



Pipe & Hangers Technical
Special Pipe - Clear-Ultra Violet Resistant (UVR) PVC

UV Resistant Clear Pipe
Dimensions & Pressure Ratings

Thin Walled UVR Pipe

| Pipe Size | O.D. | Average I.D. | Min. Wall | Nominal Wt./Ft. | Max. W.P. PSI* |
|-----------|--------|--------------|-----------|-----------------|----------------|
| 2 | 2.375 | 2.173 | 0.091 | 0.456 | 80 |
| 3 | 3.500 | 3.210 | 0.135 | 0.966 | 80 |
| 4 | 4.500 | 4.134 | 0.172 | 1.569 | 80 |
| 6 | 6.625 | 6.251 | 0.172 | 2.391 | 70 |
| 8 | 8.625 | 8.251 | 0.172 | 3.134 | 53 |
| 10 | 10.750 | 10.376 | 0.172 | 3.923 | 43 |
| 12 | 12.750 | 12.376 | 0.172 | 4.666 | 36 |

| De-rating Factors @ Elevated Temperature | |
|--|------------------|
| 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 |

Schedule 40 UVR Pipe

| Pipe Size | O.D. | Average I.D. | Min. Wall | Nominal Wt./Ft. | Max. W.P. PSI* |
|-----------|-------|--------------|-----------|-----------------|----------------|
| 1/2 | 0.840 | 0.602 | 0.109 | 0.170 | 300 |
| 3/4 | 1.050 | 0.804 | 0.113 | 0.226 | 240 |
| 1 | 1.315 | 1.029 | 0.133 | 0.333 | 220 |
| 1-1/4 | 1.660 | 1.360 | 0.140 | 0.450 | 180 |
| 1-1/2 | 1.900 | 1.590 | 0.145 | 0.537 | 170 |
| 2 | 2.375 | 2.047 | 0.154 | 0.720 | 140 |
| 2-1/2 | 2.875 | 2.445 | 0.203 | 1.136 | 150 |
| 3 | 3.500 | 3.042 | 0.216 | 1.488 | 130 |
| 3-1/2 | 4.000 | 3.521 | 0.226 | 1.789 | 120 |
| 4 | 4.500 | 3.998 | 0.237 | 2.118 | 110 |
| 6 | 6.625 | 6.031 | 0.280 | 3.733 | 90 |

Maximum Service Temperature = 140°F

The temperature de-rating factors shown in table at left can be multiplied by the pressure ratings listed for each pipe size to determine the maximum pressure rating of the pipe at the specified elevated operating temperatures.

*Pressure Rating @ 73 °F

Developed to Promote Algae Growth in Bioreactor, Biofuel, Bioremediation, Research and Aquaculture Applications

Spears® EverCLEAR™ UV Resistant (UVR) PVC piping is suitable for use where exposure to sunlight is desired. The modified clear PVC material allows light in but blocks the harmful wavelengths that damage the plastic pipe.

Produced in both Thin Walled UVR pipe down to 0.135" and Schedule 40 UVR pipe to allow rapid growth of algae and provide pressure ratings needed for circulation. Commercial use has found that UV blocking PVC provides excellent Photosynthetically Available Radiation (PAR) for algae growth. Using specialty EverCLEAR™ PVC piping is beneficial in construction of photobioreactors since clarity is critical in allowing optimum light into the process to allow the algae to grow and feed. The Thin Walled version of Spears® EverCLEAR™ Ultraviolet Resistant (UVR) PVC pipe has been found to optimize light transmission while maintaining the necessary rigidity for durable construction. The advantages of EverCLEAR™ UVR PVC includes corrosion resistance, durability, non-conductivity, light weight construction and can be easily joined using Spears® PVC Clear solvent cements and primers using standard solvent cement welding practices.

Material

Spears® EverCLEAR™ UV Resistant (UVR) PVC piping material has been specially developed for optimum UV resistance. Independent testing has shown high stability of clarity and color in Spears® EverCLEAR™ UVR piping material from actual one year weather exposure tests in Arizona, Florida, and Ohio.

Spears® EverCLEAR™ UVR chemical resistance is similar to conventional clear PVC, and is generally resistant to most acids, bases, salts, and oxidants. However, exposure to chemicals may result in discoloration over time, especially certain bleaches, oxidizing agents, and nitrogen containing organics. As a result, in-service testing under actual conditions is recommended.

