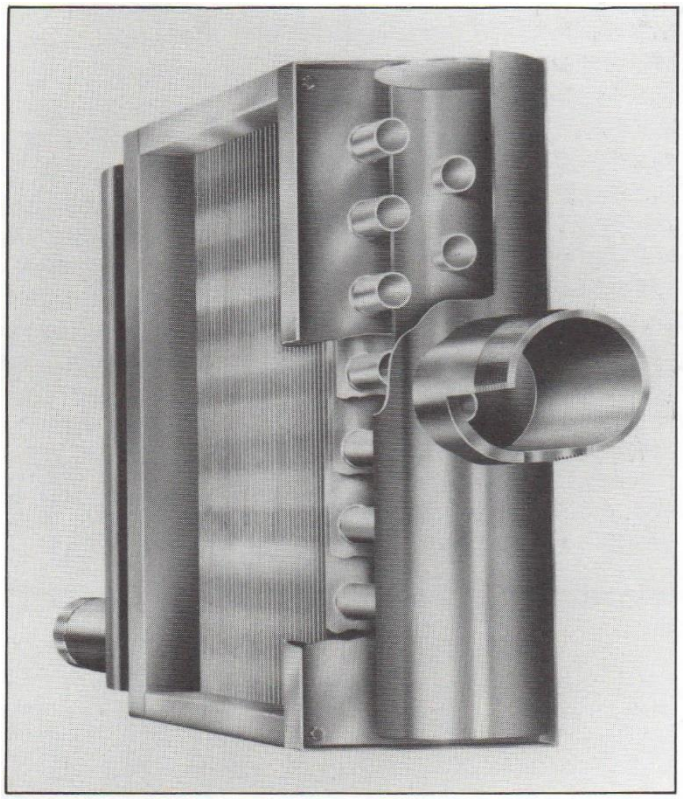
Tech Brief - Steam Coil Considerations



Tech Brief: Coils Series

Steam Coil Designs

Tech Brief - Steam Coil Considerations

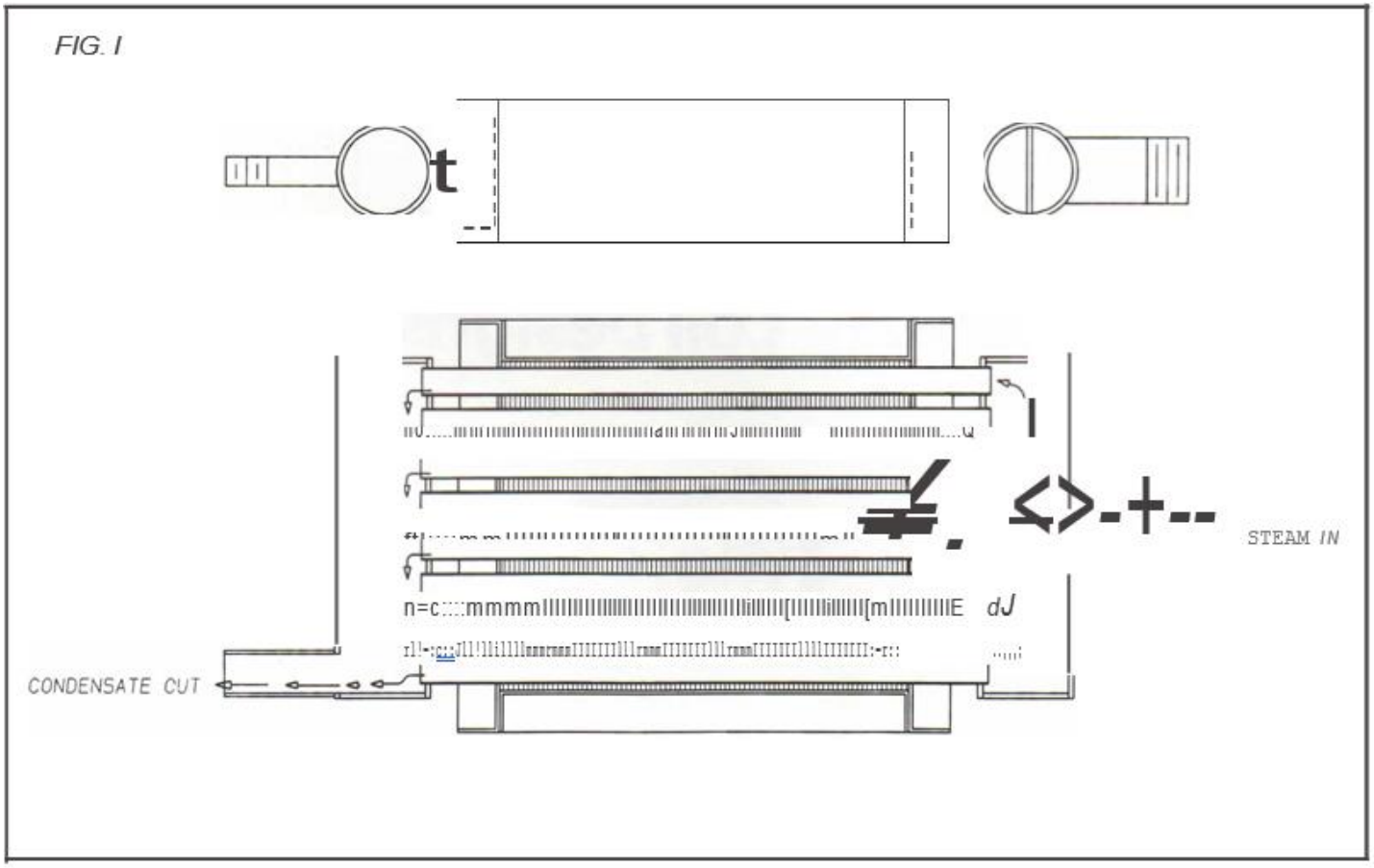
In the next two series of Tech Briefs we will provide a general overview of steam and circulating fluid coil designs. These articles are designed to aid in making the proper coil selection. The first Tech Brief covers standard steam and steam distributing coils. General steam coil guidelines are provided to help determine the proper fin lengths and tube sizes. At the end of this series there will be an article on various types of circulating coils in addition to general guidelines to follow for proper coil sizing and selection. Subsequent tech briefs will focus in detail on dimensional considerations in coil selection, performance requirements and installation guidelines.

