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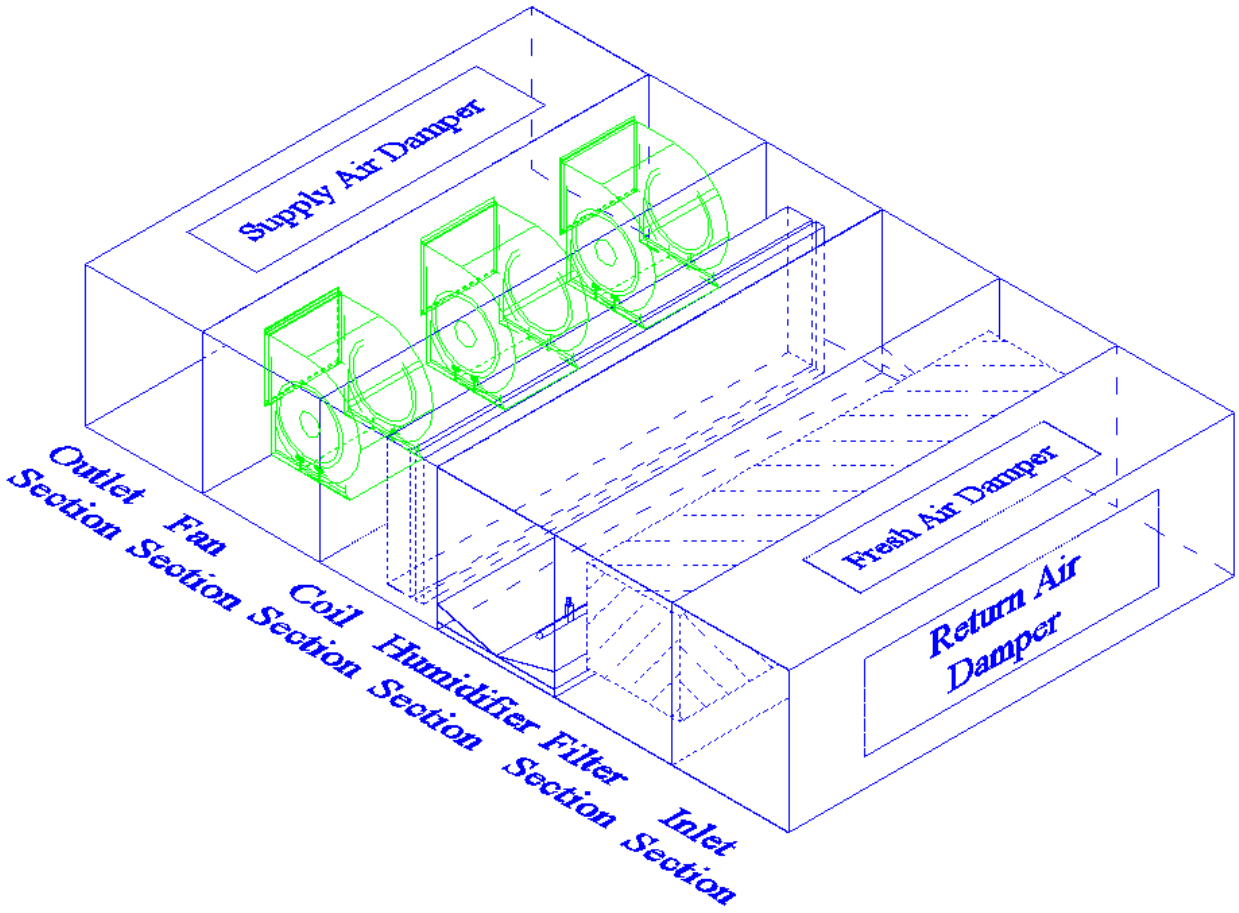
SARAVEL MINI AIR-HANDLING UNIT

800 TO 5500 CFM
(1400 TO 9300 m³/hr)




SARAVEL

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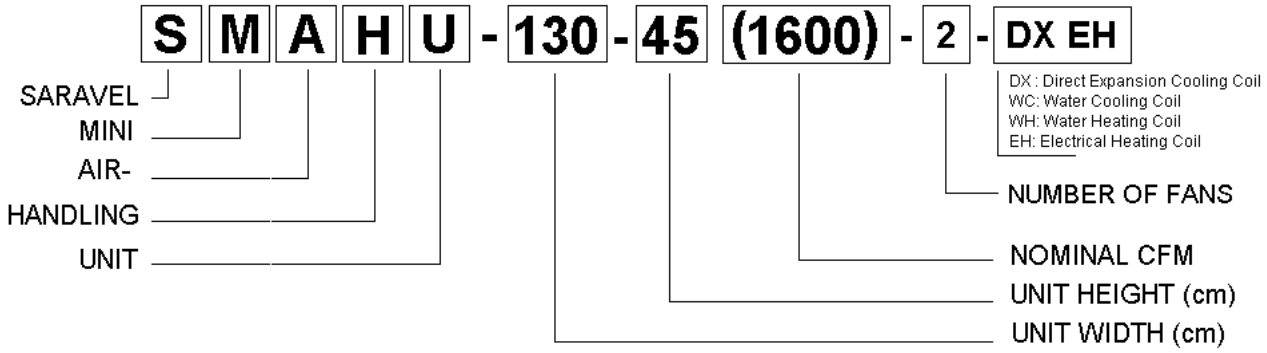
NOMENCLATURE



INTRODUCTION

Saravel **M**ini **A**ir-Handling **U**nits offer innovative solutions to the challenges facing today's users and installers of air conditioning systems.
Units are designed for a variety of residential, commercial, institutional and other applications such as houses, office buildings, shopping centers, Hotels, Restaurants, Schools and other different places. They are available in 9 different models
in the range of **800 to 5500 CFM.**
The modular units can be combined with a wide range of various accessories to adapt to every air conditioning and ventilation applications.
(For more information please consult Saravel Corp.)

Combining modern manufacturing methods, stringent quality, assurance checks and proven components, ensures that units deliver ultimate performance.
The ease of installation and minimum maintenance makes Saravel Mini Air-Handling Units ideal for year round applications in multistory office buildings, hotels, schools, industrial facilities and residential applications.

For industrial special purposes or exceptional types, customary built units can also be designed and constructed.

+ All components in SARAVEL Mini Air-Handling Units are selected of reliable and recognized international brand names or designed and constructed and checked under the standard of the air-conditioning and refrigeration industry.

The units are manufactured under Saravel's own Quality Assurance System and also Saravel Standard Engineering Specification (SES).

+ For any other special or exceptional applications pleases consult **SARAVEL Corp**.

SARAVEL CORP.
Oct. 2003

Manufacturer reserves the right to make changes in design and construction, without notice.

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SPECIFICATIONS

Reliability and proven performance are incorporated into the following design features:

FANS

All fans are centrifugal forward curve, mounted in a fan section in a reliable manner, being driven directly by their own electrical motor.
The high efficiency and low noise fans used in units has made units work with minimum noise level, suitable for special applications.
The fans' rotational speed could be controlled by variation of the supply voltage with an additional transformer or can be used with 4 predefined situation defined by the fan itself. (High (230V), Medium (180V), Low (140V), Lowest (100V))

COILS

Saravel offers chilled water, hot water, DX, steam Coils which are consist of 5/8" OD (Outer Diameter) copper tubes (4 rows deep for cooling coils and 1 row deep for heating coils) with Aluminum corrugated plate fins with fin spacing of 8,10,12 and 14 FPI (Fin per inch).
Other fin type like Crimped Spiral fins also can be built.
Tube pattern includes staggered arrangement, providing economical selection for specific duty and application ranges. Standard coils are designed with 5/8" *copper* tubes with possible alternate material selections of *carbon steel* and *stainless steel* (in spiral fin type) to meet specific application needs.

+ Electrical Heating Coil also can be mounted in supply air opening optionally. (Please Refer to Table 7)
+ Fin materials include aluminum and copper.
+ Coil air face velocity is designed between 400 to 500 FPM.
+ Coils are designed and tested for 350 psig (24 bar) pressure. DX coils are evacuated and backfilled with 15 psig (1 bar) nitrogen gas prior to shipment.
+ Headers are of heavy wall copper or carbon and steel.
+ All connections are of the sweat type suitable for brazing.
+ Tubes are mechanically expanded into fin collars for a permanent bond. (Not for spiral fin coils)
+ Spiral fins are mechanically wrapped and bonded to the tube to provide 100% contact around the periphery.

DAMPERS

SARAVEL offers opposed blade dampers as a standard component. Dampers are constructed of special aluminum alloy profiles with damper rods which turn in nylon bushings.

FILTERS

Cleanable type filters are available as standard component from SARAVEL while pleated, bag and fine filter sections are available to remove a maximum quantity of dust and bacteria from the air.
+ The Units rated CFM are just for "Washable Aluminum Filters" with 0.3 inch water final pressure drop. For other filters with more pressure drop, please consult saravel corp. to calculate the real CFM.

