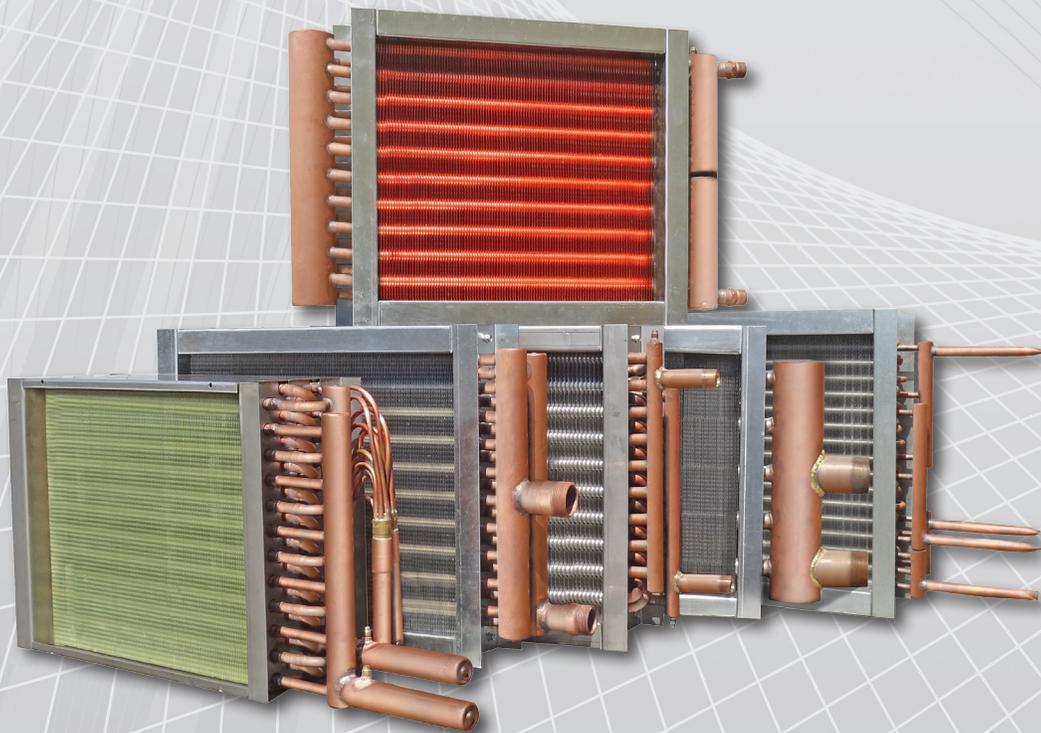




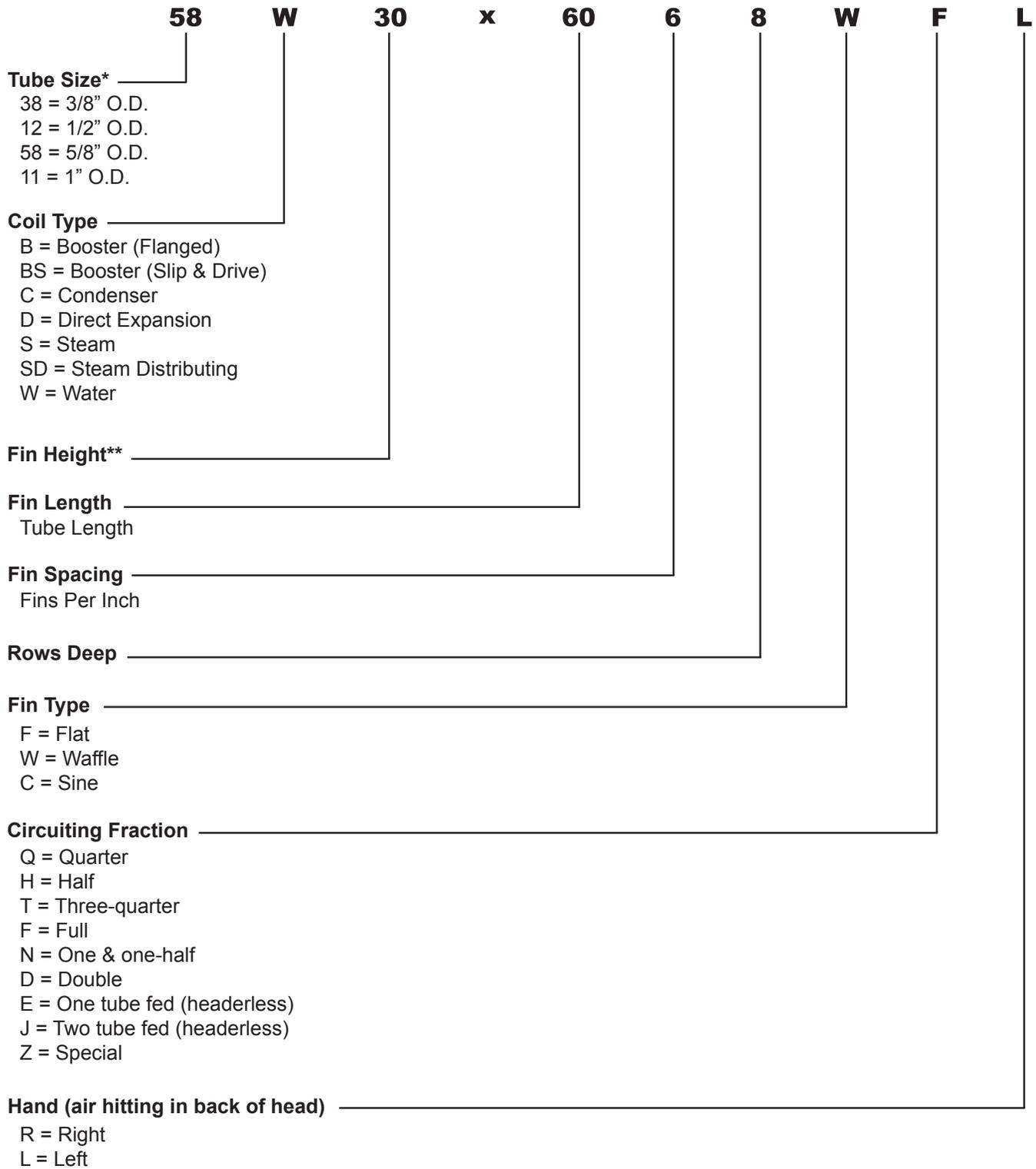
Quick Reference Guide



**Booster Coils • Fluid Coils
Steam Coils • Evaporator Coils
Condenser Coils • Industrial Coils**

The Guide to All Things RAE Coils

RAE Coils Model Nomenclature



***Notes:**

- 3/8" tube fin heights are in increments of 1"
- 1/2" tube fin heights are in increments of 1-1/4"
- 5/8" tube fin heights are in increments of 1-1/2"
- 1" tube fin heights are in increments of 3"

RAE Coils Terminology

Blow Through	The supply fan is upstream of the cooling coil.
BTU	British thermal unit
Cleanable Tubes	Threaded plugs are provided for each tube or a removable plate is provided usually at the return bend end of the coil.
Coil Circuitry	The ratio of the number of water inlet tubes to the number of tubes in the first row fed directly from the entering water header. Example: A single circuit coil has all tubes fed in the first row as compared to a half circuit coil where only 1/2 of the tubes are fed in the first row. Examples of typical coil circuiting can be found on page 10.
Condensate Burst	A phenomena where condensate fills the space between fins and the air traveling across the coil pushes or bursts the water into the airstream. Commonly referred to as water carryover.
CW	Chilled water
De-Saturation Coil	A coil design that provides integral 1-2 degrees re-heat to avoid wet final filters that are immediately downstream of a cooling coil and supply fan is in a blow-thru position.
Draw Through	The supply fan is downstream of the cooling coil.
DX Distributor	Refrigerant distributors improve system performance by mixing the refrigerant liquid and vapor as it leaves the thermal expansion valve (TEV). This ensures that all circuits of the evaporator are evenly fed, which means the evaporator is fully utilized and operating efficiently
EAT	Entering air temperature into coil
EWT	Entering water temperature into coil
FPS	Feet per second
GPM	Gallons per minute
HW	Hot water
Intermediate Drain Pan	Drain pan installed between two coils (or installed in the finpack on coils taller than 48") to reduce condensate build-up between fins. Condensate accumulates in a sloped drain pan and is carried to the lower pan via a downspout.
LAT	Leaving air temperature after coil
LWT	Leaving water temperature after coil
