CAT-AHU-2011 (1)

Saravel
Air Handling Units

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NOTE:
All specifications & dimensions subject to change without notice.

3 Introduction

SARAVEL Air Handling Units are designed for a variety of commercial, institutional, industrial, and residential applications such as: shopping centers, hospitals, and office buildings. With 15 different models and capacities ranging from 2000 to 80000 CFM, the modular units can be combined with a complete array of accessories to adapt to every air conditioning and ventilation application.

SARAVEL also offers blow thru multi-zone air handling units designed for applications wherein temperature control is required for groups, or "zones," of conditioned spaces at the air handling unit by mixing hot and cold air with individual pairs of control dampers located at the air handling unit. Multi-Zone units are best suited for serving a relatively small floor area that contains custom-built spaces requiring independent space thermostatic control such as offices in multistory buildings and hospitals. See Pages 49.

All units are made of the highest quality materials and rated according to ARI 430 standard.

All internal components are factory furnished and installed. All units are shipped in one piece where possible. Modular air handling units shipped in multi pieces are also available.

CONSTRUCTION

SARAVEL air handling units are constructed of heavy gage, galvanized steel sheet that assure years of dependable service. AHU Structure is produced either with galvanized steel or with aluminum. Easier manufacturing, less weight, aesthetic appearance and more resistance against corrosion are advantages of aluminum structure comparing to galvanized steel structure. Die-formed panels are removable to provide easy access to internal components.

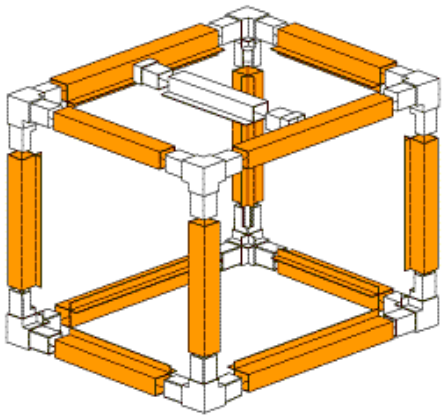


Figure 1. Aluminum structure with cast iron fittings

Coil panel sections are equipped with gaskets for air-tight operation. The 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. Heavy duty chassis is designed for maximum load carrying capacity and even load distribution.

Panel insulation covers wide range of application by use of different insulating materials.

Thermal classification of insulation in accordance with DIN EN 1886 is as follows:

	Single Skin	Double Skin
Polyurethane	T4	T2
Polyethylene	T2	T1
Rock Wool	T4	T5

Fan Section

Including all rotating assemblies; fan wheels, shafts, sheaves, and pulleys, are balanced both statically and dynamically to assure smooth and quiet operation. All fan shafts are made of carbon steel and are precision machined to provide an accurate fit with the fan bearings and the wheel hub. Solid and hollow shafts are designed to operate in less than 20% of the critical speed. Fan shafts are defined according to the AMCA classification shown on page 52.

Fan and motor sheaves are made of gray cast iron, keyed to the shafts selected at motor break horsepower. All bearings used in *SARAVEL* Air Handling Units are silent type, self aligning, and pillow block ball bearings and are sealed, thus ensuring containment of the lubricant and exclusion of moisture, dust and other contaminants. Plumber block ball bearing shall be provided by request.

Motor Mounting

Base is designed installed on all units for the most comfortable aligning of electrical motor shaft to fan shaft. Exerting degree of freedom to motor base in one direction makes it so easy to configure belt installation. Right hand or left hand locations are optional for all units.

COILS

SARAVEL offers chilled water, hot water, DX, steam, and non-freeze steam coils[1] in a number of configurations, which cover the entire range of air conditioning and industrial applications with the following construction features:

[1] For non-freeze steam coil specification contact SAREVEL sales office.

Casings

Designed for rugged support for finned tube coils, casings are available in all sizes and types to meet specific needs. Materials include heavy gage carbon steel, galvanized sheet metal, and stainless steel. All are available for varying atmospheric and air-tight conditions.

Tubes

Tube pattern includes staggered arrangement, providing economical selections for specific duty and application ranges. Standard coils are designed with 5/8" copper tubes with possible alternate material selections of cupro-nickel, carbon steel, brass and stainless steel to meet specific application needs. Tube diameters of 3/8", 1/2", 3/4", and 1" are also available.

Fins

Continuous waffle plate with rippled edge or corrugated spiral types provide optimum air turbulence and fin conformity for maximum heat transfer. Plate fins are die-formed with self-spacing collars. Tubes are mechanically expanded into fin collars for a permanent bond. Spiral fins are mechanically wrapped and bonded to the tube to provide 100% contact around the periphery. Fin materials include aluminum, copper, brass, carbon steel, and stainless steel.

Manifold headers

Manifold headers are fabricated of heavy wall copper or carbon and stainless steel. Standard connection stubs are threaded. Flanged stubs are optional.
The following features are incorporated into the design of *SAR VEL* Multi-Zone coil sections:

Heating Coil Section (Hot Deck) is sized to hold a one or two row water or steam heating coil.
Cooling Coil Section (Cold Deck) is sized to hold a total of 12 rows of coils. DX coils can also be furnished in conjunction with *SARAVEL* condensing units.

SARAVEL coils can be covered by corrosion protective coatings of Blygold®, which would be necessary at pollutant and corrosive areas. This chemical resistance on the coil assures durability and efficient performance of coils even at acidic places.

Coils are made of the highest quality materials and rated according to ARI 410 standard. In AHUs with two coils in height, Intermediate drain pan shall be installed. For coil drain pan and air vent information refer to application data section on page 80.

DAMPERS

SARAVEL offers parallel blade and opposed dampers made with galvanized steel or aluminum. Aluminum dampers with high degree of tightness satisfy class 3 of AMCA standard 503. Damper rods are constructed of 1.25mm blades with damper rods, which turn in nylon bushings.

Zone damper section is available for either top vertical or front horizontal discharge. All zone dampers are interconnected with one-piece rod. Zone partitions are furnished to facilitate connecting ductwork. Zone duct clips are also provided.

FILTERS

Cleanable type filters are available as standard component from *SARAVEL.* Bag, pleated, HEPA, ULPA, SULPA filter sections are available to remove a maximum quantity of dust and bacteria from the air in second stage filtration.

HUMIDIFIERS

SARAVEL offers three types of humidifiers: water spray, hot water pan, fog nozzles and steam grid with single and double jacket. These humidifiers provide humidity for comfort or process applications. The selection of a humidifier type depends upon the media available, the amount of moisture that is required and the accuracy of control that is necessary.

Accessories

Units shall be equipped with control and service parts such as inspection window, internal light, electric control panel and various measuring sensors.

FAT (Factory Acceptance Test)

Whenever customer needs to verify AHU component functionality in the factory before releasing foe delivery, a special acceptance procedure shall be developed to guiding the QC department will conduct required test according to contract and factory requirements.

5 Nomenclature

Introduction:
These options and accessories are available in Saravel AHU:

Air Entering Sections:	**Code**
Return Fan Section	RFS
Heat Recovery Section	HRS
Plate Type Heat Recovery	HRS1
Rotary Heat Recovery	HRS2
Heat Pipe Heat Recovery	HRS3
Diffuser Section	DS
Blender Section	BS
Mixing Section	MS
Full Fresh or Return Air Section	MS1
2-Way Mixing Box	MS2
3-Way Mixing Box with Side Inlets	MS3
4-Way Mixing Box	MS4
First Stage Filtration	
Washable Aluminum Meshes with Flat Arrangement	FSFS1
Washable Aluminum Meshes with Staggered Arrangement	FSFS2
Washable Aluminum Meshes with V-Shape Arrangement	FSFS3

Middle Sections:	Code
Second Stage Filtration	SSFS
Bag Filter	SSFS1
Pleated Filter	SSFS2
Carbon Active Filter	SSFS3
Hepa & Ulpa Filter	SSFS4
Sulpa Filter	SSFS5
Coil Sections	CS
Water Coil Sections (Cooling & Heating)	CS1
Direct Expansion Coil	CS2
Steam Coil	CS3
Electrical Coil	CS4
Face And Bypass Damper Section	FBDS
Humidifier	
Air Washer	AW
Steam humidifier	SH
Fog Nozzle	FN

Air Leaving Sections:	
Supply Fan Section	SFS
Sound Attenuator	SA
Final Stage Filtration	FSF

Control And Measuring Accessories:	
Sensors	
Temperature	T
Digital display (PT100 or Thermocouple)	TD
Static pressure	SP
Digital Display	SPD
Tube Manometer	SPM
Differential Pressure	DP
Digital Display	DPD
U-tube Manometer	DPU
Inclined Manometer	DPI
Wattmeter	W
Digital Display	WD
Actuators	A
Thermostat	TH
Digital Display	THD
Thermocouple	THT
Motor Damper	MD
Electrical Control Panel	CP

Additional Accessories:	
Self-action Damper	SAD
Lights	L
Rain Hood	RH

Most of above modules and components are not assembled in standard AHU and are available upon customer's order.

6 Nomenclature

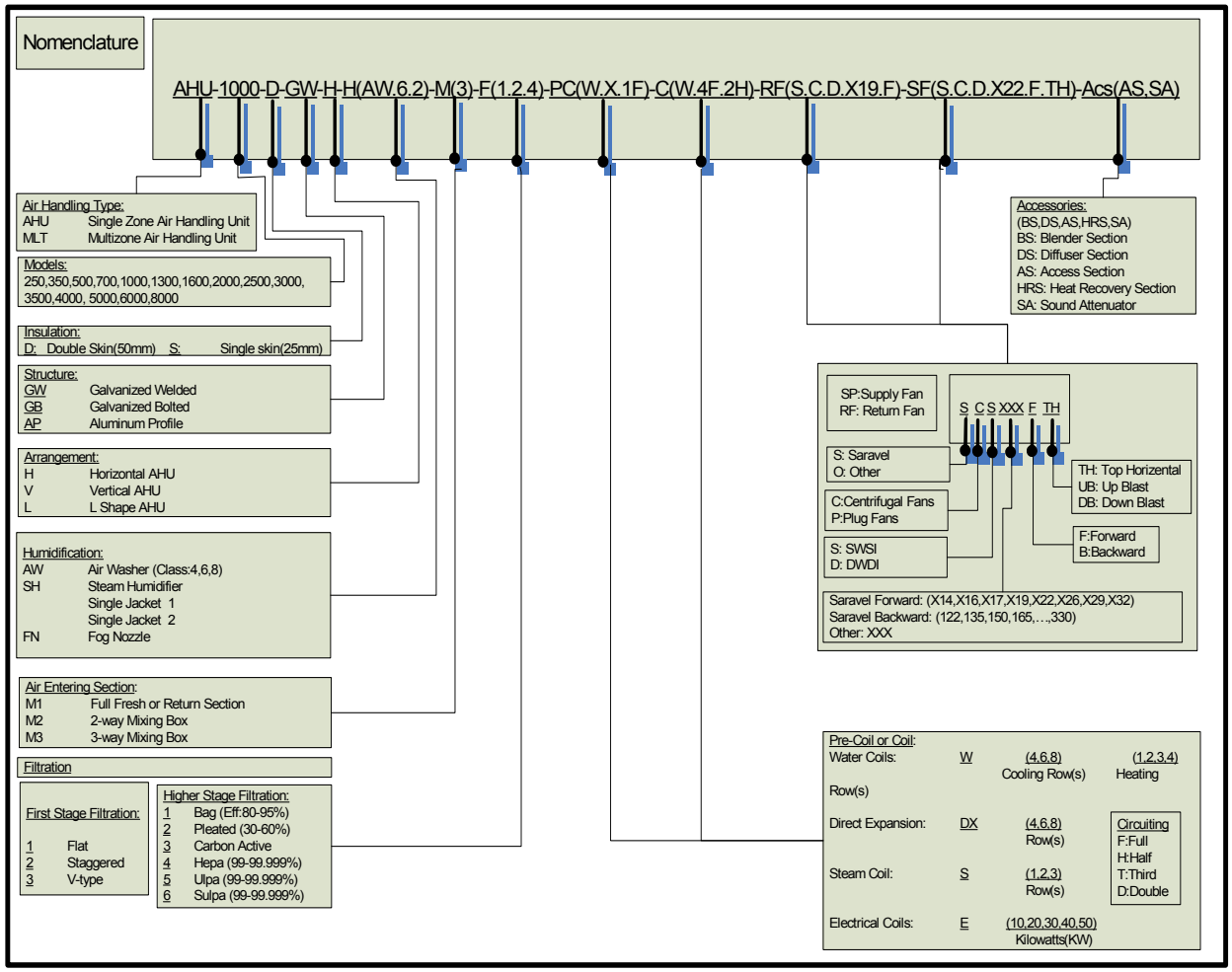


Figure 2. Nomenclature (X serves as placeholder)

Example:
The coding shown on figure 2 is representing this model:
1000 Double skin AHU with aluminum profile and horizontal arrangement with 3-way mixing box; Equipped with an air washer class 6 which is 2-bank. First, second and third stage filtration is v-type, pleated and Hepa respectively. Preheating 1-row water coil and 4-row cooling and 2-row heating coils. 19" DWDI forward curved return fan and 22" DWDI Saravel forward fan.

