

HEATING COIL SPECIFICATIONS

The economical specification of heating coils involves the consideration of a number of important factors. If the basic concepts of the application are considered during the selection process many possible problems can be avoided.

- (1) SIZING - The determining factor on the size of a coil should be the air volume it is expected to handle, as the size / air volume ratio determines the face velocity of the coil. For a given air volume a small coil will be initially cheaper to purchase but more expensive to run due to its higher air pressure drop. This can also sometimes have a bearing on the selection of the fan to overcome this resistance. It is generally suggested that face velocities be kept above 1.5 M/S in order to encourage equal air distribution over the face of the coil. The maximum face velocity should be set according to the particular situation involved. Where noise levels are of particular importance as in private homes a limit of 2.5 to 3.0 M/S maximum should be maintained. Commercial applications should be limited to 3.5 to 4.0 M/S while industrial situations can be designed up to 6 M/S although air pressure drop will often be excessive at this speed.

Selecting a maximum face velocity will determine the minimum face size required but the length to width ratio will have an effect on the cost of the coil. A long narrow coil has less tubes and manifold compared to a short wide coil of the same face area making it cheaper to manufacture. This can be negated by excessive ducting costs if taken to an extreme.

- (2) The air entering temperature has a bearing on the rows and fins selection of a coil and so should be an accurate estimation of the actual running conditions. During system start up this temperature will be lower which will greatly improve the performance of the coil. The higher the air on temperature the more difficult it becomes for a coil to maintain its rated output so if any doubt exists increase rather than decrease this figure.
- (3) Although the duty of the coil is determined by the heat load calculations of the area to be served, the load to air temperature rise relationship are directly related and certain factors should be borne in mind. Assuming load calculations are correct then air off temperatures below 24 deg C indicate that the air volume is higher than ideal. If air off temperatures are above 45 deg C it suggests more air should be used. Excessively high air off temperatures not only increase coil air resistance and cost but also encourage air stratification within the heated area thus increasing energy consumption for the same apparent effect.

- (4) Water supply temperature will be determined by the boiler being used but the return temperature and flow rates are often variable. Higher flow rates and water out temperatures result in more economical coil selection but pump and pipe sizes may need to be larger. The water pressure drop of the coil also effects pump sizing so figures of 20 to 30 kPa are often specified. The same situation of initial cost verses running costs exists here.

Generally water velocities within a coil, which is determined by the water flow rate and number of circuits, should be kept between 0.3 - 1.5 M/S to encourage turbulent flow without water scrubbing. This should not be of concern as long as a reasonable maximum water pressure drop is specified. Pressure drop ideally should not be below 0.5 kPa however on small coils with low water flow rates this is often not possible.

- (5) Coil fin spacing is adjusted by the manufacturer to obtain the required rating, but it should be remembered that close fin spacing will result in higher maintenance costs due to more frequent cleaning requirements. Often coils are specified with a maximum of 400 or 470 fins per meter. Incoming air filtration and ease of access for cleaning should be considered on this matter.
- (6) Standard coil construction is generally copper tubes with aluminum fins and galvanized steel frames. Aluminum frames add only a small amount to price and reduce the number of dissimilar metals present. For salt air or mid city applications corrosion coatings offer protection although this can be expected to add some 25 % to the purchase price.