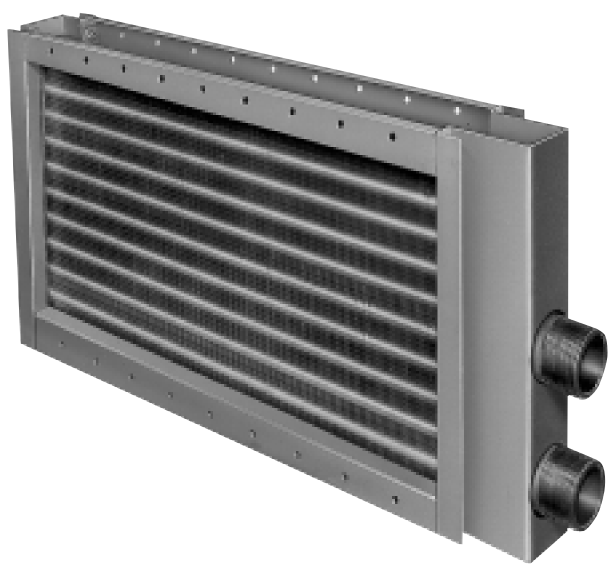
McQuay® Steam Coils
Types HI-F5, HI-F8 & E-F5



McQuay Air Conditioning

HI-F5, HI-F8 & E-F5 steam coils

SelectTOOLS™ for Contractor Coils

McQuay offers an unmatched variety of standard fin spacings, row and circuiting combinations. For optimum coil selection, McQuay's SelectTOOLS™ for Contractor Coils selection program makes it easy to select the most economical standard or special application coil to meet your job requirements.

Contact your local McQuay representative for a coil selection that meets the most exacting specification.

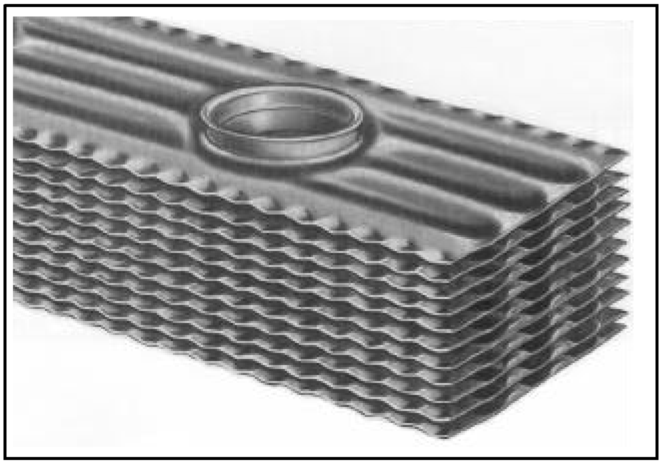
ARI certification

McQuay steam coils are certified in accordance with the forced circulation air cooling and air heating coil certification program, which is based on ARI Standard 410.

To obtain ARI certification ratings, it is first necessary to have the testing facilities reviewed for proper instrumentation, control and accuracy of test data. A coil is then submitted to an ARI approved independent testing facility for comparative tests. ARI then approves the coil manufacturer's testing facilities. After the testing facilities are approved, the coil is tested over a wide range of operating conditions. All rating data is the reviewed by ARI engineers for accuracy and confirmation that procedures established by ARI have been followed. Periodic check lists of production coils by ARI, on a random basis, assures compliance with ARI standards.

Note: special application coils may be outside the scope of ARI Standard 410.

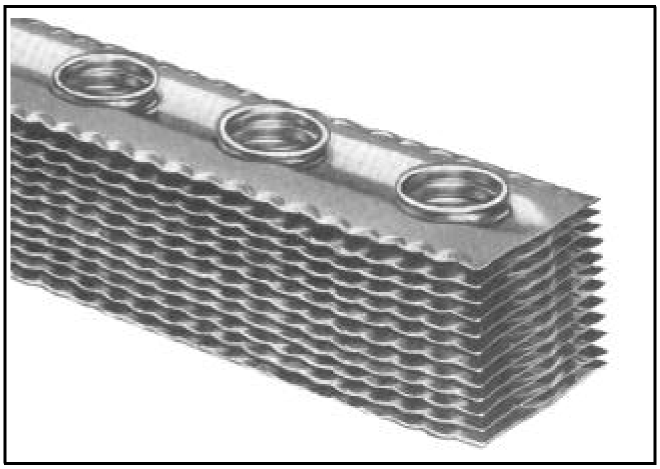
A pioneer in corrugated fin development



HI-F Means High Efficiency

A principal factor governing fin heat transfer efficiency is the boundary layer film of air adhering to any fin surface. This boundary layer insulates the fin, severely reducing the rate of heat exchange.

The advanced rippled-corrugated HI-F design creates a state of continuous turbulence which effectively reduces the boundary layer formation. The exclusive rippled edge instantly deflects the incoming air to create initial turbulence. A succession of corrugations across the fin depth, in conjunction with the staggered tubes, increases the turbulating effect and eliminates the "dead spots" behind the tubes. In this manner, the HI-F design establishes a high standard in heat transfer efficiency yielding sharply increased performance. The rippled fin edge also strengthens the fin edge and provides a pleasing overall appearance.



E-F Means Energy Efficient

The term "energy efficient," which is used to describe how well a system utilizes energy, has become a common expression in the HVAC industry.

With costs of energy rising, the need for cutting operating expenses is apparent. Lowering the air pressure drop across the face of the coil will reduce the fan brake horsepower requirement and fan motor electrical demand. The need to cut operating energy expenses is met by the E-F fin surface. The smoother fin design of the E-F surface results in lower operating costs over the life of the equipment.

Nomenclature

5 SA - 12 02 C - 033.00 - 090.00

TUBE O.D.:
5 = 5/8 inch
8 = 1 inch

COIL TYPE:

5SA	=	Single tube, opposite end connection
5JA,8JA	=	Distributing tube, same end connection
8RA	=	Distributing tube, opposite end connection
5HA	=	High pressure construction, single tube, opposite end connection
5GA,8GA	=	High pressure construction, distributing tube, same end connection
8TA	=	High pressure construction, distributing tube, opposite end connection

FINS PER INCH:
HI-F5, E F5 (06, 07, 08, 09, 10, 11, 12, 13, 14)
HI-F8 (03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14)

ROWS DEEP:
HI-F5, E-F5 (01, 02)
HI-F8 (01)

FIN DESIGN:
B = 01 & 02 ROW E-F5
C = 01 & 02 ROW HI-F5
B = 01 ROW HI-F8 (1")

FIN HEIGHT (INCHES)

FINNED LENGTH (INCHES)

Standard availability chart

COIL TYPE			STEAM (SINGLE TUBE)		STEAM (DISTRIBUTING TUBE)					
COIL MODEL			5SA	5HA	5JA	5GA	8JA	8GA	8RA	8TA
SERPENTINE CIRCUIT			Does not apply		Does not apply					
ROWS			1,2		1,2		1			
CONNECTION LOCATION			Opposite End		Same End		Same End		Opposite End	
FIN HEIGHT 3" INCREMENT			12-42							
FINNED LENGTH 1-1/2" INCREMENT			12-129							
FINS	FIN TYPE	HI-F	●	●	●	●	●	●	●	●
		E-F	●	●	●	●				
	ALUMINUM	.0075	●	●	●	●				
		.0095					●*	●*	●*	●*
		.0120					●	●	●	●
	COPPER	.006	●	●	●	●				
		.0075	●	●	●	●	●*	●*	●*	●*
		.0095	●	●	●	●	●*	●*	●*	●*
	SPACING (FPI)		6,7,8,9,10,11,12,13,14				3,4,5,6,7,8,9,10,11,12,13,14			
TUBING	DIAMETER		5/8		5/8		1			
	FACE C/C		1.5		1.5		3.0			
	COPPER	.020	●		●					
		.025	●		●		●		●	
		.035	●		●					
		.049	●		●		●		●	
	ADMIRALTY BRASS	.049		●		●				
	CUPRO-NICKEL	.020		●		●				
		.032						●		●
		.035		●		●				
		.049		●		●		●		●
HEADERS	STANDARD MAT'L		Copper	Cu Ni	Copper	Cu Ni	Copper	Cu Ni	Copper	Cu Ni
MAXIMUM STD. OPERATING LIMITS		P	150 Psig	350 Psig	150 Psig	350 Psig	150 Psig	350 Psig	150 Psig	350 Psig
		T	366 F	450 F	366 F	450 F	366 F	450 F	366 F	450 F

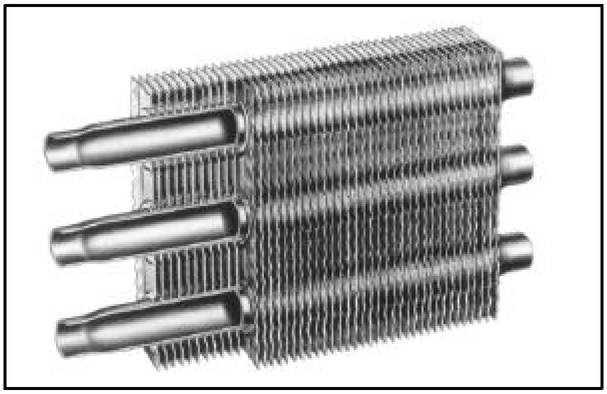
● Feature Available
* Requires 6 fins per inch or more.

Flexibility

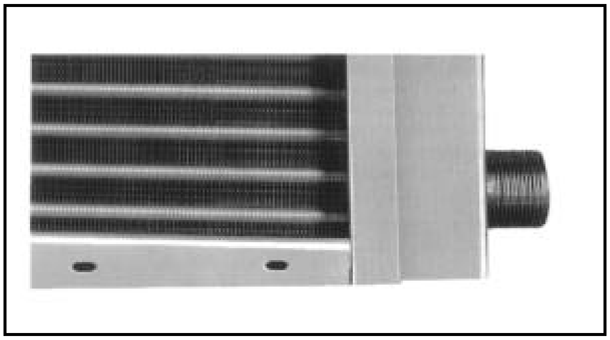
Along with the standard offerings, optional materials and special configurations are provided to meet many different specifications. Extra long finned lengths, intermediate tube supports, along with a wide variety of tube wall and fin thicknesses are available. Casings can be constructed of galvanized steel, aluminum, stainless steel or copper. Optional connection materials such as steel, red brass or copper (sweat) are offered along with butt-weld, victaulic or flange type connections. Coil coatings can be phenolic or Electro Fin. These are just a few of the options and specials that can be provided. Consult your local representative for your special coil requirements.

*Note: Special application coils may be outside the scope of ARI standard 410.

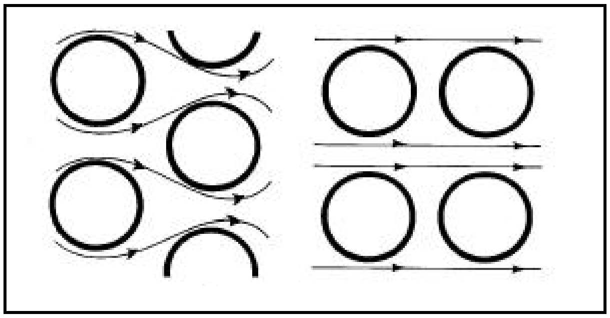
Design features



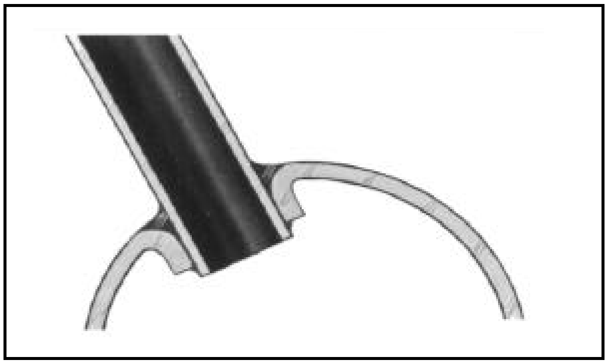
PATENTED FIN DESIGNS
The HI-F and E-F fin surfaces give the flexibility needed to perform at optimum efficiency. Seamless drawn copper tubes are mechanically expanded into full drawn, die-formed fin collars to provide positive metal-to-metal contact for high heat transfer efficiency and long coil life.