HUMIDIFIERS

SARAVEL offers two types of humidifiers: water fog humidifier and steam humidifier. These humidifiers provide humidity for comfort or process applications.
The place to locate humidifier could be either before or after coil section, depending on application and design parameters..

FRAMEWORK

All casing are constructed of 1 and 1.25 mm thickness steel sheet panels which are painted to provide an excellent corrosion protection. The body structure are made of special aluminum alloy profiles which provide an excellent rigidity, while preventing the units to be so heavy. All profiles are connected together with special aluminum profile corners.
A sloped drain pan extends beyond the coil section, providing complete condensate drainage. Coil and drain connections can be provided on either side for installation versatility.
+ All the access doors are facilitated with strong hinges and plastic door handles for easy access.
+ The units are provided with Poly-Ethylene thermal insulation to 20mm thickness with the thermal transmittance classification of T4. (According to DIN EN-1886)
+ Units are provided with a U-Tube as filter pressure drop indicator, showing filter dirtiness.
+ All sections are modular, separable, and easily accessible, which allow quick and easy unit maintenance

EXAMPLES

Example 1:

Mini Air-Handling Unit Selection
Chilled Water Application

Given:
Air Flow Rate …… 2000 CFM
Altitude ……..…. Sea Level
Entering Air Temperature …..…… 100° F DB, 75°F WB
Entering and Leaving Water Temperature …... 45°F, 55°F
Total Cooling Load ……..…….. 86 kBtu/hr

Find:
(a) Select Suitable Air-Handling Unit.
(b) Obtain Real Cooling Load In This CFM

Solution:

To select the suitable unit, referring to Table 3, Model 190-45 with 2500 CFM is selected.

$$\frac{2000\ CFM}{2500\ CFM} = 0.8 = 80\%$$

From Table 10 on page 15, for cooling coil and 80% of nominal CFM it is read:

C1=0.87

From the Tables 11 and 12 on Page 15, with standard Aluminum fins and corrugated plate fin arrangement:

C2 = C3 = 1

Returning to Table 3 on page 8, the specified unit with 8 FPI fin spacing in 100°F DB and 75°F WB and "Double" circuiting, offers 106 kBtu/hr.

Corrected capacity = Capacity in the table × C1 × C2 × C3
Corrected capacity = 106 × 0.87 × 1 × 1 = 92 kBtu/hr

92 kBtu/hr > 86 kBtu/hr (Required)

So Model 190-45, is a suitable selection.

*** This was an example for chilled water applications, but the procedure for DX and Hot water and Steam coil is just the same.**

Example 2:

Mini Air-Handling Unit Selection
Hot Water Application

Given:
Air Flow Rate ……..… 4000 CFM
Altitude ……..…. Sea Level
Entering Air Temperature …… 70° F DB
Entering and Leaving Water Temperature 160°F, 140°F
Required Heating Load …….…..…. 130 kBtu/hr

Find:
(a) Select Suitable Air-Handing Unit
(b) Real Heating Load At This CFM

Solution:

To select the suitable unit, referring to Table 5, Model 190-60 with 4500 CFM is selected.

$$\frac{4000\ CFM}{4500\ CFM} = 0.89 = 89\%$$

From Table 10 on page 15, for heating coil and 89% of nominal CFM it is read:

C1=0.95

From the Tables 11 and 12 on Page 15, with standard Aluminum fins and corrugated plate fin arrangement:

C2 = C3 = 1

Returning to Table 5 on page 12, the specified unit with 14 FPI fin spacing in 60°F DB "Half circuiting", offers 217 kBtu/hr.

Corrected capacity = Capacity in the table × C1 × C2 × C3
Corrected capacity = 217 × 0.95 × 1 × 1 = 206 kBtu/hr

But this capacity, read from table, is for 60°F entering air temperature and for entering and leaving water temperature of 180°F and 160°F. For conditions of this example, referring to figure 3 it is read:

Heating Load Correction Factor = 0.70
206 kBtu/hr * 0.70 = 144 kBtu/hr

144 kBtu/hr > 130 kBtu/hr (Required)

So Model 190-60, is a suitable selection.

*** This was an example for hot water applications, but the procedure for Chilled water and DX and Steam coil is just the same.**

EXAMPLES

Example 3:

Fog Nozzle Humidifier Selection

Given:
Inlet Condition …….…… 80°F DB, 20% RH
Volumetric Air Flow Rate …….. 4000 CFM
Altitude ……...…. Sea Level

Find:
(a) The Maximum Of Possible Humidifying
(b) Outlet Condition

Solution:

The maximum moisture difference ΔW, for a fog nozzle humidifier at constant wet bulb temperature is 10 grains of moisture per pound of dry air. (0.00143 lb/lb of dry air)

Now, Entering Altitude Table on page 17 it is read that at sea level, the density of air is 0.075 lb/ft³.
So, the air mass flow rate would be:
4000 CFM * 0.075 lb/ft³ * 60 min/hr = 18000 lb/hr
The amount of steam required is:
18000 lb/hr * 0.00143 lb/lb of dry air = 25.74 lb/hr

So **26 lb/hr** of water is the maximum amount of water that can be sprayed into the air.
Entering Psychrometric chart on last page of this guide, From the inlet condition, move along a line of constant wet bulb at a vertical distance of ΔW=10 to find the outlet condition as **73°F DB and 32% RH**.

Example 4:

Steam Humidifier Selection

Given:
Inlet Condition …….…… 70°F DB, 20% RH
Outlet Condition ……..…….…… 75°F DB, 50% RH
Volumetric Air Flow Rate …….. 3000 CFM
Altitude ……...…. Sea Level

Find:
(a) Amount Of Steam Required.

Solution:

Entering Psychrometric chart on last page of this guide, pound of moisture per lb of dry air (on vertical axis) for the inlet and outlet conditions:
Inlet : 0.0032 lb/lb of dry air
Outlet : 0.0093 lb/lb of dry air

Difference = 0.0061 lb/lb of dry air
Now, Entering Altitude Table on page ? it is read that at sea level, the density of air is 0.075 lb/ft³.
So, the air mass flow rate would be:
3000 CFM * 0.075 lb/ft³ * 60 min/hr = 13500 lb/hr
The amount of steam required is:

13500 lb/hr * 0.0061 lb/lb of dry air = 82.35 lb/hr

So **82** lb/hr of steam is required.

Attention 1:
Every Unit when installed on the channel external static pressure drop of 0.5 inch of water (maximum), would give the nominal CFM. This is the maximum CFM by putting the unit (Fans) into "High" working situation. 3 more stages of less CFM "Medium, Low and Lowest" are also available. So the CFM can be reduced till the best fit to the needs.
Additionally for reaching to exactly desired CFM, dampers can be set manually.

Attention 2:
To reach the suitable load response of coils, any change in fin spacing (8,10,12 or 14 FPI), Aluminum or Copper fin material, plate or spiral fin type, changing circuiting arrangement (Full, half, …) and changing the entering and leaving fluid temperature is possible.
For estimating the effect of these changes, please refer to correction factor tables. (Table ? to ?)

Attention 3:
Any interpolation between data given in Unit Ratings Tables is possible.

COIL CIRCUITING & PHYSICAL DATA

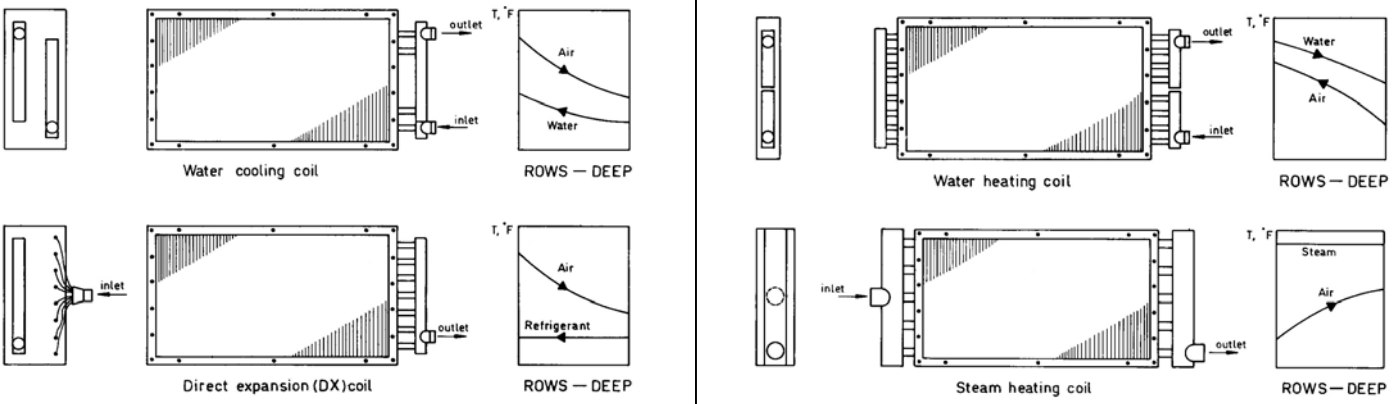


Fig 1 . Coil types and temperature profiles through the coils

Table 1 – Coil Circuiting Definition

Circuiting	Symbol	Description
Double (2)	D	All tubes in the first two rows and last two rows are connected to inlet and outlet headers respectively. (Passing fluid pressure drop is low. i.e. 1/8 of Full circuiting)
Full (1)	F	All tubes in the first and last two row are connected to inlet and outlet headers respectively. (Passing fluid pressure drop is medium.)
Half (1/2)	H	Half of the tubes in the first and last row are connected to the inlet and outlet headers respectively. (Passing fluid pressure drop is high. i.e. 8 times Full circuiting.)
One Third (1/3)	T	One third of the tubes in the first and last row are connected to the inlet and outlet headers respectively. (Applicable only when the number of tubes in each row are divisible by three.) (Passing fluid pressure drop is very high. i.e. 27 times Full circuiting)
One Fourth (1/4)	Q	One quarter of the tubes in the first and last row are connected to the inlet and outlet headers respectively. (Applicable only when the number of tubes in each row are divisible by four.) (Passing fluid pressure drop is extremely high. i.e. 64 times Full circuiting)

