



Low Extractable PVC Piping System

LE-2-1023

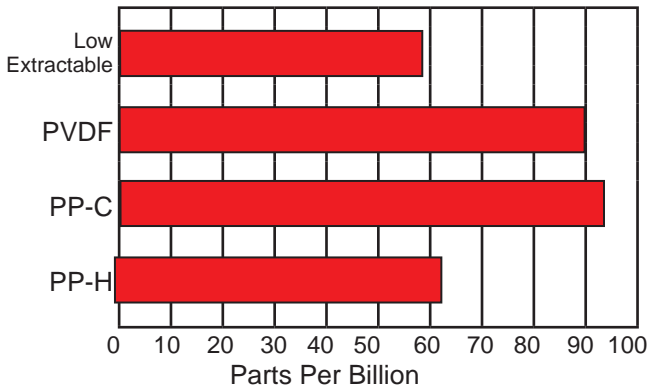
Non-Contaminating PVC Material Exceptionally Smooth Surface Characteristics Low TOC & Chemical Extraction Fast Particle Rinse Up



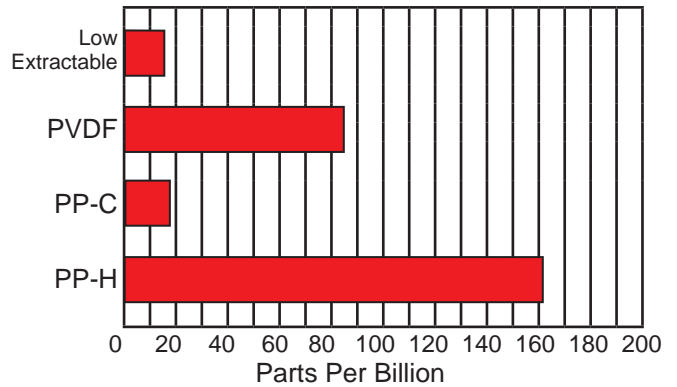
Superior Performance, Lower Installation Costs

Spears® Low Extractable PVC provides a superior, cost effective alternative to conventional high purity piping system materials while providing ease of installation without jeopardizing water quality. Specially developed for ultra-pure water systems in semiconductor, electronics, university research laboratories, hospital dialysis, industrial laboratories, Federal and state police forensic laboratories and biotechnology applications; Spears® Low Extractable PVC material has been subjected to independent laboratory leach studies during both static and dynamic exposure to 18.2 meg-ohm deionized water. Tests have shown relatively low TOC, Anion/Cation and trace metal contamination levels in comparison to conventional high purity piping system materials including PVDF and Natural Polypropylenes.

Low TOC (Total Oxidizable Carbon)



Low Ion & Trace Metal Contaminates



Material test graphic comparisons from 7-day static leach analysis at ambient temperature, 18.2 meg-ohm ultra pure water on Low Extractable, PVDF, PP Copolymer and PP Homopolymer pipe samples by ICP Mass Spectroscopy. Ion & Trace Metal contaminates reflect cumulative totals. Contact Spears® for individual levels.



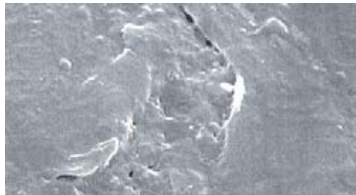
Spears® Low Extractable 5000x

Surface Characteristics Comparable to PVDF, Superior to PP & Conventional PVC

Photographic comparisons on interior wall of pipe.



High Purity PVDF 5000x



Natural Polypropylene 5000x



Conventional PVC 5000x

More Spears® Low Extractable PVC Advantages . . .

Fast System Rinse up

Semiconductor or Electronics grade high purity deionized water systems require an extremely low particle count to avoid process contamination. Drops in resistivity are directly related to particle contamination. Suitable materials must reach and maintain acceptable particle count and resistivity levels. In dynamic flow tests of Low Extractable PVC material using semiconductor grade ultra pure water, average particle counts decreased rapidly in the first 6-minutes and matched 0.05 micron background levels in 12-minutes. Resistance increased rapidly to match the 18.2 meg-ohm background level in 1-hour.

Non-contaminating Solvent Cement Joints for Lower Installation Costs

Spears® Low Extractable PVC is joined using a One-step solvent cement system specially formulated for high purity applications. Low percentages of chemical additives combined with an exceptionally fast set and cure time reduces the potential for TOC contaminates, provides for quick rinse up, and greatly reduces installation costs. The transparency of Low Extractable fittings, valves and pipe allows visual inspection for proper technique and integrity of joints.

Excellent Chemical Resistance

Spears® Low Extractable PVC is highly resistant to a wide variety of chemicals such as ozone, peroxides, and disinfectants. Low Extractable PVC is not recommended for use with chlorinated or aromatic hydrocarbons, esters or ketones.

Multiple Configurations 1/2" Through 6" Manufactured to Strict ASTM Standards

Spears® Low Extractable PVC products are strictly manufactured to ASTM requirements for optimum strength, dimensional stability, and product consistency in Spears® ISO 9001 Certified manufacturing facilities. Sizes 1/2" through 6" produced in a variety of configurations including True Union Ball Valves, Diaphragm Valves, Needle Valves, Gauge Guards, Elbows, Tees, Couplings, Reducer Couplings, Caps, Flanges, Male Adapters, Flush Style Reducer Bushings, Unions, Tank Adapters and Spears® patented Special Reinforced (SR) Female Adapters.

Low Extractable Pipe Pressure Rating

| Nominal Size | PSI @ 73° F |
|--------------|-------------|
| 1/2 | 420 |
| 3/4 | 340 |
| 1 | 320 |
| 1-1/4 | 260 |
| 1-1/2 | 240 |
| 2 | 200 |
| 3 | 190 |
| 4 | 160 |
| 6 | 140 |

Temperature De-rating Factors

| Temperature ° F | De-rating Factor |
|-----------------|------------------|
| 73 | 1.00 |
| 80 | .88 |
| 90 | .75 |
| 100 | .62 |
| 110 | .51 |
| 120 | .40 |
| 130 | .31 |
| 140 | .22 |

Low Extractable System Component Temperature (°F) / Pressure Rating (psi)

| System Component | Nominal Size | 73°F to 100°F | 110°F | 120°F | 130°F | 140°F |
|------------------|--------------|---------------|-------|-------|-------|-------|
| Unions | 1/2" - 4" | 235 | 211 | 150 | 75 | 50 |
| Ball Valves | 1/2" - 4" | 235 | 211 | 150 | 75 | 50 |
| Diaphragm Valves | 1/2" - 2" | 150 | 135 | 110 | 75 | 50 |
| Flanges | 1/2" - 6" | 150 | 135 | 110 | 75 | 50 |
| Needle Valves | 1/4" - 1/2" | 235 | 211 | 150 | 75 | 50 |
| Gauge Guards | 1/4" - 1/2" | 235 | 211 | 150 | 75 | 50 |

To determine pipe pressure rating at a desired elevated temperature, multiply the 73°F pressure rating times the designated De-rating Factor, as found in charts to the left.

Valves, Unions and Flanges have elevated temperature pressure ratings different than pipe, as shown in chart above. Maximum PVC system service temperature is 140°F.



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