7 Sequence Diagram

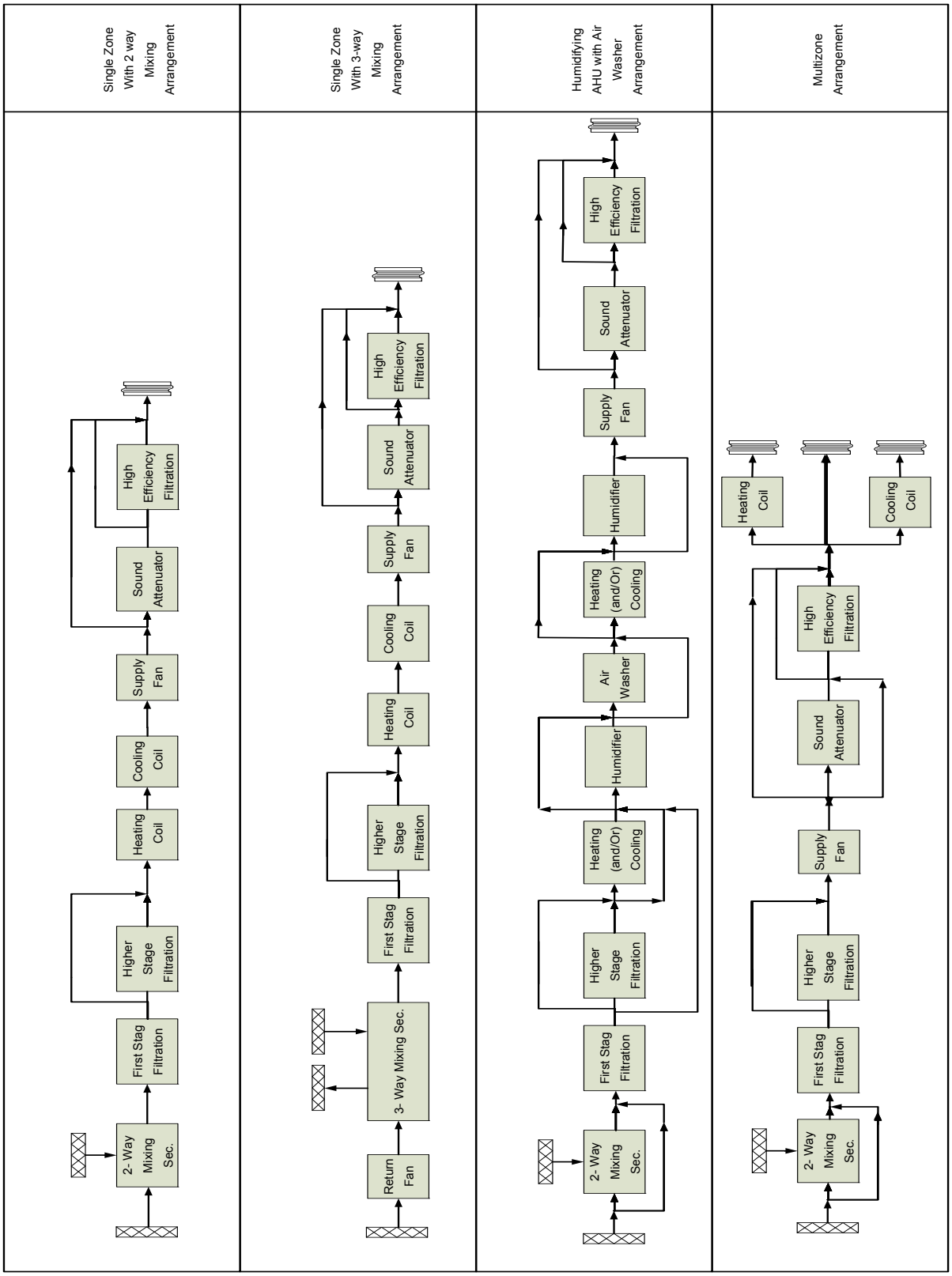


Figure 3. Air handling unit sequence diagrams

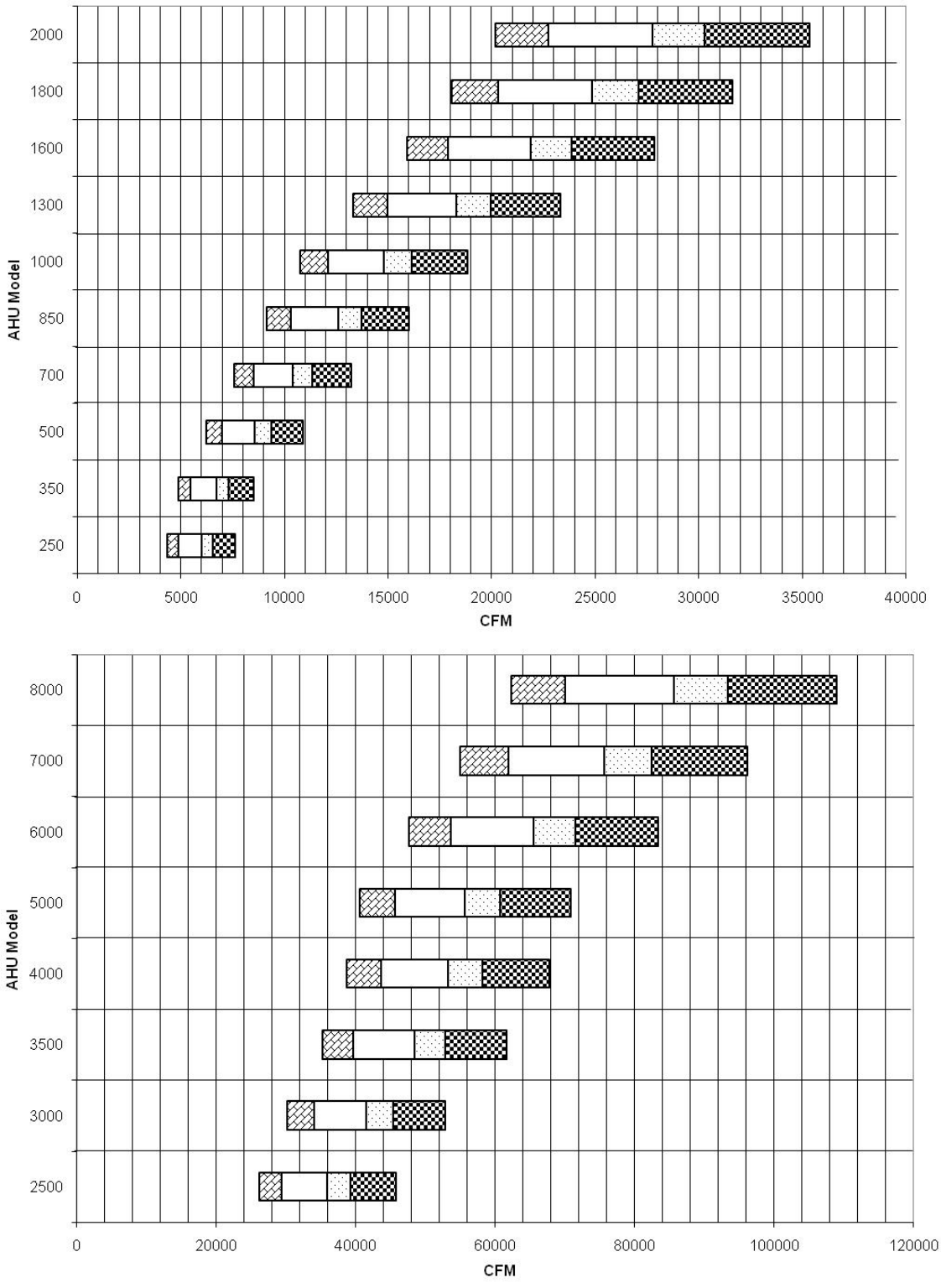


Figure 4. Quick Selection of 250 through 8000 models

Quick Selection

Table 1. Legend of quick selection

Symbol	Air Velocity (fpm)	Space Required	Cost	Application
	400-450	*High*	*Very High*	*Usually used for high latent loads*
	450-550	*High*	*High*	*Usually suggested for cooling loads*
	550-600	*Medium*	*Medium*	*Best selection according to space and cost*
	600-700	*Low*	*Low*	*Best selection for heating load*

Quick selection

In order to expedite the selection of AHU on the airflow requirements only, the quick selection figure 4 & 5 can be used. The following example illustrates the selection process:

System requirement:

Air flow rate = 20000 CFM

Refer to figure 4 and move vertically to identify regions. Next, specify possible models and by looking at table 1,their respective FPM. The results would be as follows:

Model	FPM
1300	600-700
1600	450-550
1800	400-450

According to the application described in table 1, one of the models will be selected. Usually, 450-550 FPM is the best selection according to coil performance and design. So, AHU-1300 is selected. Overall dimension of selected AHU is obtained from figure 5.

- Width 2150 mm
- Height 1700 mm

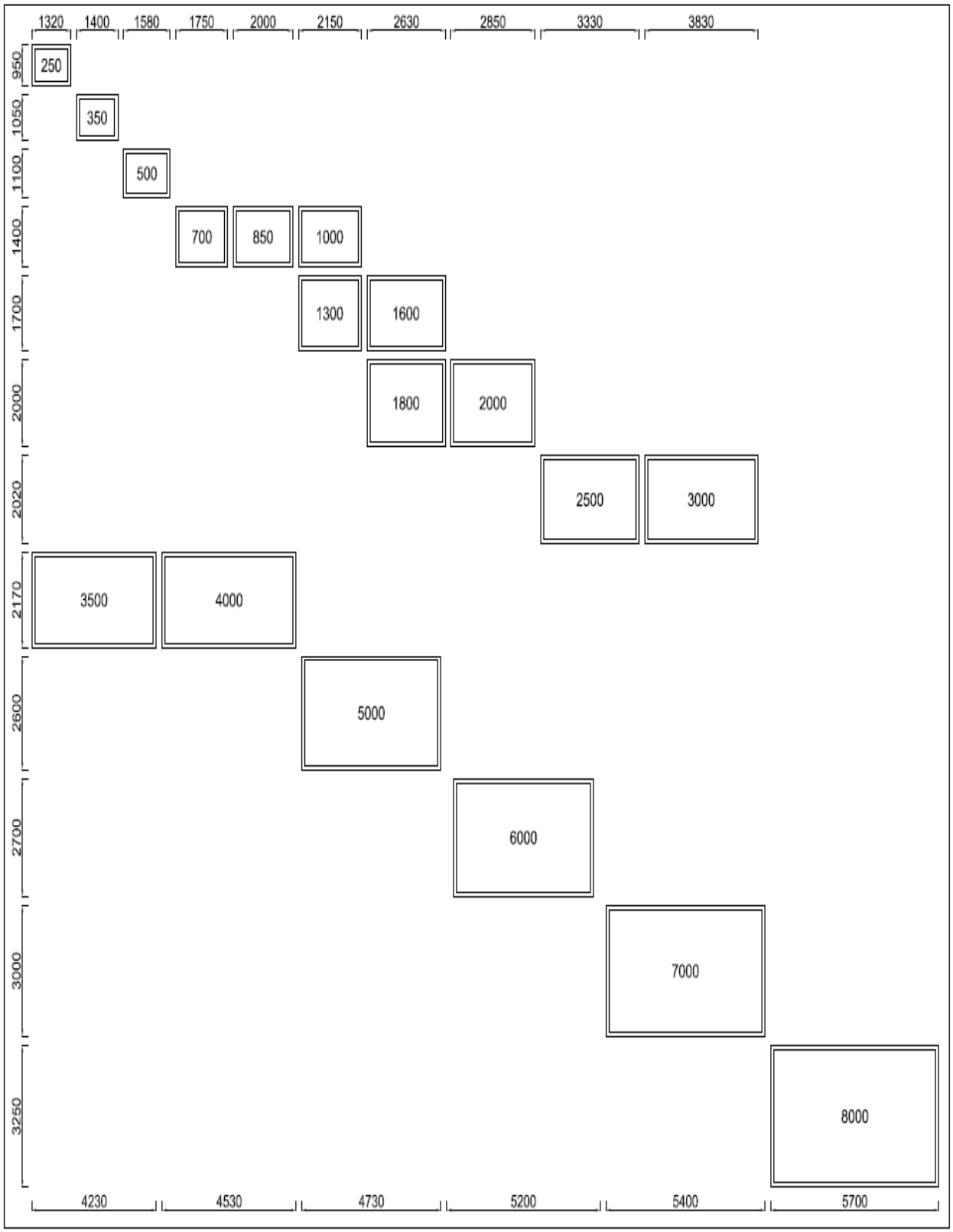


Figure 5. AHU's overall dimensions

SELECTION PROCEDURE

Example 1: Summer Design Condition: Chilled Water Application

I. System requirements:

Air Flow Rate ..... 16000 CFM
Altitude..... Sea Level
Entering Air Temperature..... 100 °F DB, 75 °F WB
Total Cooling Load..... 670 MBH
Entering Water Temperature .... 45 °F
Leaving Water Temperature ..... 55 °F
Maximum Face Velocity (FV).... 500 FPM

II. Determine unit size

To select the required face area (FA), the following relation is used:

$$FA = CFM/FV = {}^{16000}\!/_{500} = 32\ ft^2$$

From Table 29 on Page 52, *SARAVEL* AHU-1600 with two coils face area of 31.3 ft^2 is selected. Enter cooling coil rating table (8FPI) for AHU-1600 in Table 5 on Page 18, at 16000 CFM, EDB=100 of, and EWB=75 °F. It can be seen that a 4 row coil with double circuit configuration at 691 MBH total cooling capacity can adequately meet the cooling demand. The total GPM can be calculated according to:

$$Total\ \ GPM = \frac{MBH \times 1000}{500 \times \Delta T}$$

$$Total\ \ GPM = \frac{691 \times 1000}{500 \times 10} = 138.2$$

Next, enter Table 23 on page 48, the pressure drop for a 4 row coil is interpolated to be 1.5 feet of water for double circuit coil. The temperature correction factor needs to be determined next. With the average water temperature of 50 °F enter Table 24 on Page 48 and the correction factor is found to be 1.08. Multiplying 1.08 by 1.5 ft results in a pressure drop of 1.62 ft of water. The coil airside pressure drop from Table 17 on Page 42 is 0.35" w.g. at 500 fpm face velocity under 'wet' condition. Unit dimensions and lengths are considered from tables 27 & 28.