Table 2 – Physical Data

Model	Nominal Air CFM (Unit Model)	COIL				FAN						Unit Weights (Approx.) (kg)
						Wheel (Centrifugal forward curve)			Motor (1 Phase) (230 V) (4 speed)			
		Cooling Coil Rows	Heating Coil Rows	Finned Length (inch)	Tube High	No. of Fans	Type	Sound Power Level (of all fans) at nominal CFM (dB)	No. of Motors	Nominal Full Load Power (Watt)	Max. Current Amp.	
70-45	800	4	1	20	8	1	DDM 9/9 300W	64	1	300	2.5	200
130-45	1600	4	1	44	8	2	DDM 9/9 300W	67	2	300	2×(2.5)	300
190-45	2500	4	1	68	8	3	DDM 9/9 300W	70	3	300	3×(2.5)	450
70-60	1400	4	1	20	12	1	DDM 10/8 550W	64	1	550	4.6	225
130-60	3000	4	1	44	12	2	DDM 10/8 550W	67	2	550	2×(4.6)	350
190-60	4500	4	1	68	12	3	DDM 10/8 550W	70	3	550	3×(4.6)	500
70-70	1700	4	1	20	14	1	DDM 10/8 600W	67	1	600	6.4	250
130-70	3500	4	1	44	14	2	DDM 10/8 600W	70	2	600	2×(6.4)	400
190-70	5500	4	1	68	14	3	DDM 10/8 600W	73	3	600	3×(6.4)	550

- Sound power levels are rated for unit settings set to “HIGH” position. (maximum air flow)
- All electrical motors: IP=55, Insulation Class: F

UNIT RATINGS

Table 3 – COOLING COIL – Chilled Water (4 Rows) (45°F → 55°F)

Model	Nominal Air CFM	Entering Dry Bulb Temp. (°F)	Entering Wet Bulb Temp. (°F)	Circuit	8 FPI					14 FPI				
					Total Cooling Capacity (kBtu/hr)	Leaving Dry Bulb Temp. (°F)	Leaving Wet Bulb Temp. (°F)	Water Flow (GPM)	Water Pressure Drop (Ft water)	Total Cooling Capacity (kBtu/hr)	Leaving Dry Bulb Temp. (°F)	Leaving Wet Bulb Temp. (°F)	Water Flow (GPM)	Water Pressure Drop (Ft water)
70-45	800	80	67	Full	13	65.5	62.2	2.5	0.1	16	62.0	61.0	3.1	0.1
				Half	18	62.3	60.1	3.6	0.6	23	58.5	57.8	4.7	0.9
				Double	8.7	70.0	63.8	1.7	0.01	9.8	69.9	63.7	1.8	0.01
		90	72	Full	19	68.2	65.4	3.8	0.1	25	64.0	63.2	5.0	0.2
				Half	28	64.9	61.9	5.6	1.3	36	59.7	58.9	7.2	2.0
				Double	13	75.3	67.7	2.6	0.01	16	72.0	66.6	3.1	0.02
		100	75	Full	25	70.8	66.6	5.1	0.2	33	64.8	63.6	6.7	0.3
				Half	35	67.2	63.1	7.0	1.9	45	60.4	59.2	8.9	3.0
				Double	19	78.5	69.0	3.7	0.02	23	73.4	67.4	4.6	0.03
		110	81	Full	38	74.7	69.8	7.6	0.4	48	67.6	66.3	9.6	0.6
				Half	50	70.1	65.5	10	3.8	63	61.9	60.9	13	5.6
				Double	25	81.4	73.9	5.0	0.04	31	74.7	72.1	6.2	0.06
130-45	1600	80	67	Full	39	61.4	59.4	7.9	0.6	51	57.5	57.0	10	0.9
				Half	50	59.0	57.1	10	5.0	64	54.5	54.0	13	7.6
				Double	27	64.2	61.8	5.5	0.05	34	60.7	60.6	6.7	0.1
		90	72	Full	61	63.7	61.0	12	1.2	76	58.5	57.8	15	1.8
				Half	73	61.2	58.6	15	9.7	91	55.2	54.6	18	15
				Double	43	67.3	64.5	8.7	0.1	55	62.9	62.1	11	0.2
		100	75	Full	75	65.8	62.1	15	1.8	94	59.1	58.1	19	2.7
				Half	87	63.2	59.6	17	13	109	55.9	54.9	22	20
				Double	57	69.5	65.5	11	0.2	73	63.6	62.5	15	0.3
		110	81	Full	107	68.5	64.4	21	3.3	132	60.4	59.3	26	4.9
				Half	120	65.7	61.9	24	24	148	56.8	55.9	30	35
				Double	83	73.1	68.6	17	0.4	105	65.9	64.8	21	0.6
190-45	2500	80	67	Full	73	59.8	57.8	15	2.0	92	55.5	55.1	19	3.1
				Half	85	58.1	56.2	17	16	108	53.3	52.8	22	25
				Double	53	62.5	60.5	11	0.2	70	58.8	58.3	14	0.3
		90	72	Full	107	62.1	59.5	21	4.1	135	56.3	55.6	27	6.2
				Half	120	60.3	57.8	24	30	151	53.9	53.3	30	45
				Double	85	65.2	62.4	17	0.5	108	60.1	59.4	22	0.7
		100	75	Full	130	64.2	60.5	26	5.7	162	57.0	56.1	32	8.6
				Half	143	62.3	58.8	29	41	178	54.6	53.7	36	61
				Double	106	67.3	63.4	21	0.7	135	60.8	59.7	27	1.1
		110	81	Full	180	66.8	62.8	36	10	223	58.1	57.1	45	15
				Half	194	64.8	61.0	39	71	240	55.6	54.6	48	105
				Double	154	70.1	65.8	31	1.4	192	62.4	61.3	38	2.1

+ All the ratings are based upon 45°F Entering Water Temperature and 55° F Leaving Water Temperature. For other coil inlet conditions please refer to figure 2.
+ For coil air inlet condition other than listed above please consult SARAVEL CASCADES® program available upon the request from the sale office.
+ Shaded region shows that the coil water velocity is out of ARI standard limits. (1~ 8 FPS)
+ For any fin spacing between 8 and 14 FPI (i.e. 10 or 12 FPI) use interpolation between data given above.
+ The Ratings in the table has been rated at 0 altitude (Sea Level) for coils with aluminum corrugated plate fins.
For other Fin Type, Fin Material or other options, please refer to Correction Factor Tables at the end of this guide.