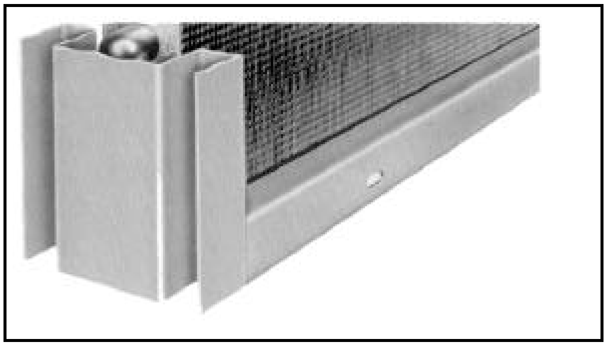
PITCHED IN THE CASING
The specially designed casing automatically provides the proper pitch for positive condensate removal resulting in reduced installation and expense. Supply and return connections are properly sized for each coil to assure optimal distribution and proper condensate removal.



STAGGERED TUBE DESIGN FOR HIGH PERFORMANCE
The more moving air in contact with tubes in the coil, the more performance obtained from the total available surface. The staggered tube design exposes the tubes to more moving air than the in-line design. The geometry of the staggered design also allows the rows to be spaced closer together. This results in a more compact coil providing higher capacities.



BRAZED COPPER TUBES-TO-COPPER HEADER JOINT
Seamless copper tubes brazed into heavy-gauge seamless drawn copper headers. This combination of similar metals eliminates unequal thermal expansion and greatly reduces stress in the tube-header joint. Intruded tube holes in the header allow an extra large mating area for increased strength and flexibility designed to provide many years of trouble-free service.

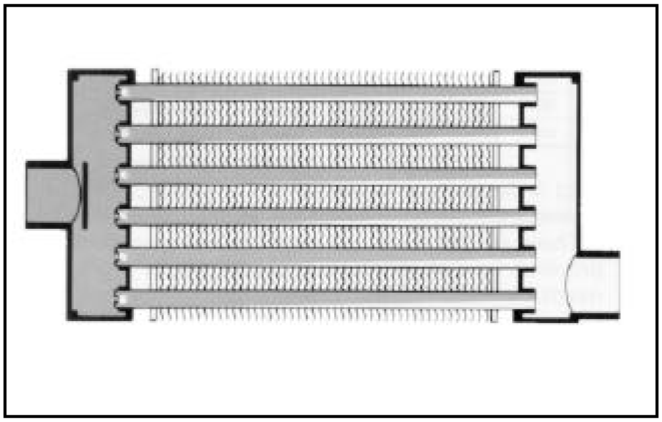


FREE FLOATING CORE
One of the most important requirements of a steam coil design is to allow for thermal expansion without creating stress and wear on the tubes.

To provide for this requirement, the coil core must be free to expand and contract within the casing without inducing wear on the tubes. A special coil casing has been designed in which the coil core is free to float in a recessed fin channel. Since the core is not supported by the tubes there is no resultant tube wear. The recessed fin channel prevents air bypass while adding structural support to the casing.

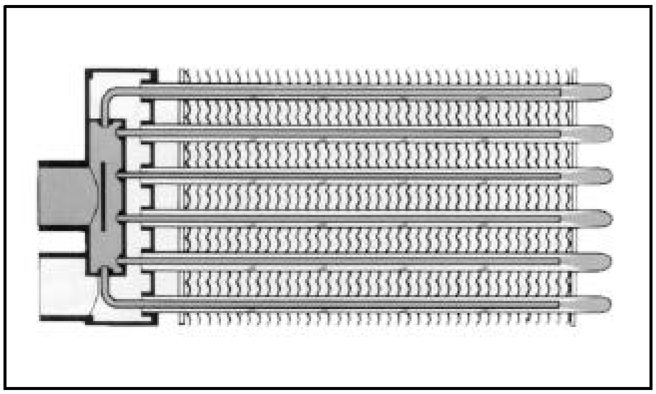
Steam circuiting arrangements

Select HI-F5, E-F5 and HI-F8 steam coils from three different circuiting arrangements: the general purpose 5SA coil, and two jet tube steam distributing styles-5JA, 8JA and 8RA coils-intended for both general and special purpose heating. While each of these arrangements has been carefully designed to serve a particular area in steam coil application, sufficient similarities are present in design and performance to render them interchangeable in many cases. Optimal fin design provides a high performing heat transfer surface while a host of exclusive features provide extended coil life.



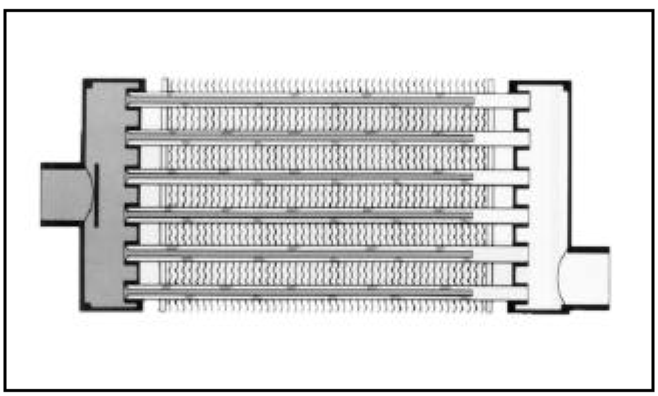
5SA & 5HA GENERAL PURPOSE STEAM COILS
5SA and high pressure 5HA steam coils are specifically designed for economical general purpose heating. Featuring high quality and high capacity, they are an ideal choice for all regular steam applications - heating, reheating, booster and process use.

The sectional diagram illustrates the steam circuiting of this single tube design. A perforated plate type steam baffle directly behind the supply connection ensures even steam pressure across the entire header length. Inlet tube orifices meter a uniform flow of steam into each tube.



5JA, 8JA, 5GA & 8GA
JET TUBE DISTRIBUTING COILS
5JA, 8JA and high pressure 5GA and 8GA jet tube steam distributing coils are excellent for any general purpose heating application. With the superior freeze resistance provided by the tube-within-a-tube construction, they are ideal for low temperature preheating and special process applications.

The construction, as illustrated, features directional orificed inner tubes, a unique elliptical supply header located inside the heavy-duty return header and a circuiting arrangement which provides both supply and return connections at the same end of the coil.



8RA & 8TA OPPOSITE END CONNECTION
JET TUBE DISTRIBUTING COILS
8RA and high pressure 8TA jet tube steam distributing coils are very similar in design and operation to the "JA" coils except that supply and return connections are located on opposite ends.

The directional orifices properly meter steam along the entire tube length to assure a consistent temperature rise across the full coil face and accelerate condensate removal. This important feature is standard on all of our jet tube steam distributing coils.

General specifications

1. **PRIMARY SURFACE**
   5/8” O.D. and 1” O.D. round seamless copper tubes. Cupro-nickel tubes are used for high pressure construction. Tubes are mechanically expanded to provide a continuous compression bond to the fins.

2. **SECONDARY SURFACE**
   HI-F5, E-F5 and HI-F8 rippled-corrugated aluminum die-formed plate type fins. Fin collars are full drawn to provide accurate control of fin spacing and maximum contact with tubes.

3. **HEADERS**
   Extra-heavy seamless copper tubing with intruded tube holes. Provides flexibility for uneven stress during coil expansion and contraction. Cupro-nickel used for high pressure construction.

4. **HEADER END CAPS**
   Heavy-gauge, die-formed copper. Monel used for high pressure construction.

5. **CONNECTIONS**
   Steel male pipe supply and return connections properly sized for coil capacity. Other materials available on request. (Red brass connections recommended for coils used with non-ferrous piping.)

6. **STEAM BAFFLES**
   Supply header baffle disperses entering steam. Prevents blow-through or short circuiting and ensures equal steam distribution to all coil tubes.

7. **BRAZING**
   All core joints are brazed with copper brazing alloys. Headers have intruded tube holes which provide maximum brazing surface and ensure lasting strength.

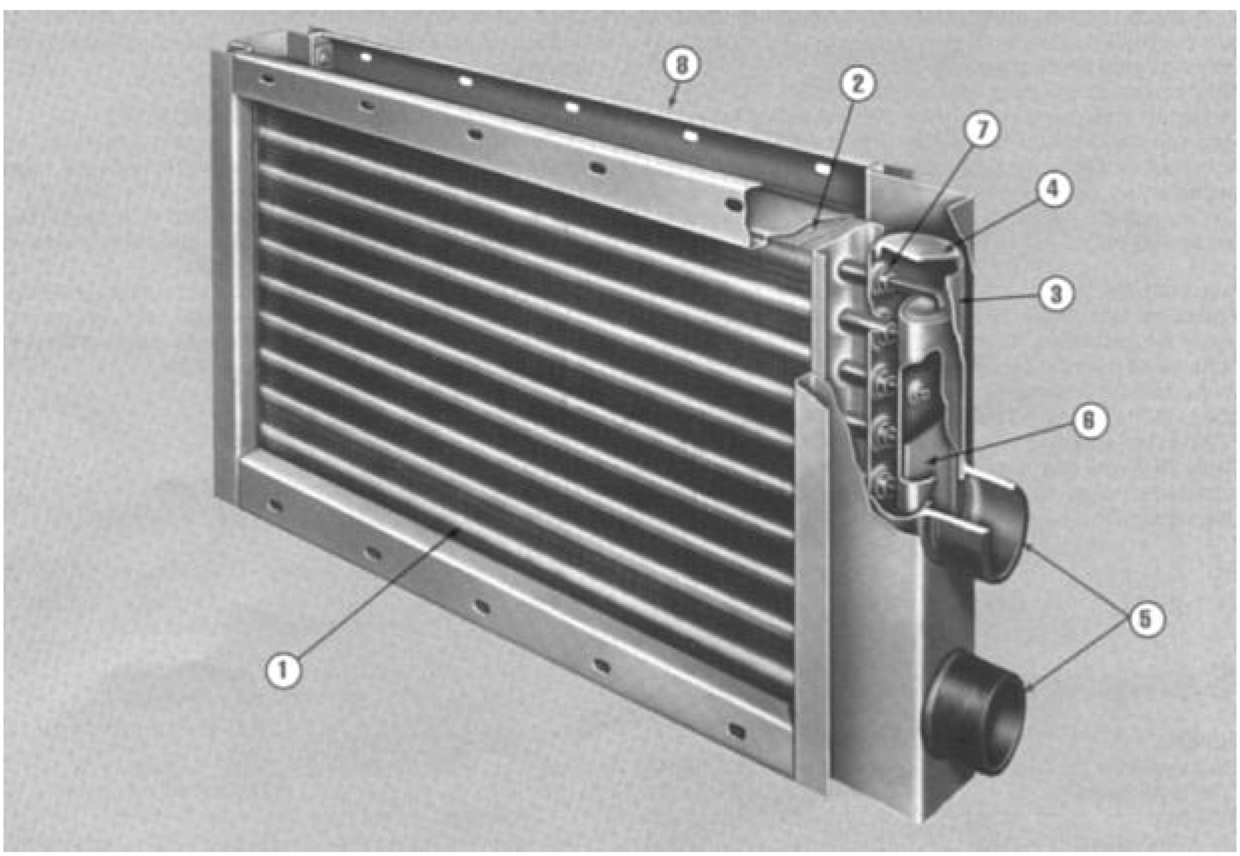
8. **CASINGS**
   Die-formed heavy-gauge continuous galvanized steel with reinforced flanges and 3/8” x 3/4” slots on 6” centers for easy mounting. Fin channels brace the core assembly in the casing, preventing air bypass and damage in handling.