STANDARD STEAM COILS

Single Pass Design

The single pass standard steam coil is designed primarily for applications using non-modulating steam supplies with air temperatures maintained above freezing. This type of coil offers excellent freeze resistance when installed with tubes in the vertical position providing that fin lengths are not excessive, (over 60 inches) and steam pressures are maintained at/or above 5 psig. Single pass standard steam coils are generally limited to 1 or 2 rows. However, special designs with more than 2 rows are occasionally used in special circumstances.

This coil design uses a baffle inside the header to help prevent uneven circuit loading. On very long headers, tube orifices can



Standard steam coils with a single pass design are most commonly used in applications where the steam supply is non-modulating and air temperatures are above freezing. The baffle shown above inside the supply header helps prevent uneven circuit loading.

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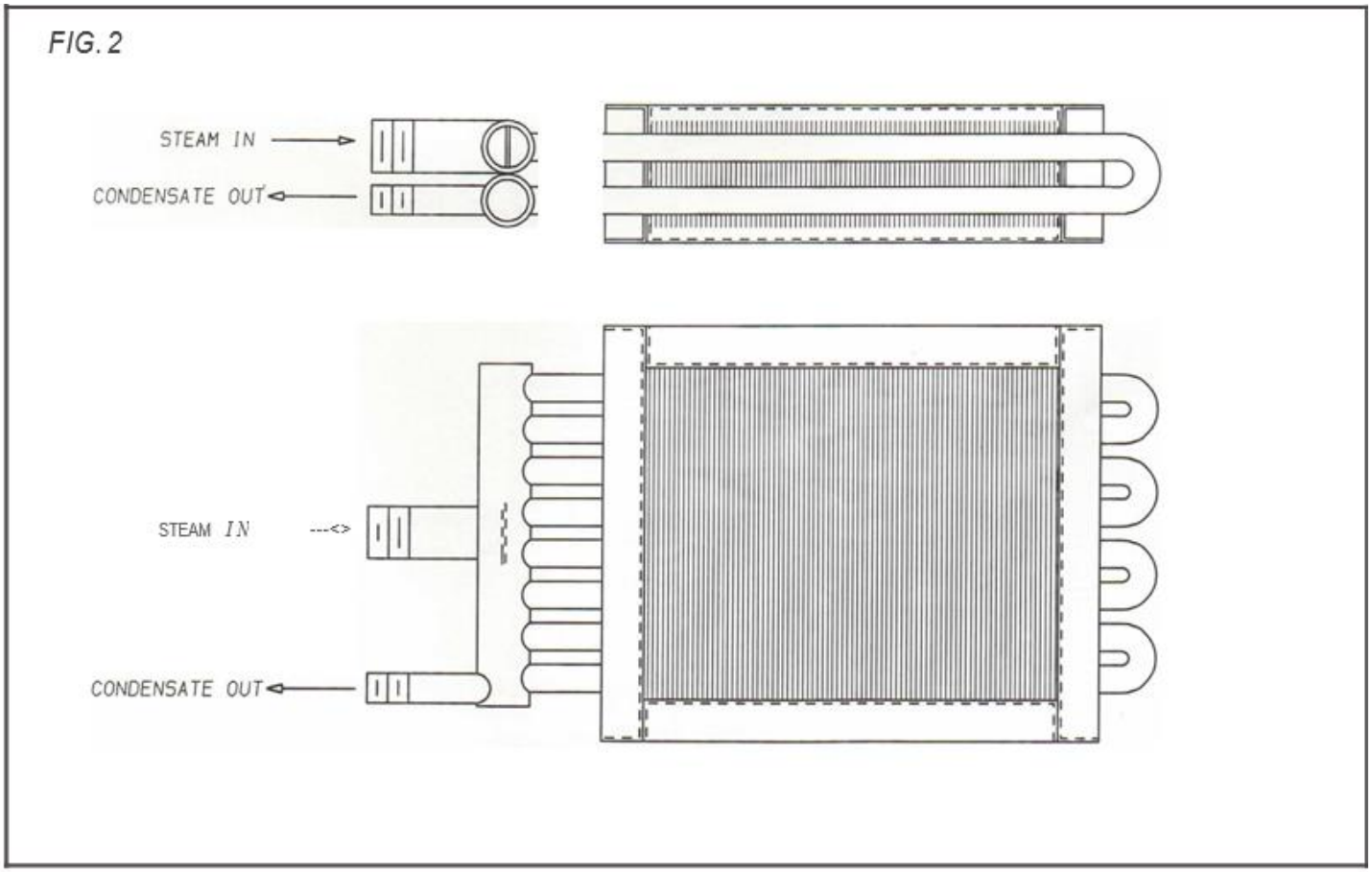
be employed to further assure good steam distribution. Caution must be taken when installing this opposite end connection coil. If the coil piping is rigidly installed it may be susceptible to damaging stress due to thermal expansion of the coil or the piping to the coil. This is easily overcome by using flexible connections or swing joints in the piping.

This coil design can be installed with tubes in a horizonal position (for vertical or horizontal airflows) or in a vertical position for horizontal airflows. Regardless of the tube position the condensate connection must be located at the lowest point in the installation

Multiple Pass Design

Multiple pass steam coils are used primarily in applications where it is desirable to have the connections located on the same end of the coil. This arrangement often facilitates piping to the coil and allows one end of the coil to "float" minimizing stresses applied to the coil headers. This design is often employed in applications where a bank of coils is installed in an external housing. In this situation, the same end connection arrangement greatly simplifies the manufacture of the housing and the removal of the coil.

This multipass coil design should not be used however in applications involving freezing air temperatures. The generally longer circuit lengths combined with the inability to pitch (slope) the tubes can inhibit condensate removal which will promote coil freezing. Also, this design should not be employed with modulating steam controls or steam pressures less than 5 psig.



Standard steam coils with a multiple pass design give customers the installation and maintenance advantage of both connections being located on the same side.

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The multipass coil design can be installed with the tubes in a horizontal position for horizontal or vertical air flows. Multipass coils cannot be used for vertical tube installations.