UNIT RATINGS

Table 3 – COOLING COIL – Chilled Water (4 Rows) (45°F → 55°F)

Model	Nominal Air CFM	Entering Dry Bulb Temp. (°F)	Entering Wet Bulb Temp. (°F)	Circuit	8 FPI					14 FPI				
					Total Cooling Capacity (kBtu/hr)	Leaving Dry Bulb Temp. (°F)	Leaving Wet Bulb Temp. (°F)	Water Flow (GPM)	Water Pressure Drop (Ft water)	Total Cooling Capacity (kBtu/hr)	Leaving Dry Bulb Temp. (°F)	Leaving Wet Bulb Temp. (°F)	Water Flow (GPM)	Water Pressure Drop (Ft water)
70-60	1400	80	67	Full	20	66.5	62.6	4.1	0.1	26	63.0	61.3	5.2	0.1
				Half	29	63.2	60.6	5.8	0.7	38	59.2	58.4	7.7	1
				Double	15	70.0	63.8	3.0	0.01	15	70.0	63.8	3.0	0.01
		90	72	Full	31	69.5	65.9	6.2	0.1	41	64.9	63.8	8.2	0.2
				Half	46	66.1	62.6	9.3	1.6	59	60.7	59.6	12	2
				Double	21	76.4	68.0	4.1	0.01	26	73.1	67.0	5.1	0.02
		100	75	Full	42	72.5	67.1	8.4	0.2	55	65.9	64.4	11	0.4
				Half	58	68.6	63.9	12	2.3	74	61.6	60.2	15	4
				Double	31	79.9	69.4	6.1	0.03	38	75.0	67.9	7.6	0.04
		110	81	Full	62	76.3	70.6	12	0.5	79	69.0	67.2	16	0.7
				Half	83	71.9	66.6	17	4.5	105	63.4	61.8	21	7
				Double	41	83.3	74.4	8.1	0.05	51	76.5	72.6	10	0.07
130-60	3000	80	67	Full	67	62.7	60.1	13	0.7	87	58.6	57.9	17	1.1
				Half	86	60.4	58.0	17	6.4	112	55.7	54.9	22	10
				Double	47	65.7	62.3	9.4	0.07	59	61.9	61.0	12	0.1
		90	72	Full	104	65.5	62.1	21	1.5	133	60.0	59.0	27	2.4
				Half	125	63.0	59.9	25	13	161	56.6	55.7	32	20
				Double	73	68.8	65.3	15	0.2	95	64.1	63.1	19	0.3
		100	75	Full	128	68	63.4	26	2.2	165	60.9	59.5	33	3.5
				Half	151	65.5	61	30	17	192	57.7	56.4	38	27
				Double	93	71.4	66.8	19	0.2	125	65.1	63.6	25	0.4
		110	81	Full	184	71.1	65.9	37	4.3	233	62.4	61.0	47	6.6
				Half	208	68.4	63.6	42	31	263	59.0	57.6	53	48
				Double	141	75.4	69.9	28	0.5	181	67.9	66.2	36	0.8
190-60	4500	80	67	Full	122	60.9	58.6	24	2.5	157	56.5	55.8	31	4.0
				Half	143	59.2	56.9	29	20	185	54.2	53.6	36.88	31
				Double	89	63.4	61.0	18	0.3	116	59.7	58.9	23	0.4
		90	72	Full	181	63.5	60.4	36	5.0	230	57.6	56.6	46	8.0
				Half	203	61.8	58.7	41	37	259	55.2	54.4	51.7	58
				Double	141	66.5	63.2	28	0.6	181	61.3	60.3	36	0.9
		100	75	Full	219	66.0	61.6	44	7.1	278	58.4	57.1	56	11
				Half	242	64.1	59.9	48	51	307	56.0	54.9	61.4	79
				Double	178	68.9	64.4	36	0.9	229	62.1	60.8	46	1.4
		110	81	Full	305	68.9	64.1	61	13	384	59.8	58.4	77	20
				Half	329	67.1	62.5	66	89	415	57.3	56.0	83.05	136
				Double	259	72.2	67.1	52	1.8	327	64.0	62.6	65	2.7

+ All the ratings are based upon 45°F Entering Water Temperature and 55° F Leaving Water Temperature. For other coil inlet conditions please refer to figure 2.
+ For coil air inlet condition other than listed above please consult SARAVEL CASCADES® program available upon the request from the sale office.
+ Shaded region shows that the coil water velocity is out of standard limits. (1~ 8 FPS)
+ For any fin spacing between 8 and 14 FPI (i.e. 10 or 12 FPI) use interpolation between data given above.
+ The Ratings in the table has been rated at 0 altitude (Sea Level) for coils with aluminum plate fins.
For other Fin Type, Fin Material or other options, please refer to Correction Factor Tables at the end of this guide.

UNIT RATINGS

Table 3 – COOLING COIL – Chilled Water (4 Rows) (45°F → 55°F)

Model	Nominal Air CFM	Entering Dry Bulb Temp. (°F)	Entering Wet Bulb Temp. (°F)	Circuit	8 FPI					14 FPI				
					Total Cooling Capacity (kBtu/hr)	Leaving Dry Bulb Temp. (°F)	Leaving Wet Bulb Temp. (°F)	Water Flow (GPM)	Water Pressure Drop (Ft water)	Total Cooling Capacity (kBtu/hr)	Leaving Dry Bulb Temp. (°F)	Leaving Wet Bulb Temp. (°F)	Water Flow (GPM)	Water Pressure Drop (Ft water)
70-70	1700	80	67	Full	25	66.7	62.7	4.9	0.1	31	63.2	61.4	6.2	0.1
				Half	35	63.4	60.7	7.0	0.7	46	59.4	58.5	9.2	1.0
				Double	18	70.0	63.8	3.7	0.01	18	70.0	63.8	3.7	0.01
		90	72	Full	37	69.6	66.0	7.4	0.1	49	65.1	63.9	9.8	0.2
				Half	55	66.4	62.8	11	1.6	71	61.0	59.9	14	3.0
				Double	25	76.7	68.1	4.9	0.01	31	73.5	67.1	6.1	0.02
		100	75	Full	50	72.9	67.3	10	0.2	66	66.2	64.6	13	0.4
				Half	69	69.1	64.1	14	2.4	89	61.9	60.4	18	4.0
				Double	36	80.3	69.5	7.3	0.03	46	75.4	68.0	9.1	0.04
		110	81	Full	74	76.7	70.9	15	0.5	95	69.3	67.5	18.97	0.8
				Half	99	72.3	66.8	20	4.7	126	63.8	62.1	25	7.0
				Double	49	83.7	74.6	9.7	0.05	61	77.0	72.7	12	0.1
130-70	3500	80	67	Full	78	62.7	60.1	16	0.7	102	58.6	57.9	20	1.1
				Half	101	60.4	58.0	20	6.4	130	55.7	54.9	26	10
				Double	55	65.7	62.3	11	0.1	69	61.9	61.0	14	0.1
		90	72	Full	122	65.5	62.1	24	1.5	155	60.0	59.0	31	2.4
				Half	146	63.0	59.9	29	12	188	56.6	55.7	38	20
				Double	85	68.8	65.3	17	0.2	111	64.1	63.1	22	0.3
		100	75	Full	150	68.0	63.4	30	2.2	192	60.9	59.5	38	3.5
				Half	176	65.5	61.0	35	17	224	57.7	56.4	45	27
				Double	109	71.4	66.8	22	0.2	146	65.1	63.6	29	0.4
		110	81	Full	215	71.1	65.9	43	4.3	272	62.4	61.0	54	6.6
				Half	243	68.4	63.6	49	31	307	59.0	57.6	61	48
				Double	165	75.4	69.9	33	0.5	211	67.9	66.2	42	0.8
190-70	5500	80	67	Full	146	61.2	58.7	29	2.6	189	56.7	56.0	38	4.1
				Half	172	59.5	57.1	34	21	224	54.4	53.7	45	33
				Double	106	63.7	61.1	21	0.3	140	59.9	59.1	28	0.4
		90	72	Full	216	64.0	60.7	43	5.2	277	57.9	56.9	55	8.2
				Half	244	62.2	59.0	49	39	314	55.4	54.5	63	62
				Double	169	66.8	63.4	34	0.6	219	61.6	60.5	44	1.0
		100	75	Full	263	66.4	61.8	53	7.5	335	58.8	57.7	67	12
				Half	290	64.6	60.2	58	54	371	56.4	55.1	74	84
				Double	212	69.4	64.6	47	0.9	276	62.5	61.0	55	1.5
		110	81	Full	366	69.5	64.5	73	14	464	60.2	58.8	93	21
				Half	396	67.6	62.8	79	94	502	57.7	56.4	100	144
				Double	311	72.6	67.3	62	1.9	395	64.4	62.8	79	2.8

+ All the ratings are based upon 45°F Entering Water Temperature and 55° F Leaving Water Temperature. For other coil inlet conditions please refer to figure 2.
+ For coil air inlet condition other than listed above please consult SARAVEL CASCADES® program available upon the request from the sale office.
+ Shaded region shows that the coil water velocity is out of standard limits. (1~ 8 FPS)
+ For any fin spacing between 8 and 14 FPI (i.e. 10 or 12 FPI) use interpolation between data given above.
+ The Ratings in the table has been rated at 0 altitude (Sea Level) for coils with aluminum plate fins.
For other Fin Type, Fin Material or other options, please refer to Correction Factor Tables at the end of this guide.