9. **PITCHED IN CASING**
   Coil cores are pitched in the casing toward the return connection for horizontal airflow. Provides proper condensate drainage and ease of installation.

10. **FREE FLOATING CORE**
    Design permits coil core to “float” free in the coil casing during expansion and contraction.

11. **TESTS**
    Complete coil tested leak free at 315 psig air pressure under warm water containing special wetting agent.

12. **OPERATING CONDITIONS**
    Standard coils rated up to 150 psig and up to 366°F temperatures. High pressure coils up to 350 psig and 450°F. When steam pressure is above 25 psig, high pressure coils are recommended for longer coil life.



Coil selection considerations

Because we offer a wide variety of steam coil types, materials and fin spacings, you can obtain a very accurate selection. To obtain proper selection of each coil, the following variables should be considered.

ENTERING AIR TEMPERATURE

Two basic types of steam coils are offered - the single tube steam coil and the jet distributing tube steam coil.

The single tube steam coil, type 5SA, is generally more economical when applied in an above freezing environment. When the entering air is near or below freezing, the jet distributing tube steam coils, types 5JA or 8JA, should be selected to provide maximum resistance to coil freeze-up.

LEAVING AIR TEMPERATURE

The selection of a coil to deliver a desired leaving air temperature is relatively simple, as it involves only dry bulb temperatures and sensible heating. Steam coils may be accurately selected to deliver the desired leaving air temperature by varying the fin series and number of rows deep. In the interest of coil economy, the higher fin series should be used in place of additional rows deep. However, in some instances, the system air pressure drop and/or condensate loading may dictate the use of a lower fin series and more rows deep.

Note: Oversized steam coils can present a control problem. Coils should be sized as accurately as possible.

OPERATING STEAM PRESSURES

Standard steam coil construction is designed to withstand operating pressures up to 150 psig and give very satisfactory service. However, the primary factors in coil life are erosive and corrosive actions, both of which are greatly accelerated with increased steam pressures. Corrosive action may be partially controlled by using compounds that will maintain the proper pH in the system. However, the best protection to prolong coil life is to use heavy-duty high pressure steam coil construction. Although high pressure construction is not necessary up to 150 psig, it is highly recommended for longer coil life and coil economy when operating steam pressures exceed 25 psig.

AIR VOLUME (CFM)

The CFM to be handled will be determined by the consideration of the installation. The coil size selected must be capable of handling the total CFM at face velocities (FPM) acceptable to the heating application. Face velocities may range from 200 to 1500 FPM with 600 to 700 FPM a common design range.

When the specified air volume is not at standard air conditions, 70°F and sea level, the CFM must be corrected, as Illustrated on page 9, before using the curves and tables in this catalog.

LOWERING AIRSIDE PRESSURE DROP

The E-F5 fin is designed to lower the air pressure drop from 20% to 30% for a given application. Although more surface may be necessary to maintain capacity, the cost can be amortized by the lower fan brake horsepower requirements. The payback may be realized in just a few months.

FREEZING CONDITIONS

When the entering air to the coil is below freezing, the use of coils in series airflow and the correct control system is the best protection against coil freeze-up. In such a system, the first coil in the direction of airflow would use a two-position control valve that would open to full steam pressure (5 psig minimum) whenever the outside air temperature drops below freezing and would be capable of raising the entering air from the minimum expected outside temperature to at least 35° F. The second coil would use a modulating control valve and would raise the entering air up to the final required leaving air temperature. By using this type of system, the first coil could not freeze, because it would always be in full operation when the entering air temperature is below 35°F. The second coil could not freeze because the entering air temperature would always be above 35°F.

For ease of control and maximum freeze protection, the use of an additional preheat coil is recommended when the entering air temperature is expected to drop well below freezing. In such a system, the first coil would be the smallest and would open at 35°F. The second coil would open at about 10°F to 15°F outside air temperature, depending on the capacity of the first coil. A third coil would be modulated to obtain the final leaving air temperature.

In calculating the air temperature rise through the second and third coil, the leaving air temperature off the first coil is used as the entering air temperature to the second coil, etc.

For additional recommendations regarding freezing conditions, refer to page 19.

INDIVIDUAL INSTALLATION REQUIREMENTS

Each installation will have its own particular requirements. Normally one of the wide variety of our steam coils will conveniently fill these requirements without modification.

If the application is to be zoned, the uniform air temperature distribution of types 5JA, 8JA and 8RA makes these coils well suited.

Where problems such as special controls, atmosphere contamination, special process applications, etc., indicate the need for a special coil, contact your local representative. This individual welcomes the opportunity to assist you.

Sample coil selection

BTUH required 1,830,000
CFM (standard air) 24,000
Coil face .... 36” x 120”
Saturated steam pressure .... 10 psig
Entering air temperature .... -10° F
Coil type .... HI-F Single Tube Coil

Coil face area: $FA = \frac{36 \times 120}{144} = 30.0 \text{ sq. ft.}$

Coil face velocity: $FV = \frac{CFM}{FA} = \frac{24{,}000}{30.0} = 800 \text{ FPM}$

TR/ITD METHOD:

1. Determine TR/ITD:

$$TR = Lvg.\ Air - Ent.Air = \frac{BTUH}{1.09 \times CFM}$$

$$\frac{1{,}830{,}000}{1.09 \times 24{,}000} = 70°F$$

ITD = Sat. Steam Temp. - Ent. Air Temp.
Sat. Steam Temp. = 239.4 (Table 2, page 16)

$$TR/ITD = \frac{70}{239.4 - (-10)} = 0.281$$

2. Initial Selection

Enter Figure 3 at 800 FPM to determine which coil meets or exceeds a TR/ITD of 0.281. A 5SA1001C coil has a TR/ITD of 0.292.

3. Determine Condensate Loading Factor (F_L)

$$Condensate\ Loading = \frac{BTUH}{Latent\ Heat \times Tubes\ Fed}$$

Latent Heat = 952.6 (Table 2, page 16)
Tubes Fed = 24 (Table 3, page 16)

$$\frac{1{,}830{,}000}{952.6 \times 24} = 80.0\ Lb./Hr./tube$$

Enter Figure 6 at 80.0 lbs./hr./tube and 10 psig to find F_L = 0.995.

4. Final Selection

Actual TR/ITD = 0.292 x 0.995 = 0.290 (greater than 0.281)
Final Selection: 5SA1001C - 36 x 120

5. Air Pressure Drop

Refer to Figure 12 and find air pressure drop of 0.37" H_20.

6. Determine Actual Condensate Loading

Actual TR = 0.290 x [239.4 - (- 10)] = 72.3
Actual BTUH = (1.09)(24,000)(72.3) = 1,892,000

$$Actual\ Condensate\ Load = \frac{BTUH}{Latent\ Heat}$$

$$\frac{1{,}892{,}000}{952.6} = 1986\ Lb./Hr.$$

7. Determine Actual Leaving Air Temperature

Actual Lvg. Air Temp. = Ent. Air Temp. + TR
= (-10) + 72.3 = 62.3°F

BASE TEMPERATURE RISE METHOD:

1. Determine Air Temperature Rise

$$TR = \frac{BTUH}{1.09 \times CFM} = \frac{1{,}830{,}000}{1.09 \times 24{,}000} = 70°F$$

2. Determine Steam Conversion Factor (F_S)

F_S = 1.098 (Table 1, page 16)

3. Determine Condensate Loading Factor (F_L)

$$Condensate\ Loading = \frac{BTUH}{Latent\ Heat \times Tubes\ Fed}$$

Latent Heat = 952.6
(Table 2, page 16)

Assume 1-row coil. If 1-row coil does not meet required capacity, the following steps should be repeated for a 2-row coil:

Tubes Fed = 24 (Table 3, page 16)

$$\frac{1{,}830{,}000}{952.6 \times 24} = 80.0\ Lb./Hr./tube$$

F_L = 0.995 (Figure 6)

4. Determine Base Temperature Rise Required

$$Base\ Temp.\ Rise\ Required = \frac{Air\ Temp.\ Rise}{F_T \times F_L}$$

$$\frac{70}{1.098 \times 0.995} = 64.1°F$$

5. Coil Selection

Enter Figure 3 at 800 FPM to determine which coil meets or exceeds a base temperature of 64.1°F A 5SA1001C coil has a base temperature of 66.2° F.
Final Selection: 5SA1001C - 36 x 120.

6. Air Pressure Drop

Refer to Figure 12 and find air pressure drop of 0.37" H_20.

7. Actual Condensate Loading

Actual TR = $Base \times F_T \times F_L$

66.2 x 1.098 x 0.995 = 72.3
Actual BTUH (1.09)(24,000)(72.3) = 1,892,000

$$Actual\ Condensate\ Load = \frac{BTUH}{Latent\ Heat}$$

$$\frac{1{,}892{,}000}{952.6} = 1986\ lb/hr.$$

General formulas

1. BTUH: *BTUH = 1.09 x CFM x Temperature Rise*

Where: 1.09 = 0.242 x 60 x 0.075
0.242 = Sp. Ht. of Air at 70°F
60 = Min./Hr.
0.075 = Density Std. Air in Lbs./Cu.Ft.
Temp. Rise = Lvg. Air Temp. - Ent. Air Temp.

2. Temperature Rise (TR): $TR = \frac{BTUH}{1.09 \times CFM}$

3. Leaving Air Temperature

Lvg. Air Temp. = Ent. Air Temp. + Temp. Rise

4. Initial Temperature Difference (ITD):

5. Face Velocity (FPM):

$$FPM = \frac{CFM}{Face\ Area\ (Sq.\ Ft.)}$$

6. Pounds Condensate:

$$Lbs.\ Cond./Hr. = \frac{BTUH}{Latent\ Heat\ of\ Steam}$$

7. Condensate Loading:

$$Lbs.\ Cond./Hr./Tube = \frac{BTUH}{Latent\ Heat\ of\ Steam \times No.\ Tubes\ Fed}$$

Conversion of air volume to standard air

When the specified air volume (CFM) is given at any temperature other than 70°F or any altitude other than sea level, these charts should be used for correction before using the capacity and pressure drop tables which are based on CFM at standard air conditions.

EXAMPLE:
To convert 15,900 CFM of air at 95°F and at 3,000 feet altitude to standard conditions:

CFM of Standard Air
= *(CFM of Specified Air x* F_T *x* F_A*)*
= *15,900 x 0.955 x 0.896*
= *13.600*

Where:
F_T = *Temperature Conversion Factor*
F_A = *Altitude Conversion Factor*

The CFM of standard air should be used to determine face velocity through the coil, which in turn is used to determine heat transfer values, and the air pressure drop through the coil.

