

COLD WEATHER: NO PRACTICAL EFFECT ON PVC PIPE INSTALLATION AND USE

Fifty years of field experience confirm that PVC pipe more than measures up to the rigors of cold-weather installation and use. In fact, an easy-to-use product like PVC pipe becomes even more advantageous as temperatures decrease. PVC is widely used in Canada, Minnesota, and the Dakotas, so cold weather is not a limiting factor for PVC pipe projects.

PVC PIPE DESIGN FOR COLD TEMPERATURES

The design properties of PVC pipe are established at 73°F (PVC pipe's reference temperature). As temperatures decrease, properties change as follows:

- *Tensile strength and modulus of elasticity* increase, so PVC pipe's ability to withstand internal pressure and external loads improves.
- *Impact strength* decreases, but this is not a design consideration – after the pipe is buried, there is no exposure to impact loads.

Other cold-weather design considerations include:

- *Expansion/Contraction:* Like all pipe materials, PVC pipe expands and contracts with temperature change. PVC's coefficient of thermal expansion is .00003 in/in/°F (meaning a 20' pipe will expand 0.07" for each 10°F increase). Correct positioning of the "insertion" line (a circumferential line near the spigot end of each PVC pipe) ensures adequate room for expansion of pipe installed in temperatures that are significantly colder than in-service temperatures. See Uni-Bell Technical Brief: "Insertion Lines for Gasketed PVC Pipe."
- *Frozen Pipe:* Regardless of pipe material, freezing of sewer and water mains should be prevented. As a general rule, pipe should be buried at least 12" below normal frost depth. Sewer laterals and water service-lines (including goosenecks) should also be below frost depth.

HANDLING AND INSTALLATION IN COLD WEATHER

- *Handling:* As mentioned above, the impact strength of PVC pipe decreases during cold weather. At 32°F, however, the pipe still maintains 70% to 90% of its strength at 73°F. Abusive procedures that may work in warm weather may not be as successful in the winter. The problem is not the weather – it's the failure to follow recommended practices.
- *Installation:* Rubber becomes harder at colder temperatures, slightly increasing the amount of force required to assemble a gasketed joint. The pipe spigot should be inserted correctly (only to the insertion line), allowing the pipe to freely expand during operating temperatures. To prevent freezing of service lines, any goosenecks should be installed at least 12" below frost depth.

OPERATIONS AND MAINTENANCE IN LOW TEMPERATURES

- *Tapping:* There are no cold-temperature limitations for tapping PVC pipe.
- *Thawing Frozen Lines:* While prevention is the best practice, methods for thawing frozen lines are described in chapter 11 of Uni-Bell's *Handbook of PVC Pipe*, Fifth Edition.

Installation practices rather than pipe material are the key consideration in cold conditions. Abusive handling practices should not be used with any pipe material – regardless of temperature. Worker safety should always be paramount: prolonged exposure to cold weather may affect workers' productivity and performance.