UNIT RATINGS

Table 4 – COOLING COIL - DX Coil (4 Rows)

Model	Nominal Air CFM	Entering Dry Bulb Temp. (°F)	Entering Wet Bulb Temp.	8 FPI			14 FPI		
				Total Cooling Capacity (kBtu/hr)	Leaving Air Dry Bulb Temp. (°F)	Leaving Air Wet Bulb Temp. (°F)	Total Cooling Capacity (kBtu/hr)	Leaving Air Dry Bulb Temp. (°F)	Leaving Air Wet Bulb Temp. (°F)
70-45	800	80	67	16	63.0	60.8	29	55.8	55.2
		85	70	21	65.0	62.5	36	56.7	56.0
		90	72	24	66.7	63.6	41	57.4	56.7
		95	75	30	68.5	65.2	49	58.3	57.4
130-45	1600	80	67	50	58.9	57.0	74	52.0	51.6
		85	70	62	60.5	58.3	89	52.7	52.2
		90	72	70	61.8	59.2	100	53.2	52.6
		95	75	83	63.3	60.5	116	53.9	53.2
190-45	2500	80	67	88	57.6	55.7	122	51.0	50.5
		85	70	107	59.0	56.9	146	51.6	51.1
		90	72	121	60.2	57.7	163	52.1	51.5
		95	75	142	61.7	59.0	190	52.7	52.1
70-60	1400	80	67	29	63.9	61.3	48	56.7	56.0
		85	70	33	66.1	63.1	60	57.7	56.9
		90	72	39	67.9	64.3	68	58.6	57.6
		95	75	48	69.9	66.0	81	59.6	58.5
130-60	3000	80	67	86	60.4	58.0	130	53.3	52.7
		85	70	105	62.2	59.5	157	54.1	53.4
		90	72	120	63.7	60.4	176	54.8	54.0
		95	75	143	65.4	61.9	206	55.7	54.8
190-60	4500	80	67	148	58.8	56.6	211	52.0	51.4
		85	70	180	60.4	57.9	252	52.7	52.0
		90	72	202	61.8	58.8	281	53.3	52.5
		95	75	239	63.4	60.2	327	54.1	53.3
70-70	1700	80	67	31	64.1	61.5	58	56.9	56.1
		85	70	40	66.4	63.3	72	58.0	57.1
		90	72	46	68.1	64.5	81	58.9	57.8
		95	75	57	70.2	66.2	97	59.9	58.8
130-70	3500	80	67	100	60.4	58.0	152	53.3	52.7
		85	70	123	62.2	59.5	183	54.1	53.4
		90	72	140	63.7	60.4	205	54.8	54.0
		95	75	167	65.4	61.9	240	55.7	54.8
190-70	5500	80	67	178	59.1	56.7	255	52.2	51.5
		85	70	216	60.8	58.1	305	53.0	52.3
		90	72	243	62.2	59.1	340	53.6	52.8
		95	75	287	63.9	60.5	396	54.5	53.6

+ The Ratings in the table are for R-22 Refrigerant and are calculated at altitude 0 (Sea Level).
+ For coil air inlet condition other than listed above please consult SARAVEL CASCADES® program available upon the request from the sale office.
+ The Ratings in the table are for 5/8" copper tubes, Aluminum plate fins with full circuiting arrangement and has been calculated for 45° F evaporating temperature. For other evaporating temperatures please refer to figure 4.
+ For any fin spacing between 8 and 14 FPI (i.e. 10 or 12 FPI) use interpolation between data given above.
+ For other Refrigerants, Fin Material or any other options please refer to Correction Factor Tables at the end of this guide.

UNIT RATINGS

Table 5 – Hot Water Heating Coil Rating Table (1 Row)

Model	Nominal Air CFM	Entering Dry Bulb Temp.(°F)	8 FPI				14 FPI			
			Total Heating Capacity kBtu/hr	Leaving Air Dry Bulb Temp. (°F)	Water Flow GPM	Water Pressure Drop Ft water	Total Heating Capacity kBtu/hr	Leaving Air Dry Bulb Temp. (°F)	Water Flow GPM	Water Pressure Drop Ft water
70-45	800	14	34	53	3.5	0.2	50	71	5.1	0.4
		32	29	65	3.0	0.2	43	81	4.4	0.3
		60	22	85	2.2	0.1	32	97	3.3	0.2
		80	17	100	1.8	0.1	25	108	2.5	0.1
130-45	1600	14	79	60	8.2	1.1	119	82	12	2
		32	69	72	7.1	0.9	104	92	11	2
		60	54	91	5.5	0.5	80	106	8.2	1
		80	43	105	4.4	0.4	64	117	6.5	1
190-45	2500	14	128	61	13	3.0	192	85	20	6
		32	112	73	12	2.4	168	94	17	5
		60	88	92	9.0	1.5	132	108	14	3
		80	70	106	7.2	1.0	106	119	11	2
70-60	1400	14	54	49	5.5	0.2	81	67	8.3	0.5
		32	46	63	4.8	0.2	69	78	7.1	0.4
		60	35	83	3.6	0.1	52	94	5.3	0.2
		80	30	100	3.1	0.1	40	106	4.1	0.1
130-60	3000	14	132	55	14	1.3	200	75	21	3
		32	115	67	12	1.0	174	85	18	2
		60	89	87	9.2	0.7	135	101	14	1
		80	71	102	7.3	0.4	107	113	11	1
190-60	4500	14	209	57	21	3.5	317	79	33	7
		32	183	70	19	2.8	278	89	29	6
		60	143	89	15	1.8	217	104	22	4
		80	115	104	12	1.2	174	116	18	3
70-70	1700	14	64	49	6.6	0.2	96	66	10	0.5
		32	55	62	5.7	0.2	83	77	8.5	0.4
		60	41	82	4.3	0.1	62	93	6.3	0.2
		80	37	100	3.8	0.1	47	105	4.8	0.1
130-70	3500	14	154	55	16	1.3	233	75	24	3
		32	134	67	14	1.0	203	85	21	2
		60	104	87	11	0.7	157	101	16	1
		80	83	102	8.5	0.4	125	113	13	1
190-70	5500	14	249	56	26	3.7	378	77	39	8
		32	218	69	22	2.9	332	88	34	6
		60	171	89	18	1.8	259	103	27	4
		80	137	103	14	1.2	208	115	21	3

+ The Ratings in the table has been calculated at 0 altitude (Sea Level).
+ Shaded region shows that the coil water velocity is out of ARI standard limits. (1~ 8 FPS)
+ The Ratings in the table are for 1 Row 5/8" copper tubes, Aluminum corrugated plate fins with **half** circuiting arrangement.
+ The Ratings are based on 180° F entering water temperature and 160° F leaving water temperature. For other coil inlet conditions please refer to figures 3.
+ For any fin spacing between 8 and 14 FPI (i.e. 10 or 12 FPI) use interpolation between data given above.
+ For other Fin Type, Fin Material or any other options, please refer to Correction Factor Tables at the end of this guide.

UNIT RATINGS

Table 6 – HEATING COIL – Steam Coil Rating

Model	Nominal Air CFM	Entering Air Dry Bulb Temp. (°F)	5 psi					
			8 FPI			14 FPI		
			Total Heating Capacity (kBtu/hr)	Leaving Air Dry Bulb Temp. (°F)	Steam Flow (lb/hr)	Total Heating Capacity (kBtu/hr)	Leaving Air Dry Bulb Temp. (°F)	Steam Flow (lb/hr)
70-45	800	14	45	65	47	70	95	73
		32	41	79	43	64	106	67
		60	35	100	36	55	123	57
		80	31	116	32	48	136	50
130-45	1600	14	94	68	98	146	98	152
		32	86	81	89	134	109	140
		60	74	102	77	115	126	120
		80	65	117	67	101	138	105
190-45	2500	14	146	68	152	228	98	237
		32	134	81	139	209	109	217
		60	114	102	119	179	126	186
		80	101	117	105	157	138	164
70-60	1400	14	73	62	76	115	89	119
		32	67	76	69	105	101	109
		60	57	97	59	90	119	94
		80	50	113	52	79	132	83
130-60	3000	14	158	62	164	249	90	259
		32	145	76	150	228	102	237
		60	124	98	129	195	120	203
		80	109	113	113	172	133	179
190-60	4500	14	240	63	250	379	92	394
		32	220	77	229	347	103	361
		60	189	99	196	297	121	309
		80	166	114	173	262	134	272
70-70	1700	14	87	61	90	137	88	143
		32	79	75	83	125	100	131
		60	68	97	71	107	118	112
		80	60	112	62	95	131	98
130-70	3500	14	185	63	192	291	91	303
		32	169	76	176	267	102	277
		60	145	98	151	228	120	238
		80	127	114	133	201	133	209
190-70	5500	14	287	62	299	454	90	472
		32	263	76	274	416	102	433
		60	225	98	235	356	120	371
		80	199	113	207	313	132	326

+ The Ratings in the table are for 1 Row 5/8" copper tubes, Aluminum corrugated plate fins with **half** circuiting arrangement at 0 altitude.
+ The Ratings are based on 5 PSI steam working pressure and 227° F steam working temperature. For any different working pressure please refer to table 7.
+ For any fin spacing between 8 and 14 FPI (i.e. 10 or 12 FPI) use interpolation between data given above.
+ For other Fin Type, Fin Material or any other options, please refer to Correction Factor Tables at the end of this guide.