Phenolic or E-Coat	A dipped coating that is applied to coils to provide enhanced corrosion protection.
Sensible BTU (SBTU)	Sensible heat only, not latent. Heating coils will only show Sensible heat gain. Note: Some cooling coils may only perform sensibly.
Spray Coating	A sprayed coating that is applied to coils to provide enhanced corrosion protection. Spray coatings are generally less expensive than dipped coatings.
Turbulators	A spiral wound wire placed inside each tube to help prevent laminar flow of water to promote more efficient energy transfer from the water to the tube/fin assy. Turbulators are used frequently with high percentages of glycol. Some engineers/owners do not allow Turbs.
Total BTU (TBTUH)	Includes Latent and Sensible heat. Cooling coil performance data sheets will show Total and Sensible BTU performance.
Ultra Casing	Copper tube sheets attached to desired standard casing material to provide copper tube to copper tube sheet connection. Ultra casing can be used for extreme, abrupt changes in operating temperatures or for applications that involve excessive vibration.
WPD	Water pressure drop

RAE Coils General Guidelines

COIL SIZING GUIDELINES

CFM (Cooling Coils)	350-400 CFM/Ton with return air 200-250 CFM/Ton with outside air
Face Velocities	Cooling Coils: typically 500 (+/-50) FPM, can be lower for 100% outside air conditions Heating Coils: typically 700 (+/-100) FPM, can be much higher based on application
Fin Height (FH)	Typically 42"-48" max depending on fin spacing, FPM, and application. FH can be as high as 96" if the customer will install a intermediate drain pan in the fin pack, try to stay under 12 FPI or if conditions do not present sufficient condensate to create water carry over.
Fin Length (FL)	Maximum of 288" (Indoor access pull may limit and/or scheduled max WPD)
Fin Spacing/Fins per Inch (FPI)	Generally 8-10 FPI for cooling/heating applications. Low temp applications or applications that will require defrost may have a low fin spacing of 4-6 FPI. Any application that needs to be frequently washed or cleaned in place (CIP) would also use a lower FPI
Mixed Air Cooling Conditions	Typically 80°F/67°F
Outside Air Conditions	Typically 95°F/75°F
Tubes High (in coil face)	3/8" Tubes: FH/1 = number of tubes high per row 1/2" Tubes: FH/1.25 = number of tubes high per row 5/8" Tubes: FH/1.5 = number of tubes high per row 1" Tubes: FH/3 = number of tubes high per row