Example 2: Summer Design Condition DX Coil Application

I. System requirements given:

Total Load.....990 MBH
Sensible Load .....710 MBH
Air Flow Rate .....25000 CFM
Altitude.....Sea Level
Entering Air Temperature.....90 °F DB, 72 °F WB
Suction Temperature.....45 °F
Recommended Face Velocity ...500 FPM

II. Determine unit size

To select the required Face Area (FA), the following relation is used:

$$FA = CFM/FV = {}^{25000}\!/_{500} = 50\ ft^2$$

From Table 29 on Page 52, *SARAVEL* AHU-2500 with a face area of 50.5 ft^2 is selected. The capacity and the outlet conditions of the selected 4 rows coil (8FPI) can be read from Table 7 on Page 25 as 1101 MBH, LDB=62 °F, and LWB=59 °F respectively. The sensible load can be calculated from the following formula.

Sensible Load (SL) = 1.087 x CFM x (EDB-LDB)
= 1.087 x 25000 x (90 - 62)
= 760900 BTU/hr
= 760.9 MBH

Since the capacity of the coil is greater than the system requirements the cooling load can be matched. Unit dimensions and lengths are considered from tables 27 & 28.

III. Pressure drop

According to table 18 with the selected coil airside pressure drop is 0.35 in.wg for 4rows coil .

Example 3: Winter Design Condition

I. System requirements:

Heating Load.....1800 MBH
Air Flow Rate .....22400 CFM
Maximum Face Velocity .....700 FPM
Entering Air Temperature.....14 °F DB
Entering Water Temperature.....180 °F
Leaving Water Temperature.....160 °F
Coil Circuit Configuration .....Full

II. Determine unit size

AHU-2000 is selected according to table 29 with which air velocity is:

$$FPM = CFM\ /\ FA = 22400\ /\ 41 = 546.34$$

With *SARAVEL* AHU-2000 and 14 °F EDB, at Table 9 on Page 30, at 2 row coil (14FPI) with a capacity of 2344 MBH can be selected. From Table 12 on Page 34 the velocity correction factor is 1.05. Multiplying the coil heating capacity by the correction factor:

$$2344 \times 1.05 = 2461.2 \ MBH$$

The heating load can be sufficiently met by the coil with the capacity of 1800 MBH. The leaving dry bulb temperature can be calculated from the following relation:

$$LDB = EDB + TH / (1.087 \times CFM)$$
$$= 14 + 2461200 / (1.087 \times 22400) = 101.08^{o} F$$

According to table 17 airside pressure drop would be 0.19 in. wg.

Unit dimensions and lengths are considered from tables 27 & 28.

Example 4: Winter Design Condition Steam Application

SARAVEL AHU-2500
Air Flow Rate .....25000 CFM
Entering Air Temperature.....30 °F DB
Leaving Air Temperature.....130 °F DB
Steam Pressure .....5 PSIG

The heating load is calculated according to the formula below:

Heating Load = CFM x 1.087 x (LDB - EDB)
= 25000 x 1.087 x (130 - 30)

= 2717 MBH

Enter Steam Coil Rating Table 10 on Page 33 for 8FPI, with 25000 CFM, and EDB=30 °F. Select 2 row coil with 2644 MBH capacity which adequately meet the heating load.
According to table 17 airside pressure drop would be 0.13 in. wg.

FAN SELECTION

After coil selection, the next step is the sizing and selection of the fan. Suppose *SARAVEL* AHU-1600 draw thru unit selected in Example 1 is configured with the following accessories with external pressure drop of 2 in. w.g.:

Calculation of Pressure Drops

Module name	Table	PD (in. wg)
1) Inlet damper (ID)	T.18	0.00
2) Exhaust air damper (EAD)	T.18	0.00
3) Regulator Damper (RD)	T.18	0.00
4) Fresh air damper (FAD)	T.18	0.02
5) First stage filter (FSF)	T.18	0.20
6) Second stage filter (SSF)	T.18	0.00
7) Preheat coil (Cooling and Heating) (PC)	T.17	0.00
8) Humidifying section (HS)	T.18	0.40
9) Coil Section (Cooling and Heating) (CS)	T.17	0.35+0.13
10) Final stage filtration (FSF)	T.19	0.00
11) Sound attenuator (SA)	T.18	0.00
Internal Pressure Drop		1.10
AHU Inlet external pressure drop		1.00
AHU outlet external pressure drop		1.00
AHU Total Static Pressure		**3.10**

From 26" fan curve on Page 38, with 3.1" static pressure and 16000 cfm, the fan with 12.1 BHP and 666 rpm is selected. Therefore, a 15 HP electrical motor power shall be selected according to the following formula:

$$HP_{motor} = BHP \times 1.25 = 12.1 \times 1.25 = 15.1$$

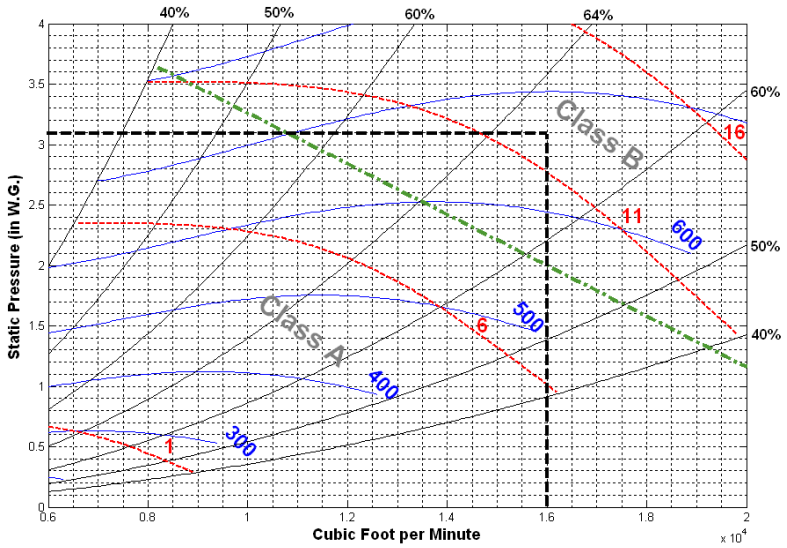


Figure 6. Fan performance curve of DWDI 26" fan

AIR WASHER SELECTION

Cooling and humidifying application

SARAVEL AHU-3000 has been selected for a cooling and humidifying application. Air initially at 104 of DB and 72 °F WB at a rate of 30000 CFM is to be cooled and humidified to 75 °F DB. Enter Table 50 on Page 66 at 500 FPM (Air face velocity) and Class-8 air washer for AHU-3000. The efficiency, E_{Aw}, of the chosen air washer is 94%. Then LDB can be calculated according to the following relation:

LDB = EDB-E_{AW} (EDB - EWB)
= 104 - 0.94 x (104 - 72) = 74°F

The required water flow rate can be obtained from Table 51 on Page 66, enter at model 3000 under C-8, the rated flow rate is found to be 240 GPM based on a design pressure of 30 PSI. The airside pressure drop for Class-8 air washer is 0.4" W.G. from Table 18 on Page 42.

STEAM HUMIDIFIER SELECTION

Given:
Inlet Condition ..... 70 of DB, 20% RH
Outlet Condition ..... 75 of DB, 50% RH
Volumetric Air Flow Rate ..... 5000 CFM

Enter psychometric chart and read the pound of moisture per lb of dry air on the vertical axis for the inlet and outlet conditions:
Inlet air ..... 0.0032 lb/lb of dry
Outlet air ..... 0.0093 lb/lb of dry
Difference ..... 0.0061 lb/lb of dry

Next, convert pound of moisture per lb of dry air to grains of moisture per lb of dry air by multiplying the difference by 7000. The grains of moisture obtained are 43 per lb of dry air. Enter Figure 7 on Page 14 at 43 grains of moisture and 5000 CFM and read the capacity of the humidifier as 1500 lb/hr on the vertical axis.

FOG NOZZLE HUMIDIFIER SELECTION

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.
Given:
Volumetric Air Flow Rate ..... 20000 cfm
Inlet Condition ..... 80"F DB, 20% RH

To increase the humidity ratio by 10 grains of moisture per lb of dry air, enter Figure 8 on Page 15 at 20000 CFM and read the spray water capacity as 125 *lb/hr.* On the psychrometric chart on the last Page, 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.

Table 2. Comparison of humidification methods

	Steam	Evaporative Pan	Water Spray
Effect on air temperature	Virtually no change	Small temperature rise	Substantial temperature drop (if no heating of spray water)
Unit capacity per unit size	Small to very large	Small	Small
Maintenance frequency	Annual	Weekly to monthly	Weekly to bimonthly
Response to control	Immediate	Slow	Slow
control of output	On-off or full range modulation	On-off	On-off
Sanitation / corrosion	sterile medium corrosion free	Bacteria can exist Pan is subjected to corrosion	Bacteria can exist Pan is subjected to corrosion
Cost: price (per unit of capacity)	Low	High	Low to medium
Installation	Varies with availability of steam, water, electricity and etc.		
Operation	Low	Low	Low
Maintenance	Low	High	High

