INSTALLING REFRIGERATION PIPING INSULATION

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INSTALLATION

Installing insulation on new refrigeration piping: the slip-on method

The *slip-on* method of installation is used when you can insulate new piping before it goes up or as it is being connected.

All you do is slip a length of insulation over the pipe or copper tubing, as shown in Figure 1. The inside of the insulation is coated with a powdered lubricant, making it easy to slip the insulation over the pipe.

NOTE:

Small amounts of powdered lubricant may enter the open ends of pipe or tubing. This dust must be kept out of refrigeration systems. Plug the open ends of pipe before slipping on the insulation.

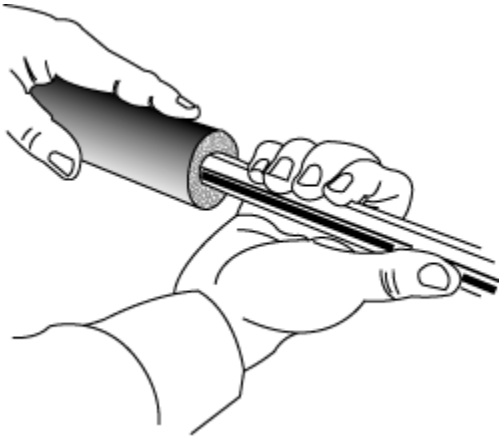

Figure 1 Slip on tubing.

Since rubber insulation, a closed-cell rubber, is flexible, it will follow bends in tubing and can be slipped right over bent tubing, 45° sweat ells, 90° sweat ells, and couplings, as shown in Figure 2.

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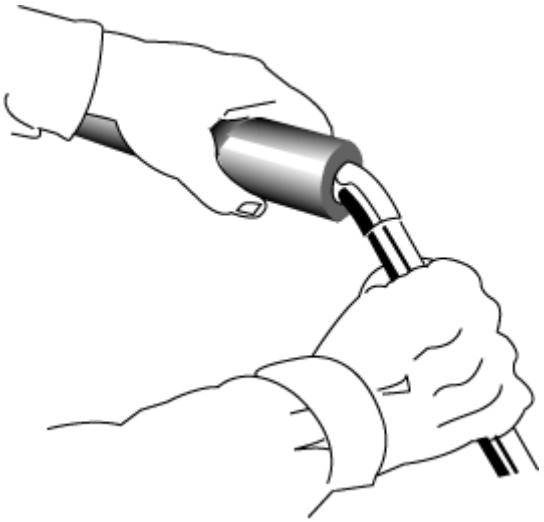

Figure 2 Tubing is flexible.

GUIDELINES FOR WORKING WITH REFRIGERATION PIPING INSULATION

- Use good quality tools—in particular, fresh adhesive, good adhesive brushes, and sharp knives.
- Apply insulation only when the pipes are clean, dry, and unheated or uncooled. The surface to be insulated must be free of rust.
- Never stretch insulation when sealing the joints. It is better to compress it slightly. Use pieces of insulation that are at least as long as the section of pipe to be insulated.
- Always use the insulation that is properly sized for the pipe it is to cover. Do not stretch it over the pipe.
- Do not crowd insulation-covered pipes. Space pipes far enough apart to allow for the free circulation of air. Air movement is an extra safeguard against surface condensation of cold pipes, especially under hot, humid conditions.
- All piping insulation must be properly sealed to minimize heat loss and control condensation. On cold lines, open pipe insulation joints may allow the formation of condensation, increasing the potential for or contributing to possible pipe or tubing corrosion. Seal insulation joints as shown in this guide.
- When using refrigeration piping insulation outdoors, always paint with a recommended finish. Follow the manufacturer's instructions regarding the type of finish, the number of coats required, etc. Allow proper drying times between coats.
- In double-layer work, apply insulation with the side and end joints staggered.
- Do not compress piping insulation at joists, studs, columns, ducts, hangers, etc. This is important because the insulation will lose thermal efficiency where it is compressed. On cold systems, surface condensation may occur where insulation is compressed.