COIL MATERIALS OF CONSTRUCTION

AcryCoat	Fin coated with Epoxy coating from the mill (80% less cost than dipped)
Casing Options	Cooling Coils: galvanized, stainless, aluminum (Stainless preferred for rust prevention) Heating Coils: galvanized, stainless, aluminum (Galvanized preferred due to lack of condensate)
Coating Options	Phenolic/Heresite, Electro-Fin, Tehcni-Coat, E-Coat
Connection Options	Water/Steam Coils: steel, brass, copper DX Coils: Copper
Fin Thicknesses	Aluminum: .006", .008", .010" Copper: .006", .008", .010"
Fin Types	Sine, Waffle and Flat. Sine offers the highest performanc but at the expense of APD. Waffle is moderate fin patters with increased performance over flat with reasonable APD. Flat offers the least APD with decreased performance. Note at higher fin spacing applications the flat fin performance de-rate is less prominent.
Tube Diameters	DX, Condensing, Chilled Water, and Hot Water Coils: 3/8", 1/2", 5/8" Standard Steam Coils: 5/8" Steam Distributing Coil: 1"
Tube Thicknesses	3/8" Tubes: .014", .016", .020" 1/2" Tubes: .017", .025", .032" 5/8" Tubes: .020", .025", .035", .049" 1" Tubes: .035", .049"

NOTE: All RAE Coils are tested to 400 PSIG, with the exception of 1" steam coils (tested at 200 PSIG) and 410A refrigerant heat pump DX or condensing coils (tested at 650 PSIG.)

RAE Coils General Guidelines

COIL SELECTION GUIDELINES

Air Pressure Drop	Chilled Water Coils: 0.75°F to 1°F Hot Water Coils: 0.25°F to 5°F
Altitude	Most coils are selected at SCFM. If your elevation exceeds 1,000-2,000 feet consider ACFM and entering the actual altitude. Your selection will need to be more robust due to the decrease in air density.
Entering Water Temperature (EWT)	Chilled Water Coils: 43°F to 45°F with a 10°F to 15°F TD Hot Water Coils: 180°F with a 20°F TD
Gallons per Minute (GPM)	2.4 GPM/Ton of cooling
Maximum Rows (Chilled Water Coils)	Typically 12, though some engineers limit to 6-8 rows per coil and require two coils in series separated by an access section.
Refrigerant Pressure Drop	R-410a: 6 PSI is the target, with a minimum of 2 PSI and a maximum of 12 PSI R-22: 2-4PSI is the target, with a minimum of 2 PSI and a maximum of 6 PSI
Water Pressure Drop (WPD)*	Chilled Water Coils: 10 to 25 feet Hot Water Coils: 5 to 15 feet
Water Velocity*	3 to 4 FPS with a minimum of 2 FPS and a maximum of 6 FPS
Weight	To determine water weight in coil, add 1 lb./square foot of coil face area/row

*Always adjust coil circuiting to maximize allowable water velocity and water pressure drop (WPD.)

FREQUENTLY ASKED QUESTIONS

What criteria most affects coil selection?

1. Coil circuiting (tube velocity and water pressure drop)
2. Fin spacing, then feet per minute and rows
3. Fin height is more expensive than fin length when adjusting coil face area

Typical Coil Circuiting

One issue confronting salespeople, contractors, and engineers as they attempt to discuss an existing coil is how to describe it. What one person describes as “rows,” another will call “passes,” and yet a third will identify as “tubes high.”