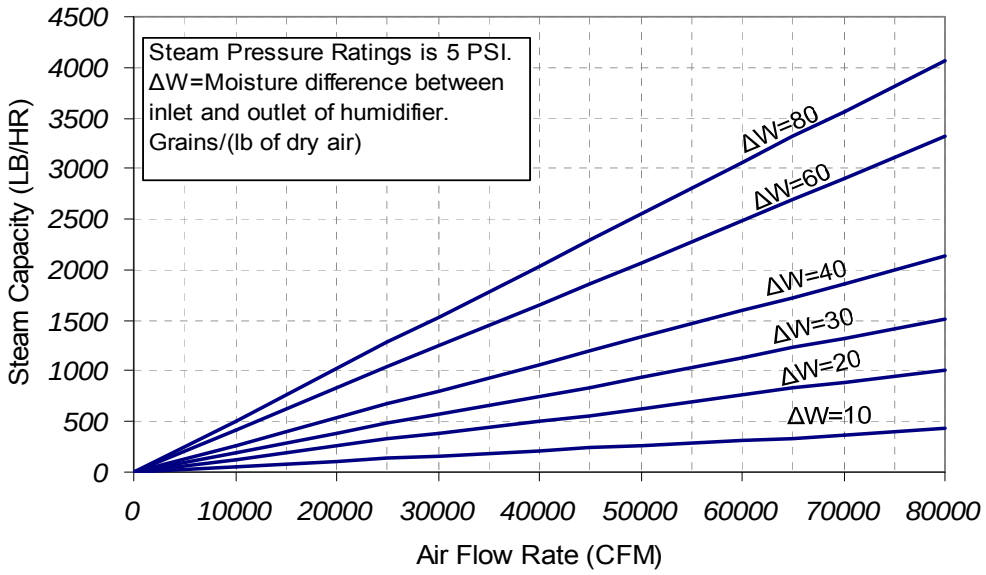


Figure 7. Steam humidifier capacity curve

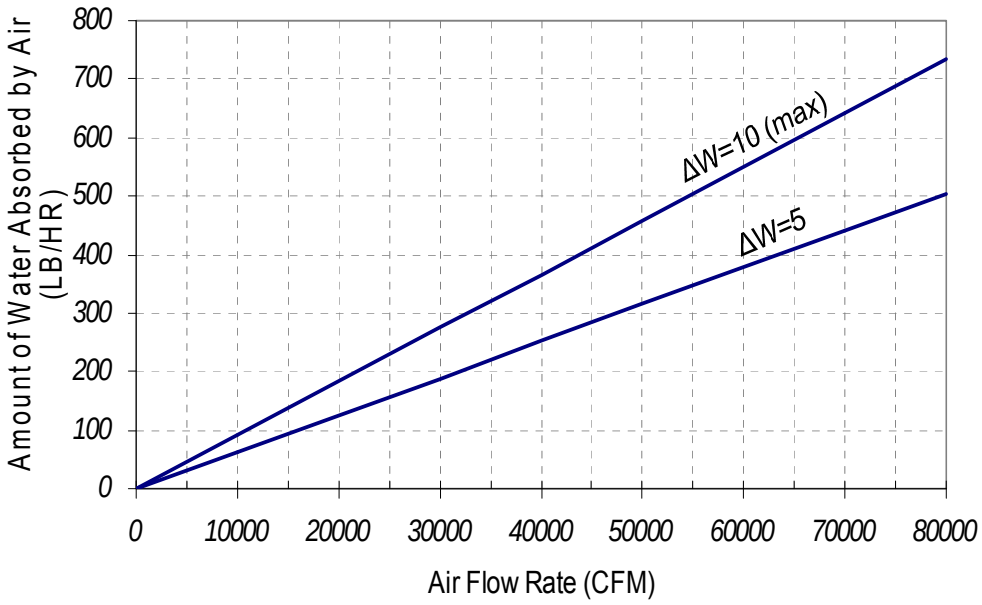


Figure 8 Fig nozzle

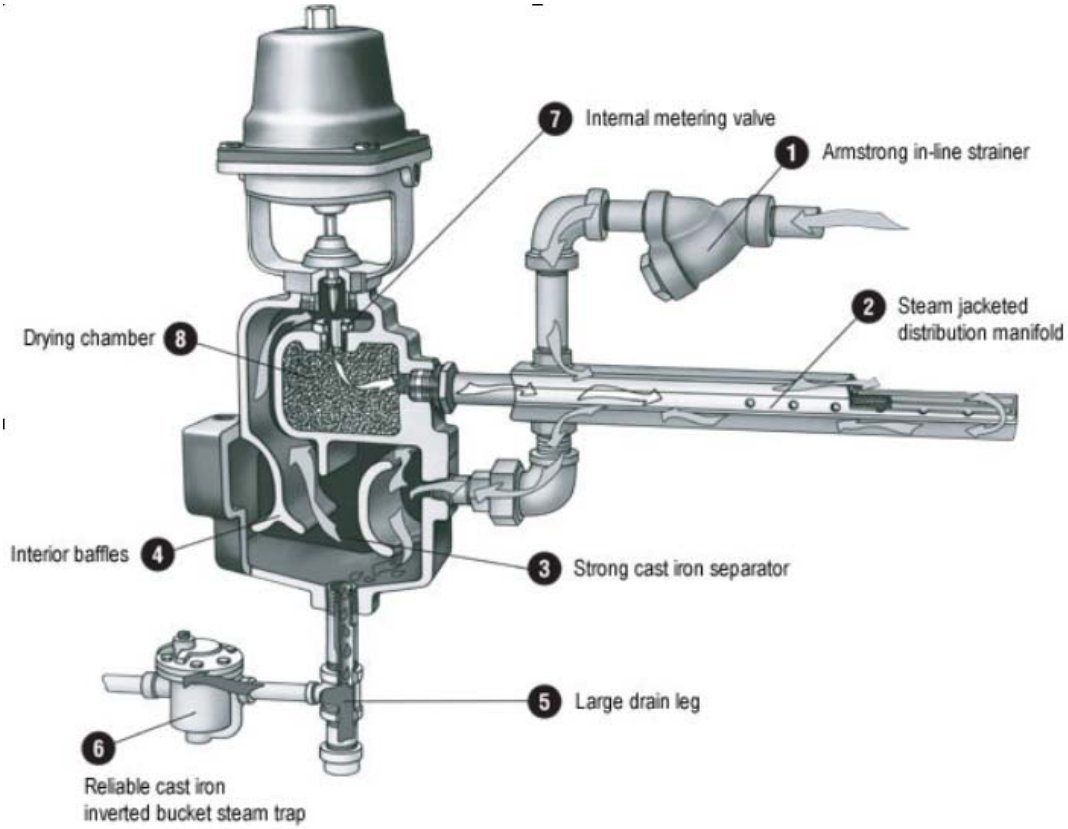
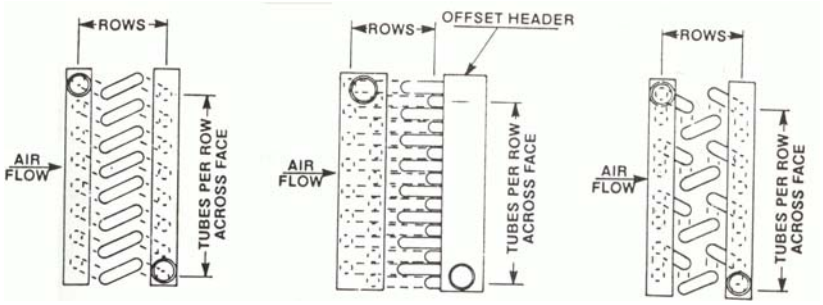


Figure 9 Steam Humidifier

Table 3. Coil physical data

	Symbol	Tube Material		Fin Material		Running Fluid
		Copper Cupro-Nickel	Steel St37	Aluminum	Copper Cupro-Nickel	
Cooling Coil	WC	Yes	No	Yes	Yes	Water
Heating Coil	WH	Yes	No	Yes	Yes	Water
Direct Expansion Coil	DX	Yes	No	Yes	Yes	R22
Steam Coil	S	No	Yes	Yes	Yes	Saturated Steam
Electrical Coil	E	Yes	No	No	Yes	--



Full 4 Rows 4 Passes 8 Circuits | Double 4 Rows 2 Passes 16 Circuits | Half 4 Rows 8 Passes 4 Circuits

Figure 10. Coil circuiting

Table 4. Coil circuiting definitions

Circuiting	Symbol	Description
Double (2)	**D**	In 24 tubes coil for example, two twelve-tube rows are connected to inlet and outlet headers
Full (1)	**F**	In 24 tubes height coil for example, one 24-tube row is connected to inlet and outlet headers and fluid passes one time in each row
Half (1/2)	**H**	In 24 tubes height coil for example, one twelve-tube row is connected to inlet and outlet headers and fluid passes two times in each row. Number of tubes must be divisible by 2.
One third (1/3)	**T**	In 24 tubes height coil for example, one eight-tube row is connected to inlet and outlet headers and fluid passes three times in each row. Number of tubes must be divisible by 3.
One fourth (1/4)	**F**	In 24 tubes height coil for example, one six-tube row is connected to inlet and outlet headers and fluid passes four times in each row. Number of tubes must be divisible by 4.

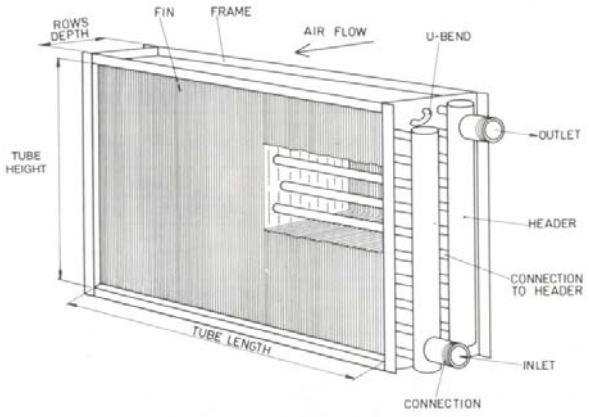


Figure 12. Standard coil components

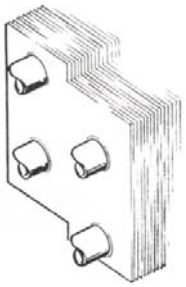
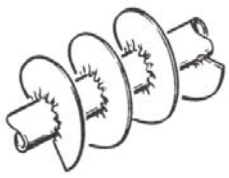


Plate Fins



Spiral Fins

Figure 11. Plate and spiral fins

17 Cooling Coil Ratings

Table 5. Cooling coil ratings (8FPI) EWT 45°F, LWT 55°F

MODEL	CFM	EDB °F	EWB °F	CIR.	4ROWs			6ROWs			8ROWs		
					TC*MBH	LDB °F	LWB °F	TC*MBH	LDB °F	LWB °F	TC*MBH	LDB °F	LWB °F
250	2500	80	67	F	54	63	60	83	57	56	102	54	54
				H	72	60	58	98	55	54	115	52	52
		90	72	F	85	66	62	122	59	57	147	54	54
				H	105	63	60	138	56	55	159	53	52
		100	75	F	106	68	64	147	60	58	174	55	54
				H	127	65	61	163	58	56	187	53	52
		110	81	F	153	71	66	205	62	60	237	56	55
				H	175	68	63	222	59	57	250	53	53
350	3500	80	67	F	78	62	60	119	57	56	146	54	53
				H	104	60	58	140	55	54	164	52	51
		90	72	F	123	65	62	175	58	57	208	54	54
				H	151	62	59	197	56	55	226	52	52
		100	75	F	152	67	63	211	59	58	247	55	54
				H	181	64	61	234	57	55	266	53	52
		110	81	F	220	70	66	292	61	59	336	55	55
				H	251	67	63	317	58	56	354	53	52
500	5000	80	67	F	124	62	59	180	56	55	217	53	53
				H	154	59	57	205	54	54	238	51	51
				D	86	64	61	138	59	58	180	56	55
		90	72	F	189	64	61	259	58	56	306	54	53
				H	222	62	59	286	56	54	326	52	52
				D	137	67	64	213	61	60	267	56	56
		100	75	F	232	66	62	311	59	57	362	54	53
				H	266	64	60	338	56	55	382	52	51
				D	179	70	66	263	62	60	323	57	56
		110	81	F	328	69	65	427	60	58	488	55	54
				D	263	73	68	376	64	62	448	58	57
700	7000	80	67	F	179	61	59	254	56	55	307	53	53
				H	219	59	57	288	54	54	333	51	51
				D	124	63	61	200	59	58	259	55	55
		90	72	F	270	64	61	366	57	56	430	53	53
				H	312	62	59	399	56	55	456	52	51
				D	200	67	64	308	60	59	381	56	56
		100	75	F	329	66	62	439	59	57	508	54	53
				H	373	64	60	473	56	55	535	52	51
				D	258	70	65	377	62	60	460	57	56
		110	81	F	464	69	65	600	60	58	685	55	54
				D	380	73	68	535	63	61	633	57	57

Table 5. Cooling coil ratings (8 FPI) EWT 45°F, LWT 55°F (Continued)

MODEL	CFM	EDB °F	EWB °F	CIR.	4ROWs			6ROWs			8ROWs		
					TC*MBH	LDB °F	LWB °F	TC*MBH	LDB °F	LWB °F	TC*MBH	LDB °F	LWB °F
850	8500	80	67	F	222	61	58	313	56	55	377	53	52
				H	264	59	57	347	54	53	403	52	51
				D	159	63	61	251	58	57	322	55	54
		90	72	F	332	64	60	447	58	56	522	53	53
				H	376	62	59	484	56	54	551	52	51
				D	253	67	63	381	60	58	470	56	55
		100	75	F	402	66	62	536	59	56	617	54	53
				H	450	64	60	570	57	55	644	53	52
				D	322	69	65	465	61	59	563	56	55
		110	81	F	564	69	64	728	60	58	827	55	54
				D	472	72	67	656	63	61	772	57	56
1000	10000	80	67	F	285	60	58	390	55	54	459	52	52
				H	331	59	57	426	54	53	490	50	50
				D	210	62	60	325	58	57	404	54	54
		90	72	F	419	63	60	552	56	55	637	53	52
				H	468	61	58	615	55	53	666	51	60
				D	334	66	63	483	59	58	581	55	54
		100	75	F	505	65	61	657	57	56	749	53	52
				D	416	68	64	585	60	58	694	55	54
		110	81	F	702	68	63	889	59	57	1004	53	53
				D	606	71	66	816	61	60	947	56	55
1300	13000	80	67	F	370	60	58	506	55	54	596	52	52
				H	429	59	57	553	54	53	635	51	51
				D	271	63	60	421	58	57	524	54	54
		90	72	F	543	63	60	716	56	55	827	53	52
				H	607	61	58	762	55	54	865	51	51
				D	432	66	63	627	59	58	754	55	54
		100	75	F	655	65	61	852	57	56	973	53	52
				D	539	68	64	759	60	58	900	55	55
		110	81	F	910	68	63	1154	59	57	1300	54	53
				D	781	71	66	1057	62	60	1227	56	55
1600	16000	80	67	F	467	60	58	632	55	54	739	52	52
				H	530	59	57	683	54	53	780	51	51
				D	359	63	60	541	57	56	665	54	53
		90	72	F	678	63	60	889	56	55	1021	53	52
				D	560	65	62	792	59	57	945	54	54
		100	75	F	817	65	61	1052	57	56	1199	53	52
				D	691	68	63	955	60	58	1123	55	54
		110	81	F	1127	68	63	1426	59	57	1602	54	53
				D	992	71	66	1321	61	59	1525	56	55

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Table 5. Cooling coil ratings (8 FPI) EWT 45°F, LWT 55°F (Continued)

MODEL	CFM	EDB °F	EWB °F	CIR.	4ROWs			6ROWs			8ROWs		
					TC*MBH	LDB °F	LWB °F	TC*MBH	LDB °F	LWB °F	TC*MBH	LDB °F	LWB °F
1800	18000	80	67	F	546	59.5	57.4	732	54.5	53.7	850	51.5	51.2
				H	616	58.1	56.1	784	53.4	52.6	894	50.6	50.2
				D	428	61.9	59.6	632	56.6	55.7	770	53.2	52.9
		90	72	F	792	61.9	59.1	1026	55.6	54.5	1172	51.9	51.5
				D	862	60.5	57.8	1082	54.4	53.4	1210	51	50.6
				F	662	64.4	61.5	918	57.6	56.7	1090	53.6	53.2
		100	75	D	950	64.2	60.2	1210	56.7	55.2	1386	52.6	51.5
				F	1026	62.6	58.8	1268	55.5	54	1416	51.5	50.9
				D	816	66.7	62.6	1106	58.9	57.3	1294	54.1	53.5
		110	81	F	1306	66.9	62.6	1634	58.1	56.5	1830	53.1	52.6
				H	1164	69.5	65	1524	60.4	58.7	1750	54.9	54.2
2000	20000	80	67	F	615	59	57	820	54	54	952	51	51
				D	495	62	59	719	56	55	686	53	53
		90	72	F	887	62	59	1146	56	54	1302	52	52
				D	756	64	61	1037	58	56	1222	54	53
		100	75	F	1064	64	60	1352	57	55	1530	52	52
				D	926	66	62	1246	59	57	1448	54	53
		110	81	F	1458	67	63	1840	58	56	2039	53	53
				D	1313	69	65	1708	60	58	1951	55	54
2500	25000	80	67	F	645	61	59	923	56	55	1101	53	52
				H	784	59	57	1033	54	53	1198	51	51
				D	447	64	61	--	--	--	934	55	55
		90	72	F	974	64	61	1322	57	56	1541	53	53
				H	1126	62	59	1441	55	54	1637	52	51
				D	723	67	64	--	--	--	1375	56	55
		100	75	F	1186	61	62	1576	58	57	1825	54	53
				H	1342	64	60	1697	57	55	1920	52	52
				D	931	69	65	--	--	--	1649	56	56
		110	81	F	1676	69	64	2156	60	58	2456	54	44
				H	1836	67	62	2288	58	56	2251	53	52
				D	1370	72	67	--	--	--	2276	57	57
3000	30000	80	67	F	816	61	59	1137	56	55	1354	52	52
				H	965	59	57	1259	54	53	1447	51	51
				D	590	63	61	--	--	--	1173	55	54
		90	72	F	1213	63	60	1621	57	56	1874	53	53
				H	1368	62	59	1740	55	54	1976	52	51
				D	941	66	63	--	--	--	1698	55	55
		100	75	F	1470	66	61	1929	58	56	2212	54	53
				D	1189	69	64	--	--	--	2034	56	55
		110	81	F	2054	68	64	2622	60	58	2972	54	54
				D	1737	72	67	--	--	--	2786	57	56