The air pressure drop value taken from Figures 12, 13, and 14 must be converted to altitude to be used for static pressure calculations. To convert the air pressure drop from standard air at sea level to the air pressure drop at altitude use the following equation:

$$\text{Pressure Drop at Altitude} = \frac{\text{Pressure Drop at Sea Level}}{F_T \times F_A}$$

Figure 1. Temperature Conversion Factor

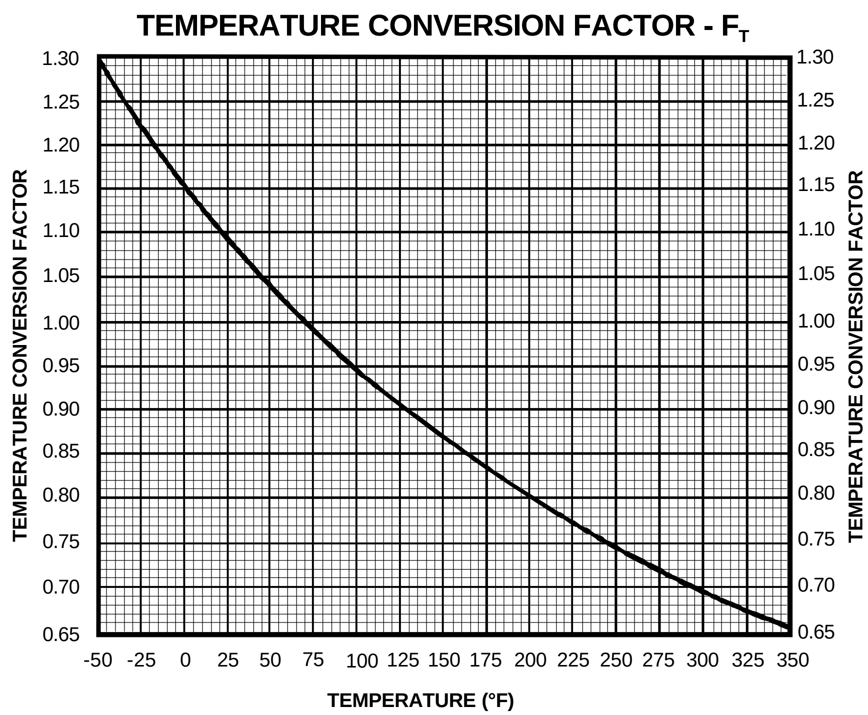
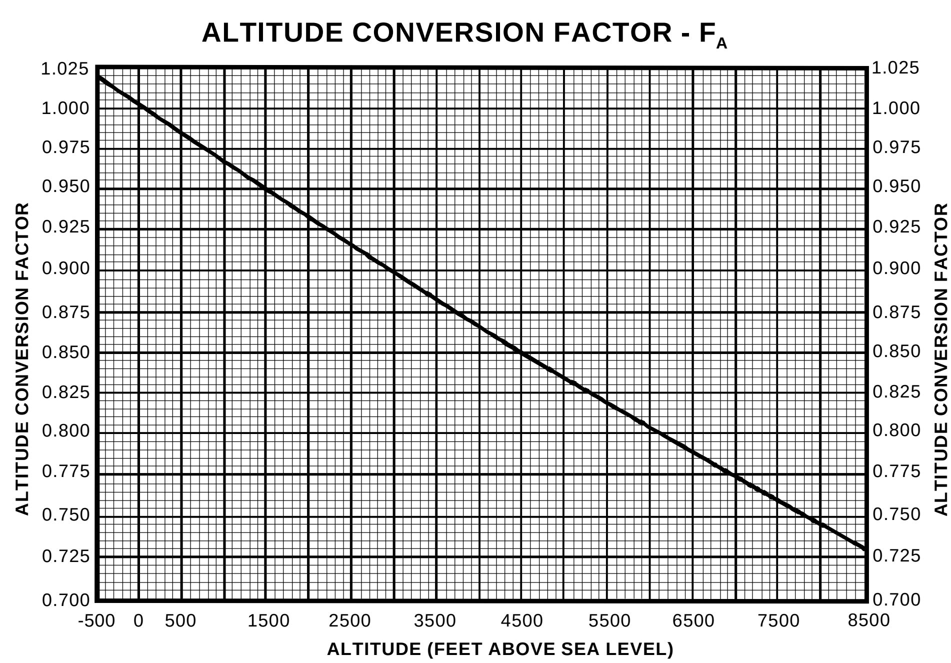


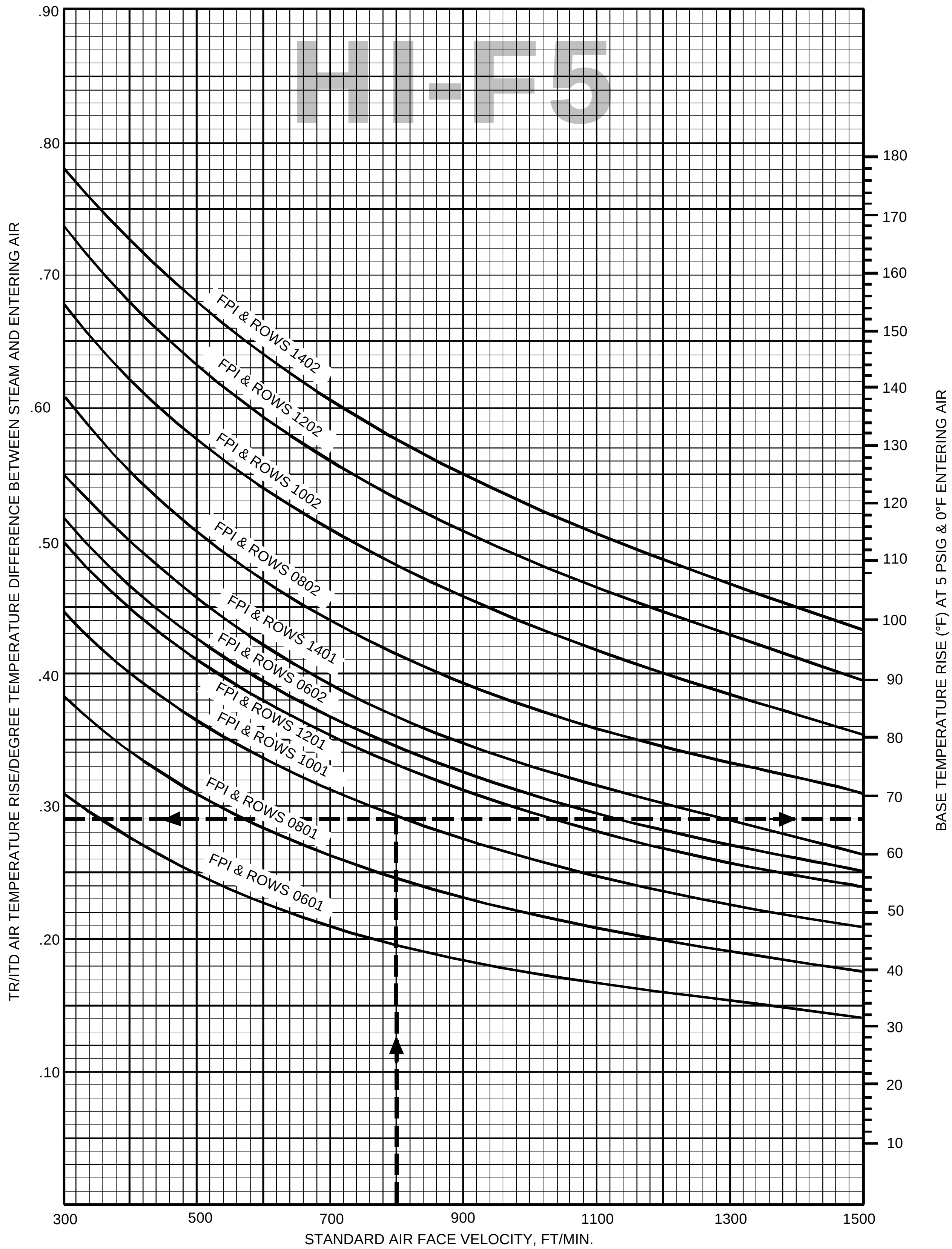
Figure 2. Altitude Conversion Factor



Capacity data

Figure 3. Steam Capacity Curves for HI-F5 Coils - 5SA & 5HA*

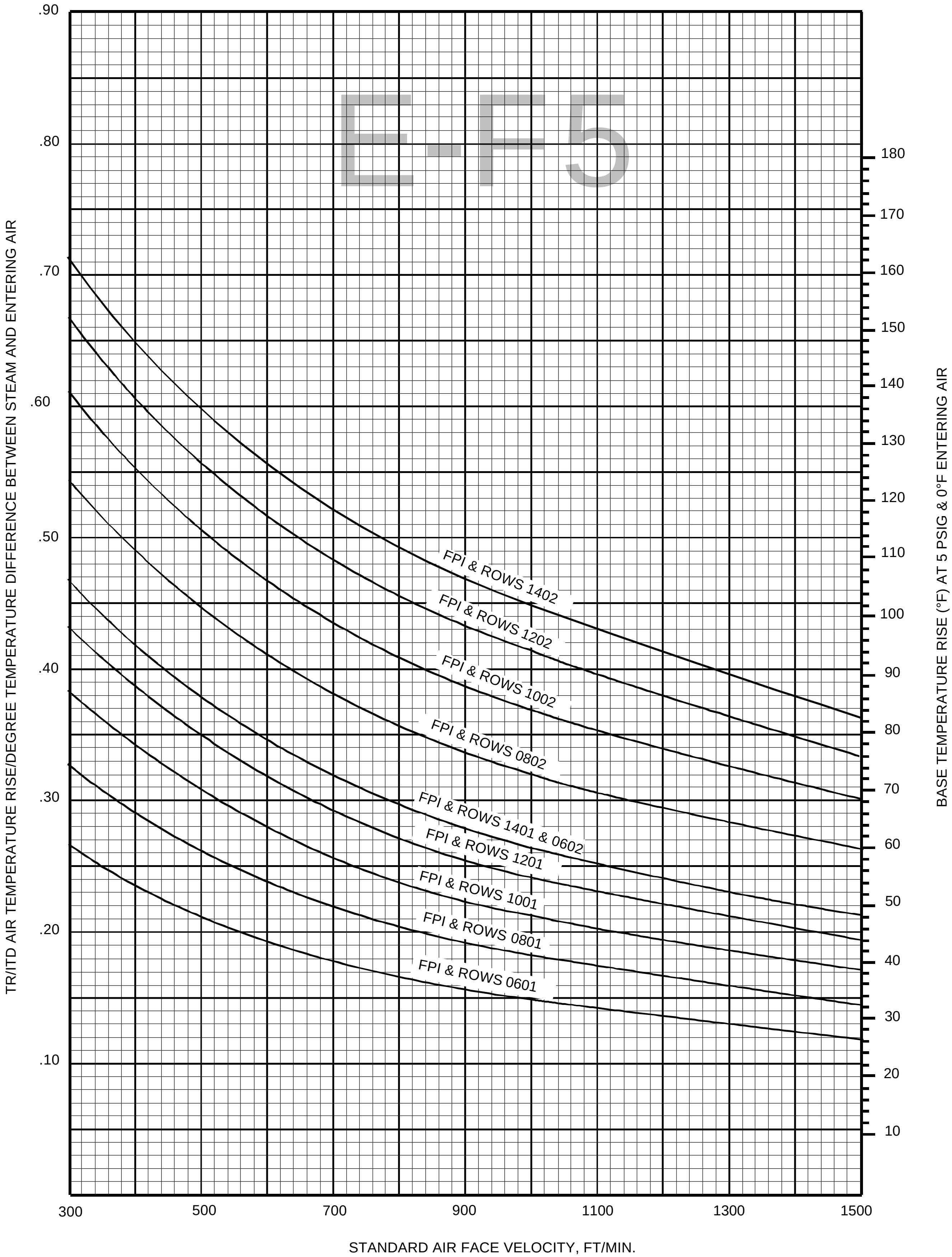
CAPACITY FOR ODD FIN SPACINGS MAY BE FOUND BY INTERPOLATION



* 5J/G coils may have slightly less capacity than shown. Use SelectTOOLS™ for Contractor Coils Program for optimum selection.

