear the mark of these Listing agencies. This pipe shall have a flame spread rating of 0-25 when tested for surface burning characteristics in accordance with CAN/ULC-S102-2-M88 or equivalent.

# Marking:

Product marking shall meet the requirements of ASTM D1785 and shall include: the manufacturer's name (or the manufacturer's trademark when privately labeled); the nominal pipe size; the material designation code; the pipe schedule and pressure rating in psi for water @ 73°F; the ASTM designation D1785; the independent laboratory's seal of approval for potable water usage; and the date and time of manufacture.

# Sample Specification:

All PVC Schedule 80 pipe shall be manufactured from a Type I, Grade I Polyvinyl Chloride (PVC) compound with a Cell Classification of 12454 per ASTM D1784. The pipe shall be manufactured in strict compliance to ASTM D1785, consistently meeting and/or exceeding the Quality Assurance test requirements of this standard with regard to material, workmanship, burst pressure, flattening, and extrusion quality. The pipe shall be manufactured in the USA, using domestic materials, by an ISO 9001 certified manufacturer. Standard lengths of pipe sizes 6" and larger shall be beveled each end by the pipe manufacturer. This pipe shall carry the National Sanitation Foundation (NSF) seal of approval for potable water applications. All pipe shall be manufactured by Georg Fischer Piping Systems.

# PVC Industrial Pipe: Schedule 80

## Schedule 80 Dimensions

| Nom. Pipe Size (in.) | O.D. | Average I.D. | Min. Wall | Nom. Wt./Ft. | Max. W.P. |
|---|---|---|---|---|---|
| 1/8 | 0.405 | 0.195 | 0.095 | 0.063 | 1230 |
| 1/4 | 0.540 | 0.282 | 0.119 | 0.105 | 1130 |
| 3/8 | 0.675 | 0.403 | 0.126 | 0.146 | 920 |
| 1/2 | 0.840 | 0.526 | 0.147 | 0.213 | 850 |
| 3/4 | 1.050 | 0.722 | 0.154 | 0.289 | 690 |
| 1 | 1.315 | 0.936 | 0.179 | 0.424 | 630 |
| 1-1/4 | 1.660 | 1.255 | 0.191 | 0.586 | 520 |
| 1-1/2 | 1.900 | 1.476 | 0.200 | 0.711 | 470 |
| 2 | 2.375 | 1.913 | 0.218 | 0.984 | 400 |
| 2-1/2 | 2.875 | 2.290 | 0.276 | 1.500 | 420 |
| 3 | 3.500 | 2.864 | 0.300 | 2.010 | 370 |
| 3-1/2 | 4.000 | 3.326 | 0.318 | 2.452 | 350 |
| 4 | 4.500 | 3.786 | 0.337 | 2.938 | 320 |
| 5 | 5.563 | 4.768 | 0.375 | 4.078 | 290 |
| 6 | 6.625 | 5.709 | 0.432 | 5.610 | 280 |
| 8 | 8.625 | 7.565 | 0.500 | 8.522 | 250 |
| 10 | 10.750 | 9.493 | 0.593 | 12.635 | 230 |
| 12 | 12.750 | 11.294 | 0.687 | 17.384 | 230 |
| 14 | 14.000 | 12.410 | 0.750 | 20.852 | 220 |
| 16 | 16.000 | 14.213 | 0.843 | 26.810 | 220 |
| 18 | 18.000 | 16.014 | 0.937 | 33.544 | 220 |
| 20 | 20.000 | 17.814 | 1.031 | 41.047 | 220 |
| 24 | 24.000 | 21.418 | 1.218 | 58.233 | 210 |

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

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

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

### De-Rating Factor

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

THE MAXIMUM SERVICE TEMPERATURE FOR PVC IS 140°F.

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

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

Chemical resistance data should be referenced for proper material selection and possible de-rating when working with fluids other than water. Refer to Harvel Plastics 112/401 Product Bulletin for chemical resistance, installation data, and additional information.

**ASTM STANDARD D1784 MATERIAL EQUIVALENTS:**
Cell Classification 12454 = PVC Type I Grade I = PVC1120 Pipe sizes shown are manufactured in strict compliance with ASTM D1785.