Table 5. Cooling coil ratings (8 FPI) EWT 45°F, LWT 55°F (Continued)

MODEL	CFM	EDB °F	EWB °F	CIR.	4ROWs			6ROWs			8ROWs		
					TC*MBH	LDB °F	LWB °F	TC*MBH	LDB °F	LWB °F	TC*MBH	LDB °F	LWB °F
3500	**35000**	80	67	F	*981*	*60*	*58*	*1361*	*55*	*54*	*1600*	*52*	51
				H	*1149*	*59*	*57*	*1486*	*54*	*53*	*1712*	*51*	50
				D	*727*	*63*	*61*	--	--	--	*1405*	*54*	54
		90	72	F	*1458*	*63*	*60*	*1923*	*56*	*55*	*2222*	*53*	52
				D	*1160*	*66*	*63*	--	--	--	*2028*	*55*	54
		100	75	F	*1761*	*65*	*61*	*2285*	*58*	*56*	*2615*	*53*	52
				D	*1444*	*68*	*64*	--	--	--	*2415*	*55*	55
		110	81	F	*2430*	*68*	*64*	*3101*	*59*	*57*	*3495*	*54*	53
				D	*2099*	*71*	*66*	--	--	--	*3296*	*56*	55
4000	**40000**	80	67	F	*1149*	*60*	*58*	*1565*	*55*	*54*	*1841*	*52*	52
				H	*1322*	*59*	*57*	*1702*	*54*	*53*	*1952*	*51*	51
				D	*869*	*63*	*60*	--	--	--	*1640*	*54*	54
		90	72	F	*1682*	*63*	*60*	*2212*	*56*	*55*	*2547*	*53*	52
				D	*1364*	*66*	*62*	--	--	--	*2347*	*54*	54
		100	75	F	*2028*	*65*	*61*	*2616*	*58*	*56*	*2997*	*53*	52
				D	*1699*	*68*	*64*	--	--	--	*2788*	*55*	54
		110	81	F	*2798*	*68*	*63*	*3551*	*59*	*57*	*4000*	*54*	53
				D	*2451*	*71*	*66*	--	--	--	*3791*	*56*	55
5000	50000	80	67	F	*1448*	*60*	*57.9*	*1972*	*55.1*	*54*	*2304*	*52*	*51.6*
				H	*1648*	*58.7*	*56.5*	*2128*	*53.9*	*53*	*2432*	*51*	*50.6*
				D	*1100*	*62.6*	*60.2*	--	--	--	*2072*	*53.8*	*53.4*
		90	72	F	*2112*	*62.7*	*59.7*	*2764*	*56.4*	*55.2*	*3188*	*52.5*	*52*
				H	*2324*	*61.2*	*58.3*	*2936*	*55.1*	*53.9*	*3308*	*51.5*	*51*
				D	*1740*	*65.3*	*62.1*	--	--	--	*2948*	*54.3*	*53.8*
		100	75	F	*2544*	*65*	*60.8*	*3280*	*57.5*	*55.8*	*3744*	*53.1*	*52.4*
				H	*2760*	*63.5*	*59.4*	*3448*	*56.2*	*54.6*	*3868*	*52*	*51.4*
				D	*2148*	*67.7*	*63.3*	--	--	--	*3500*	*54.9*	*54.2*
		110	81	F	*3504*	*68*	*63.4*	*4428*	*59.1*	*57.3*	*4996*	*53.9*	*53.2*
				D	*3088*	*70.7*	*65.8*	--	--	--	*4744*	*55.8*	*55.1*
6000	60000	80	67	F	*1788*	*59.8*	*57.6*	*2400*	*54.8*	*54*	*2808*	*51.7*	*51.3*
				D	*1408*	*62.1*	*59.5*	--	--	--	*2552*	*53*	*53*
		90	72	F	*2588*	*62*	*59*	*3368*	*56*	*54*	*3856*	*52*	*51*
				D	*2180*	*64*	*61*	--	--	--	*3600*	*53*	*53*
		100	75	F	*3112*	*64*	*60*	*3992*	*57*	*55*	*4532*	*52*	*52*
				D	*2684*	*67*	*62*	--	--	--	*4268*	*54*	*53*
		110	81	F	*4288*	*67*	*62*	*5384*	*58*	*56*	*6044*	*53*	*52*
				D	*3812*	*70*	*65*	--	--	--	*5780*	*55*	*54*
7000	70000	80	67	F	*2144*	*59.5*	*57.3*	*2864*	*54.5*	*53.6*	*3320*	*51.4*	*51.1*
				D	*1700*	*61.7*	*59.5*	--	--	--	*3024*	*53.1*	*52.7*
		90	72	F	*3092*	*61.9*	*59*	*3984*	*55.7*	*54.6*	*4572*	*51.9*	*51.4*
				D	*2624*	*64.3*	*61.2*	--	--	--	*4248*	*53.6*	*53.2*
		100	75	F	*3708*	*64.1*	*60.2*	*4720*	*56.7*	*55.1*	*5340*	*52.4*	*51.8*
				D	*3220*	*66.6*	*62.4*	--	--	--	*5032*	*54.1*	*53.5*
		110	81	F	*5088*	*69.9*	*62.6*	*6356*	*58.2*	*56.6*	*7112*	*53.2*	*52.6*
				D	*4564*	*69.4*	*64.8*	--	--	--	*6812*	*54.9*	*54.2*

Table 5. Cooling coil ratings (8 FPI) EWT 45°F, LWT 55°F (Continued)

MODEL	CFM	EDB °F	EWB °F	CIR.	4 Rows			6 Rows			8 Rows		
					TC*MBH	LDB °F	LWB °F	TC*MBH	LDB °F	LWB °F	TC*MBH	LDB °F	LWB °F
8000	80000	80	67	F	2452	59	57	3264	54	53	3792	51	51
				D	1984	61	59	--	--	--	3476	53	52
		90	72	F	3552	62	59	4560	55	54	5192	52	51
				D	3028	64	61	--	--	--	4876	53	53
		100	75	F	4232	64	60	5384	56	55	6096	52	51
				D	3700	66	62	--	--	--	5780	54	53
		110	81	F	5808	67	62	7272	58	56	8112	53	52
				D	5236	69	64	--	--	--	7800	54	54

* For other coil inlet conditions listed above, consult SARAVEL CASCADE® program available on 3 ½ " diskette upon request from sales office.
-- Coil construction is not possible. (Physical limitations)

Table 6. Cooling coil ratings (14 FPI) EWT 45°F, LWT 55°F

MODEL	CFM	EDB °F	EWB °F	CIR.	4 Rows			6 Rows			8 Rows		
					TC*MBH	LDB °F	LWB °F	TC*MBH	LDB °F	LWB °F	TC*MBH	LDB °F	LWB °F
250	2500	80	67	F	71	58.8	58.1	101	54	53.4	119	51	51
				H	93	55.7	55	118	51.3	51.1	133	48.9	48.9
		90	72	F	109	60.1	59.2	147	54.1	54	168	50.7	50.7
				H	134	56.6	55.8	165	51.4	51.2	181	48.7	48.6
		100	75	F	136	60.9	59.7	176	54.3	54.1	198	50.6	50.6
				H	160	57.5	56.3	194	51.6	51.3	211	48.7	48.6
		110	81	F	193	62.5	61.2	241	54.7	54.5	267	50.6	50.6
350	3500	80	67	F	102	58.5	57.9	144	53.7	53.6	169	50.7	50.7
				H	132	55.3	54.8	168	51	50.8	188	48.6	48.6
		90	72	F	156	59.7	58.9	208	53.8	53.6	238	50.4	50.4
				H	191	56.2	55.4	233	51	50.9	255	48.4	48.3
		100	75	F	194	60.4	59.3	250	53.8	53.6	281	50.3	50.3
				H	229	56.9	55.9	275	51.2	51	297	48.4	48.4
		110	81	F	275	61.9	60.7	343	54.2	54	377	50.2	50.2
500	5000	80	67	F	158	57.6	57	217	52.8	52.7	251	50	50
				H	198	54.7	54.1	247	50.5	50.4	273	48.3	48.2
				D	110	60.9	60.2	171	56.2	56.1	213	53	52.9
		90	72	F	240	58.6	57.8	309	52.9	52.7	348	49.7	49.7
				H	282	55.5	54.8	339	50.6	50.4	367	48.1	48.1
				D	176	62.8	61.9	259	56.6	56.4	309	52.8	52.8
		100	75	F	293	59.4	58.2	369	53	52.8	410	49.6	49.6
				H	336	56.3	55.3	397	50.8	50.6	429	48	48
				D	230	63.6	62.4	320	56.6	56.4	373	52.5	52.4
		110	81	F	411	60.7	59.5	501	53.3	53.1	545	49.7	49.6
				D	330	65.9	64.6	444	57.5	57.2	506	52.8	52.7

Table 6. Cooling coil ratings (14 FPI) EWT 45°F, LWT 55°F (Continued)

MODEL	CFM	EDB °F	EWB °F	CIR.	4 Rows			6 Rows			8 Rows		
					TC*MBH	LDB °F	LWB °F	TC*MBH	LDB °F	LWB °F	TC*MBH	LDB °F	LWB °F
700	7000	80	67	F	229	57.3	56.6	308	52.6	52.4	354	49.9	49.8
				H	280	54.6	53.9	346	50.5	50.3	382	48.2	48.2
				D	163	60.5	59.8	249	55.7	55.6	306	52.6	52.5
		90	72	F	343	58.3	57.4	438	52.6	52.4	491	49.5	49.5
				H	397	55.4	54.6	476	50.5	50.3	516	48	48
				D	259	62.3	61.4	371	56.2	56	440	52.4	52.3
		100	75	F	417	59.1	57.9	519	52.9	52.6	575	49.5	49.5
				D	333	63.1	61.8	457	56.2	55.9	529	52.2	52.1
		110	81	F	583	60.4	59.2	704	53.2	53	765	49.6	49.6
				D	478	65.3	63.9	634	56.9	56.6	717	52.3	52.2
850	8500	80	67	F	287	56.9	56.2	381	52.2	52.1	436	49.6	49.5
				H	343	54.5	53.8	420	50.5	50.3	464	48.2	48.2
				D	209	60.1	59.4	310	55.4	55.2	381	52.1	52.1
		90	72	F	425	58	57	537	52.4	52.2	597	49.5	49.4
				H	483	55.5	54.6	576	50.6	50.4	625	48.1	48.1
				D	328	61.9	60.8	463	55.7	55.4	543	52	51.9
		100	75	F	514	58.9	57.6	636	52.7	52.4	699	49.5	49.4
				D	418	62.7	61.3	565	55.8	55.4	649	51.8	51.8
		110	81	F	714	60.3	58.9	857	53.1	52.9	931	49.5	49.5
				D	598	64.8	63.3	783	56.5	56.1	878	52	51.9
1000	10000	80	67	F	364	55.9	55.3	471	51.4	51.2	528	49	48.9
				H	424	53.6	53	512	49.7	49.6	558	47.7	47.7
				D	274	59.1	58.4	395	54.3	54.1	471	51.3	51.2
		90	72	F	530	56.8	56	655	51.5	51.3	720	48.7	48.7
				D	424	60.5	59.6	577	54.5	54.3	665	50.9	50.9
		100	75	F	638	57.5	56.4	773	51.6	51.4	842	48.7	48.6
				D	533	61.2	60	699	54.5	54.2	791	50.7	50.7
		110	81	F	879	58.7	57.6	1080	50.3	50.1	1141	47.6	47.6
				D	758	62.8	61.6	959	54.9	54.7	1062	50.8	50.8
1300	13000	80	67	F	472	55.9	55.3	609	51.5	51.3	686	49	49
				H	549	53.7	53.1	665	49.7	49.6	725	47.7	47.7
				D	355	59.1	58.4	509	54.4	54.2	611	51.3	51.3
		90	72	F	688	56.8	56	850	51.5	51.3	934	48.8	48.8
				D	550	60.5	59.6	747	54.5	54.4	862	51	51
		100	75	F	828	57.6	56.5	1004	51.7	51.4	1094	48.7	48.7
				D	692	61.2	60	905	54.6	54.3	1024	50.9	50.9
		110	81	F	1140	58.8	57.6	1402	50.3	50.2	1483	47.6	47.6
				D	984	62.9	61.6	1246	55	54.8	1380	50.9	50.8
1600	16000	80	67	F	598	55.6	54.9	764	51.1	51	854	48.7	48.7
				D	464	58.6	57.9	652	53.8	53.7	771	50.8	50.8
		90	72	F	865	56.4	55.6	1060	51.2	51	1158	48.6	48.5
				D	711	59.9	59	950	53.9	53.7	1083	50.5	50.4
		100	75	F	1035	57	56.1	1247	51.4	51.2	1352	48.6	48.5
				D	884	60.6	59.4	1136	54	53.8	1279	50	50.4
		110	81	D	1250	62	60.8	1556	54	54.2	1713	50	50.4

Table 6. Cooling coil ratings (14 FPI) EWT 45°F, LWT 55°F (Continued)