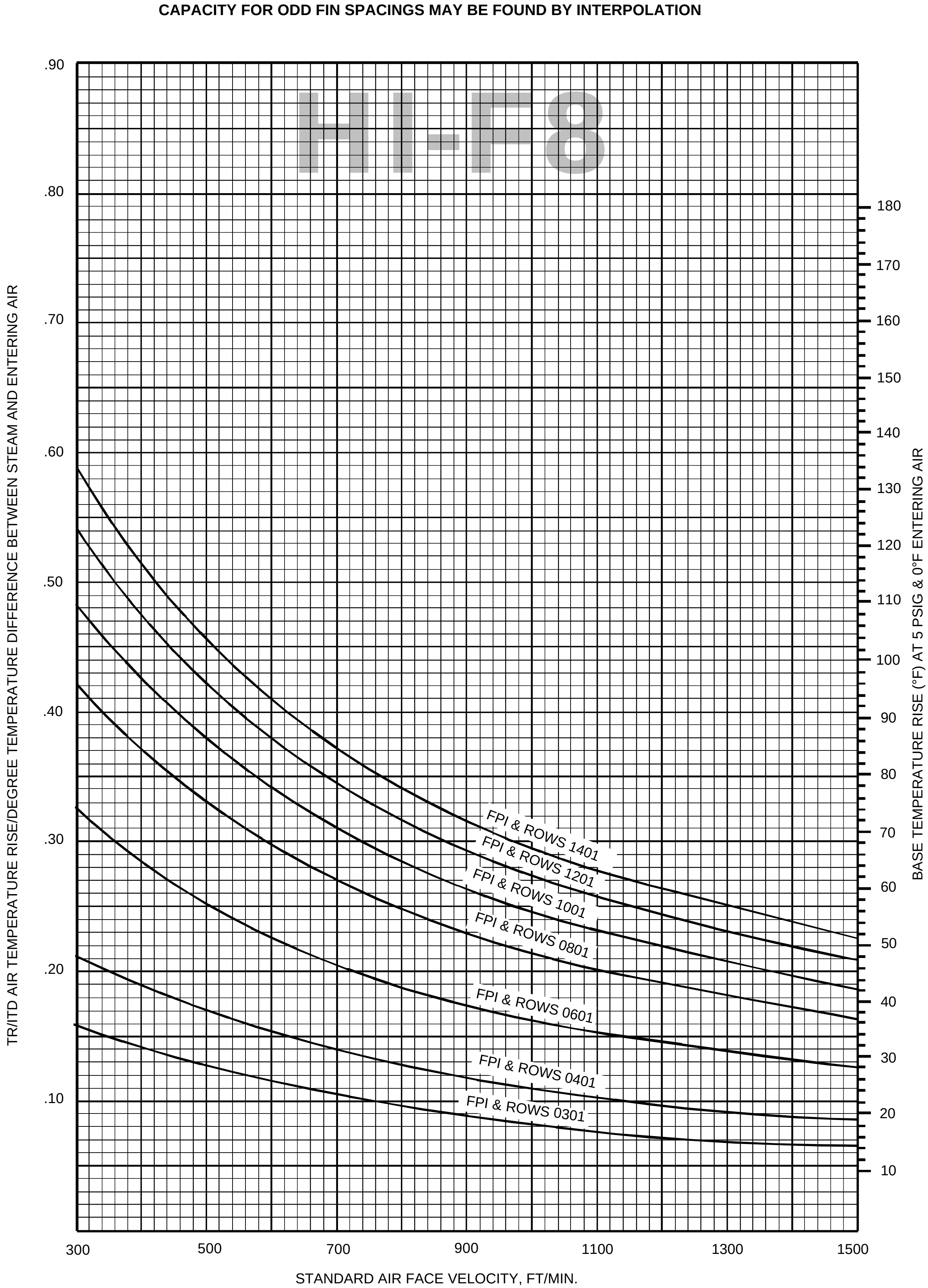
Figure 4. Steam Capacity Curves E-F5 Coils - 5SA & 5HA*

CAPACITY FOR ODD FIN SPACINGS MAY BE FOUND BY INTERPOLATION



* 5J/G coils may have slightly less capacity than shown. Use SelectTOOLS™ for Contractor Coils Program for optimum selection.

Figure 5. Steam Capacity Curves for HI-F8 Coils - 8JA, 8RA, 8GA & 8TA



* 5J/G coils may have slightly less capacity than shown. Use SelectTOOLS™ for Contractor Coils Program for optimum selection.

Condensate loading factors

Figure 6. 5SA & 5HA Coils

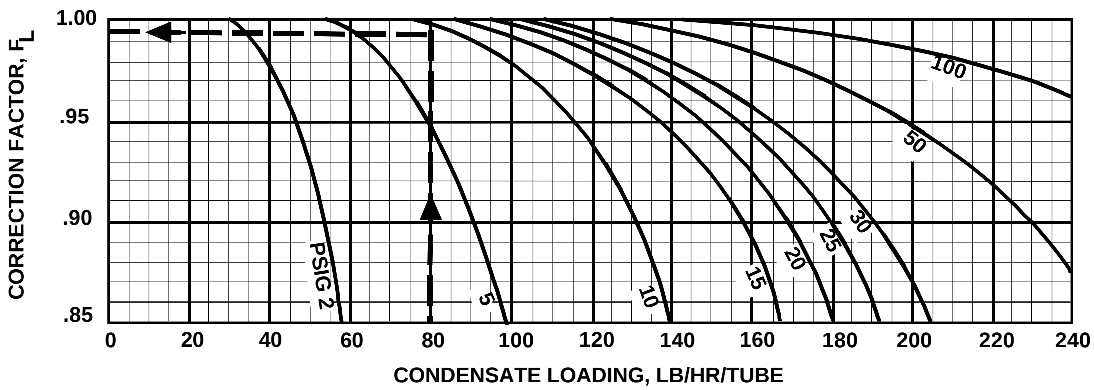


Figure 7. 5JA & 5GA Coils

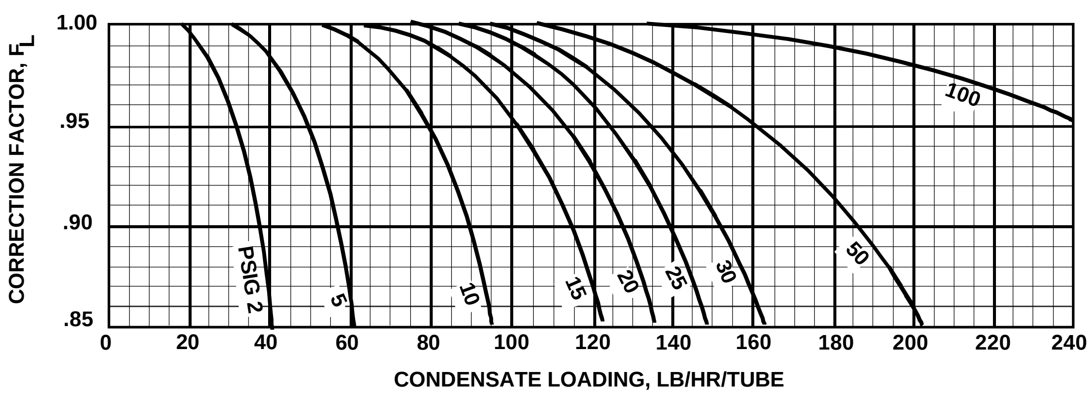
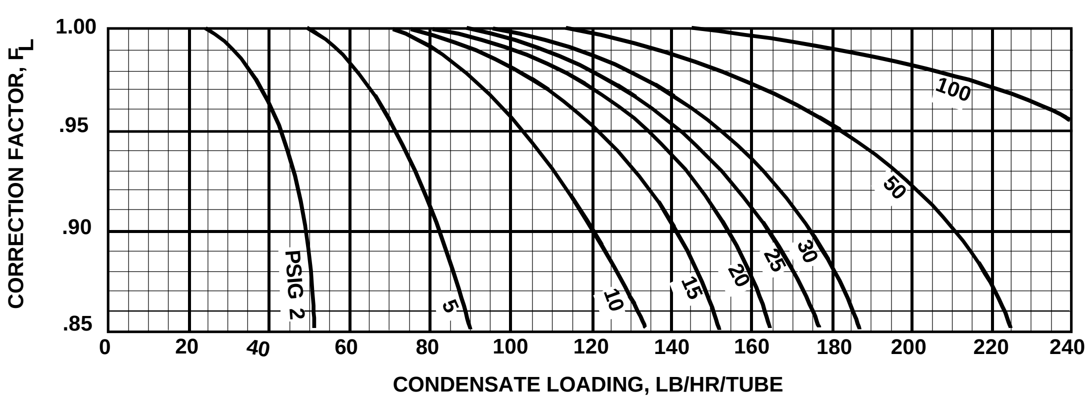