STEAM DISTRIBUTING COILS

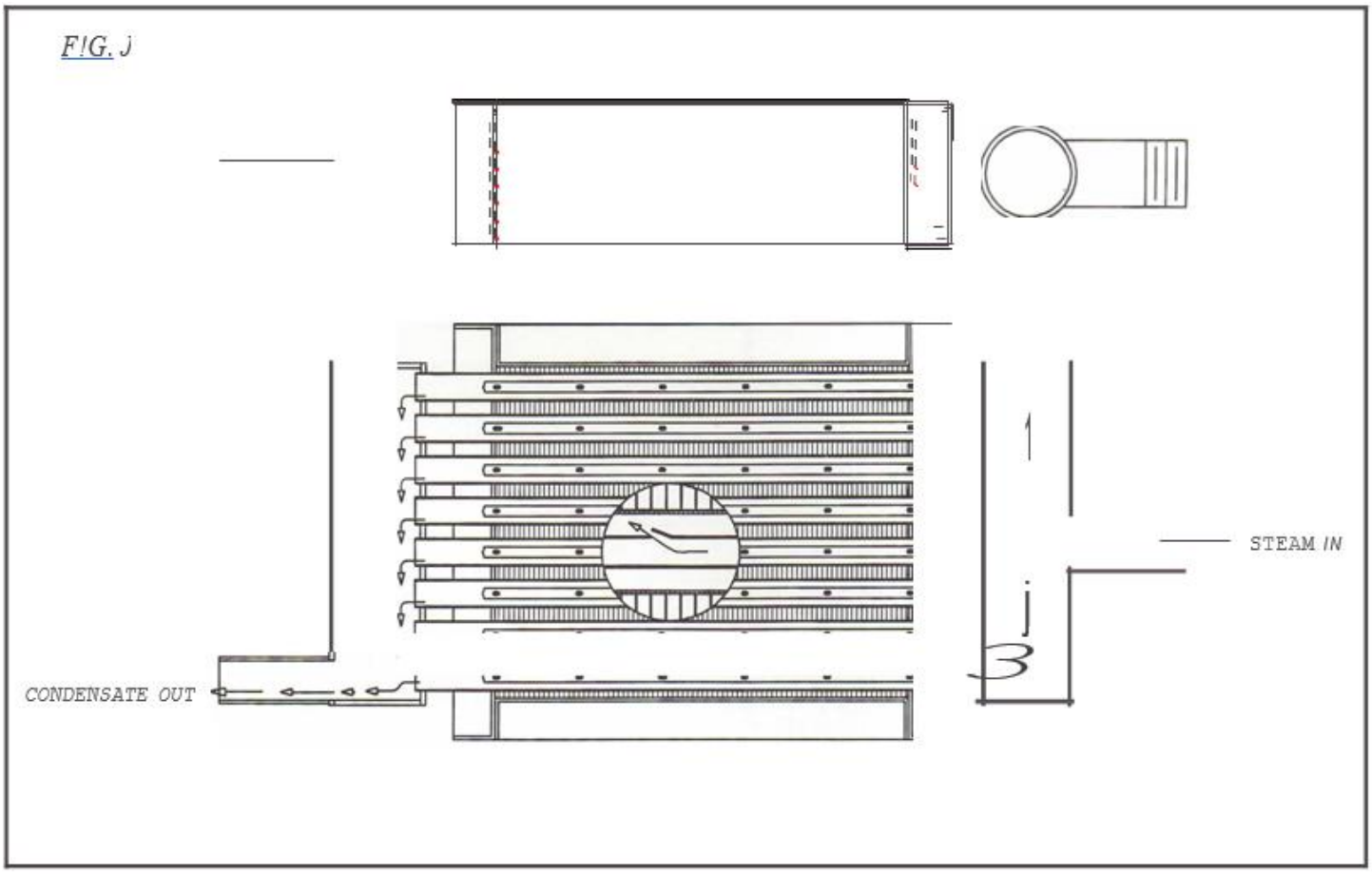
Single Pass Design

Single pass steam distributing coils use a directionally orificed inner tube that evenly distributes the steam throughout the entire face of the coil. This design offers improved uniformity of air temperature off the face of the coil allowing for better temperature control with low or modulating steam controls. A single pass steam distributing coil (also called "non freeze" coils) offers excellent resistance to freezing. The steam distributing design is limited to 1 or 2 rows.

Because the coil has opposite end connections, caution is needed during installation to properly allow for thermal expansion. This is easily overcome by using flex connections or swing joints in the piping.
This coil design can be installed with tubes in a horizontal position (for horizontal or vertical airflows) or in a vertical position for horizontal airflows. Regardless of the tube position, the condensate connection must be located at the lowest point in the installation.

Two Pass Design

The two-pass steam distributing coil which is also called a "non freeze" coil uses an orificed inner tube design similar to the single pass steam distributing coil. The coil also has the same temperature control advantages with low or modulating steam in addition to excellent resistance in applications involving



Steam distributing coils with a single pass design are built with "tubes-within-tubes." All steam travels through the inner tube and passes into the outer tube through directional orifices. Steam distributing coils are also often called "non freeze" coils.

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freezing air temperatures. The primary advantage of the two-pass design is having connections on the same end of the coil. This enables a more flexible case design and re- duces stresses caused by thermal expansion and rigid piping installations.

The two-pass distributing coil design can be installed with tubes in a horizontal position (for horizontal or vertical airflow) or in a vertical position for horizontal airflows. Regardless of the tube position, the condensate connection must be located at the lowest point in the installation.