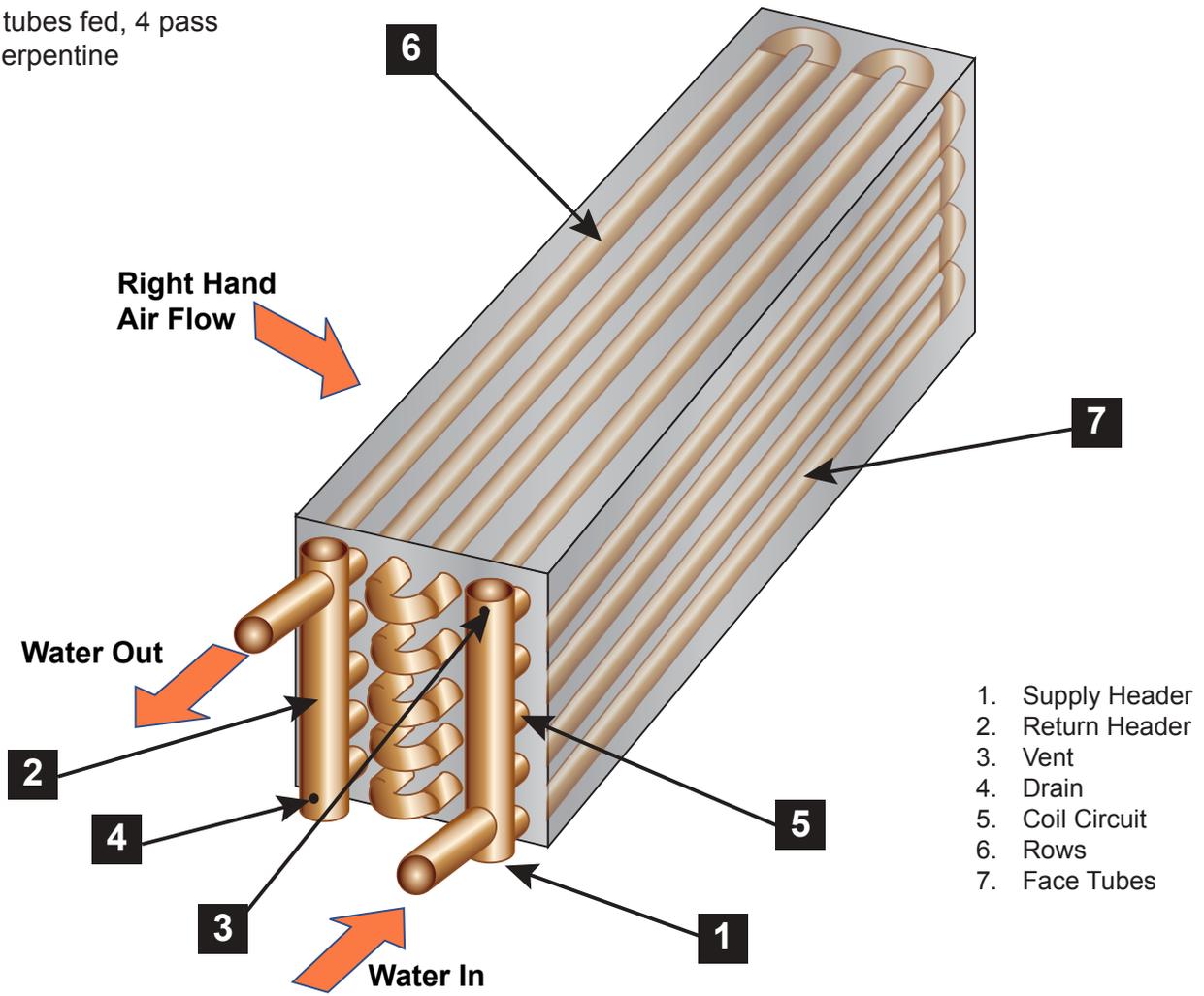
The diagram below is what we believe most accurately describes the components of a coil. It shows the rows deep, tubes in the face (or tubes high), number of passes, etc.

However, when an old coil is observed in the field, you can usually only see the header end and/or the end opposite the header (also known as the return bend end.) Luckily, taking good pictures or notes of both of those ends will identify many of the critical details on a coil.

The following section shows several diagrams of various circuiting views.

TYPICAL CHILLED WATER COIL

4 row, 5 tubes fed, 4 pass
Single Serpentine

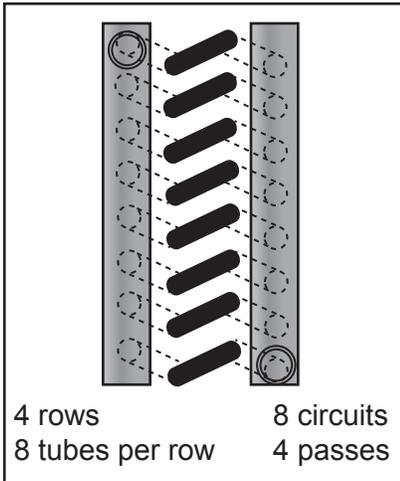


Typical Coil Circuiting

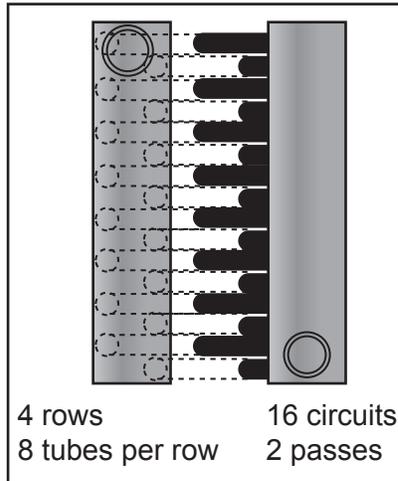
Circuitry is the ratio of water inlet tubes to total number of tubes in the first row.

Note: 1 row, full-circuit coils have opposite end connections!