Figure 8. 8JA, 8RA, 8GA & 8TA Coils



Air pressure drop

Figure 12. 5SA, 5HA, 5JA & 5GA Coils

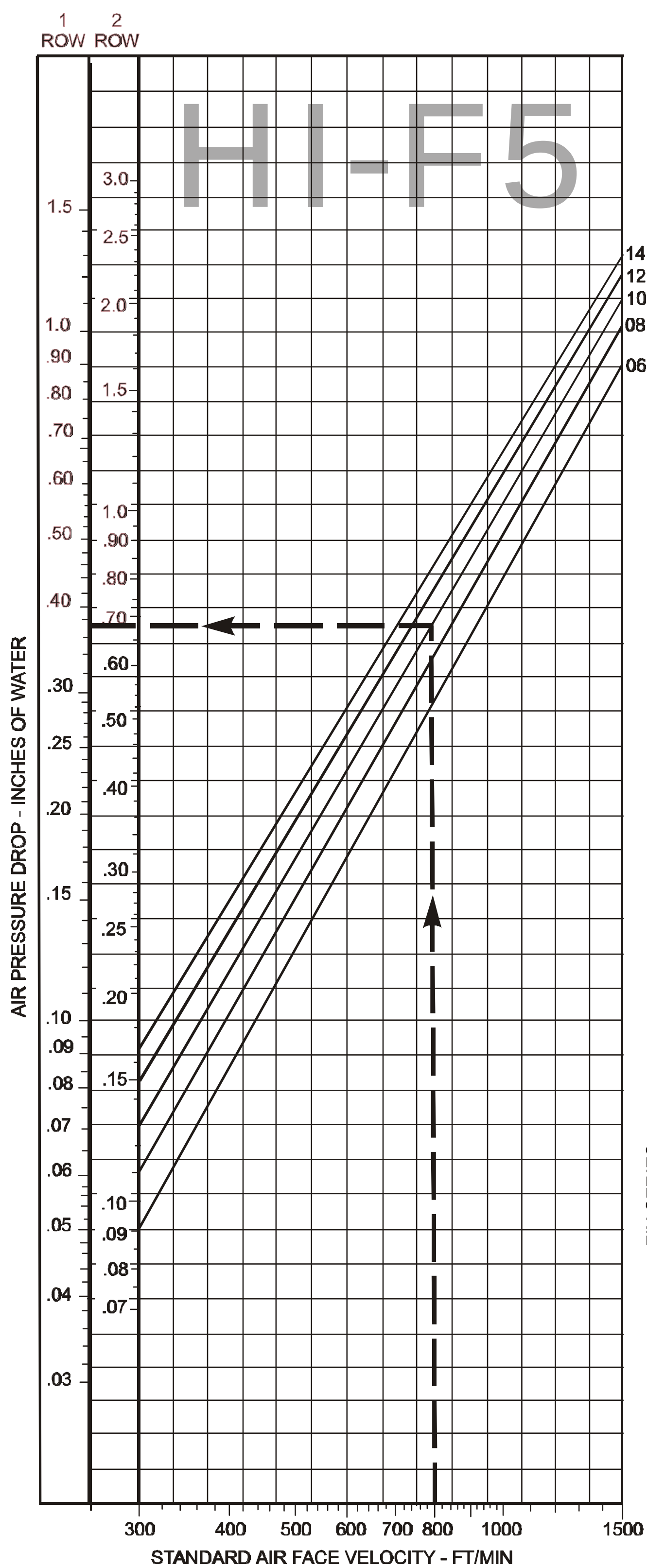
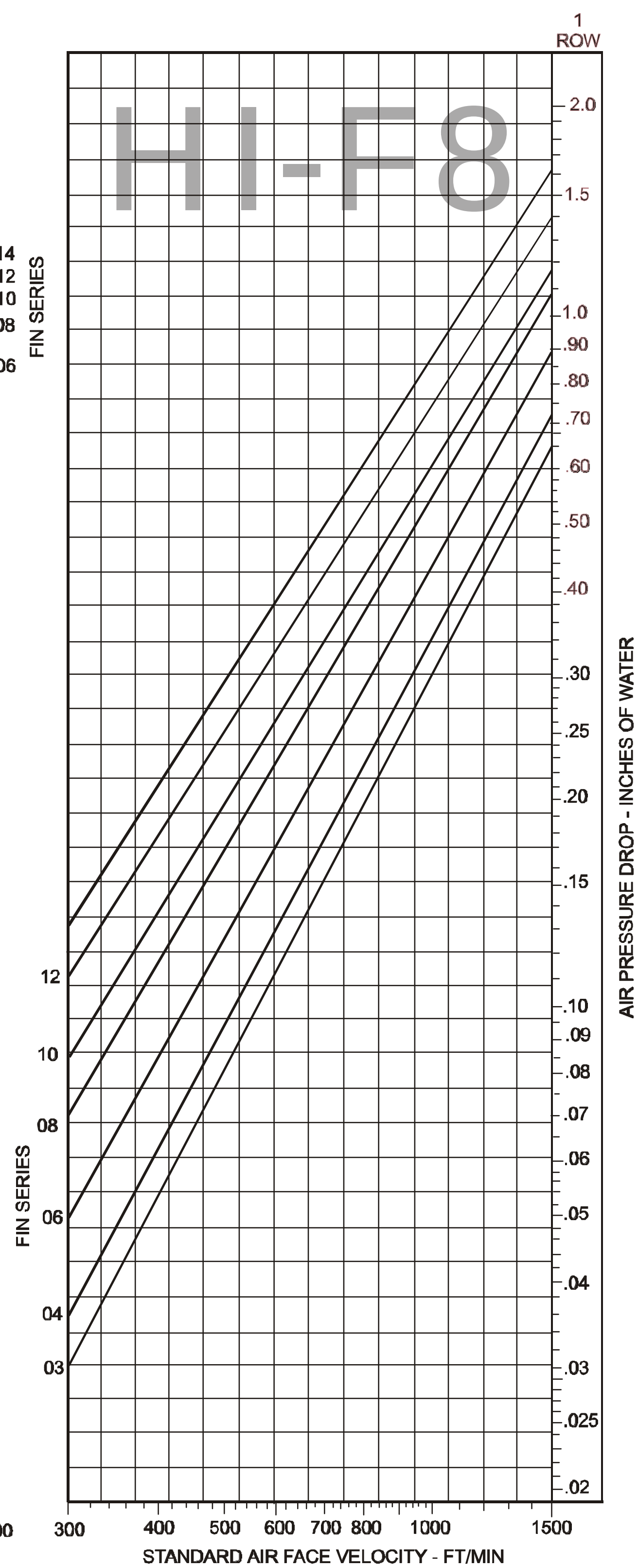
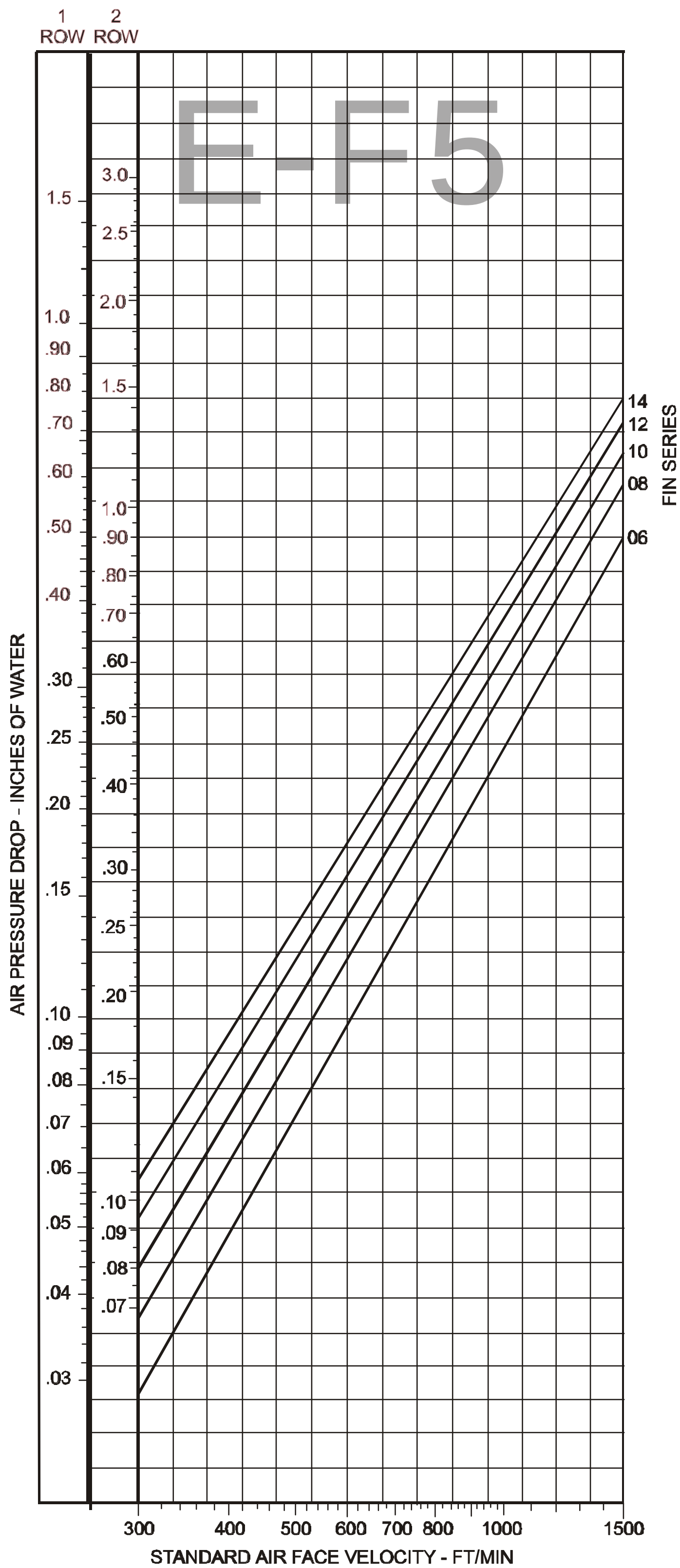


Figure 13. 8JA, 8GA & 8RA Coils



NOTE: Air pressure drop for odd fin spacings may be found by interpolation.

Figure 14. 5SA, 5HA, 5JA & 5GA Coils



NOTE: Air pressure drop for odd fin spacings may be found by interpolation.

Coil selection data

Table 1. Steam Conversion Factors (F_S)

ENT. AIR TEMP	STEAM – PRESSURE – TEMPERATURE – LATENT HEAT							ENT. AIR TEMP	STEAM – PRESSURE – TEMPERATURE – LATENT HEAT						
	0 212.0° 970.3	0 218.5° 966.1	5 227.1° 960.6	10 239.4° 952.6	15 249.7° 945.6	20 258.8° 939.6	25 266.8° 934.0		0 212.0° 970.3	0 218.5° 966.1	5 227.1° 960.6	10 239.4° 952.6	15 249.7° 945.6	20 258.8° 939.6	25 266.8° 934.0
-20	1.021	1.050	1.088	1.142	1.187	1.227	1.263	**40**	0.757	0.786	0.824	0.878	0.923	0.963	0.999
-15	0.999	1.028	1.066	1.120	1.165	1.205	1.241	**45**	0.753	0.764	0.802	0.856	0.901	0.941	0.977
-10	0.977	1.003	1.044	1.098	1.143	1.183	1.219	**50**	0.713	0.742	0.780	0.834	0.879	0.919	0.955
-5	0.955	0.984	1.022	1.076	1.121	1.161	1.197	**55**	0.691	0.720	0.758	0.812	0.857	0.897	0.933
0	0.933	0.962	1.000	1.054	1.099	1.139	1.175	**60**	0.669	0.698	0.736	0.790	0.835	0.875	0.911
5	0.911	0.940	0.978	1.032	1.077	1.117	1.153	**65**	0.647	0.676	0.714	0.768	0.813	0.853	0.889
10	0.889	0.918	0.856	1.010	1.055	1.095	1.131	**70**	0.625	0.654	0.692	0.746	0.791	0.831	0.867
15	0.867	0.896	0.934	0.988	1.033	1.073	1.109	**75**	0.603	0.632	0.670	0.724	0.769	0.809	0.845
20	0.845	0.874	0.912	0.966	1.011	1.051	1.087	**80**	0.581	0.610	0.648	0.702	0.747	0.787	0.823
25	0.823	0.852	0.890	0.944	0.989	1.029	1.065	**85**	0.559	0.588	0.626	0.680	0.725	0.765	0.801
30	0.801	0.830	0.868	0.922	0.967	1.007	1.043	**90**	0.537	0.566	0.604	0.658	0.703	0.743	0.779
35	0.779	0.808	0.846	0.900	0.945	0.985	1.021	**100**	0.493	0.522	0.560	0.614	0.659	0.699	0.735

NOTE: To calculate conversion factors not given in the above table, use this formula:

$$\text{Conversion Factor} = \frac{\text{Saturated Steam Temperature - Entering Air Temperature}}{227.1}$$

Table 2. Properties of Saturated Steam, BTU/Lb.

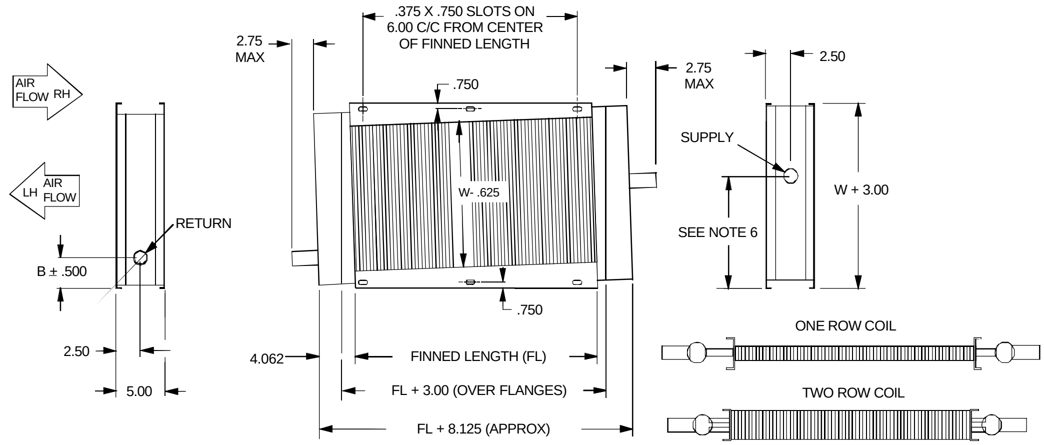
PSIG	TEMP. (°F)	LATENT HEAT	PSIG	TEMP. (°F)	LATENT HEAT
2	218.5	966.1	**60**	307.3	904.7
5	227.1	960.6	**70**	316.0	898.0
10	239.4	952.6	**80**	323.9	891.9
15	249.7	945.7	**90**	331.2	886.2
20	258.8	939.6	**100**	337.9	880.8
25	266.8	934.0	**125**	352.9	868.3
30	274.0	929.0	**150**	365.9	857.2
40	286.7	919.9	**175**	377.4	846.9
50	297.7	911.8	**200**	387.8	837.5

Table 3. Number of Tubes Fed

COIL TYPE	ROWS	FIN HEIGHT (FH) - INCHES										
		12	15	18	21	24	27	30	33	36	39	42
8JA,8RA,8GA,8TA	1	4	5	6	7	8	9	10	11	12	13	14
5SA,5JA,5HA,5GA	1	8	10	12	14	16	18	20	22	24	26	28
	2	15	19	23	27	31	35	39	43	47	51	55