INSTALLING REFRIGERATION PIPING INSULATION

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When you are using 1-in. wall insulation, it may be necessary to fabricate a miter-cut fitting cover. To do this, cut the insulation at the 90° sweat ells, as shown in Figure 3, and butt the insulation against each side of the fitting. (Later a fitting cover will be installed over these fittings.) Use a length of insulation as long or slightly longer than the section of piping to be covered.

NOTE:

Never stretch the insulation.

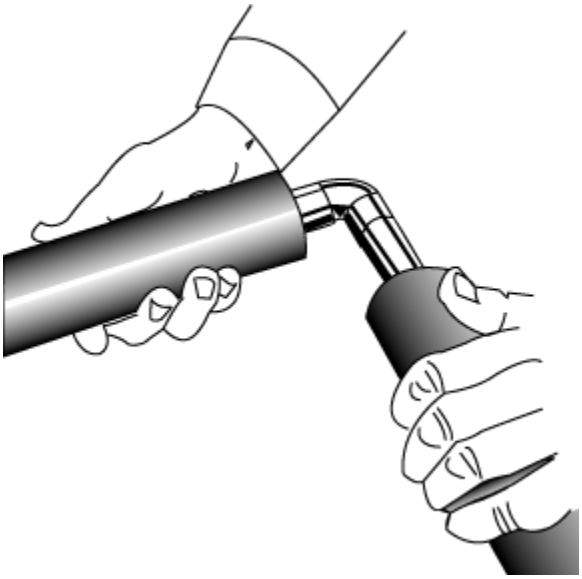

Figure 3 Prepare the ell.

Apply a coating of an approved contact-type adhesive to both butt ends to be joined, as in Figure 4.

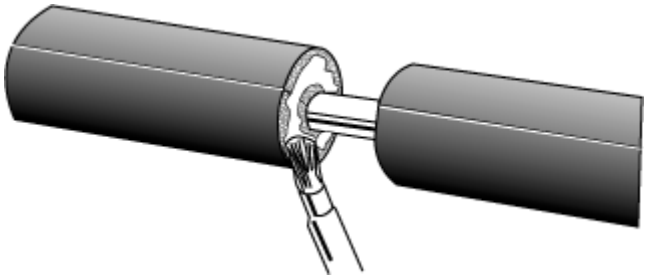

Figure 4 Apply adhesive.

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Before butting the ends together, allow the adhesive to set until it is dry to the touch but still tacky under slight pressure. Join the surfaces as in Figure 5.

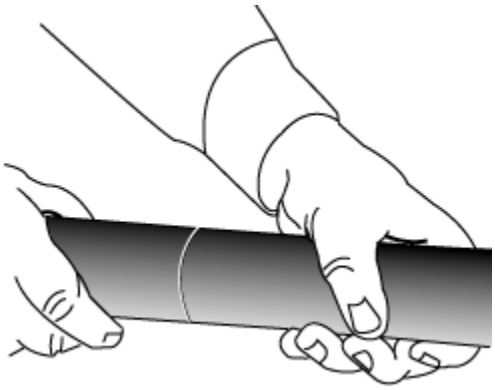

Figure 5 Joining surfaces.

FABRICATING FITTING COVERS

Some manufacturers provide a convenient miter guide on the carton that contains the insulation (see the AP Armaflex carton, for example), or you can make your own template with all the angles necessary for normal installations. To form a 90° elbow, cut through the insulation at a 45° angle with the help of the miter template, as in Figure 6.

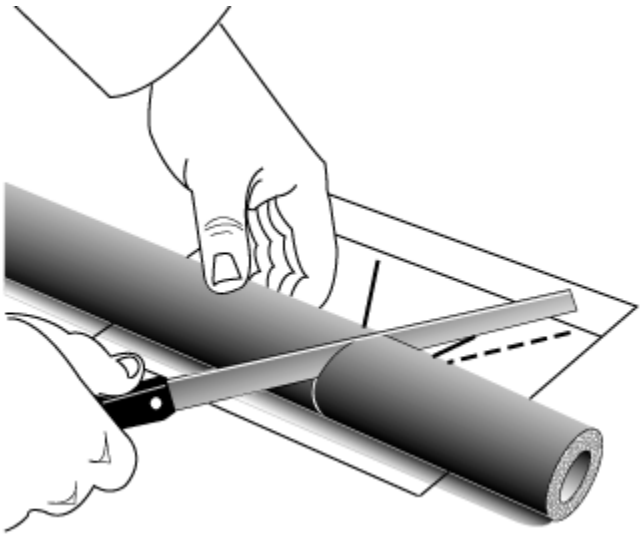

Figure 6 Cut insulation at a 45° angle.

