



# TECH TIP #19

## HOW DO YOU KEEP STEAM COILS FROM FREEZING?

Courtesy Coil Company—www.coilcompany.com

### STEAM COILS TO HEAT AIR FROM SUB-FREEZING TEMPERATURES (BELOW 32°F)

When heating outdoor air from temperatures below 32°F, provision must be made to prevent freezing of the condensate in coil tubes.

Outdoor air may be as low as or lower than 20°F below zero and must be heated to 35° to 45° before being introduced to the reheat coil which will bring temperatures up to 160° to 180° for use for ventilation, comfort heating or process application range.

The design of the low temperature or preheat coil differs from that of the conventional or reheat coil in a number of ways. It should have inner steam tubes to carry the steam full length of the outer or finned tubes to prevent cold spots across coil face.

Preheat coil is the general term for coils handling air below 32°F and is designed to bring temperatures above 35°F before introduction of air to the reheat coil which raises temperature to 160° or 180°F range or higher.

If possible, the tubes in the preheat coil should be vertical to provide complete gravity drainage of condensate to the condensate header.

When use of vertical tubes is not practical due to height limitation, horizontal tubes with inner distributor tube are acceptable. Tubes, however, should be pitched 1/8" to 1/4" per foot to condensate outlet for drainage.

For the general configuration of the horizontal and vertical tube preheat coil see drawings page 10. The steam chamber supplies steam to the inner tubes which have small orifice holes full length.

This supplies equal steam volume to the far end of the tube and prevents cold spots which could promote freeze-up.

The outer tube returns the hot condensate to the header condensate chamber for delivery to the condensate trap system and return to the boiler.

Use of distributor type (DT) preheat coils does not insure against coil freeze-up damage. Many factors such as pressure drop in coil, air in coil or plugged orifices in distributor tubes may all cause condensate to build up in tubes and freeze.

Accumulation of air and non-condensable gases in tubes may restrict flow of condensate and result in freeze-up and tube rupture.

Any time the pressure within a preheat coil falls below that in the return piping, condensate may build up in the tubes and freeze-up is imminent if air across coil is below 32°F.

This condition may be corrected by a vacuum breaker to maintain coil above return line pressure.

Use of a vacuum pump on return main to hold return line pressure below coil pressure is most effective.

Do not discharge condensate from preheat coils into overhead return lines.

Always provide a strainer in steam line to distributor tube coils to protect the small orifice holes on inner tube from plugging due to scale and sediment.

An additional freeze-up prevention measure is the condensate temperature sensing hook-up shown on page 11.

Preheat coils are usually one row deep.

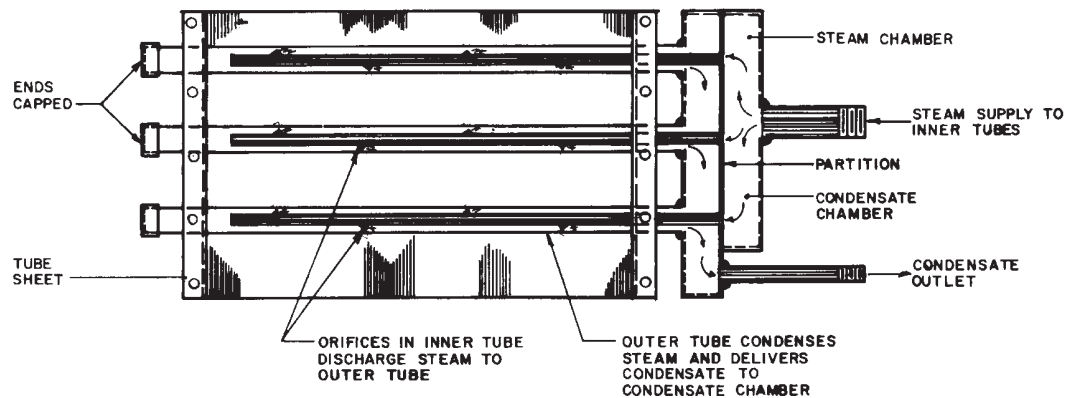
Reheat coils are generally two rows deep.

Air may be introduced to either side of steam coils since steam and condensate are theoretically at same temperature.

In many cases steam distributor coils (DT) are specified for temperatures above 32°F, particularly when fin length is over 60" and steam supply is modulated and steam at reduced pressure must be delivered to far end.

### HORIZONTAL TUBE DT\* STEAM COIL

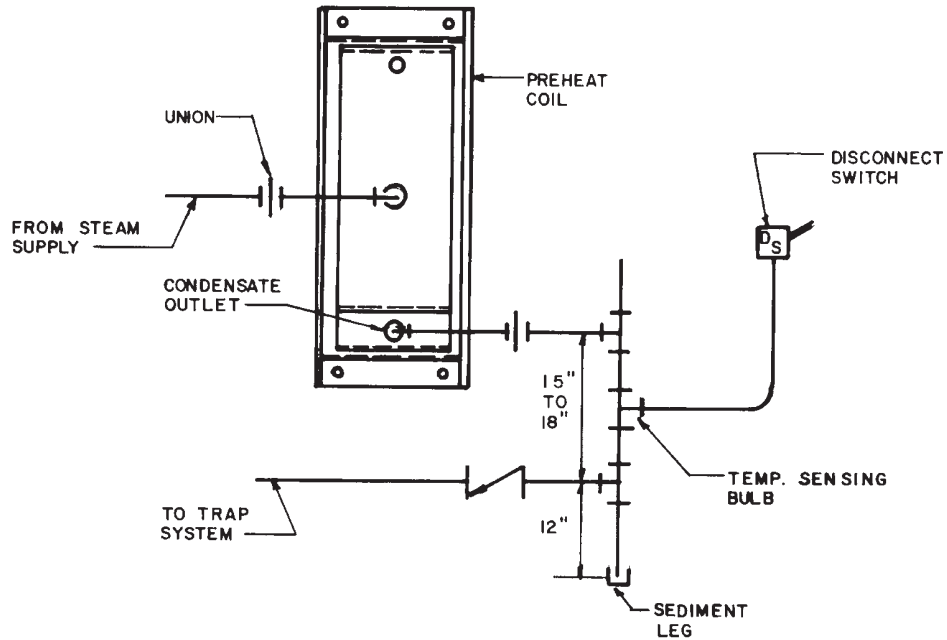
Essential components of the (DT\*) Steam Distributor coil.





## TECH TIP #19 (Cont.)

### TYPICAL HOOK-UP FOR FREEZE PROTECTION OF PREHEAT STEAM COILS



Temperature sensing bulb is located in Tee. Disconnect switch is used to control blower motor and close fresh air damper when condensate temperature drops below any set temperature between 45° and 60°F.

Use same hook-up for vertical tube coils. See drawings for coil configuration on page 10.

### COIL PIPING — LOW PRESSURE SYSTEM

For pressures of 0# Ga. to 15# Ga. corresponding to 212° to 250°F.