UNIT RATINGS AND COIL CONNECTIONS

Table 7 - Steam Coil Correction Factors For Different Working Pressures

Entering Air Dry Bulb Temp. (°F)	15 psi			30 psi			60 psi		
	Total Heating	Leaving Air Dry Bulb Temp.	Steam Flow	Total Heating	Leaving Air Dry Bulb Temp.	Steam Flow	Total Heating	Leaving Air Dry Bulb Temp.	Steam Flow
14	1.1	1.08	1.12	1.23	1.19	1.27	1.39	1.33	1.47
32	1.12	1.08	1.13	1.25	1.17	1.29	1.42	1.28	1.51
60	1.14	1.07	1.15	1.29	1.15	1.33	1.49	1.25	1.58
80	1.16	1.07	1.17	1.32	1.13	1.37	1.56	1.22	1.65

Correct Load = Load From Table 6 * correction factor from table 7

Table 8 – Electrical Heating Coil Ratings (1 Row) (1 Phase 220 V)

Model	Nominal Air CFM	Entering Temp. + … °F *													
		5					10					20				
		Heating Capacity (kW)	Phase	Line Curr. (Amp.)	No. of Contr. Steps	No. and Cap. (kw) of Elem.	Heating Capacity (kW)	Phase	Line Curr. (Amp.)	No. of Contr. Steps	No. of Elem.	Heating Capacity (kW)	Phase	Line Curr. (Amp.)	No. of Contr. Steps	No. of Elem.
70-45	800	1.5	1	7	1	1×1.5	3.0	1	14	2	2×1.5	5.5	1	25	3	2+2+1.5
130-45	1600	3.0	1	14	2	2×1.5	5.5	1	25	3	2+2+1.5	11.0	1	50	3	3×3 + 2
190-45	2500	4.0	1	18	3	2×2	8.5	1	39	3	3×3	17.0	1/3	77/44	3	5×3 + 2
70-60	1400	2.0	1	9	1	1×2	5.0	1	23	2	2+3	9.5	1	43	3	3×3
130-60	3000	5.0	1	23	2	2+3	10.0	1	45	3	2×3 + 2×2	20.0	1/3	91/53	3	7*3
190-60	4500	7.5	1	34	3	3+3+1.5	15.0	1/3	68/39	3	5×3	30.0	1/3	136/79	3	10×3
70-70	1700	3.0	1	14	2	2×1.5	6.0	1	27	2	2×3	11.5	1	52	3	3×3 + 2
130-70	3500	6.0	1	27	2	2×3	12.0	1	55	2	4×3	23.5	1/3	107/62	3	8×4
190-70	5500	9.0	1	41	3	3×3	18.5	1/3	84/49	3	6×3	37.0	1/3	168/97	3	12×3

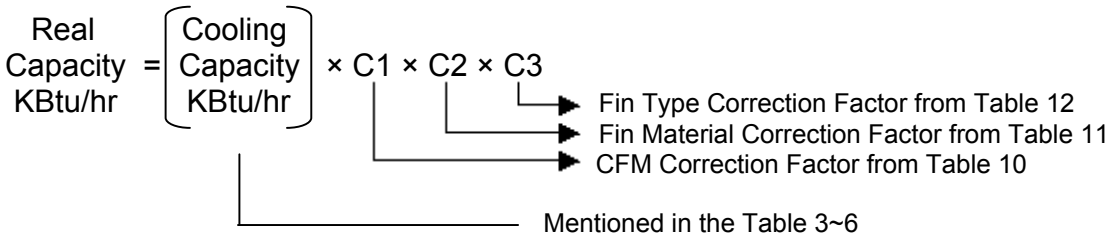
* Ratings are based on temperature increase. (i.e. Leaving Air Temp. = Entering Air Temp. + 5, 10, 20 °F)

Table 9 – Connection Sizes

Model	Water Coil Connection		Dx Coil Connections		Steam Coil Connections	
	Chilled Water (4 Rows)	Hot Water (1 Row)	Suction (4 Rows)	Liquid (4 Rows)	Supply (1 Row)	Condensate (1 Row)
70-45	1"	3/4"	3/4"	3/8"	3/4 "	3/4"
130-45	1 1/2"	1"	1"	1/2"	1"	1"
190-45	2"	1 1/4"	1 1/8"	5/8"	1 1/2"	1 1/2"
70-60	1 1/2"	1"	1"	1/2"	1"	1"
130-60	2"	1 1/4"	1 1/8"	5/8"	1 1/2"	1 1/2"
190-60	2"	1 1/2"	1 5/8"	3/4"	2"	1 1/2"
70-70	1 1/2"	1"	1"	1/2"	1"	1"
130-70	2"	1 1/4"	1 3/8"	5/8"	1 1/2"	1 1/2"
190-70	2 1/2"	2"	1 5/8"	3/4"	2"	1 1/2"

CORRECTION FACTORS

+ **U**se these correction factors as multipliers to the capacity ratings offered in the tables.



Or

+ **D**ivide your required capacity by these correction factors before you go through the tables.

1. CFM Correction Factor (C1)

The ratings in the table 3 to 6 are offered for the exact CFM mentioned there in the table. But depend on total external static pressure drop and upon the working situation selected by operator, (High, Medium, Low, Lowest) CFM differs from the mentioned quantities. This changes the real cooling capacity of the unit. So determine that the desired CFM is how many percent of the nominal CFM and use correction factors mentioned in table 10.
(For more explanation, please refer to Examples.)

Table 10- CFM Correction Factor (C1)

Percent of Nominal CFM	50%	60%	70%	80%	90%	100%	110%	120%	130%	140%	150%
Cooling Coil	0.62	0.71	0.79	0.87	0.94	1.00	1.06	1.12	1.18	1.23	1.29
Heating Coil	0.71	0.78	0.84	0.90	0.95	1.00	1.05	1.09	1.13	1.17	1.20

2. Fin Material Correction Factor (C2)

Fins of coil can be of different materials.
The ratings in the table are offered for Aluminum fin type. Use the related correction factor for Copper (Cu) fins.

Table 11- Fin Material Correction Factor (C2)

Fin Arrangement	Correction Factor
Corrugated Plate Fin	**1**
Crimped Spiral Fins	**0.99**

3. Fin Type Correction Factor (C3)

Fins in coils can be of two different types.
The ratings in the table are offered for “Corrugated Plate Fins” type. Use the related correction factor for “Crimped Spiral Fins”.

Table 12 - Fin Type Correction Factor (C3)

Fin Material	Correction Factor
Al	**1**
Cu	**1.05**

CORRECTION FACTORS

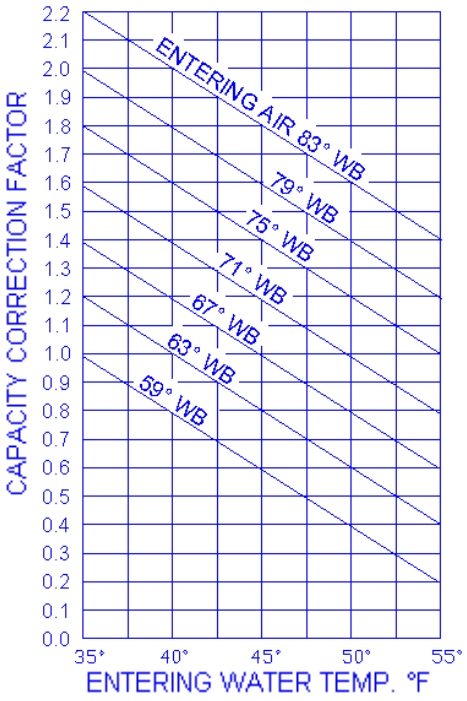


FIGURE 2. CHILLED WATER COIL CORRECTION FACTOR

Corrected load = load from table 3 for 80, 67 × correction factor from figure 2
All correction factors are based on 80/67 °F entering dry and wet bulb temp.