Reverse the position of one of the sections in relation to the other so that an elbow is formed, as shown in Figure 7. Join the two sections using the adhesive.

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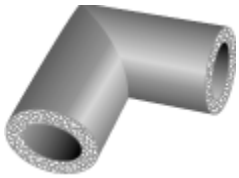

Figure 7 From an elbow.

Cut open the inside wall of the elbow, taking care not to damage the opposite wall. The slit-open elbow should slip over the fitting, as shown in Figure 8. Apply adhesive to the seam (not to the butt ends), allow to tack dry, and fit over the fitting. Press the seams together working from the ends toward the center of the elbow.

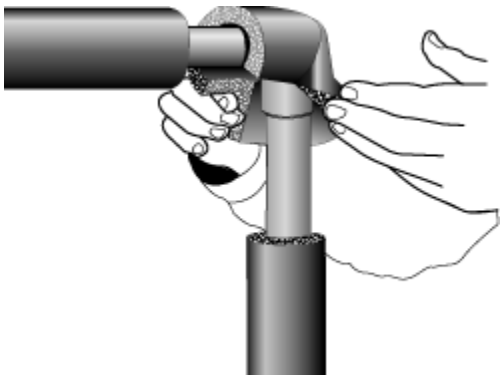

Figure 8 Slit open the tube to apply.

Finally, wet seal the butt ends to the incoming lengths of insulation, as shown in Figure 9. Cut the incoming lengths so that the butt joints are in slight compression.

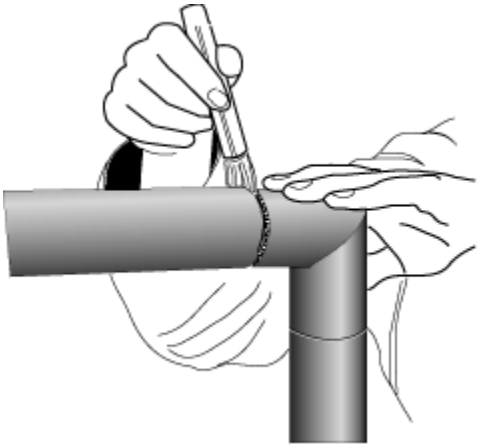

Figure 9 Apply adhesive to the butt ends.

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P-TRAP FITTINGS

When you are using 1-in. wall insulation, it is normally necessary to fabricate miter-cut covers for P-trap fittings. This can be accomplished by using either a 45° miter layout or a 22.5° miter layout, as shown in Figures 10 and 11.