THE MAXIMUM SERVICE TEMPERATURE FOR PVC UVR CLEAR IS 140°F

SPEARS® CLEAR UVR PIPE MUST BE PROTECTED FROM FREEZING

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PVC Physical Properties

| GENERAL | Value | Test Method |
|---|--------------------------------|-------------|
| Specific Gravity, (g/cu.cm @ 73°F) | 1.38 | ASTM D792 |
| Cell Classification | 11553 | ASTM D1784 |
| Maximum Service Temperature | 140°F | |
| Color | Transparent / slight blue tint | |
| Hardness, Shore D | 85 | ASTM D2240 |
| Hazen-Williams Factor | C=150 | |
| MECHANICAL | | |
| Tensile Modulus of Elasticity, psi @ 73°F | 416,000 | ASTM D638 |
| Tensile Strength, psi @ 73°F | 8,250 | ASTM D638 |
| Flexural Modulus, psi @ 75°F | 423,000 | ASTM D790 |
| Flexural Strength, psi @ 75°F | 13,600 | ASTM D790 |
| Izod Impact notched - injection molded, .125 in. bars, 73°F | 3.9 ft-lbs./in. | ASTM D256 |
| THERMAL | | |
| Coefficient of Linear Expansion (in/in/°F) | 3.9 x 10 ⁻⁵ | ASTM D696 |
| Deflection Temperature Under Load, Annealed, 264 psi, .125 in. Bars | 142°F | ASTM D648 |
| FLAMMABILITY | | |
| Flame Rating | V-0 | UL-94 |

Joining Methods

Spears® PVC EverCLEAR™ pipe is easily joined by a standard solvent cementing process, threaded connections and flanges. To maintain system clarity, Spears® recommends the use of a clear, medium-bodied, fast-setting cement in conjunction with a clear primer for optimum joint integrity. See Installation section for industrial pressure pipe for guidelines. Threading of Thin Walled or Schedule 40 EverCLEAR™ UVR PVC pipe is not a recommended practice due to insufficient wall thickness.

Thermal Expansion and Contraction

Standard calculations for thermal expansion and contraction may be applied to Spears® EverCLEAR™ UVR PVC. The coefficient of linear expansion for Spears® EverCLEAR™ UVR pipe is 3.9 x 10⁻⁵ in./in./°F. The rate of expansion or contraction can be calculated as follows:

$\Delta L = 12 yL (\Delta T)$

Where:

ΔL = Expansion or contraction in inches

y = 4.1 x 10⁻⁵ (coefficient of linear expansion)

L = Length of piping run in feet

T = Temperature change °F (T max.-T @ installation)

Hangers and Supports

Spears® EverCLEAR™ UVR PVC piping should be mounted and supported in the same manner as PVC industrial piping. However, heat deformation and mechanical loads need additional consideration with EverCLEAR™ UVR piping and should not be deflected more than 3% of the outside diameter. Thin Walled pipe must be supported properly to avoid buckling and provide circumferential support to maintain roundness. Support location and spacing are based on the pipe diameter, operating temperature of the system, and the location of any concentrated stress loads (i.e., valves, flanges, and any other heavy system components). Hangers used must have an adequate load-bearing surface free of any rough or sharp edges that could damage the piping during use. They must also not restrict linear movement of the system due to the effects of expansion and contraction; over tightening must be avoided.

Thin Walled UVR Support Spacing

| Pipe Size (inches) | Maximum Support Spacing in Feet | | | | |
|--------------------|---------------------------------|-------|-------|-------|-------|
| | 60°F | 80°F | 100°F | 120°F | 140°F |
| 2 | 4-1/2 | 4-1/2 | 4 | 3-1/2 | 3 |
| 3 | 5-1/2 | 5-1/2 | 5 | 4-1/2 | 3-1/2 |
| 4 | 6-1/2 | 6 | 5-1/2 | 5 | 4 |
| 6 | 6-1/2 | 6 | 5-1/2 | 5 | 4 |
| 8 | 6 | 5-1/2 | 5 | 4-1/2 | 4 |
| 10 | 5-1/2 | 5-1/2 | 5 | 4-1/2 | 3-1/2 |
| 12 | 5 | 5 | 4-1/2 | 4 | 3-1/2 |

Schedule 40 UVR Support Spacing

| Pipe Size (inches) | Maximum Support Spacing in Feet | | | | |
|--------------------|---------------------------------|-------|-------|-------|-------|
| | 60°F | 80°F | 100°F | 120°F | 140°F |
| 1/2 | 4 1/2 | 4 1/2 | 4 | 2 1/2 | 2 1/2 |
| 3/4 | 4 1/2 | 4 1/2 | 4 | 2 1/2 | 2 1/2 |
| 1 | 5 1/2 | 5 | 4 1/2 | 3 | 2 1/2 |
| 1-1/4 | 5 1/2 | 5 1/2 | 5 | 3 | 3 |
| 1-1/2 | 6 | 5 1/2 | 5 | 3 1/2 | 3 |
| 2 | 6 | 5 1/2 | 5 | 3 1/2 | 3 |
| 2-1/2 | 7 | 6 1/2 | 6 | 4 | 3 1/2 |
| 3 | 7 | 7 | 6 | 4 | 3 1/2 |
| 3-1/2 | 7 1/2 | 7 | 6 1/2 | 4 | 4 |
| 4 | 7 1/2 | 7 | 6 1/2 | 4 1/2 | 4 |
| 6 | 8 1/2 | 8 | 7 1/2 | 5 | 4 1/2 |