Dimensional data

Figure 15. 5SA, 5HA, 8RA & 8TA Cased Coils

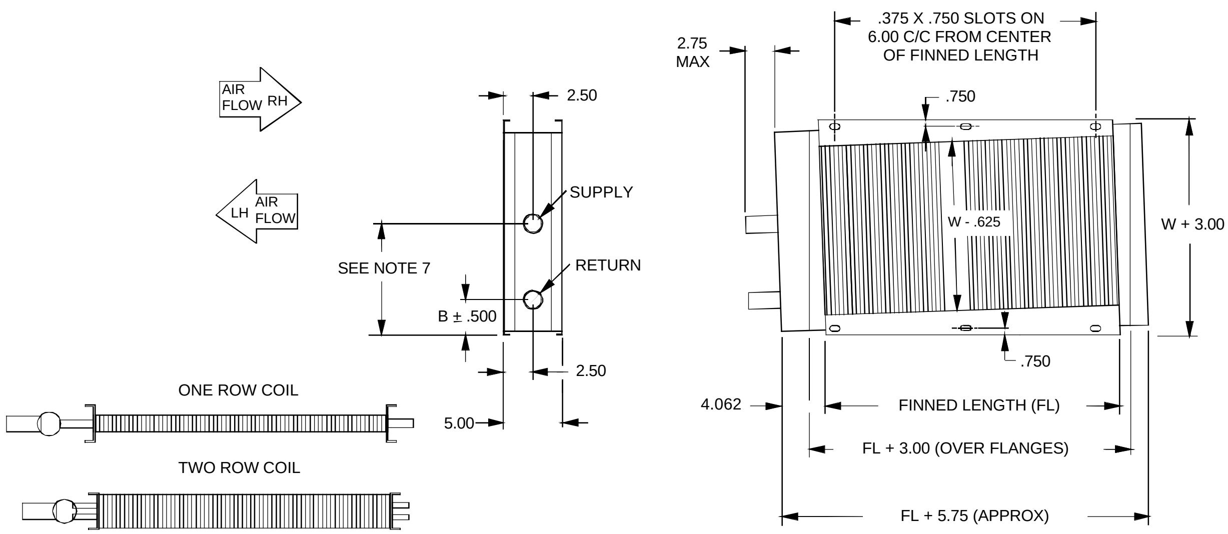


MODEL	ROW	SUPPLY CONN SIZE	RETURN CONN SIZE	B	W
5SA, 5HA	01	1-1/2	1-1/2	2.25	12.00 - 18.00
5SA, 5HA	01	2	1-1/2	2.25	21.00 - 42.00
5SA, 5HA	02	2-1/2	2-1/2	2.75	12.00 - 42.00
8RA, 8TA	01	2-1/2	2-1/2	2.75	12.00 - 42.00

GENERAL NOTES:

1. HORIZONTAL AIR FLOW.
2. ALL COILS DRAINABLE.
3. CONNECTIONS ARE PIPE, NPT (EXT.)
4. ALL DIMENSIONS ARE IN INCHES.
5. CONNECTION LOCATION ± .125.
6. .125 TO .562 ABOVE COIL CENTER LINE.
7. TUBES ARE PITCHED TOWARD RETURN CONNECTION.
8. STEAM DISTRIBUTNG INNER TUBES (8RA & 8TA).

Figure 16. 5JA, 5GA, 8JA & 8GA Cased Coils



GENERAL NOTES:

1. HORIZONTAL AIR FLOW.
2. ALL COILS DRAINABLE.
3. CONNECTIONS ARE PIPE, NPT (EXT.)
4. ALL DIMENSIONS ARE IN INCHES.
5. CONNECTION LOCATION ± .125
6. STEAM DISTRIBUTING INNER TUBES.
7. .125 TO .562 BELOW COIL CENTER LINE.
8. TUBES ARE PITCHED TOWARD RETURN CONNECTION.

MODEL	ROW	CONN SIZE	B	W
5JA, 5GA	01	2	2.50	12.00 - 42.00
5JA, 5GA	02	2-1/2	2.75	12.00 - 42.00
8JA, 8GA	01	2-1/2	2.75	12.00 - 42.00

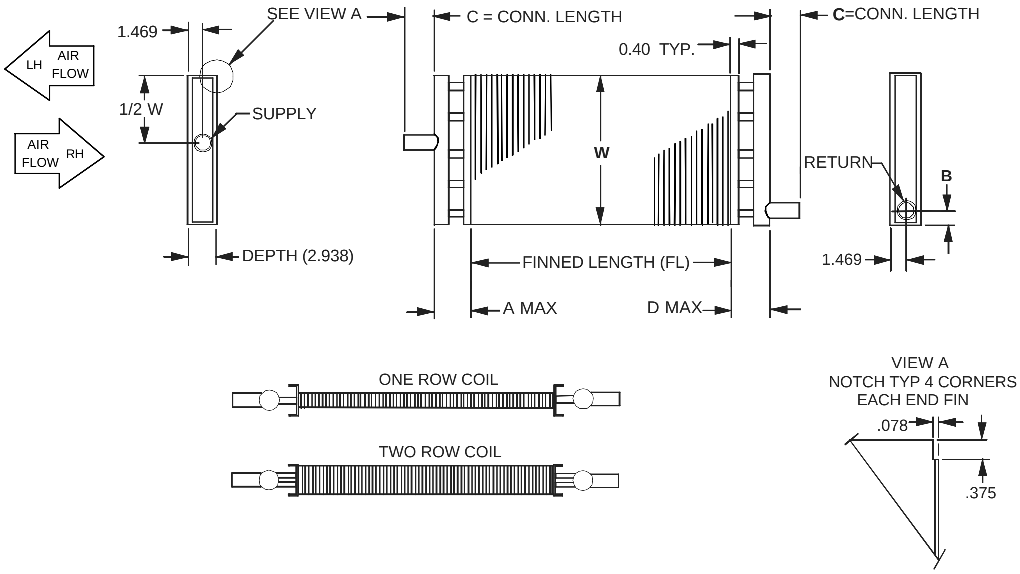
NOMENCLATURE: 5 S A

TUBE CENTERS:
A = 1-1/2 inch (except all HIF8 coils are 3” CC)

COIL TYPE:
S = Standard construction, Fig. 15 & 16 with single tube
J = Standard construction, Fig. 15 & 16 with distributing tube
R = Standard construction, Fig. 15 & 16 with distributing tube
H = High pressure construction, Fig. 15 & 16 with single tube
G = High pressure construction, Fig. 15 & 16 with distributing tube
T = High pressure construction, Fig. 15 & 16 with distributing tube

TUBE DIAMETER
5 = 5/8 inch O.D.
8 = 1 inch O.D.

Figure 17. 5SA, 5HA, 8RA & 8TA Uncased Coils



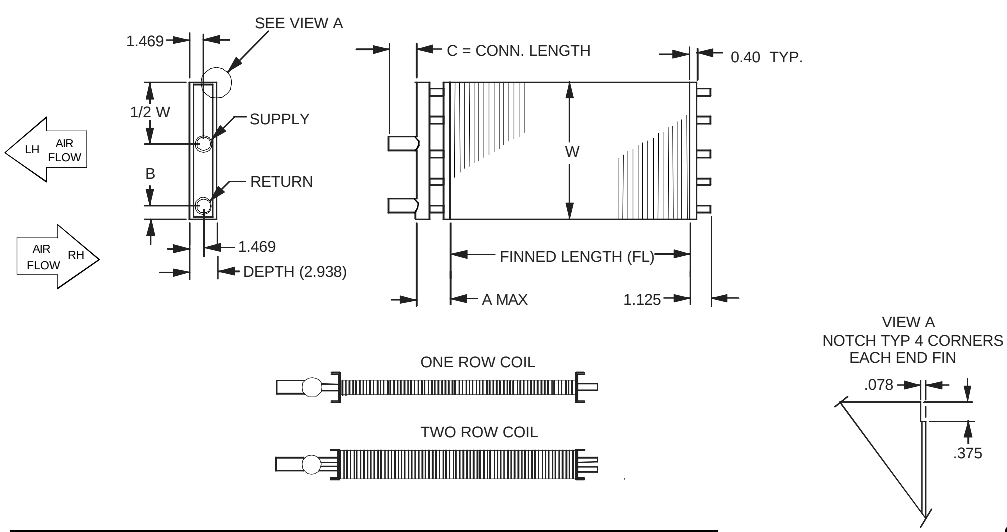
CONN LENGTH	
OPTION	C
CONTRACTOR	3.00
STD. UNIT	7.00
LINED UNIT	8.50
VISION UNIT	8.50

MODEL	ROW	SUPPLY CONN SIZE	RETURN CONN SIZE	A	B	D	W
5SA, 5HA	01	1-1/2	1-1/2	3.250	1.125	3.250	12.00 - 18.00
5SA, 5HA	01	1-1/2	1-1/2	3.750	1.125	3.250	21.00 - 42.00
5SA, 5HA	02	2-1/2	2-1/2	3.875	1.625	3.875	12.00 - 42.00
8RA, 8TA	01	2-1/2	2-1/2	3.875	1.625	3.875	12.00 - 42.00

GENERAL NOTES:

1. HORIZONTAL AIR FLOW.
2. ALL COILS DRAINABLE.
3. CONNECTIONS ARE PIPE, NPT (EXT.)
4. ALL DIMENSIONS ARE IN INCHES.
5. CONNECTION LOCATION ± .125.
6. STEAM DISTRIBUTNG INNER TUBES (8RA & 8TA).

Figure 18. 5JA, 5GA, 8JA & 8GA Uncased Coils



CONN LENGTH	
OPTION	C
CONTRACTOR	3.00
STD. UNIT	7.00
LINED UNIT	8.50
VISION UNIT	8.50

MODEL	ROW	CONN SIZE	A	B	W
5JA, 5GA	01	2	3.750	1.375	12.00 - 42.00
5JA, 5GA	02	2-1/2	3.875	1.625	12.00 - 42.00
8JA, 8GA	01	2-1/2	3.875	1.625	12.00 - 42.00

GENERAL NOTES:

1. HORIZONTAL AIR FLOW.
2. ALL COILS DRAINABLE.
3. CONNECTIONS ARE PIPE, NPT (EXT.)
4. ALL DIMENSIONS ARE IN INCHES.
5. CONNECTION LOCATION ± .125
6. STEAM DISTRIBUTING INNER TUBES.

NOMENCLATURE: 5 S A

TUBE CENTERS:
A = 1-1/2 inch (except all HIF8 coils are 3” CC)

COIL TYPE:
S = Standard construction, Fig. 17 & 18 with single tube
J = Standard construction, Fig. 17 & 18 with distributing tube
R = Standard construction, Fig. 17 & 18 with distributing tube
H = High pressure construction, Fig. 17 & 18 with single tube
G = High pressure construction, Fig. 17 & 18 with distributing tube
T = High pressure construction, Fig. 17 & 18 with distributing tube

TUBE DIAMETER
5 = 5/8 inch O.D.
8 = 1 inch O.D.

Piping data

APPLICATION RECOMMENDATIONS

Satisfactory operation and service are best provided when coils are installed with proper piping, trap, and support arrangement. The following notes and diagrams are recommended.

General

1. Provide separate supports and hangers for the coil and for the piping.
2. Be certain that adequate piping flexibility is provided. Stresses resulting from expansion of closely coupled piping and coil arrangement can cause serious damage. Coils having opposite end connections must be piped with expansion joints.
3. Standard coils are pitched in the casings when installed for horizontal airflow. The installation should be checked to ensure that the casing is level. On vertical airflow applications, the coils must be pitched when installed.
4. Do not reduce pipe size at the coil return connection. Carry return connection size through the dirt pocket, making the reduction at the branch leading to the trap.
5. Install vacuum breakers on all applications to prevent retaining condensate in the coil. Generally, the vacuum breaker is to be connected between the coil inlet and the return main, as shown. However, for a system with a flooded return main, the vacuum breaker should be open to the atmosphere and the trap design should allow venting of large quantities of air.
6. Do not drip supply mains through the coil.
7. Do not attempt to lift condensate when using modulating or on-off control.