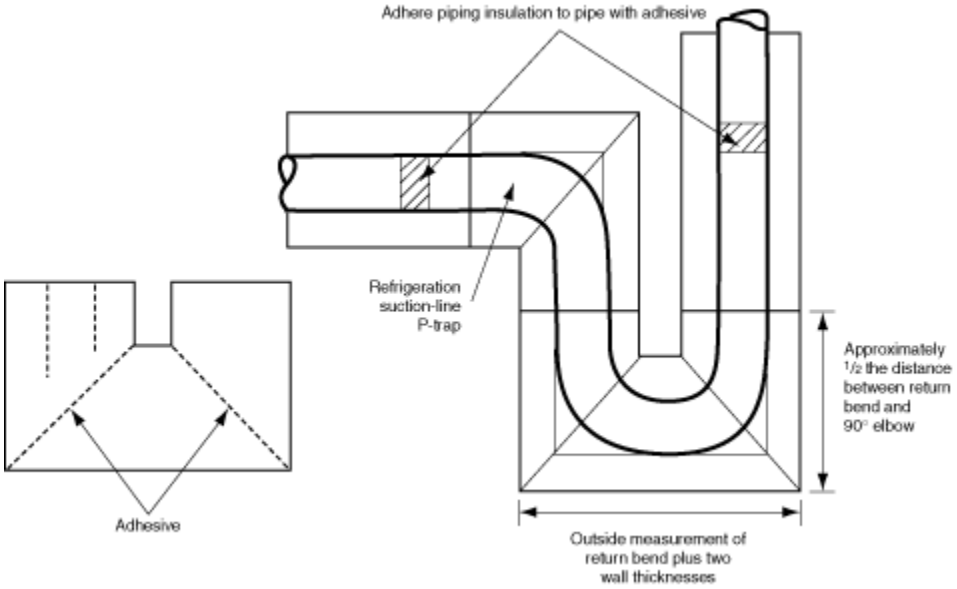

Figure 10 Sample 45°-miter layout.

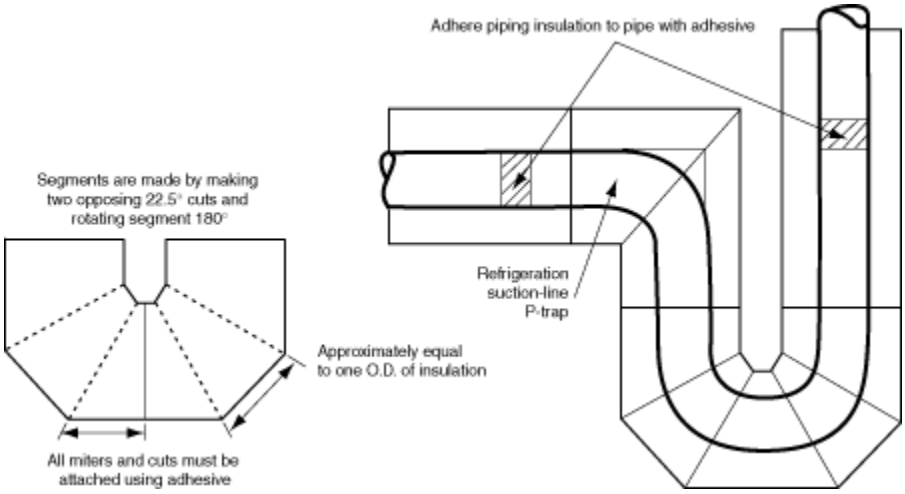

Figure 11 Sample 22.5°-miter layout.

After fabrication, the 180° cover can be slit along the inside radius so that it may be snapped around the trap and then sealed with adhesive. The insulation must be adhered to the pipe on both sides of the P-trap with adhesive.

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Installing insulation on existing refrigeration piping: the snap-on method

The *snap-on* method of installing insulation is used when the pipe or copper tubing to be is insulated has already been installed and connected.

With unslit tubular insulation, use a sharp knife to cut the insulation lengthwise on one side, as shown in Figure 12.

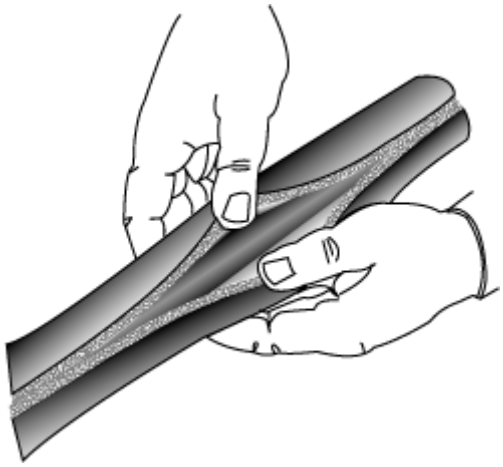

Figure 12 Cut insulation for existing pipe.

Brush-coat both cut surfaces with adhesive. Push the insulation down over the pipe to hold the adhesive-coated surfaces apart while the adhesive dries. Application of the adhesive is shown in Figure 13.

Figure 13 Push the insulation down.

