



refrigerant tubing will have the ends sealed off to prevent any contaminants from entering while applying the insulation.

Always use the insulation that is properly sized for the pipe it is to cover and, where possible, the insulation should be at least as long as the section of pipe to be insulated. Do not stretch the insulation over the pipes. Do not crowd insulation-covered pipes. Space pipes far enough apart to allow for the free circulation of air. Air movement can be an extra safeguard against surface condensation on cold pipes.

Good quality refrigeration piping insulation, when installed in accordance with the manufacturer's specifications, will not cause stress corrosion cracking of copper tubing.

It is very important that piping insulation is properly sealed to minimise heat loss and control condensation. On cold lines, open-pipe insulation joints may allow the formation of condensation, decreasing the effectiveness of the insulation and providing the potential for, or contributing to, possible pipe corrosion. Water

may condense and drip onto walls, ceilings or equipment, causing damage which you may be held accountable for.

When sealing joints, a contact adhesive is normally used, sometimes in conjunction with sealing tape. Never stretch insulation when sealing the joints. It is better to compress it slightly. When forming butt joints, first apply the adhesive to both surfaces, allow the adhesive to set until it is dry to the touch but still slightly tacky, press the seams together working from the ends butting the ends together and allow the adhesive to set. To form a 90° elbow, cut through the insulation at a 45° angle. It is normally necessary to fabricate mitre-cut covers for p-trap fittings. This can be accomplished by either cutting to a 45° mitre layout or a 22.5° mitre layout.

You may have the need to apply or reapply insulation to an existing pipework system. Obviously, the slip-on method is not a practical method. For this type of application, we use snap-on insulation. One could of course, using a sharp knife, cut the insulation open lengthways. You must then glue the entire length of the slit as previously described. Alternatively, one can purchase armaflex that has been manufactured for this purpose.

Once the insulation has been applied, simply peel off the paper and firmly press the edges together.



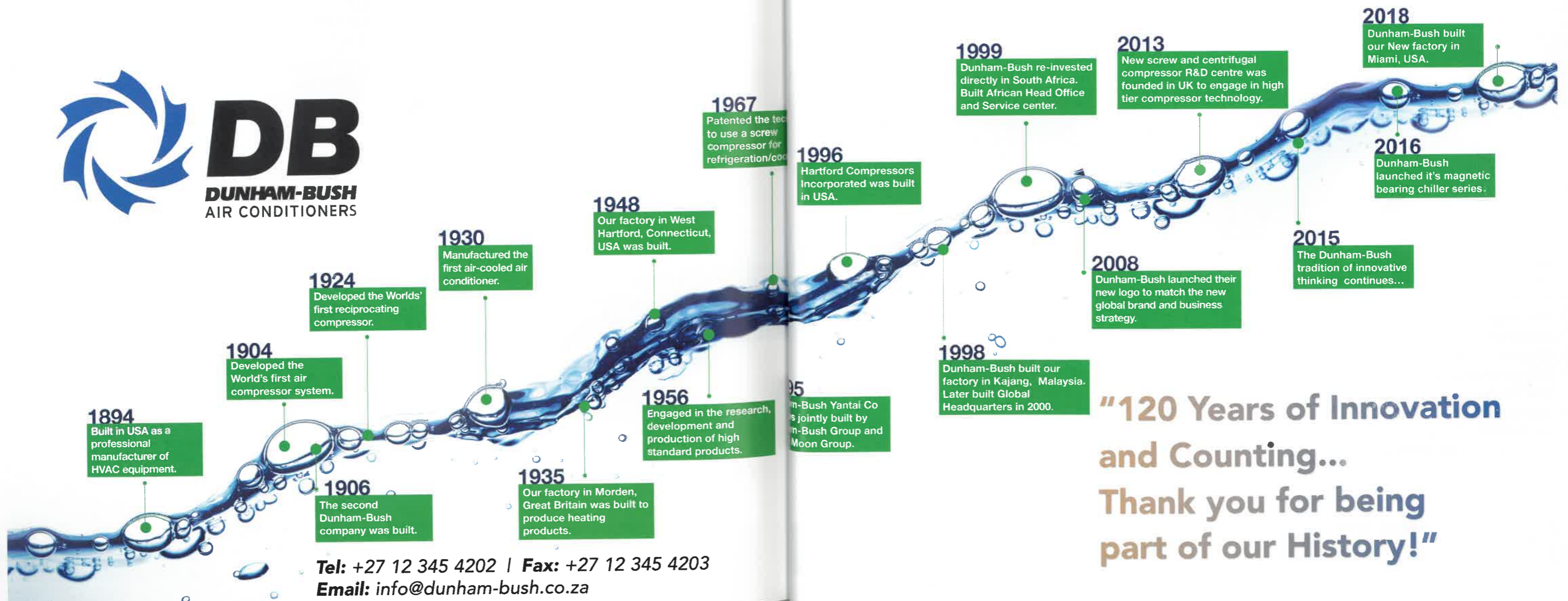
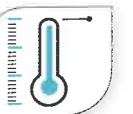
Premanufactured armaflex with adhesive.

