

## Lesson 5: Protecting Water Pipes from Freezing

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A well-designed and constructed plumbing system will seldom freeze. Freezing is preventable if certain factors are considered when planning pipe installation, and methods of insulating and heating pipes are available to prevent freezing. If lines do freeze, thawing the pipes without causing damage is possible if it is done correctly.

#### Factors to Consider When Installing Pipe

Running water lines underground below the frost line is a proven method of preventing freezing in the lines. How deeply the pipes are laid depends on the frost line in the area. The average frost line in Missouri is 36 inches. Pipes should be below the frost line. Most people install their pipes a foot below the frost line to help prevent freezing. A county Extension office or reference materials from a local library can provide information on the exact depth necessary in an area.

When installing plumbing in and around a structure, the design of the plumbing system should take into account the potential for freezing. Designing the system so that pipes are placed in interior rather than outside walls. When conditions heavily favor freezing, other measures may protect interior pipes. Supplying at least minimal heat to the inside of the structure using any appropriate heating system will greatly reduce the risk of pipes freezing

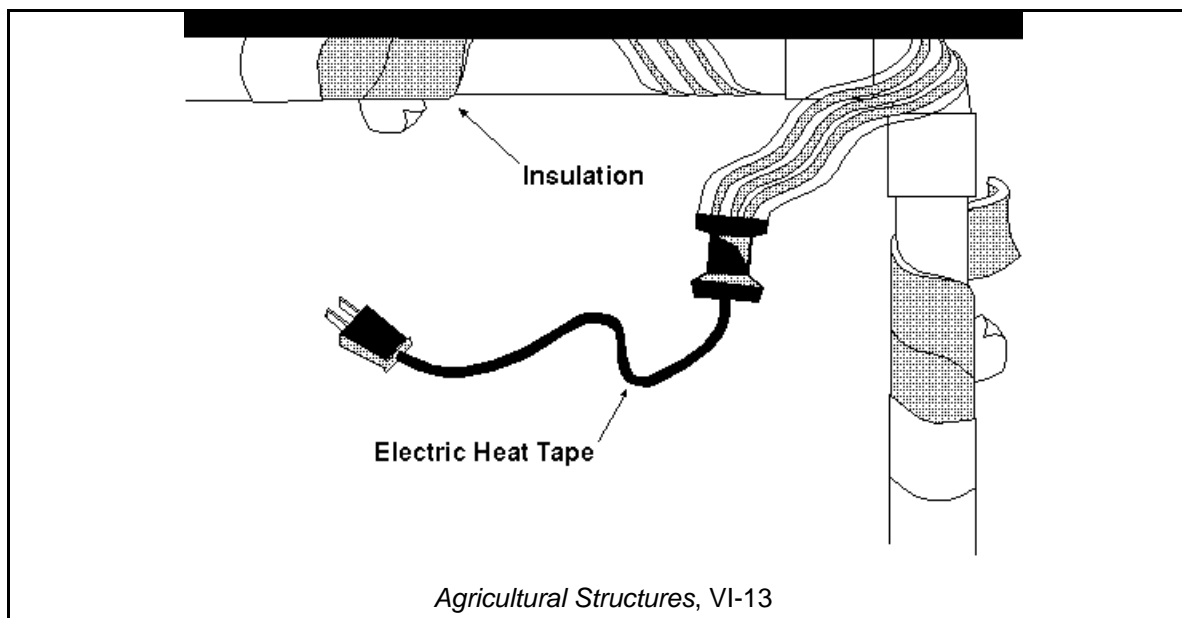
can protect them from freezing. If pipes must be exposed to cold temperatures, certain measures can be taken to avoid freezing. Insulation should be used around pipes placed near exterior walls. Insulation with an R factor of 6.5 to 8 offers substantial protection. The insulation should be carefully wrapped, with the ends butted together tightly and joined with tape.

Frost-free faucets should be used outdoors; their design prevents water from remaining in the section of pipe extending above the ground when the faucet is not in use. If pipe is installed in an area subject to freezing, a drain valve should be added. The valve allows water to drain out of the pipe, preventing damage due to freezing.

#### Methods to Prevent Freezing

Where water lines come to the surface, a significant threat of freezing exists, and protective measures should be taken. In cold weather, any exposed pipe should be wrapped in waterproof insulation; with extremely cold temperatures, even frost-free faucets should be insulated. Protecting the pipe from direct winds will also reduce the threat of freezing. One way to protect the pipe would be to create a temporary shelter around the exposed pipe using stacked hay bales.

inside the building. Another method of preventing freezing involves using electric heat tape. The heat tape is placed along the pipe, which is then wrapped in insulation to hold the heat close to the pipe, as shown in Figure 5.1.



The tape carries an electrical current through it to supply heat, much like an electric blanket. Heat tape can be wired either with a timer set to turn it on and off at certain times or with a thermostat that activates the tape at a designated temperature.

*Figure 5.1 - Electric Heat Tape*

Allowing the water to run continuously can also prevent freezing. Monitoring a water line's output is useful if freezing is likely. As ice forms in the pipe, the water pressure begins to drop. The line should be opened a little so that the water runs continuously. Running water is much more resistant to freezing; the water may also help remove ice that has already formed in the line. If the pressure returns to normal, the water should be allowed to drip or trickle from the faucet until the temperature rises to a safe point.

### Thawing Frozen Water Pipes

Should pipes become completely frozen and obstructed, a careful inspection of all exposed water lines will be necessary. If any breaks are found, the water to that section of the line or to the entire system should be turned off. The break will have to be repaired, usually by cutting out the broken section and putting in a new pipe with fittings, before turning the water on again.

To thaw frozen pipes, the frozen section of the pipe needs to be heated. Professional plumbers frequently use torches for this task. However, this practice can be dangerous. If the flame comes in contact with combustible material, a fire can result. With the pipes frozen, water may not be available to douse even a small fire. Also, heating the pipes in one spot too quickly can cause the water to boil, creating enough pressure to cause the pipes to explode. If the pipe is too hot to touch, too much heat is being applied. A flame should never be applied directly to a plastic pipe, since it will melt.

Safer methods can be utilized to heat pipes. Electric heaters, hair dryers, heating pads, and electric blankets are often effective, although these devices should only be used after evaluating if any danger of electrical shock exists when using them around water lines. Placing embers or charcoal briquettes in an appropriate container near the frozen pipes may be useful for thawing exterior pipes.

### Summary

With frozen water pipes, prevention is by far the best solution. Pipe lines should be buried below the frost line. The design of the plumbing system should also prevent freezing, by avoiding placing pipes near exterior walls or using insulation where appropriate, using frost-free outdoor faucets, and installing drain valves. If pipes are likely to freeze, they should be insulated or heated if possible, or the water may be allowed to run continuously. Frozen lines must be inspected for leaks before applying heat to the frozen section. Thawing must be done safely, without starting a fire, causing pipes to explode, or creating a situation where electrical shock is possible.

### Credits

Annis, William H. *Basic Plumbing Skills*. Athens, Ga.: American Association for Vocational Instructional Materials (AAVIM), 1989.

McConnell, Charles. *Plumbers and Pipe Fitters Library*. Vol. 3, *Water Supply · Drainage · Calculations*. New York: Macmillan, 1989.

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