Dura Plastic Products, Inc.

# Technical Tips

## ASTM Fitting Standards

Schedule 40 and 80 solvent weld and threaded fittings are **covered by the following ASTM Standard Specifications**:

- D2464 - Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule80.
- D2466 - Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
- D2467 - Socket-Type Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
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These Standards deal mainly with workmanship, materials, dimensions, tolerances and testing. There are no pressure ratings for PVC fittings in these ASTM Standards. The only pressure references are for burst pressure. The Standards even state that the burst pressures are used "only as an indication of quality" and "do not imply rated working pressures."

## Pressure Surges

Definition: Few piping systems are operated under "static" conditions for long periods of time. Hydraulic transient conditions or "surges" occur in every irrigation system. A pressure surge or "water hammer" is created any time the flowrate changes in a piping system. This may be caused by valve operation, pumps starting or stopping, linebreaks or rapid escape of entrapped air.

## Prevention Tips

**To limit the magnitude and frequency of pressure surges, system operators should use the following guidelines:**

1. Operate the system to maintain pump flowrate as uniformly as possible. This will not only reduce hydraulic transient problems but will increase the life of the pumping unit.

2. Attempt to balance system flows so the sprinkler set changes are systematic within system subunits. Avoid changing from one main area of the system and back again in the operating program. Maintain sub-unit flows uniformly, if possible.

3. Run fewer sets for longer times. Hydraulically, it is easier on the system to run a given set as long as possible, provided runoff does not occur, or the moisture holding capacity of the soil is not exceeded. This will allow for fewer sets and, thereby, fewer opportunities for surges to occur.

4. Avoid operating too many sprinklers in one area of the system and elevating the operating velocities. Use the design guidelines to govern the number of sprinklers that may operate simultaneously on a given pipe segment or loop.

## Temperature Expansion Considerations

All pipe materials expand and contract with changes in temperature and this dimensional change must be considered in the design and installation of the piping systems. As a general rule, a 10 degree Fahrenheit change in temperature will cause PVC pipe to expand or contract 3/8" in for every 100 feet of length. For example, a 1,000 foot pipeline installed in the summer when the ambient temperature is 90 degrees Fahrenheit would shrink about 20 inches if the soil cooled to 40 degrees Fahrenheit in the winter. This change in length must be accommodated or severe damage to the pipe fittings will result.

## Temperature Correction Factors

Corrections must be made to derate all PVC and CPVC pipe, valves and fittings when operating temperatures are expected to exceed 73 degrees Fahrenheit. The working pressure is directly affected by temperature changes. The drop in pressure capacity can be calculated using table 3. Multiply the maximum working pressure by the temperature correction factor for a known temperature.

Example: For 2" Schedule 80 PVC fitting, the maximum working pressure is 243 psi. If the operating temperature is known to be 110 degrees Fahrenheit, the correction factor can be found on the chart to be 0.50. The adjusted working pressure would then be 243 x 0.50 = 121 psi.

The chart below is to be used to determine recommended pressures. If you have any questions regarding your system, contact your architect or designer for proper system operations.

## Temperature Correction Factors

| Operating Temp. (°F) | 70 | 80 | 90 | 100 | 110 | 115 | 120 | 125 | 130 | 140 | 150 | 160 | 170 | 180 | 200 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PVC | 1.00 | .88 | .75 | .62 | .50 | .45 | .40 | .35 | .30 | .22 | NR | NR | NR | NR | NR |
| CPVC | 1.00 | 1.00 | .91 | .82 | .77 | .74 | .65 | .66 | .62 | .50 | .47 | .40 | .32 | .25 | .20 |