MODEL	CFM	EDB °F	EWB °F	CIR.	4 Rows			6 Rows			8 Rows		
					TC*MBH	LDB °F	LWB °F	TC*MBH	LDB °F	LWB °F	TC*MBH	LDB °F	LWB °F
1800	18000	80	67	F	702	54.9	54.3	876	50.7	50.6	976	48.4	48.3
				D	754	57.9	57.2	762	53.2	53.1	890	50.3	50.3
		90	72	F	1002	55.8	55	1210	50.8	50.6	1318	48.2	48.2
				D	840	59.1	58.2	1102	53.1	53	1242	49.9	49.9
		100	75	F	1194	56.6	55.5	1422	50.9	50.7	1536	48.2	48.2
				D	1032	59.8	58.6	1310	53.4	53.2	1660	50	49.9
		110	81	D	1454	61.1	60	1788	53.7	53.4	1954	49.9	49.9
2000	20000	80	67	F	791	54.7	54.1	985	50.5	50.4	1090	48.3	48.2
				D	631	57.6	57	866	52.8	52.7	1005	50	50
		90	72	F	1128	55.5	54.8	1354	50.6	50.4	1469	48.1	48.1
				D	961	58.5	57.7	1237	52.9	52.7	1392	49.7	49.7
		100	75	F	1343	56	55.3	1588	50.8	50.6	1716	48	48
				D	1173	59	58.2	1477	53	52.7	1637	49	49.6
		110	81	D	1645	60	59.5	2005	53	53.1	2182	49	49.6
2500	25000	80	67	F	825	57	56	1109	52.4	52.3	1272	49.7	49.7
				H	1011	54	53	1243	50.3	50	1373	48.1	48.1
				D	588	60	59	--	--	--	1100	52.4	52.4
		90	72	F	1235	58	57	1573	52.5	52.3	1757	49.4	49.4
				H	1426	55	54	1704	50	50.3	1847	48	47.9
				D	934	62	61	--	--	--	1583	52.2	52.2
		100	75	F	1502	58	57	1865	52	52.4	2063	49.4	49.3
				D	1202	62	61	--	--	--	1899	52	51.9
		110	81	F	2094	60	59	2528	53	52.8	2745	49.4	49
				D	1722	65	63	--	--	--	2572	52.2	52
3000	30000	80	67	F	1050	56.4	55.8	1373	51	51	1559	49	49
				H	1238	54	53	1512	50	49	1661	47	47
				D	773	59	59	--	--	--	1371	51	51
		90	72	F	1545	57	56	1928	52	51	2136	49	49
				D	1210	61	60	--	--	--	1954	51	51
		100	75	F	1860	58	57	2283	52	51	2504	49	48
				D	1532	62	60	--	--	--	2324	51	51
		110	81	F	2577	59	58	3073	52	52	3319	49	49
				D	2183	63	62	--	--	--	3139	51	51
3500	35000	80	67	F	1270	56	55	1638	51	51	1845	49	49
				H	1475	53.7	53	1788	49	49	1946	47	47
				D	954	59	58	--	--	--	1641	51	51
		90	72	F	1848	56	56	2282	51	51	2513	48	48
				D	1474	60	59	--	--	--	2320	51	51
		100	75	F	2221	57	56	2700	51	51	2943	48	48
				D	1855	61	60	--	--	--	2778	51	50
		110	81	F	3055	58	57	3620	52	51	3896	48	48
				D	1638	63	61	--	--	--	3712	50	50

* For other coil inlet conditions listed above, consult SARAVEL CASCADE® program available on 3 ½ " diskette upon request from sales office.

-- Coil construction is not possible. (Physical limitations)

Table 6. Cooling coil ratings (14 FPI) EWT 45°F, LWT 55°F (Continued)

MODEL	CFM	EDB °F	EWB °F	CIR.	4 Rows			6 Rows			8 Rows		
					TC*MBH	LDB °F	LWB °F	TC*MBH	LDB °F	LWB °F	TC*MBH	LDB °F	LWB °F
4000	40000	80	67	F	1481	55	55	1896	51	51	2120	48	48
				D	1132	58	58	--	--	--	1911	51	51
		90	72	F	2141	56	55	2633	51	51	2888	48	48
				D	1739	60	59	--	--	--	2683	50	50
		100	75	F	2566	57	56	3104	51	51	3370	48	48
				D	2172	60	59	--	--	--	3177	50	50
		110	81	D	3084	62	61	--	--	--	4269	50	50
5000	50000	80	67	F	1856	55.6	55	2376	51	51	2664	48.7	48.7
				D	1440	58.6	57.9	--	--	--	2396	51	51
		90	72	F	2692	56.5	55.7	3296	53	53	3604	48.7	48.7
				D	2208	59	59	--	--	--	3368	50.5	50.5
		100	75	F	3220	57.4	56.2	3896	51.4	51.2	4220	48.5	48.5
				D	2748	60.7	59.5	--	--	--	3992	50.5	50.5
		110	81	F	4424	58.6	57.4	5204	51.9	51.6	5580	48.6	48.6
				D	3888	62.3	60.9	--	--	--	5348	50.5	50.5
6000	60000	80	67	F	2304	55.2	54.5	2896	51	51	3232	48	48
				D	1824	58.1	57.4	--	--	--	2956	50	50
		90	72	F	3308	56	55	4016	50	50	4376	48	48
				D	2764	59	58	--	--	--	4108	50	50
		100	75	F	3948	57	55	4712	51	51	5104	48	48
				D	3408	60	58	--	--	--	4844	50	50
		110	81	F	5384	58	56	6288	51	51	6728	48	48
				D	4804	61	60	--	--	--	6484	50	50
7000	70000	80	67	F	2752	54.9	54.2	3424	50.6	50.5	3800	48.4	48.3
				D	2188	57.7	57.1	--	--	--	3492	50.1	50.1
		90	72	F	3936	55.6	54.8	4736	50.6	50.5	5136	48.2	48.1
				D	3316	58.7	57.9	--	--	--	4852	49.8	49.8
		100	75	F	4680	56.4	55.4	5548	50.9	50.6	5972	48.2	48.2
				D	4068	59.6	58.4	--	--	--	5708	49.8	49.7
		110	81	F	6372	57.6	56.5	7396	51.2	51	7896	48.2	48.1
				D	5728	60.8	59.6	--	--	--	7616	49.8	49.8
8000	80000	80	67	F	3164	54	54	3940	50	50	4352	48	48
				D	2540	57	56	--	--	--	4032	50	50
		90	72	F	4488	55	54	5404	50	50	5868	48	48
				D	3844	55	54	--	--	--	5572	49	49
		100	75	F	5364	56	55	6340	50	50	6848	48	48
				D	4680	59	58	--	--	--	6536	49	49
		110	81	F	5364	56	55	6340	50	50	6848	48	48
				D	4680	59	58	--	--	--	6536	49	49

* For other coil inlet conditions listed above, consult SARAVEL CASCADE® program available on 3 ½ " diskette upon request from sales office.

-- Coil construction is not possible. (Physical limitations)

25 Direct Expansion Coil Ratings

Table 7. DX coil ratings (8 FPI & Full Circuitry)

MODEL	CFM	EDB	EWB	4 Rows			6 Rows			8 Rows		
		°F	°F	TC*MBH	LDB °F	LWB °F	TC*MBH	LDB °F	LWB °F	TC*MBH	LDB °F	LWB °F
250	2500	80	67	71	60.4	58.1	100	54.9	53.9	119	51.4	51
		85	70	87	62.1	59.6	121	55.8	54.8	143	52	51.6
		90	72	99	63.6	60.5	136	56.6	55.4	160	52.4	52
		95	75	119	65.3	62	160	57.7	56.4	187	53	52.6
350	3500	80	67	102	59.9	57.8	143	54.4	53.7	169	51.1	50.7
		85	70	126	61.6	59.2	173	55.4	54.5	203	51.6	51.3
		90	72	144	63	60.1	195	56.2	55.1	227	52	51.6
		95	75	171	64.6	61.5	229	57	55.9	265	52.5	52.1
500	5000	80	67	156	59.3	57.2	212	53.9	53	248	50.6	50.2
		85	70	191	60.9	58.5	256	54.8	53.9	296	51.1	50.8
		90	72	216	62.3	59.4	287	55.5	54.4	330	51.5	51.1
		95	75	256	63.9	60.8	336	56.5	55.3	385	52	51.6
700	7000	80	67	221	59.2	57	299	53.8	52.9	349	50.5	50.1
		85	70	271	60.8	58.3	362	54.6	53.7	417	51	50.7
		90	72	306	62.2	59.2	404	55.4	54.3	463	51.5	51
		95	75	361	63.9	60.7	473	56.4	55.2	540	52	51.6
850	8500	80	67	272	59.1	56.8	365	53.8	52.8	424	50.5	50.1
		85	70	332	60.8	58.2	438	54.7	53.7	504	51.5	50.7
		90	72	373	62.3	59.1	490	55.6	54.3	564	51.5	51
		95	75	440	63.9	60.6	574	56.5	55.2	656	52.1	51.5
1000	10000	80	67	344	58.1	56	451	52.8	52	515	49.8	49.5
		85	70	417	59.6	57.3	542	53.6	52.7	615	50.2	49.9
		90	72	468	60.9	58.2	605	54.3	53.3	684	50.6	50.2
		95	75	553	62.4	59.5	704	55.2	54.1	794	51.1	50.7
1300	13000	80	67	446	58.1	56	584	52.9	52.1	669	49.8	49.5
		85	70	541	59.7	57.3	701	53.7	52.8	796	50.3	50
		90	72	607	61	58.2	783	54.4	53.3	888	50.6	50.2
		95	75	715	62.5	59.5	914	55.3	54.2	1031	51.1	50.7
1600	16000	80	67	557	58	55.9	726	52.8	51.9	829	49.7	49.4
		85	70	675	59.5	57.1	869	53.6	52.7	985	50.2	49.8
		90	72	757	60.9	58	969	54.3	53.2	1098	50.5	50.1
		95	75	890	62.4	59.3	1131	55.2	54	1273	51.1	50.6
1800	18000	80	67	652	57.4	55.3	838	52.2	51.4	948	49.3	49
		85	70	784	58.9	56.6	1000	53	52.2	1128	49.7	49.4
		90	72	878	60.2	57.5	1114	53.7	52.7	1250	50.1	49.7
		95	75	1036	61.6	58.7	1302	54.5	53.4	1450	50.6	50.2
2000	20000	80	67	732	57.2	55.2	936	52.1	51.3	1059	49.2	48.9
		85	70	882	58.7	56.4	1119	52.9	52.1	1255	49.7	49.4
		90	72	988	60	57.3	1247	53.6	52.5	1397	50	49.6
		95	75	1157	61.5	58.6	1450	54.4	53.4	1619	50.5	50.1
2500	25000	80	67	799	59	56	1079	53	52	1251	50	50
		85	70	977	60	58	1298	54	53	1497	50	50
		90	72	1101	62	59	1453	55	54	1668	51	50
		95	75	1306	63	60	1704	56	55	1942	51	51
3000	30000	80	67	998	58	56	1321	53	52	1525	50	49
		85	70	1209	60	57	1591	54	53	1816	50	50
		90	72	1361	61	58	1773	54	53	2018	51	50
		95	75	1608	63	60	2075	55	54	2352	51	51

Table 7. DX coil ratings (8 FPI & Full Circuitry) (Continued)

MODEL	CFM	EDB	EWB	4 Rows			6 Rows	8 Rows				
		°F	°F	TC*MBH	LDB °F	LWB °F	TC*MBH	LDB °F	LWB °F	TC*MBH	LDB °F	LWB °F
3500	35000	80	67	1195	58	56	1571	52	52	1799	49	49
		85	70	1453	59	57	1885	53	52	2142	50	50
		90	72	1631	61	58	2098	54	53	2382	50	50
		95	75	1922	62	59	2457	55	54	2773	51	50
4000	40000	80	67	1385	58	55	1807	52	52	2069	49	49
		85	70	1669	59	57	2160	53	52	2460	50	49
		90	72	1879	61	58	2411	54	53	2728	50	50
		95	75	2210	62	59	2819	55	54	3168	51	50
5000	50000	80	67	1736	58	55	2256	52	52	2584	49	49
		85	70	2100	59	57	2708	53	52	3072	50	49
		90	72	2352	61	58	3024	54	53	3408	50	50
		95	75	2764	62	59	3520	55	54	3964	51	50
6000	60000	80	67	2132	57	55	2764	52	51	3136	49	49
		85	70	2576	59	56	3292	53	52	3720	50	49
		90	72	2888	60	57	3668	54	53	4136	50	49
		95	75	3396	62	59	4284	54	53	4796	50	50
7000	70000	80	67	2552	57.3	55.3	3272	50.2	51.4	3700	49	49
		85	70	3068	58	56	3900	53	52	4388	49	49
		90	72	3432	60	58	4344	54	53	4864	50	50
		95	75	4028	61	58	5056	54	53	5644	50	50
8000	80000	80	67	2912	57	55	3736	52	51	4224	49	48
		85	70	3512	58	56	4464	53	52	5012	49	49
		90	72	3936	60	57	4968	53	52	5564	50	49
		95	75	4608	61	58	--	--	--	--	--	--

* For other coil inlet conditions listed above, consult SARAVEL CASCADE® program available on 3 ½ " diskette upon request from sales office.
* All ratings are based on 45 ^{o}F evaporating temperature and full circuiting

Table 8. DX coil ratings (14 FPI & Full Circuitry)