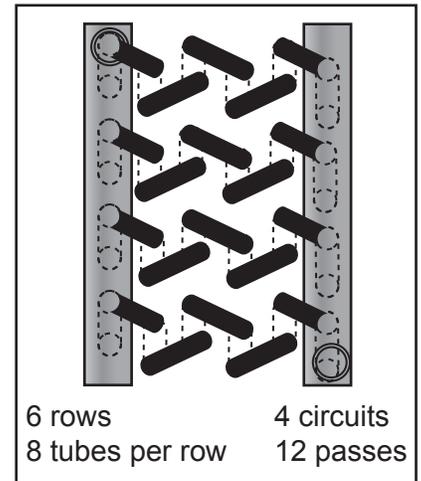
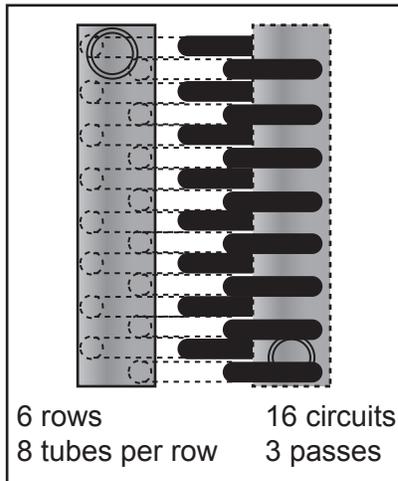
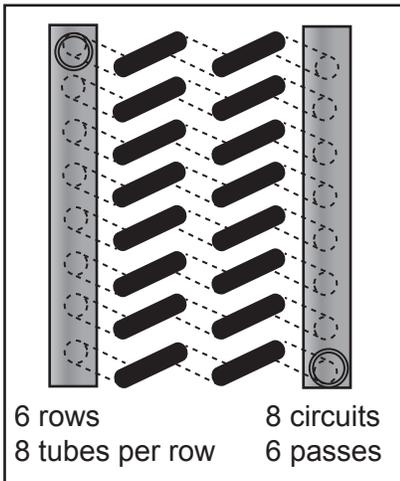
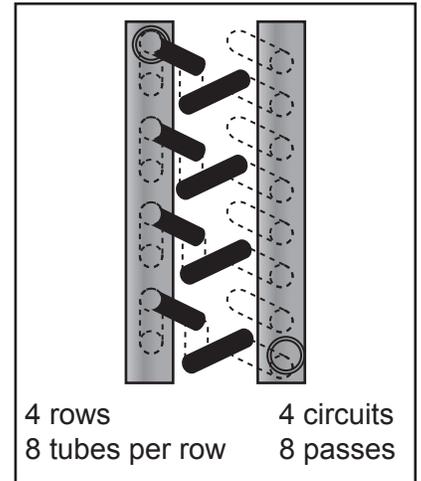
SINGLE SERPENTINE



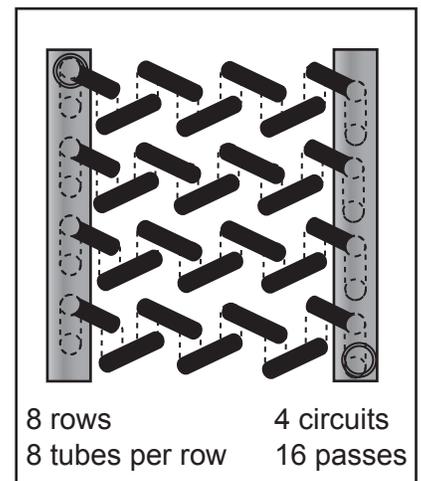
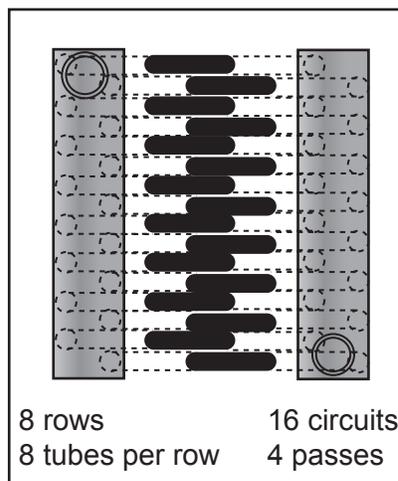
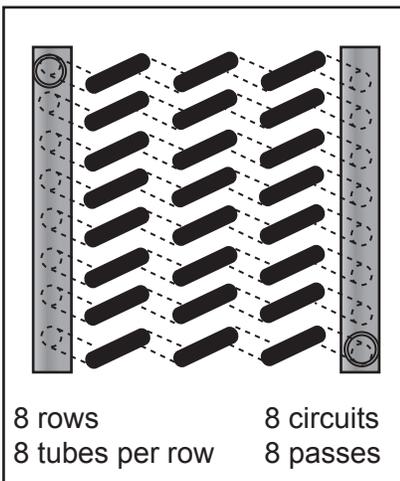
DOUBLE SERPENTINE