The adhesive should be dry to the touch but tacky under slight pressure before you join the surfaces. You can test the tackiness with the back of your fingernails, as shown in Figure 14. If the insulation should

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become stuck to the pipe after you have applied adhesive, break the insulation loose by running a finger down the pipe. This is illustrated in Figure 15.

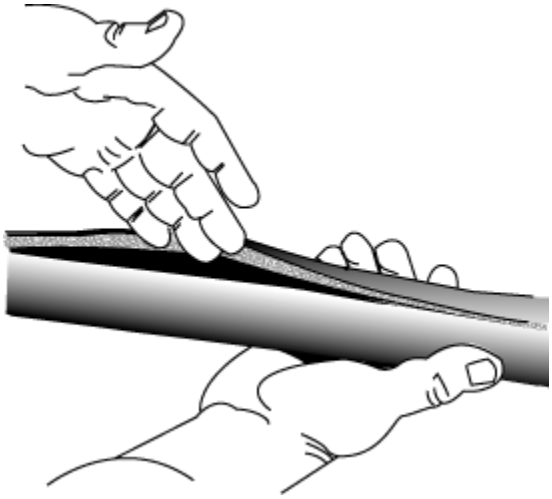

Figure 14 Test the tackiness of the adhesive.

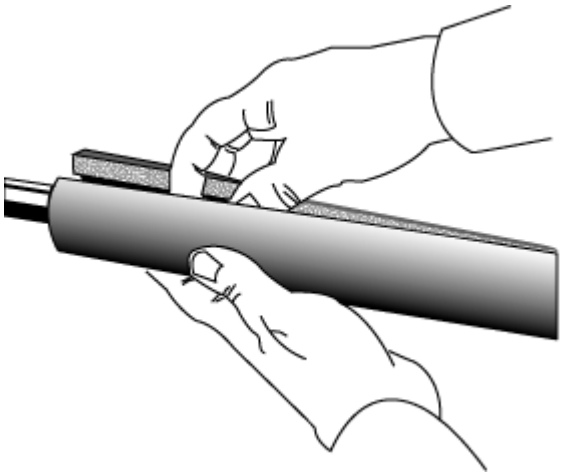

Figure 15 Loosen stuck insulation.

When the adhesive has air-dried, apply moderate pressure to the entire joint to assure a vapor-tight bond. This is shown in Figure 16.

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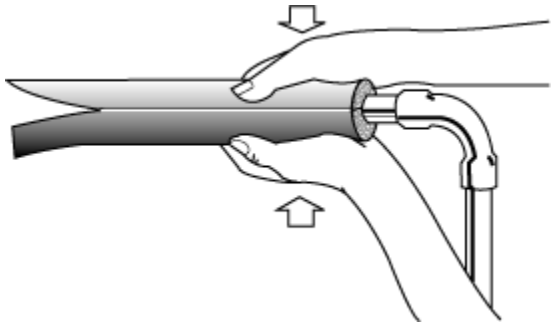

Figure 16 Apply moderate pressure to insulation after drying.

APPLYING TWO LAYERS OF INSULATION

Figure 17 illustrates the application of a double layer of insulation. Apply double-layered insulation with the side and end joints staggered, where possible.

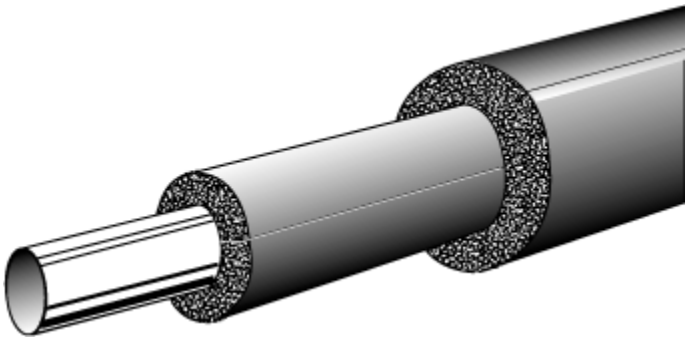

Figure 17 Stagger double-layered insulation.

CORRECT USE OF ADHESIVE

Before use, shake or stir the adhesive thoroughly. Use small cans of adhesive for actual insulation work to prevent it from drying too rapidly. Use a brush with short, stiff bristles.