MODEL	CFM	EDB	EWB	4 Rows			6 Rows			8 Rows		
		°F	°F	TC*MBH	LDB °F	LWB °F	TC*MBH	LDB °F	LWB °F	TC*MBH	LDB °F	LWB °F
250	2500	80	67	71	60.4	58.1	100	54.9	53.9	119	51.4	51
		85	70	87	62.1	59.6	121	55.8	54.8	143	52	51.6
		90	72	99	63.6	60.5	136	56.6	55.4	160	52.4	52
		95	75	119	65.3	62	160	57.7	56.4	187	53	52.6
350	3500	80	67	102	59.9	57.8	143	54.4	53.7	169	51.1	50.7
		85	70	126	61.6	59.2	173	55.4	54.5	203	51.6	51.3
		90	72	144	63	60.1	195	56.2	55.1	227	52	51.6
		95	75	171	64.6	61.5	229	57	55.9	265	52.5	52.1
500	5000	80	67	156	59.3	57.2	212	53.9	53	248	50.6	50.2
		85	70	191	60.9	58.5	256	54.8	53.9	296	51.1	50.8
		90	72	216	62.3	59.4	287	55.5	54.4	330	51.5	51.1
		95	75	256	63.9	60.8	336	56.5	55.3	385	52	51.6
700	7000	80	67	221	59.2	57	299	53.8	52.9	349	50.5	50.1
		85	70	271	60.8	58.3	362	54.6	53.7	417	51	50.7
		90	72	306	62.2	59.2	404	55.4	54.3	463	51.5	51
		95	75	361	63.9	60.7	473	56.4	55.2	540	52	51.6

Table 8. DX coil ratings (14 FPI & Full Circuitry) (Continued)

MODEL	CFM	EDB	EWB	4 Rows			6 Rows			8 Rows		
		°F	°F	TC*MBH	LDB °F	LWB °F	TC*MBH	LDB °F	LWB °F	TC*MBH	LDB °F	LWB °F
850	8500	80	67	245	58.3	57.5	338	53.7	53.5	416	49.8	49.8
		85	70	288	60.2	59.3	398	54.8	54.6	489	50.4	50.3
		90	72	319	61.6	60.5	440	55.6	55.3	541	50.6	50.6
		95	75	368	63.5	62.3	507	56.8	56.5	624	51.1	51
1000	10000	80	67	344	58.1	56	451	52.8	52	515	49.8	49.5
		85	70	417	59.6	57.3	542	53.6	52.7	615	50.2	49.9
		90	72	468	60.9	58.2	605	54.3	53.3	684	50.6	50.2
		95	75	553	62.4	59.5	704	55.2	54.1	794	51.1	50.7
1300	13000	80	67	446	58.1	56	584	52.9	52.1	669	49.8	49.5
		85	70	541	59.7	57.3	701	53.7	52.8	796	50.3	50
		90	72	607	61	58.2	783	54.4	53.3	888	50.6	50.2
		95	75	715	62.5	59.5	914	55.3	54.2	1031	51.1	50.7
1600	16000	80	67	557	58	55.9	726	52.8	51.9	829	49.7	49.4
		85	70	675	59.5	57.1	869	53.6	52.7	985	50.2	49.8
		90	72	757	60.9	58	969	54.3	53.2	1098	50.5	50.1
		95	75	890	62.4	59.3	1131	55.2	54	1273	51.1	50.6
1800	18000	80	67	566	57.3	56.6	774	52.4	52.2	944	48.3	48.3
		85	70	666	59	58.2	910	53.3	53.1	1112	48.6	48.5
		90	72	736	60.3	59.3	1008	53.9	53.7	1230	48.6	48.6
		95	75	850	62	60.3	1162	54.9	54.6	1418	48.8	48.7
2000	20000	80	67	732	57.2	55.2	936	52.1	51.3	1059	49.2	48.9
		85	70	882	58.7	56.4	1119	52.9	52.1	1255	49.7	49.4
		90	72	988	60	57.3	1247	53.6	52.5	1397	50	49.6
		95	75	1157	61.5	58.6	1450	54.4	53.4	1619	50.5	50.1
2500	25000	80	67	799	59	56	1079	53	52	1251	50	50
		85	70	977	60	58	1298	54	53	1497	50	50
		90	72	1101	62	59	1453	55	54	1668	51	50
		95	75	1306	63	60	1704	56	55	1942	51	51
3000	30000	80	67	998	58	56	1321	53	52	1525	50	49
		85	70	1209	60	57	1591	54	53	1816	50	50
		90	72	1361	61	58	1773	54	53	2018	51	50
		95	75	1608	63	60	2075	55	54	2352	51	51
3500	35000	80	67	1195	58	56	1571	52	52	1799	49	49
		85	70	1453	59	57	1885	53	52	2142	50	50
		90	72	1631	61	58	2098	54	53	2382	50	50
		95	75	1922	62	59	2457	55	54	2773	51	50
4000	40000	80	67	1385	58	55	1807	52	52	2069	49	49
		85	70	1669	59	57	2160	53	52	2460	50	49
		90	72	1879	61	58	2411	54	53	2728	50	50
		95	75	2210	62	59	2819	55	54	3168	51	50
5000	50000	80	67	1736	58	55	2256	52	52	2584	49	49
		85	70	2100	59	57	2708	53	52	3072	50	49
		90	72	2352	61	58	3024	54	53	3408	50	50
		95	75	2764	62	59	3520	55	54	3964	51	50
6000	60000	80	67	2132	57	55	2764	52	51	3136	49	49
		85	70	2576	59	56	3292	53	52	3720	50	49
		90	72	2888	60	57	3668	54	53	4136	50	49
		95	75	3396	62	59	4284	54	53	4796	50	50

Table 8. DX coil ratings (14 FPI & Full Circuitry) (Continued)

MODEL	CFM	EDB	EWB	4 Rows			6 Rows			8 Rows		
		°F	°F	TC*MBH	LDB °F	LWB °F	TC*MBH	LDB °F	LWB °F	TC*MBH	LDB °F	LWB °F
7000	70000	*80*	*67*	*2176*	*57*	*56*	*2980*	*52*	*52*	*3640*	*48*	*48*
		85	*70*	*2560*	*59*	*58*	*3508*	*53*	*53*	*4282*	*48*	*48*
		90	*72*	*2832*	*60*	*59*	*3880*	*54*	*54*	*4736*	*49*	*49*
		95	*75*	*3264*	*62*	*61*	--	--	--	--	--	--
8000	80000	*80*	*67*	*2912*	*57*	*55*	*3736*	*52*	*51*	*4224*	*49*	*48*
		85	*70*	*3512*	*58*	*56*	*4464*	*53*	*52*	*5012*	*49*	*49*
		90	*72*	*3936*	*60*	*57*	*4968*	*53*	*52*	*5564*	*50*	*49*
		95	*75*	*4608*	*61*	*58*	--	--	--	--	--	--

* For other coil inlet conditions listed above, consult SARAVEL CASCADE® program available on 3 ½ " diskette upon request from sales office.
* All ratings are based on 45 ^{o}F evaporating temperature and full circuiting

29 Water Heating Coil Ratings

Table 9. Water heating coil ratings (MBH)

MODEL	CFM	EDB °F	CIR.	8 FPI EWT 180°F, LWT 160°F		14 FPI EWT 180°F, LWT 160°F	
				1 ROW	2 ROW	1 ROW	2 ROW
250	2500	-4	F	116	219	173	303
			H	128	231	192	320
		14	F	101	195	151	269
			H	113	206	170	285
		32	F	87	170	130	236
			H	99	181	148	251
		60	F	65	132	97	183
			H	76	142	114	198
350	3500	-4	F	168	317	250	435
			H	185	333	278	458
		14	F	147	281	219	387
			H	164	297	246	409
		32	F	127	245	188	338
			H	143	261	215	360
		60	F	95	190	141	263
			H	111	205	166	284
500	5000	-4	F	245	455	367	628
			H	266	475	401	656
		14	F	216	405	323	559
			H	236	424	356	586
		32	F	187	355	279	490
			H	207	373	311	516
		60	F	142	277	212	383
			H	161	294	241	409
700	7000	-4	F	342	631	513	875
			H	368	656	555	910
		14	F	302	562	452	779
			H	327	586	494	813
		32	F	262	493	392	683
			H	286	516	432	717
		60	F	200	385	298	535
			H	223	408	336	567
850	8500	-4	F	474	788	651	1011
			H	487	805	675	1039
		14	F	361	670	544	934
			H	388	696	588	972
		32	F	313	588	472	821
			H	340	613	515	857
		60	F	240	460	361	644
			H	265	485	402	679

* For other coil inlet conditions listed above, consult SARAVEL CASCADE® program available on 3 ½ " diskette upon request from sales office.

-- Coil construction is not possible. (Physical limitations)

Table 9. Water heating coil ratings (MBH) (Continued)

MODEL	CFM	EDB °F	CIR.	8 FPI EWT 180°F, LWT 160°F		14 FPI EWT 180°F, LWT 160°F	
				1 ROW	2 ROW	1 ROW	2 ROW
1000	10000	-4	F	518	937	777	1293
			H	549	967	828	1334
		14	F	458	836	687	1153
			H	489	865	737	1194
		32	F	399	734	598	1014
			H	429	762	647	1054
		60	F	307	576	460	798
			H	336	603	506	836
1300	13000	-4	F	669	1213	1004	1674
			H	709	1251	1070	1727
		14	F	592	1081	889	1494
			H	632	1119	953	1546
		32	F	516	950	773	1313
			H	554	986	836	1365
		60	F	397	746	595	1033
			H	434	781	654	1082
1600	16000	-4	F	818	1477	1233	2048
			H	861	1518	1303	2105
		14	F	725	1318	1093	1828
			H	767	1358	1162	1885
		32	F	633	1159	953	1609
			H	674	1198	1020	1664
		60	F	490	912	737	1269
			H	529	949	800	1322
1800	18000	-4	F	932	1670	1402	2304
			H	980	1716	1478	2366
		14	F	850	1528	1267	2108
			H	894	1579	1350	2170
		32	F	740	1344	1114	1858
			H	786	1388	1186	1916
		60	F	576	1060	862	1466
			H	618	1100	932	1524
2000	20000	-4	F	1064	1900	1602	2622
			H	1113	1945	1681	2686
		14	F	945	1697	1423	2344
			H	993	1741	1500	2406
		32	F	827	1494	1244	2066
			H	873	1537	1319	2126
		60	F	643	1178	966	1632
			H	687	1219	1037	1691

* For other coil inlet conditions listed above, consult SARAVEL CASCADE® program available on 3 ½ " diskette upon request from sales office.

-- Coil construction is not possible. (Physical limitations)

Table 9. Water heating coil ratings (MBH) (Continued)

MODEL	CFM	EDB °F	CIR.	8 FPI EWT 180°F, LWT 160°F		14 FPI EWT 180°F, LWT 160°F	
				1 Row	2 Row	1 Row	2 Row
2500	25000	-4	F	--	2282	--	3153
			H	1332	2371	2009	3278
		14	F	--	2031	--	2809
			H	1185	2119	1786	2931
		32	F	--	1781	--	2464
			H	1037	1866	1593	2584
		60	F	--	1391	--	1529
			H	808	1473	1215	2045
3000	30000	-4	F	--	2747	--	3803
			H	1602	2841	2421	3934
		14	F	--	2448	--	3391
				1426	2539	2154	3520
		32	F	--	2149	--	2979
			H	1250	2238	1888	3106
		60	F	--	1684	--	2340
			H	977	1770	1475	2461
3500	35000	-4	F	--	3251	--	4492
			H	1900	3353	2869	4635
		14	F	--	2098	--	4008
			H	1692	2999	2555	4148
		32	F	--	2546	--	3524
			H	1458	2644	2241	3662
		60	F	--	1999	--	2772
			H	1162	2093	1754	2905
4000	40000	-4	F	--	3691	--	5114
			H	2153	3798	3257	5264
		14	F	--	3292	--	4565
			H	1918	3397	2902	4713
		32	F	--	2894	--	4017
			H	1684	2996	2547	4161
		60	F	--	2275	--	3164
			H	1320	2373	1997	3303
5000	50000	-4	F	--	4592	--	6376
			H	2676	4720	4052	6552
		14	F	--	4096	--	5692
			H	2384	4224	3612	5868
		32	F	--	3604	--	5008
			H	2092	3724	3172	5180
		60	F	--	2832	--	3948
			H	1640	2952	2488	4116

* For other coil inlet conditions listed above, consult SARAVEL CASCADE® program available on 3 ½ " diskette upon request from sales office.
-- Coil construction is not possible. (Physical limitations)

Table 9. Water heating coil ratings (MBH) (Continued)

MODEL	CFM	EDB °F	CIR.	8 FPI EWT 180°F, LWT 160°F		14 FPI EWT 180°F, LWT 160°F	
				1 Row	2 Row	1 Row	2 Row
6000	60000	-4	F	--	*5580*	--	*7732*
			H	*3252*	*5716*	*4920*	*7924*
		14	F	--	*5016*	--	*6908*
			H	*2896*	*5116*	*4388*	*7096*
		32	F	--	*4380*	--	*6084*
			H	*2544*	*4512*	*3852*	*6268*
		60	F	--	*3452*	--	*4800*
			H	*2000*	*3576*	*3024*	*4980*
7000	70000	-4	F	--	*6476*	--	*8940*
			H	*3792*	*6636*	*5728*	*9164*
		14	F	--	*5920*	--	*8184*
			H	*3464*	*6080*	*5232*	*8408*
		32	F	--	*5212*	--	*7208*
			H	*3044*	*5368*	*4600*	*7428*
		60	F	--	*4108*	--	*5696*
			H	*2392*	*4256*	*3616*	*5908*
8000	80000	-4	F	--	*7536*	--	*10424*
			H	*4404*	*7712*	*6664*	*10668*
		14	F	--	*6728*	--	*9316*
			H	*3932*	*6904*	*5944*	*9560*
		32	F	--	*5924*	--	*8212*
			H	*3456*	*6092*	*5228*	*8448*
		60	F	--	*4672*	--	*6488*
			H	*2716*	*4836*	*4112*	*6720*

* For other coil inlet conditions listed above, consult SARAVEL CASCADE® program available on 3 ½ " diskette upon request from sales office.