HALF SERPENTINE

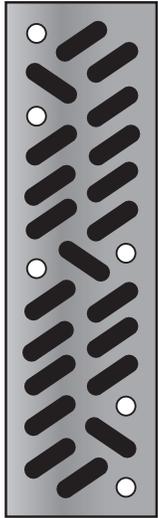


opposite end connections shown

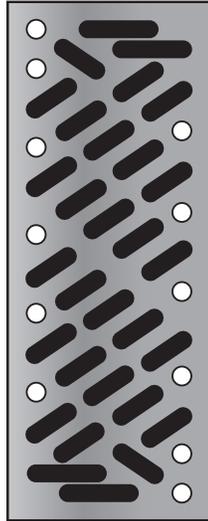


Typical Coil Circuiting

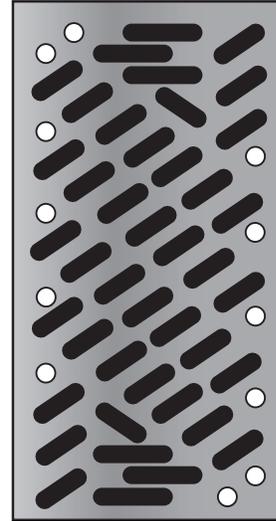
HEADER END SHOWN - HEADERS REMOVED



4 row,
quarter circuit



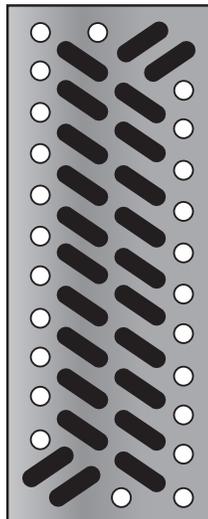
6 row,
half circuit



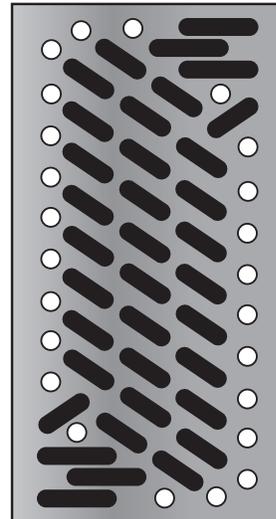
8 row,
half circuit



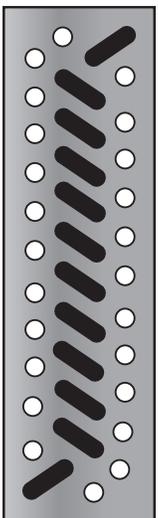
4 row,
half circuit



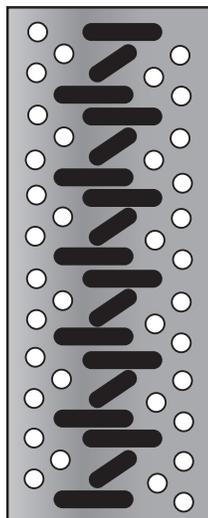
6 row,
full circuit



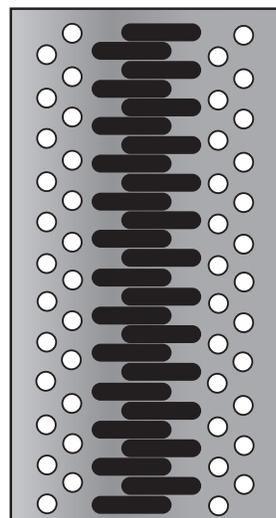
8 row,
full circuit



4 row,
full circuit



6 row,
one and a half
circuit



8 row,
double circuit

RAE Coils Installation Guidelines

WATER & STEAM COILS

Coil connections are extended through the duct or AHU casing walls (unless an internal pipe chase is required in the AHU). Coils are certified/rated in accordance with AHRI 410.

DX COILS

Same as Chilled Water Coils except that coil construction may be single circuit or dual circuit interlaced, dual circuit face split, or dual circuit split by rows. Coils are certified/rated in accordance with AHRI 410.

CHILLED WATER DESIGN RULES FOR AHU INSTALLATION

1. Minimum unit width based on coils:

$FL + 10'' + (2 \times \text{wall thickness})$

**Add an additional 9" for internal pipe case and an additional 12" for 2W coils.*

**DX Coils: Add 4-6" in width to accommodate Distributor and Tubing*

2. Minimum unit height based on coils:

$FH + 7'' + \text{base height} + \text{roof thickness} + \text{roof slope}$

**Add an additional (2" + FH) for each additional coil. Add an additional 2" for each additional coil that has slide racks.*

3. Try not to exceed 42"-48" fin height per coil unless the coil is entirely sensible cooling. Try not to exceed 240" fin length. Most indoor units will require much shorter coil lengths to allow for replacement.
4. Target minimum 2 FPS on CV systems and 3-5 FPS on VAV systems to help address turn down (6 FPS maximum). Recommend verifying with engineer minimum conditions to assure operation above Laminar flow conditions. Balance FPS with scheduled maximum WPD (CW WPD is typically 15-20')

Note: *Where to put cooling coils is usually a question of where they are in relation to the supply fan. If unit conditions are given vs. coil conditions, then motor heat must be taken into consideration. If blow through cooling is used, then fan heat must be added to the mixed air conditions entering the cooling coil. If blow through is preferred, a desaturation coil design can add 1-2° of reheat to help avoid the wet final filter concern. This arrangement has the least impact on the amount of cooling coil surface required to provide a given discharge temperature. In a draw through, the leaving conditions for the coil must be lower than the desired discharge temperature as the fan/motor heat must be added to the air leaving the coil. This does provide an advantage in applications that include final filters as the fan/motor heat lowers the relative humidity slightly. Under certain conditions, cold saturated air will "wet" the final filter.*

HEATING COIL DESIGN RULES FOR AHU INSTALLATION

1. Minimum unit width based on coils:

$FL + 10'' + (2 \times \text{wall thickness})$

**Add an additional 9" for internal pipe case and an additional 12" for 2W coils.*

2. Minimum unit height based on coils:

$FH + 6'' + \text{base height} + \text{roof thickness} + \text{roof slope}$

**Add an additional (3.5" + FH) for each additional coil. No additional space required for slide racks.*

3. Try not to exceed 60" fin height per coil. Try not to exceed 240" fin length. Most indoor units will require much shorter coil lengths to allow for replacement.
4. Size at 550 to 700 FPM. Maximum of 1,000 FPM if unit layout allows.
5. Maintain a 1 to 6 FPS on fluid flow (2 to 4 FPS is preferred) and a maximum WPD of 10 to 15 feet.