## CPVC Industrial Pipe: Schedule 40 & 80

# Application:

Corrosion resistant pressure pipe, IPS sizes 1/8" through 24", for use at temperatures up to and including 200˚F. Pressure rating (130 psi to 1130 psi) varies with schedule, pipe size, and temperature as shown on page 2 of this specification, and as stated in Georg Fischer Harvel LLC engineering bulletin (Product Bulletin 112/401). Generally resistant to most acids, bases, salts, aliphatic solutions, oxidants, and halogens. Chemical resistance data is available and should be referenced for proper material selection. Pipe exhibits excellent flammability characteristics (ULC Listed for Surface Burning Characteristics) and other physical properties. Typical applications include: chemical processing, plating, high purity applications, hot and cold potable water systems, water and wastewater treatment, and other industrial applications involving hot corrosive fluid transfer.

# Scope:

This specification outlines minimum manufacturing requirements for Chlorinated Polyvinyl Chloride (CPVC) schedule 40 and 80 iron pipe size (IPS) pressure pipe. This pipe is intended for use in industrial systems where the fluid conveyed does not exceed 200˚F. This pipe meets and or exceeds the industry standards and requirements as set forth by the American Society for Testing and Materials (ASTM) 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 Grade I, with a Cell Classification of 23447 as defined in ASTM D1784. This compound shall be light gray in color, and shall be approved by NSF for use with potable water.

# Dimensions:

CPVC Schedule 40 and Schedule 80 pipe shall be manufactured in accordance to the requirements of ASTM F441 for physical dimensions and tolerances. Each production run of pipe manufactured in compliance to this standard, shall also meet the test requirements for materials, workmanship, burst pressure, flattening, and extrusion quality defined in ASTM F441. All belled-end pipe shall have tapered sockets to create an interference-type fit, which meet or exceed the dimensional requirements, and the minimum socket length for pressure-type sockets, as defined in ASTM D2672.

# Marking:

Product marking shall meet the requirements of ASTM F 441 and shall include: the manufacturers name (or the manufacturers trademark when privately labeled); the nominal pipe size; the material designation code; the pipe schedule and pressure rating in psi for water @ 73˚F; the ASTM designation F 441; and the independent laboratory's seal of approval for potable water usage. Marking shall also include the flame spread rating and smoke development rating when tested and listed for surface burning characteristics per CAN/ULC S102.2 (Flame Spread (F.S.) of < 25 and Smoke Development (S.D.) of < 50).

# Sample Specification:

All CPVC Schedule 40 and schedule 80 pipe shall be manufactured from a Type IV, Grade I Chlorinated Polyvinyl Chloride (CPVC) compound with a minimum Cell Classification of 23447 per ASTM D1784. The pipe shall be manufactured in strict compliance to ASTM F441, consistently meeting the Quality Assurance test requirements of this standard with regard to material, workmanship, burst pressure, flattening, and extrusion quality. The pipe shall be produced in the USA using domestic materials, by an ISO 9001 certified manufacturer, and shall be stored indoors after production, at the manufacturing site, until shipped from factory. This pipe shall carry the National Sanitation Foundation (NSF) seal of approval for potable water applications. The pipe shall have a Flame Spread rating < 25 and a Smoke Development rating < 50 when tested and listed for Surface Burning Characteristics in accordance with CAN/ULC-S102-2-M88 or equivalent. All pipe shall be manufactured by Georg Fischer Harvel LLC.

