**1 Hydronic Coils**

1.1 Information applicable to all hydronic coils:
- Pipe connections are to be non-ferrous, e.g. red brass
- Tube wall thickness $\geq 0.025”$
- Fin thickness $\geq 0.0095”$
- Water Velocity $\geq 2.5$ and $\leq 5$ fps
- WPD $\leq 10’$
- APD $\leq 1.00”$
- $\frac{1}{2}”$ valved vent and $\frac{1}{2}”$ valved drain on the outside of the unit.

**Notes:** Some manufacturers use steel connections which can cause an electrolysis problem when connecting to a system with predominately copper pipe.

Some manufacturers use thinner walled tube. This causes a problem at the bends where the pipe is pulled (stretched) thinner on the outside. That is the point of the most erosion and causes premature failure.

Some manufacturers use thinner fins that are damaged easily.

Higher water velocities aggravate erosion.

Some manufacturers have vent and drain connections that are too small to be of any practical use.

1.2 Information specific to hydronic cooling coils
- Average face velocity $\leq 450$ FPM
- $\Delta T \geq 18°F$ ($45°F$ to $63°F$)
- Casing to be stainless steel $\geq 18$ ga.

**Note:** Early research established $500$ FPM as the velocity below which there is no moisture carryover. The problem is that designing for an average of $500$ FPM means there will likely be areas of high velocity somewhere on the coil face causing moisture carry over. Simply lowering the average face velocity to $450$ removes this possibility and provides a second benefit of significantly reducing pressure drop.

2 Steam Distributing Coils

2.1 Steam heat and reheat coils may be horizontal tube.

2.2 Steam preheat coils are vertical tube, steam distributing type, in the draw through configuration with top steam and bottom condensate header. Both steam and condensate headers are to be out of the air stream.

2.3 Information applicable to all hydronic coils:
- Pipe connections are to be steel
- Casing to be galvanized steel $\geq 18$ ga.
- Tube wall thickness $\geq 0.035”$
- Inner tube diameter $\frac{5}{8}”$ OD
- Outer tube diameter $1”$ OD
- Fin thickness $\geq 0.0095”$
- APD $\leq 0.50”$

2.4 Stream preheat coils are not to be Internal Face and Bypass type.

**Note:** Though popular with designers IFB coils have a limited life span, with linkages prematurely binding. IFB coils also require extra length to ensure adequate mixing.

3 Cooling Coil Freeze Protection

3.1 The simplest and most reliable is to place the preheat coil and the chilled water coil on opposite sides of a plenum fan. In this way the fan is used for thorough mixing.

**Note:** Though plenum (aka plug) fans may be slightly less efficient than other fan types, being able to reduce the overall static pressure by a simpler pre-heat coil arrangement with no air mixers has proven to be advantageous.

3.2 A second method is to install a small circulating pump on the water coil. The pump is off and out of the water flow during the summer. In the winter the pump is turned on. The normal LWT sensor monitors the leaving water temperature. If the LWT falls below $35°F$ then the chilled water control valve opens.

3.3 The third method is to install two back to back, independently controlled preheat coils. The first one heats the air $20°F$. Thus anytime the OA is below freezing this coil is wide open. The second coil heats the air $45°F$. 