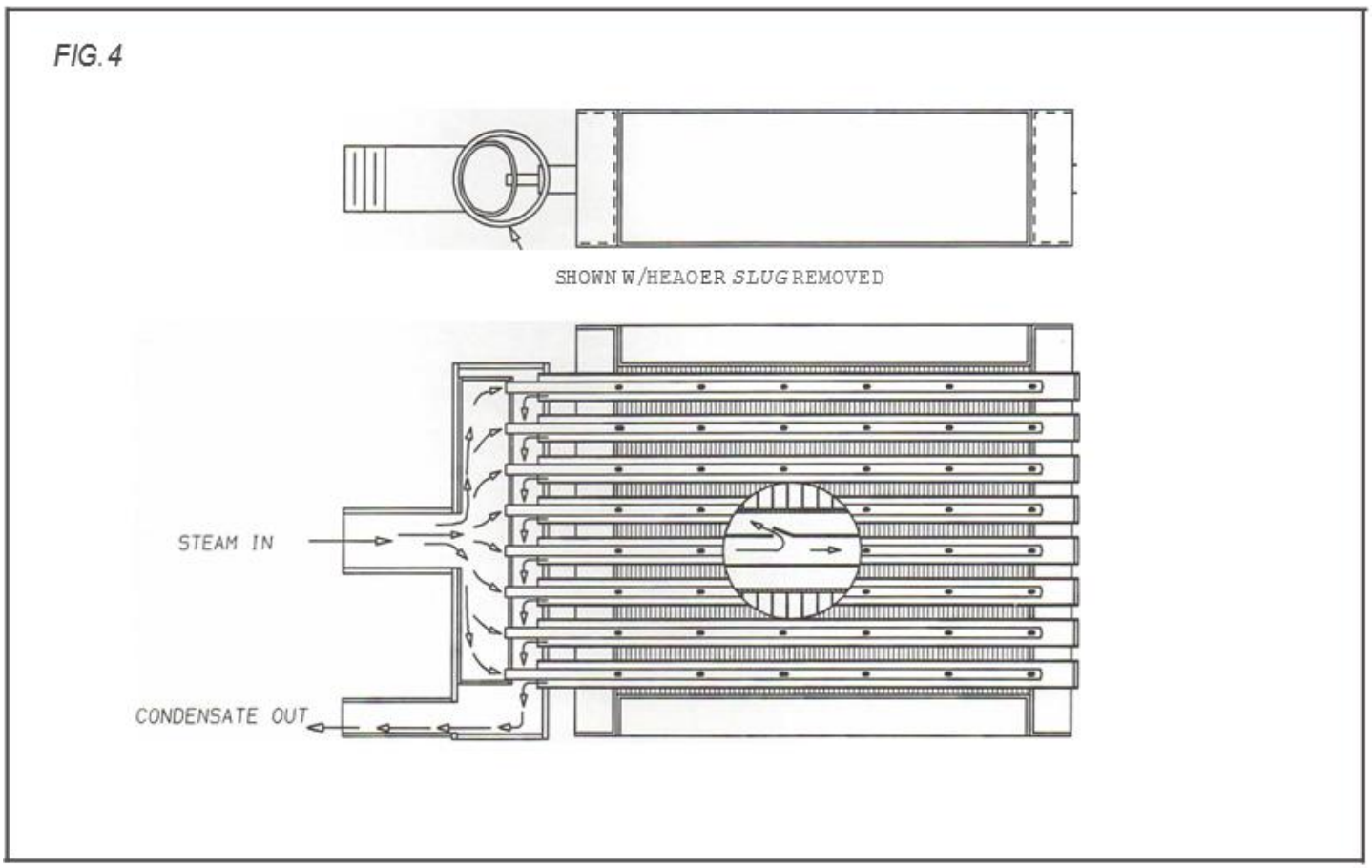
OTHER CONSIDERATIONS

Tube Size

Most coil manufacturers offer more than one tube diameter. Often, standard steam coils and two row steam distributing coils are offered in a 5/a inch diameter tube while one row steam distributing coils are generally offered with a larger tube diameter (usually 3/4 inch to 11/a inch). These arrangements seem to work satisfactorily for most comfort heating applications. The tube diameter is based on the condensate loading per tube, which is determined by; the capacity of the coil, the number of tubes, and the tube diameter. If the condensate loading per tube is too high, condensate can back up in the coil causing a decrease in capacity, water hammer, and/or corrosion problems. More information on this topic will be presented in subsequent issues.

Fin Height Considerations

Depending on the manufacturer's equipment and fabrication methods, fin heights are generally available in specific increments that relate to the tube spacing. The tube



Steam distributing coils with a two pass design have the same advantages of their multiple pass standard design counterparts. And like single pass steam distributing coils, these two pass coils work well in low or modulating steam applications and perform well when freezing air temperatures are encountered.