# CPVC Industrial Pipe: Schedule 40 & 80

## Schedule 40 Dimensions

| Nom. Pipe Size (in.) | O.D. | Average I.D. | Min. Wall | Nom. Wt./Ft. | Max. W.P |
|---|---|---|---|---|---|
| 1/4 | 0.540 | 0.344 | 0.088 | 0.096 | 780 |
| 3/8 | 0.675 | 0.473 | 0.091 | 0.128 | 620 |
| 1/2 | 0.840 | 0.602 | 0.109 | 0.190 | 600 |
| 3/4 | 1.050 | 0.804 | 0.113 | 0.253 | 480 |
| 1 | 1.315 | 1.029 | 0.133 | 0.371 | 450 |
| 1-1/4 | 1.660 | 1.360 | 0.140 | 0.502 | 370 |
| 1-1/2 | 1.900 | 1.590 | 0.145 | 0.599 | 330 |
| 2 | 2.375 | 2.047 | 0.154 | 0.803 | 280 |
| 2-1/2 | 2.875 | 2.445 | 0.203 | 1.267 | 300 |
| 3 | 3.500 | 3.042 | 0.216 | 1.660 | 260 |
| 3-1/2 | 4.000 | 3.521 | 0.226 | 1.996 | 240 |
| 4 | 4.500 | 3.998 | 0.237 | 2.363 | 220 |
| 5 | 5.563 | 5.016 | 0.258 | 2.874 | 190 |
| 6 | 6.625 | 6.031 | 0.280 | 4.164 | 180 |
| 8 | 8.625 | 7.942 | 0.322 | 6.268 | 160 |
| 10 | 10.750 | 9.976 | 0.365 | 8.886 | 140 |
| 12 | 12.750 | 11.889 | 0.406 | 11.751 | 130 |
| 14 | 14.000 | 13.073 | 0.437 | 13.916 | 130 |
| 16 | 16.000 | 14.940 | 0.500 | 18.167 | 130 |
| 18 | 18.000 | 16.809 | 0.562 | 22.965 | 130 |
| 20 | 20.000 | 18.743 | 0.593 | 29.976 | 120 |
| 24 | 24.000 | 22.544 | 0.687 | 37.539 | 120 |

## Schedule 80 Dimensions

| Nom. Pipe Size (in.) | O.D. | Average I.D. | Min. Wall | Nom. Wt./Ft. | Max. W.P. |
|---|---|---|---|---|---|
| 1/4 | 0.540 | 0.282 | 0.119 | 0.117 | 1130 |
| 3/8 | 0.675 | 0.403 | 0.126 | 0.162 | 920 |
| 1/2 | 0.840 | 0.526 | 0.147 | 0.238 | 850 |
| 3/4 | 1.050 | 0.722 | 0.154 | 0.322 | 690 |
| 1 | 1.315 | 0.936 | 0.179 | 0.473 | 630 |
| 1-1/4 | 1.660 | 1.255 | 0.191 | 0.654 | 520 |
| 1-1/2 | 1.900 | 1.476 | 0.200 | 0.793 | 470 |
| 2 | 2.375 | 1.913 | 0.218 | 1.097 | 400 |
| 2-1/2 | 2.875 | 2.290 | 0.276 | 1.674 | 420 |
| 3 | 3.500 | 2.864 | 0.300 | 2.242 | 370 |
| 3-1/2 | 4.000 | 3.326 | 0.318 | 2.735 | 350 |
| 4 | 4.500 | 3.786 | 0.337 | 3.277 | 320 |
| 5 | 5.563 | 4.768 | 0.375 | 4.078 | 290 |
| 6 | 6.625 | 5.709 | 0.432 | 6.258 | 280 |
| 8 | 8.625 | 7.565 | 0.500 | 9.506 | 250 |
| 10 | 10.750 | 9.493 | 0.593 | 14.095 | 230 |
| 12 | 12.750 | 11.294 | 0.687 | 19.392 | 230 |
| 14 | 14.000 | 12.410 | 0.750 | 23.261 | 220 |
| 16 | 16.000 | 14.213 | 0.843 | 29.891 | 220 |
| 18 | 18.000 | 16.014 | 0.937 | 37.419 | 220 |
| 20 | 20.000 | 17.814 | 1.031 | 45.879 | 220 |
| 24 | 24.000 | 21.418 | 1.218 | 64.959 | 210 |

ASTM STANDARD D1784 MATERIAL EQUIVALENTS:
Cell Classification 23447 = CPVC Type IV Grade I = CPVC 4120

PIPE SIZES SHOWN ARE MANUFACTURED IN STRICT COMPLIANCE WITH ASTM F441

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

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

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

### De-Rating Factor

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

THE MAXIMUM SERVICE TEMPERATURE FOR CPVC IS 200˚F.

Solvent-cemented joints should be utilized when working at or near maximum temperatures. GF Harvel does not recommend the use of CPVC for threaded connections at temperatures above 150˚F; use flanged joints, unions, or roll grooved couplings where disassembly is necessary at elevated temperatures.

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

Chemical resistance data should be referenced for proper material selection and possible de-rating when working with fluids other than water. Refer to GF Harvel 112/401 Product Bulletin for chemical resistance and installation data.