Note: *Where to put heating coils depends on the application. If freezing of a cooling coil during the winter is a concern, a heating coil could be placed upstream of the cooling coil to provide freeze protection. If reheating of conditioned air to lower the relative humidity is more of a concern, the heating coil would be placed downstream of the cooling coil. Some systems may have both preheat and reheat coil, if both concerns are valid.*

Coil Field Measurement Sheets

Note: Field measurement sheets are available electronically. Contact your RAE Coils Account Manager.

STANDARD STEAM COILS

										RAE Corporation (STANDARD STEAM COILS) REPLACEMENT COIL DATA SHEET (SAME END CONNECTIONS) REP. NAME _____ PROJECT _____ PR. NO. _____ MODEL _____						
RDWS	FPI	FH	FL	A	B	CH	OL	CD	S	HA	HB	CT	CB	HD	NOTES	
FIN MATERIAL		TUBE MATERIAL		CASING MATERIALS		CONNECTIONS										
<input type="checkbox"/> FLAT <input type="checkbox"/> CORR <input type="checkbox"/> ALUM <input type="checkbox"/> .006 <input type="checkbox"/> AL ACR <input type="checkbox"/> .008 <input type="checkbox"/> CU <input type="checkbox"/> .010 <input type="checkbox"/> CU ACR <input type="checkbox"/>		<input type="checkbox"/> 1/2 <input type="checkbox"/> 5/8 <input type="checkbox"/> .017 <input type="checkbox"/> .020 <input type="checkbox"/> .025 <input type="checkbox"/> .025 <input type="checkbox"/> .032 <input type="checkbox"/> .035 <input type="checkbox"/> .049 <input type="checkbox"/>		<input type="checkbox"/> 18 GA. <input type="checkbox"/> 16 GA. <input type="checkbox"/> GALV. <input type="checkbox"/> S.S. <input type="checkbox"/> ALUM. <input type="checkbox"/> CU FLANGE TYPE <input type="checkbox"/> STACKING <input type="checkbox"/> STANDARD		<input type="checkbox"/> COPPER <input type="checkbox"/> STEEL SUPPLY _____ RETURN _____ HDR DIA. _____ <input type="checkbox"/> MPT. <input type="checkbox"/> FPT. <input type="checkbox"/> ODS.		ITEM NO. _____ COIL CIRCUITING _____								

STEAM DISTRIBUTING COILS

										RAE Corporation (1" STEAM DISTRIBUTING COILS) REPLACEMENT COIL DATA SHEET (SAME END CONNECTIONS) REP. NAME _____ PROJECT _____ PR. NO. _____ MODEL _____				
FPI	FH	FL	A	B	CH	OL	CD	S	HA	CT	CB	HD	QTY. NOTES:	
FIN MATERIAL		FIN TYPE		TUBE		CASING MATERIALS		CONNECTIONS						
<input type="checkbox"/> ALUM <input type="checkbox"/> .006 <input type="checkbox"/> AL ACR <input type="checkbox"/> .008 <input type="checkbox"/> CU <input type="checkbox"/> .010 <input type="checkbox"/> CU ACR <input type="checkbox"/>		<input type="checkbox"/> CORR <input type="checkbox"/> FLAT <input type="checkbox"/> RIP. <input type="checkbox"/> EDGE <input type="checkbox"/> STR. <input type="checkbox"/> EDGE		<input type="checkbox"/> 1" DIA. <input type="checkbox"/> .035 <input type="checkbox"/> .049 FLANGE TYPE <input type="checkbox"/> STACKING <input type="checkbox"/> STANDARD		<input type="checkbox"/> 18 GA. <input type="checkbox"/> 16 GA. <input type="checkbox"/> GALV. <input type="checkbox"/> S.S. <input type="checkbox"/> ALUM. <input type="checkbox"/> CU		<input type="checkbox"/> COPPER <input type="checkbox"/> STEEL SUPPLY _____ COND. _____ HDR DIA. _____ <input type="checkbox"/> MPT. <input type="checkbox"/> FPT. <input type="checkbox"/> ODS.		CASING PITCHED 1/2" ITEM NO. _____ COIL CIRCUITING _____				

Coil Field Measurement Sheets

Note: Field measurement sheets are available electronically. Contact your RAE Coils Account Manager.

WATER COILS

FILE # RAEDVGLDVG

= 1-5/8 FOR 12 SERIES .017 & .025 R-BENDS
 = 2-0/0 FOR 12 SERIES .032 R-BENDS
 = 1-7/8 FOR 58 SERIES .020 & .025 R-BENDS
 = 2-1/4 FOR 58 SERIES .035 & .049 R-BENDS

RAE Corporation (CHILLED & HOT WATER COILS)