Traps

1. Size traps in accordance with trap manufacturer's recommendations. Be certain that the required differential will always be available. DO NOT UNDERSIZE.
2. Float and thermostatic or bucket traps are recommended for low pressure steam. On high pressure systems, bucket traps are normally recommended. The thermostatic traps should be used only for air venting.
3. Bucket traps are recommended for use with on-off control only.
4. Locate traps at least 12 inches below the coil return connection.
5. Multiple coil installation:
   a. Each coil or group of coils that is individually controlled must be individually trapped.
   b. Coils in series — separate traps are required for each coil, or bank of coils, in series.
   c. Coils in parallel — a single trap may generally be used but an individual trap for each coil is preferred.

Controls

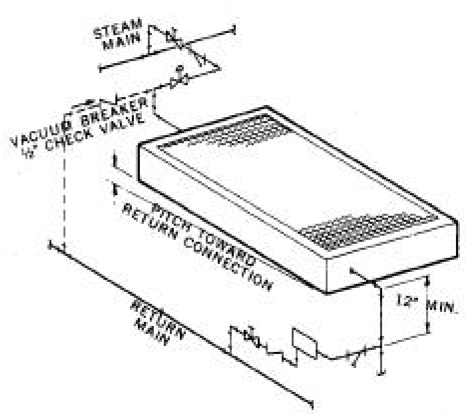
1. With coils arranged for series airflow, a separate control is required on each bank, or coil, in the direction of airflow.
2. On high pressure installations, a two-position steam valve with a face and bypass arrangement is preferred where modulating control is required.
3. Modulating valves must be sized properly. DO NOT UNDERSIZE.

Freezing Conditions (Entering air temperatures below 35°F)

1. 5JA, 8JA and 8RA coils are definitely recommended.
2. 5 psi steam must be supplied to coils at all times.
3. Modulating valves are not recommended. Control should be by means of face and bypass dampers.
4. Consideration should be given to the use of two or three coils in series with two-position steam control valves on that coil or coils which will be handling 35°F or colder air. The desired degree of control can be attained with a modulating valve on the downstream coil.
5. Provision should always be made to thoroughly mix fresh air and return air before it enters coil. Also, temperature control elements must be properly located to obtain true air mixture temperatures.
6. As additional protection against freeze-up, the trap should be installed sufficiently far below coil to provide an adequate hydrostatic head to help remove of condensate during an interruption in the steam pressure. Estimate 3 feet for each 1 psi of trap differential required.
7. On startup, admit steam to coil ten minutes before admitting outdoor air.
8. Provisions must be made to close fresh air dampers if steam supply pressure falls below minimum specified.

SYMBOLS FOR PIPING ARRANGEMENTS

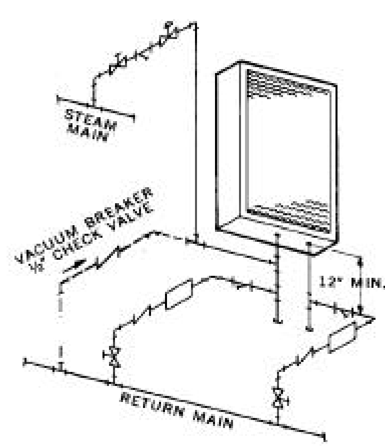
LOW PRESSURE (TO 25 PSI)



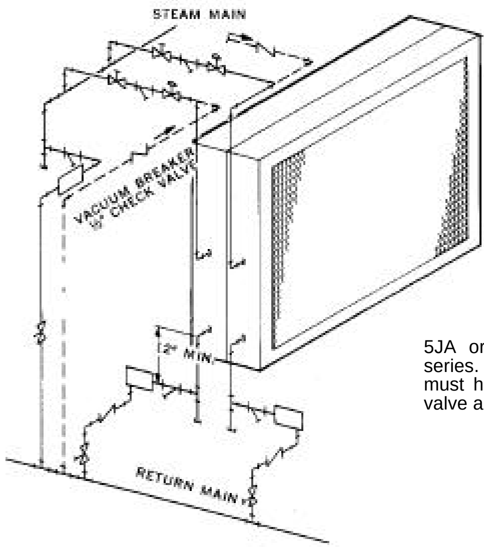
*5JA or 8JA coil installed with tubes vertical. The coil supply piping must be dripped ahead of the coil on an installation of this type.

*5SA coil installed for vertical airflow. Installer must pitch coil toward the return connection on vertical airflow installations. For horizontal airflow installation, the required pitch is built into the casing.

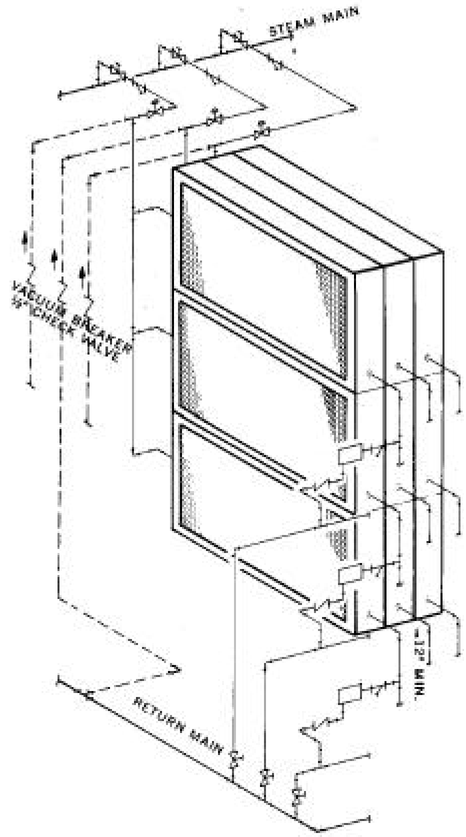
*** NOTE:** Rating data is ARI certified only for the standard ARI coil orientation; i.e., horizontal tubes, vertical coil face and horizontal airflow.



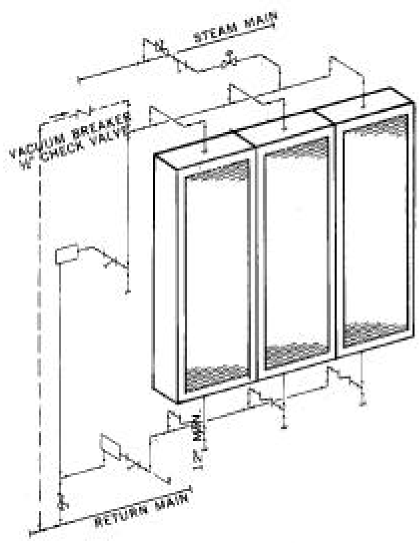
LOW PRESSURE (TO 25 PSI)



5JA or 8JA coil installed in series. Note that each coil must have a separate control valve and trap.



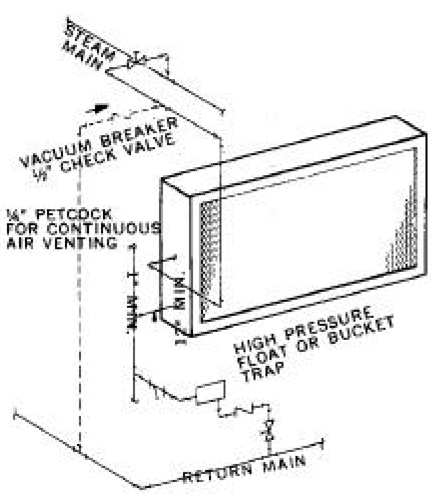
8RA and 5SA coils banked three high by three deep. Individual trapping of each coil as shown is preferred. Note that it is necessary to provide a separate control valve for each bank in the direction of airflow.



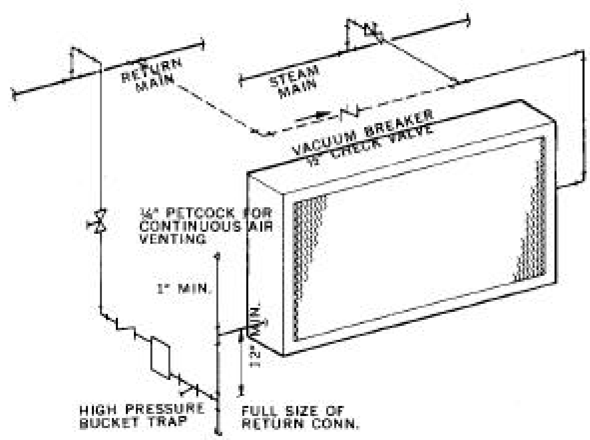
*5SA coils installed with tubes vertical. Diagram shows single trap; however, it is always preferable to trap each coil individually.

* NOTE: Rating data is ARI certified only for standard ARI coil orientation; i.e., horizontal tubes, vertical coil face and horizontal airflow.

HI PRESSURE (OVER 25 PSI)



5GA or 8GA coils. Note the addition of a vacuum breaker to permit the coil to drain during shutdown.



8TA or 5HA coils. Condensate is lifted to overhead return main.

Engineering guide specifications

Furnish and install as shown on plans and as described in the tabulated specifications, McQuay ARI certified steam heating coils of extended surface, staggered tube, HI-F or E-F rippled, corrugated plate fin type. Coil performance should be substantiated by computer generated output data.

HEADERS shall be of non-ferrous materials using seamless copper tubing with intruded tube holes to permit expansion and contraction without creating undue stress. Rolled-in joints or dissimilar metals will not be acceptable. Both the supply and return headers shall be completely encased by the coil casing. Heating surface tubes shall not pass through a header end sheet and be subjected to wear of the tubes because of movement which occurs when the coils expand and contract.

Orificed baffle plates shall be installed in the supply headers opposite the supply connection to provide proper diffusion of the entering steam.

PRIMARY SURFACE shall be round, seamless (5/8" O.D.) (1" O.D.) copper tubing brazed into intruded header tube holes using brazing alloys. Tubes on two-row coils shall be staggered in the direction of airflow. Tubes shall be on 1-1/2" or 3" centers. High pressure coils shall have cupro-nickel tubes and headers.

SECONDARY SURFACE shall consist of rippled aluminum plate fins (HI-F5, E-F5 or HI-F8) for higher capacity and structural strength. Fins shall have full drawn collars to provide a continuous surface cover over the entire tube. Fins shall not have sharp edges which accumulate dirt. Tubes shall be expanded into the fins to provide a continuous primary to secondary compression bond over the entire finned length for maximum heat transfer rates.

CASINGS shall be constructed of continuous galvanized steel. Coil side plates shall be reinforced type for greater strength and ease of stacking and shall have 3/8" x 3/4" slots on 6" centers for mounting. Full length fin channels shall be furnished to brace the coil core and prevent air bypass.

Coils shall be pitched in casing for horizontal airflow toward the return header end. A minimum of 1/8" pitch per foot of coil finned length shall be used to allow proper condensate drainage.

5SA, 5HA, 8RA & 8TA COILS shall have the supply header on one end and return header on the other end. The supply header end of each coil tube shall be properly orificed to meter the steam uniformly to each tube.

5JA, 5GA, 8JA & 8GA COILS shall have both the supply header and return header on the same end. The supply header shall be enclosed by the return header and shall feed the inner steam distributing tubes. The coil end opposite the connection end shall be free to float within the casing as expansion and contraction occurs.

TESTS: The complete coil core shall be tested with 315 pounds air pressure under warm water and suitable for working conditions up to 150 psig and 366° F. High pressure coils shall be suitable for working conditions up to 350 psig and 450 °F. Individual tube tests and core tests before installation of headers are not considered satisfactory. Hydrostatic tests alone will not be acceptable. Capacities shall be as outlined in the tabulation and substantiated by computer generated output data.

Suggested Steam Coil Tabulation

TAG NO.	QTY.	COIL TYPE	FIN SERIES	ROWS	FIN HEIGHT	FINNED LENGTH
FACE AREA	**MAX. FACE VELOCITY**	**CFM**	**ENT. AIR TEMP. (°F)**	**LVG. AIR TEMP (°F)**	**PSIG STEAM**	**MAX. AIR PRESSURE DROP INCHES OF WATER**

13600 Industrial Park Boulevard, Minneapolis, MN 55441 USA • (800) 432-1342 • www.mcquay.com