It is possible that you may have to apply two layers of insulation. The same rules apply, but make sure to stagger the side and end butt joints. In this case you may come across the term wet sealing. 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.

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

- All seams and joints of elastomeric insulation, 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 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 connections must be gas tight.
- Good quality refrigeration piping insulation, when installed in accordance with the manufacturer's specifications, will not cause stress corrosion cracking of copper tubing.
- Be aware of and protect against the effects of UV light.
- 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.



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- 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.
 - 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.
 - Pressure testing of the refrigeration piping should be conducted before sealing the insulation. 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.
- Piet, this should help you with your issues around armaflex.

Thank you for all your questions. Send your problems (and sometimes your creative solutions) to acra@netactive.co.za with 'Solutions Page' in the subject line. You may include pictures.

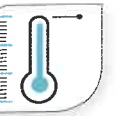
Chris sent me the following: Grant, here is an example of good workmanship in KwaZulu-Natal.



Hi Chris, thanks – words fail me!

REFERENCES:

ACRA **RACA**



SELELE MASHILO

Selele Mashilo has a mechanical engineering diploma from Tshwane University of Technology and a refrigeration and air-conditioning diploma from Unisa. His experience includes over a decade in government as deputy-director building services before rejoining the private sector in 1998 as HVAC&R project engineer. He is the former chairperson of the Refrigeration and Air Conditioning Empowerment Forum of SA (RAEFSA), the Air Conditioning and Refrigeration Industrial Council of SA (ACRICSA), and Black Energy Services Companies (BESCO).

HVAC&R SYSTEMS

APPLICATIONS (CLEAN SPACES)

CONTINUED

By Selele Mashilo

Conditioned air pattern introduced into a room influences the control of internal contaminants.

I dealt with non-laminar air flow in the previous article. In some instances, it is critical that internally created contaminants be removed quickly from the space, especially where toxic materials are processed or handled. As such, laminar flow air pattern may be considered.

LAMINAR AIR FLOW

In a laminar flow, air is introduced evenly from the entire ceiling or the roof of the space if air terminals are used. The purpose of this is to remove the air at the bottom of the room that carries all internally created contaminants. Obstructions may be created by equipment present in the space or by movement from the occupants. If constant air velocity in the space is achieved, the obstructions are eliminated. Some of the contaminants may adhere to downstream sides of equipment and two conditions may arise. Non-airfoiled shaped obstructions may create some eddies downstream which obstruct removal of contaminants, and contaminants remain on the surfaces of

equipment where air flow is parallel to the surface with very low air velocities caused by friction drag.

Air velocity of laminar flow is recommended at 0.46m/s to provide a good dilution.

As indicated, the air may be introduced into the space through the ceiling void with filters inserted above the ceiling. The air may also be introduced on the side of the wall evenly.

The diagram below indicates how laminar flow may be achieved by using the ceiling void as air supply space. The air is distributed evenly throughout the ceiling.

The conditioned aid may be introduced on the side of the wall and extracted on the opposite wall as indicated by the figure below:

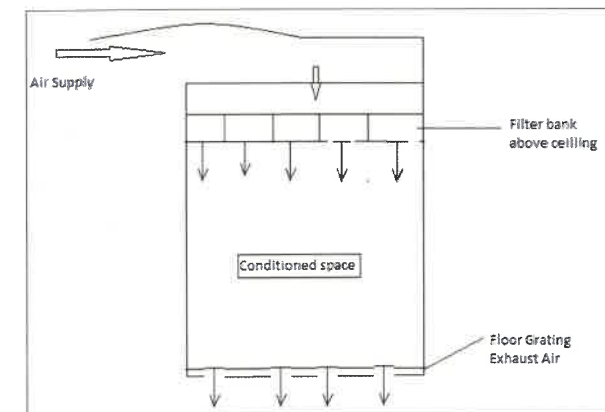


Figure 1: Ceiling Plenum Air Supply (courtesy ASHRAE HVAC System 1987).

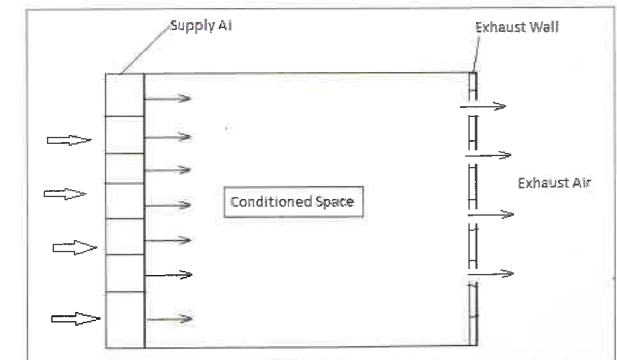


Figure 2: Horizontal Laminar Flow Space (courtesy ASHRAE HVAC System 1987).

Clean rooms are kept either in a positive pressure or negative pressure, depending on the activities inside the space. In instances where contaminants are hazardous, air is filtered and extracted.

Reference: ASHRAE **RACA**



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