REPLACEMENT COIL DATA SHEET

REP. NAME _____ PROJECT _____

PR. NO. _____ MODEL _____

RDWS	FPI	FH	FL	A	B	CH	DL	CD	S	HA	HB	CT	CB	HD	NOTES

FIN MATERIAL		TUBE MATERIAL		CASING MATERIALS		CONNECTIONS		
<input type="checkbox"/> FLAT	<input type="checkbox"/> CORR	<input type="checkbox"/> 1/2	<input type="checkbox"/> 5/8	<input type="checkbox"/> 18 GA.	<input type="checkbox"/> 16 GA.	<input type="checkbox"/> COPPER	<input type="checkbox"/> STEEL	
<input type="checkbox"/> ALUM	<input type="checkbox"/> .006	<input type="checkbox"/> .017	<input type="checkbox"/> .020	<input type="checkbox"/> GALV.	<input type="checkbox"/> S.S.	SUPPLY _____		
<input type="checkbox"/> AL ACR	<input type="checkbox"/> .008	<input type="checkbox"/> .025	<input type="checkbox"/> .025	<input type="checkbox"/> ALUM.	<input type="checkbox"/> CU	RETURN _____		
<input type="checkbox"/> CU	<input type="checkbox"/> .010	<input type="checkbox"/> .032	<input type="checkbox"/> .035	FLANGE TYPE		HDR DIA. _____		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> .049	<input type="checkbox"/> STACKING	<input type="checkbox"/> STANDARD	MPT. <input type="checkbox"/> FPT. <input type="checkbox"/> ODS.		
							ITEM NO. _____	
							COIL CIRCUITING _____	

DIRECT EXPANSION COILS, SINGLE CIRCUIT

FILE # RAEDVGLDVG

= 1-5/8 FOR 12 SERIES .017 & .025 R-BENDS
 = 2-0/0 FOR 12 SERIES .032 R-BENDS
 = 1-7/8 FOR 58 SERIES .020 & .025 R-BENDS
 = 2-1/4 FOR 58 SERIES .035 & .049 R-BENDS

RAE Corporation (DIRECT EXPANSION COILS)

REPLACEMENT COIL DATA SHEET

SINGLE CIRCUIT

REP. NAME _____ PROJECT _____

PR. NO. _____ MODEL _____

RDWS	FPI	FH	FL	A	B	CH	DL	CD	S	HA	HB	CT	CB	HD	NOTES

FIN MATERIAL		TUBE MATERIAL		CASING MATERIALS		CONNECTIONS		
<input type="checkbox"/> FLAT	<input type="checkbox"/> CORR	<input type="checkbox"/> 1/2	<input type="checkbox"/> 5/8	<input type="checkbox"/> 18 GA.	<input type="checkbox"/> 16 GA.	<input type="checkbox"/> COPPER	<input type="checkbox"/> STEEL	
<input type="checkbox"/> ALUM	<input type="checkbox"/> .006	<input type="checkbox"/> .017	<input type="checkbox"/> .020	<input type="checkbox"/> GALV.	<input type="checkbox"/> S.S.	SUCTION _____		
<input type="checkbox"/> AL ACR	<input type="checkbox"/> .008	<input type="checkbox"/> .025	<input type="checkbox"/> .025	<input type="checkbox"/> ALUM.	<input type="checkbox"/> CU	LIQUID _____		
<input type="checkbox"/> CU	<input type="checkbox"/> .010	<input type="checkbox"/> .032	<input type="checkbox"/> .035	FLANGE TYPE		HDR DIA. _____		
<input type="checkbox"/> CU ACR	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> .049	<input type="checkbox"/> STACKING	<input type="checkbox"/> STANDARD	MPT. <input type="checkbox"/> FPT. <input type="checkbox"/> ODS.		
							ITEM NO. _____	
							COIL CIRCUITING _____	

Coil Field Measurement Sheets

Note: Field measurement sheets are available electronically. Contact your RAE Coils Account Manager.

DIRECT EXPANSION COILS, DUAL CIRCUIT INTERLACED

FILE # RAEDVG7.DWG 												RAE Corporation REPLACEMENT COIL DATA SHEET < DIRECT EXPANSION COILS > DUAL CIRCUIT INTERLACED REP. NAME _____ PROJECT _____ PR. NO. _____ MODEL _____					
* = 1-5/8\"/>																	
ROWS	FPI	FH	FL	A	B	CH	QL	CD	S	HA	HB	CT	CB	HD	NOTES		
FIN MATERIAL		TUBE MATERIAL		CASING MATERIALS		CONNECTIONS											
<input type="checkbox"/> FLAT <input type="checkbox"/> CORR		<input type="checkbox"/> 1/2 <input type="checkbox"/> 5/8		<input type="checkbox"/> 18 GA. <input type="checkbox"/> 16 GA.		<input type="checkbox"/> COPPER <input type="checkbox"/> STEEL											
<input type="checkbox"/> ALUM <input type="checkbox"/> .006 <input type="checkbox"/> AL ACR <input type="checkbox"/> .008 <input type="checkbox"/> CU <input type="checkbox"/> .010 <input type="checkbox"/>		<input type="checkbox"/> .017 <input type="checkbox"/> .020 <input type="checkbox"/> .025 <input type="checkbox"/> .025 <input type="checkbox"/> .032 <input type="checkbox"/> .035 <input type="checkbox"/> .049		<input type="checkbox"/> GALV. <input type="checkbox"/> S.S. <input type="checkbox"/> ALUM. <input type="checkbox"/> CU		SUCTION _____ LIQUID _____ HDR DIA. _____ <input type="checkbox"/> MPT. <input type="checkbox"/> FPT. <input type="checkbox"/> ODS.											
														FLANGE TYPE <input type="checkbox"/> STACKING <input type="checkbox"/> STANDARD		ITEM NO. _____ COIL CIRCUITING _____	

Notes:

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www.RAE-Coils.com

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