Apply adhesive in a thin, uniform layer to both surfaces to be joined. Adhesives can become tacky in 2 to 5 min after application. This time will vary according to ambient temperatures and relative humidities. Avoid "open times" in excess of 10 min.

Allow the adhesive to "tack dry." The correct initial drying period can be checked by using the "fingernail test." Touch the surface with a fingernail. If the surface feels tacky and your fingernail adheres to it, the joint may be closed. If the surfaces are left to dry for too long a period, they will not adhere when pressed together. In this case, reactivate by applying another layer of adhesive. Some adhesives may not adhere to asphalt, bitumen, red-lead, or cement surfaces.

The maximum adhesive force is obtained when two tack-dry surfaces are brought together. Press the surfaces being joined together firmly for a few seconds.

To clean tools, contaminated metal surfaces, or surfaces that have talc applied, wipe with a cloth dampened with alcohol.

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In general, the application of adhesives should not be carried out when the ambient temperature is below 40°F. If you are working outdoors at temperatures between 40 and 50°F, keep the can of adhesive indoors at 65°F until needed.

WET SEALING

At times, two insulation surfaces or joints may require "wet sealing" for condensation control. This method of sealing requires compressed joints and overlapping surfaces.

Wet sealing is accomplished by applying wet adhesive between the surfaces and immediately closing in the desired position, without any "open time" for the adhesive. "Open time" is defined as the period between first applying the adhesive and finally closing together the joint seam or surface.

IMPORTANT INSTALLATION CONSIDERATIONS

Keep the following guidelines in mind when you work with refrigeration piping insulation:

- All seams and joints of *elastomeric insulation*, a closed-cell rubber, must be properly sealed with adhesive, thereby preventing condensation between the insulation and the copper tubing.
- Installers of copper tubing should avoid introducing applied stress to the copper. Applied stress can be a result of any manipulation, direct or indirect, resulting in stresses to the copper tubing.
- Under no circumstances should chlorinated solvents such as 1,1,1,-trichloroethane be used to clean a copper refrigeration system. Such solvents have been linked to rapid system failure.
- No acidic materials such as citric acid or acetic acid (vinegar) should be used on copper systems. Such acids are found in many cleaners.
- Self-evaporating lubricating oil, and even refrigerants themselves, can react with moisture to produce corrosive acidic materials such as acetic acid. Therefore, all soldered connections must be gas tight, as a leak could result in failure to a section of insulated copper tubing.
- Good quality refrigeration piping insulation, when installed in accordance with the manufacturer's specifications, will not cause stress corrosion cracking of copper tubing.

ENGINEERING CONSIDERATIONS

Apply the following engineering considerations when installing refrigeration pipe insulation:

- Appropriate wall thicknesses of insulation that is suitable for the environment and the operating conditions must be used to avoid condensation on the copper tubing.
- Insulation should in no way be constricted mechanically or adhered to the copper tubing except as noted in this guide. Improper operations may result in the pooling of water between the insulation and copper tubing.
- Extraneous chemicals or chemical-bearing materials, such as corrosive cleaners containing ammonia and/or amine salts, wood smoke, nitrites, and ground or trench water, should not come into contact with the insulation.
- Where the layout of the system is such that condensation may form and run along uninsulated copper by gravitational force, a beginning run of insulation must be adhered completely to the

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copper tubing with adhesive. This will prevent water from entering between the insulation and the copper.

- Copper tubing used in refrigeration systems should comply with ASTM B280 and should be from a reputable manufacturer.

SYSTEM TESTING

Consider the following system testing factors when working with pipe insulation:

- When pressure-testing copper tube systems, take care not to exceed the specific yield point of the copper tube used.
- When testing copper tubing for leaks, use only a detector solution designed for that purpose.
- It must be assumed that all commercially available soap and detergent products contain ammoniacal or amine materials, which do contribute to the formulation of stress cracks.
- Any insulation that has become wet or saturated with refrigeration lubricating oils should be completely replaced. These types of oils can react with moisture to form corrosive materials.