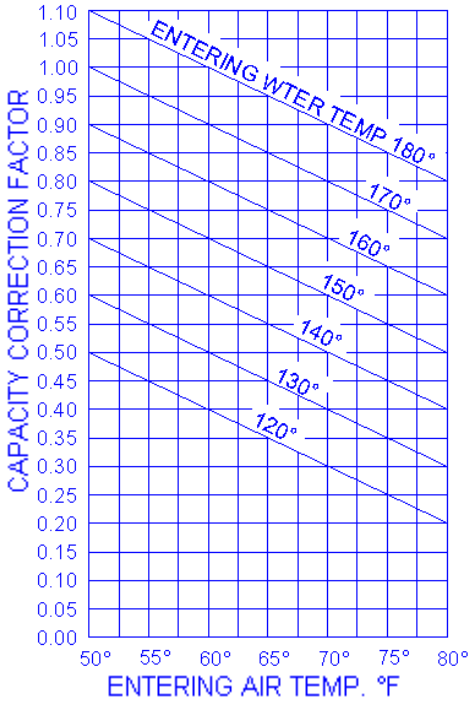


FIGURE 3. HOT WATER COIL CORRECTION FACTOR

Corrected load = load from table 5 for 80, 67 × correction factor from figure 3
All correction factors are based on entering air dry bulb=60°F and entering water=180°F

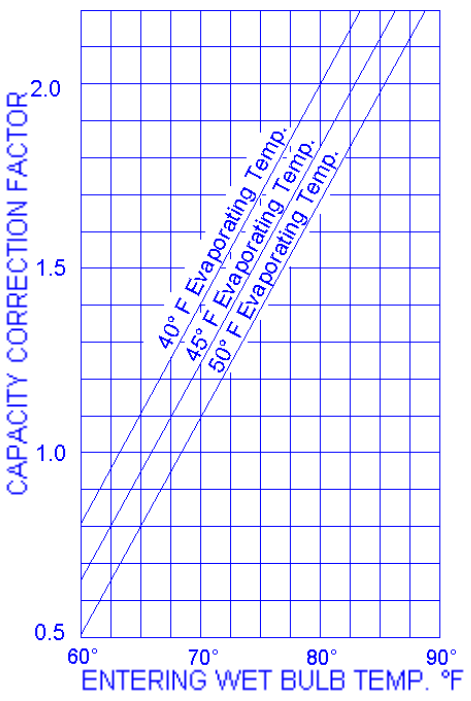


FIGURE 4. DX COIL CORRECTION FACTOR

Corrected load = load from table 4 for 80, 67× correction factor from figure 4
All correction factors are based on 80/67 entering dry and wet bulb temp. at 45°F evaporating temp.

Table 13 – Guideline for Ethylene Glycol mixture

Bulk Mixture (By Weight)		Freezing Point (°C)	GPM Add Percentage	
Water	Ethylene Glycol		Cooling	Heating
100%	0%	0.0	0%	0%
95%	5%	-1.4	1%	2%
90%	10%	-3.2	2%	3%
85%	15%	-5.4	3%	4%
80%	20%	-7.8	5%	5%
75%	25%	-10.7	7%	6%
70%	30%	-14.1	9%	7%
65%	35%	-17.9	11%	9%
60%	40%	-22.3	14%	10%
55%	45%	-27.5	17%	12%
50%	50%	-33.8	20%	14%
45%	55%	-41.1	23%	16%

Ethylene Glycol solutions with water can be overheated by fired heaters or other energy sources. Generally ethylene glycol is recommended only for bulk operating temperature ranges from –40 °F to +275 °F.

CORRECTION FACTORS AND PRESSURE DROPS

Other Refrigerants for DX Coils

Using other refrigerants than R-22, like R-134a and R-407C would result in decreasing capacity. Use specified factor for every unit type.

Corrected Capacity = Capacity from Table 4 * Correction factors from table 14

Refrigerant	Correction Factor
R-22	**1**
R-134a	**0.65**
R-407C	**1.04**

Table 14 – Refrigerant Correction Factors

* These correction factors have been estimated by assuming the same evaporating temp. (45°F) and the same condensing temp. with the same superheating and sub-cooling in evaporator and condenser subsequently. Also the volumetric flow rate (ft³/min), in the circuit, has been assumed constant for all refrigerants.

Table 15 – Air-Side Pressure Drops of Different Components (in. wg.) (at 500 FPM face velocity)

Coil						Damper		Mixing Box without filter	Face and bypass Damper	Dirty Aluminum filter
1 Row 8 FPI	1 Row 14FPI	4 Rows 8 FPI		4 Rows 14 FPI						
		Dry	Wet	Dry	Wet	Parallel	Opposed			
0.08	0.12	0.27	0.45	0.41	0.63	0.03	0.05	0.06	0.2	0.3

For obtaining pressure drop in other velocities, it can easily calculated by the following formula.

$$\frac{\Delta P_2}{\Delta P_1} = \left[\frac{V_2}{V_1}\right]^2$$

Table 16 – Air Density vs Altitude

The density of air could be obtained easily from table 16 for calculations.

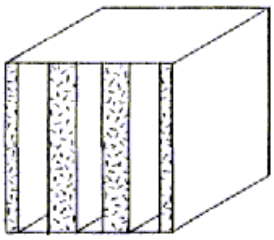
Altitude		Density
Feet	meters	lb/ft³
0	0	0.0750
500	152	0.0737
1000	305	0.0724
1500	457	0.0710
2000	610	0.0697
2500	762	0.0685
3000	914	0.0672
3500	1067	0.0660
4000	1219	0.0648
4500	1372	0.0636
5000	1524	0.0624
5500	1676	0.0613
6000	1829	0.0601
6500	1981	0.0590
7000	2133	0.0579
7500	2286	0.0568
8000	2438	0.0557
8500	2591	0.0547
9000	2743	0.0536
9500	2895	0.0526
10000	3048	0.0516

SOUND ATTENUATORS

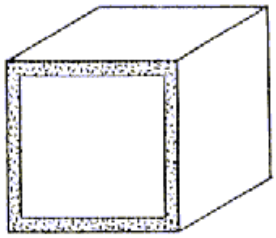
The ratings are based upon sound power level of the fans generated at full load working point of the units.

For parallel baffle type, the baffle width is 100mm.

The sound ratings has been established for 900 Hz frequency which is the average common frequency of the fans.



Parallet Baffle Type



Lined Duct Type

Table 16 – Sound attenuator ratings (Sound absorbed and CFM reduction) (Lined Duct Type)

Unit	Nom. CFM	Maximum sound power level of the unit (dB)	Silencer Type	Sound absorbed per ft. length of silencer (dB)	CFM reduction due to pressure drop of silencer (%)		
					Silencer length		
					1 ft.	2 ft.	3 ft.
70-45	800	64	L Type (50 mm)	21	4	5	5
			H Type (100mm)	-	-	-	-
130-45	1600	67	L Type (50 mm)	7	2	2	3
			H Type (100mm)	-	-	-	-
190-45	2500	70	L Type (50 mm)	3	1	2	2
			H Type (100mm)	-	-	-	-
70-60	1400	64	L Type (50 mm)	15	3	4	5
			H Type (100mm)	35	41	44	47
130-60	3000	67	L Type (50 mm)	6	1	1	2
			H Type (100mm)	9	9	11	13
190-60	4500	70	L Type (50 mm)	3	1	1	1
			H Type (100mm)	3	4	6	8
70-70	1700	67	L Type (50 mm)	13	2	3	4
			H Type (100mm)	28	30	32	36
130-70	3300	70	L Type (50 mm)	5	1	1	1
			H Type (100mm)	7	7	9	11
190-70	5500	73	L Type (50 mm)	3	1	1	1
			H Type (100mm)	3	4	5	7

Table 17 – Sound attenuator ratings (Sound absorbed and CFM reduction) (Parallel Baffle Type)

Unit	Nom. CFM	Maximum sound power level of the unit* (dB)	Silencer Cross Section Open area	Sound absorbed (dB)			CFM reduction due to pressure drop of silencer (%)		
				Silencer length			Silencer length		
				1 ft.	2 ft.	3 ft.	1 ft.	2 ft.	3 ft.
70-45	**800**	64	66%	15	27	36	2	2	3
			50%	"	"	"	"	"	"
			33%	21	30	31	11	14	16
130-45	**1600**	67	66%	15	27	35	1	1	2
			50%	18	29	33	2	2	4
			33%	21	28	29	13	15	17
190-45	**2500**	70	66%	15	27	36	1	1	2
			50%	17	28	35	1	2	3
			33%	22	29	30	13	15	17
70-60	**1400**	64	66%	14	24	31	2	2	3
			50%	-	-	-	-	-	-
			33%	17	23	24	14	16	18
130-60	**3000**	67	66%	14	24	30	1	1	2
			50%	16	24	25	3	4	5
			33%	18	22	23	15	16	18
190-60	**4500**	70	66%	14	24	30	1	1	2
			50%	17	23	24	4	6	8
			33%	19	23	24	14	16	18
70-70	**1700**	67	66%	-	-	-	-	-	-
			50%	17	24	26	7	8	9
			33%	-	-	-	-	-	-
130-70	**3300**	70	66%	16	25	28	2	2	3
			50%	17	22	25	7	8	9
			33%	18	20	21	21	23	25
190-70	**5500**	73	66%	14	23	29	2	3	3
			50%	16	25	27	4	5	6
			33%	19	22	24	17	19	21

FAN RATINGS

FIGURE 5. PERFORMANCE CURVE OF THE FAN(S) USED IN UNITS :

70 – 45 (800) (1 FAN)
130 – 45 (1600) (2 FANS)
190 – 45 (2500) (3 FANS)

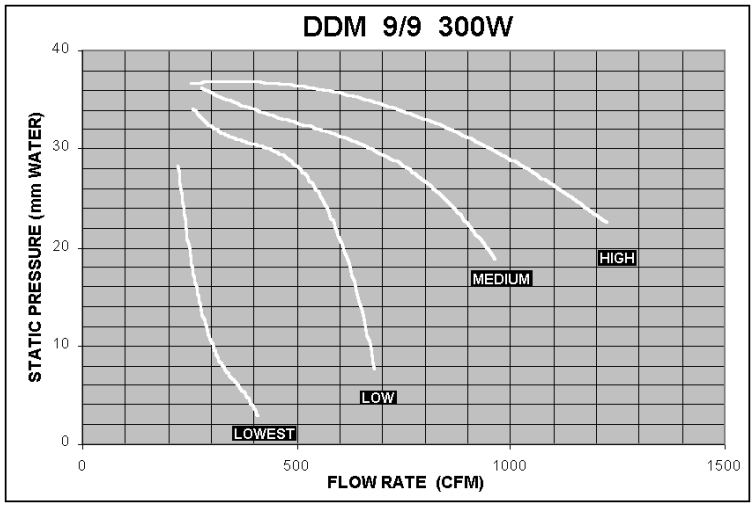


FIGURE 6. PERFORMANCE CURVE OF THE FAN(S) USED IN UNITS :

70 – 60 (1400) (1 FAN)
130 – 60 (3000) (2 FANS)
190 – 60 (4500) (3 FANS)

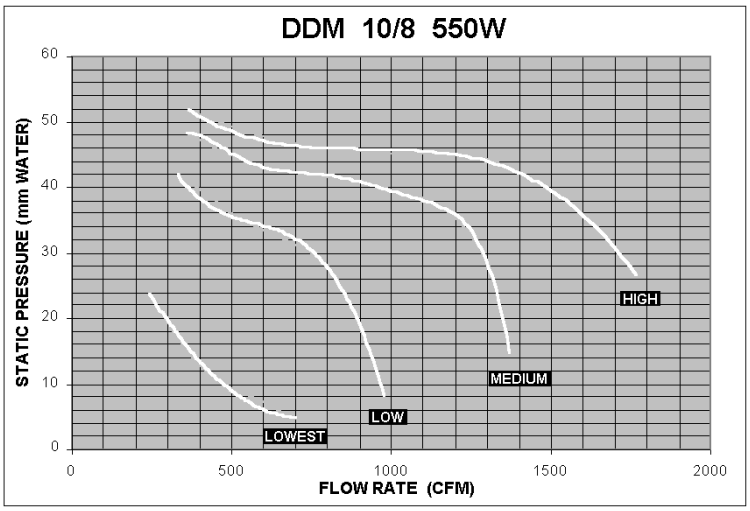
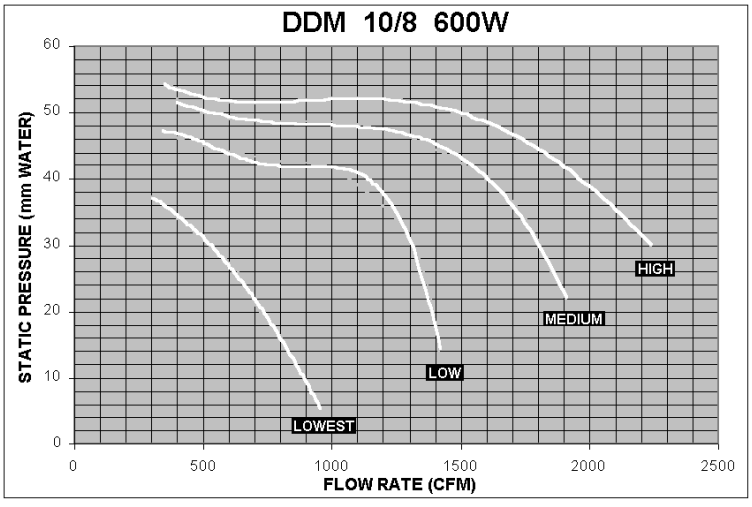


FIGURE 7. PERFORMANCE CURVE OF THE FAN(S) USED IN UNITS :

70 – 70 (1700) (1 FAN)
130 – 70 (3500) (2 FANS)
190 – 70 (5500) (3 FANS)

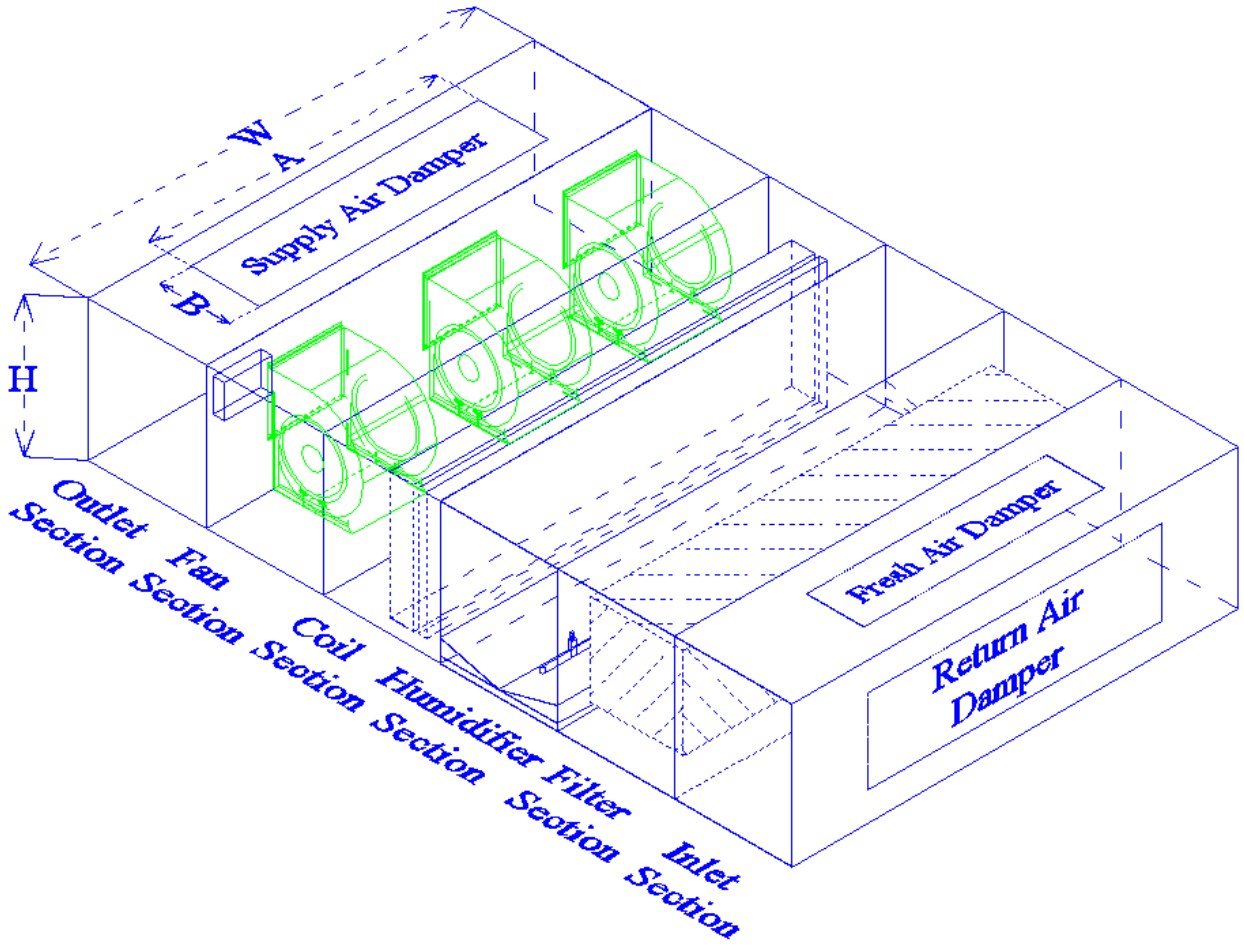


DIMENSIONS

Model	Nominal Air CFM (Unit Model)	Width & Height		Modular Lengths (Sections)					A (mm)	B (mm)
		Width (mm)	Height (mm)	Inlet Section Length (mm)	Filter Section Length (mm)	Coil Section Length (mm)	Fan Secion Length (mm)	Outlet Section Length (mm)		
70-45	800	700	450	500	500	500	500	500	298	255
130-45	1600	1300	450	500	500	500	500	500	596	255
190-45	2500	1900	450	500	500	500	500	500	894	255
70-60	1400	700	600	500	500	500	500	500	309	341
130-60	3000	1300	600	500	500	500	500	500	618	341
190-60	4500	1900	600	500	500	500	500	500	927	341
70-70	1700	700	700	500	500	500	500	500	350	341
130-70	3500	1300	700	500	500	500	500	500	700	341
190-70	5500	1900	700	500	500	500	500	500	1050	341

Mentioned lengths are approximations. Exact and modified dimensions are defined after technical drawings being drawn.

* All the sections are in the form of modular sections and each one can be omitted by costumer desire.
* In the case of using only flat filter or aluminum pre-filter, length of filter section can be reduced about half times, in construction.
* Inlet and filter sections can be constructed in one section on costumer favor.



SARAVEL CORP.

Sep. 2003

Manufacturer reserves the right to make changes in design and construction, without notice.

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