-- Coil construction is not possible. (Physical limitations)

33 Steam Coil Ratings

Table 10. Steam heating coil ratings (MBH)

MODEL	CFM	EDB °F	8 FPI AT 5 PSI*		14 FPI AT 5 PSI*	
			1 ROW	2 ROWS	1 ROW	2 ROWS
250	2500	-20	191	328	294	460
		10	168	288	259	404
		30	152	262	235	367
		60	129	222	199	311
350	3500	-20	277	472	425	658
		10	243	415	373	578
		30	221	377	339	525
		60	187	319	287	445
500	5000	-20	390	667	599	931
		10	343	586	527	818
		30	311	532	478	743
		60	264	451	405	630
700	7000	-20	535	918	824	1287
		10	470	806	724	1131
		30	427	732	658	1027
		60	362	621	558	871
850	8500	-20	618	1070	979	1537
		10	543	940	859	1350
		30	493	854	780	1226
		60	418	724	661	1039
1000	10000	-20	783	1338	1203	1868
		10	688	1176	1057	1641
		30	625	1068	960	1490
		60	530	905	814	1263
1300	13000	-20	1012	1732	1556	2420
		10	890	1521	1368	2126
		30	808	1381	1242	1930
		60	685	1171	1053	1637
1600	16000	-20	1219	2092	1879	2937
		10	1071	1839	1651	2581
		30	972	1669	1499	2343
		60	825	1415	1271	1987
1800	18000	-20	1386	2376	2174	3372
		10	1218	2088	1910	2962
		30	1106	1894	1734	2690
		60	938	1606	1470	2280
2000	20000	-20	1560	2667	2398	3726
		10	1371	2344	2107	3274
		30	1245	2128	1913	2973
		60	1055	1804	1622	2521
2500	25000	-20	1936	3314	2978	4636
		10	1701	2912	2617	4074
		30	1544	2644	2376	3699
		60	1310	2242	2015	3136
3000	30000	-20	--	3947	--	5532
		10	--	3468	--	4861
		30	--	3149	--	4414
		60	--	2670	--	3742

Coil Correction Factor

Table 13. Velocity correction factor

Coil Face Velocity (fpm)	350	400	450	500	550	600	700	800
Heating Coil	*0.80*	*0.88*	*0.94*	*1.00*	*1.05*	*1.11*	*1.19*	*1.28*
Cooling Coil	*0.86*	*0.92*	*0.96*	*1.00*	*1.03*	*1.06*	*1.11*	*1.15*

Table 14. Entering GPM correction factor each coil circuiting (only for pressure drop calculation)

Circuit Type	Double	Full	Half	One Third	One Forth
Correction Factor	*0.5*	*1*	*2*	*3*	*4*

Table 15. Coil bypass factor application

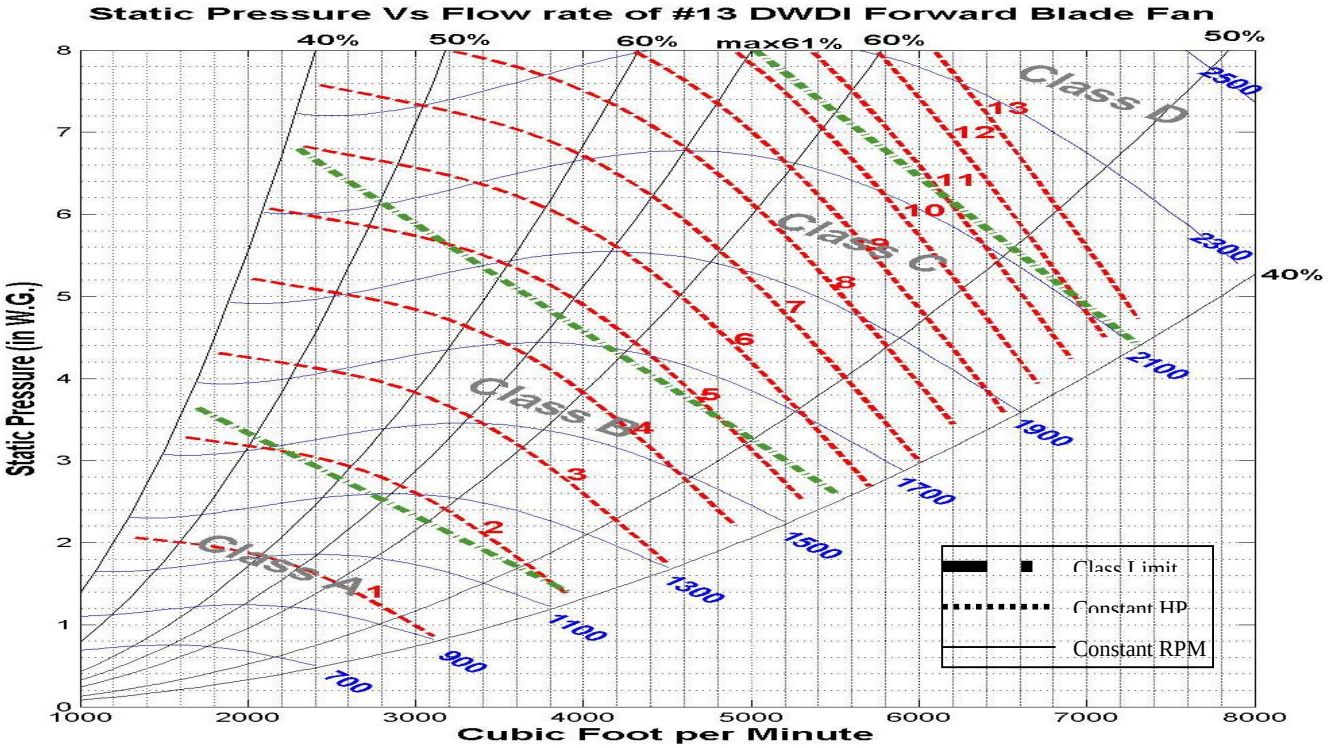
Coil Bypass Factor	Type of Application	Examples
0.3 - 0.5	Small Total Load	Residence
0.2 - 0.3	Low SHF with Large Total Load	Residence, Small retail Shop, Factory
0.1 - 0.2	Typical Comfort Application	Department Store, Bank, Factory
0.05 - 0.1	Higher Latent Loads or Large Outdoor Air Loads	Department Store, Restaurant
0.0 - 0.05	All Outdoor Air Application	Hospital, Operation Room

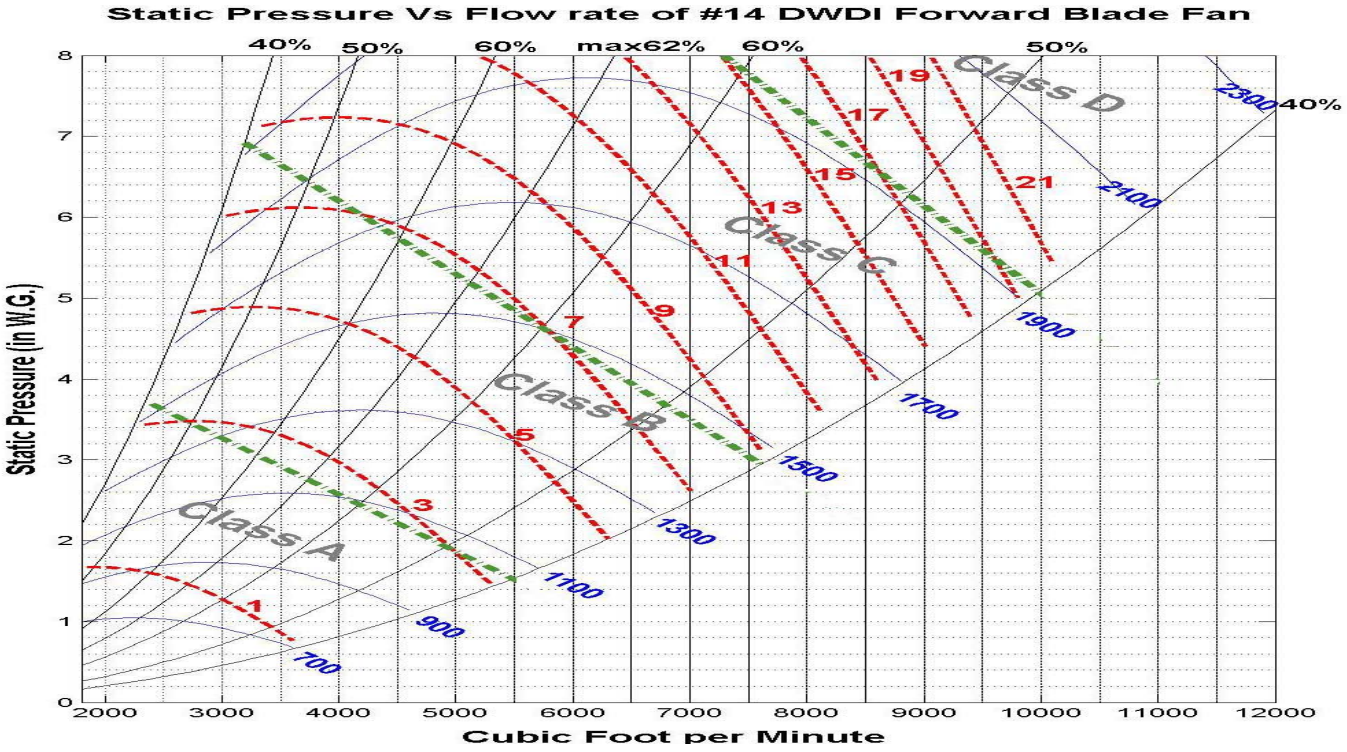
Table 16. Coil bypass factor

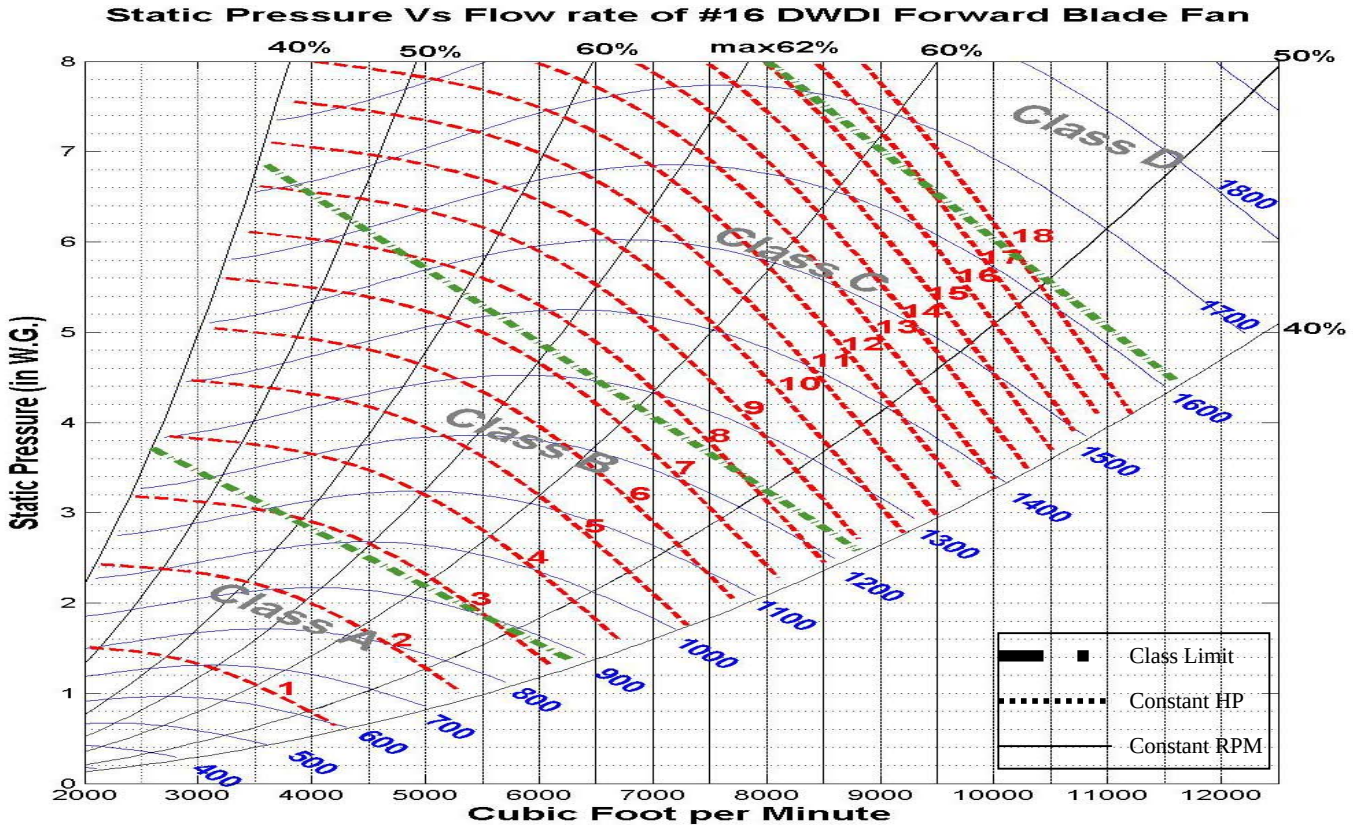
Air Velocity (fpm)	8 FPI				14 FPI			
	2 Rows	4 Rows	6 Rows	8 Rows	2 Rows	4 Rows	6 Rows	8 Rows
400	*0.34*	*0.20*	*0.10*	*0.05*	*0.20*	*0.07*	*0.02*	*0.01*
450	*0.36*	*0.21*	*0.11*	*0.05*	*0.22*	*0.08*	*0.02*	*0.01*
500	*0.39*	*0.23*	*0.12*	*0.06*	*0.26*	*0.09*	*0.03*	*0.01*
550	*0.42*	*0.26*	*0.13*	*0.07*	*0.30*	*0.10*	*0.04*	*0.01*
600	*0.45*	*0.27*	*0.14*	*0.08*	*0.46*	*0.11*	*0.04*	*0.02*

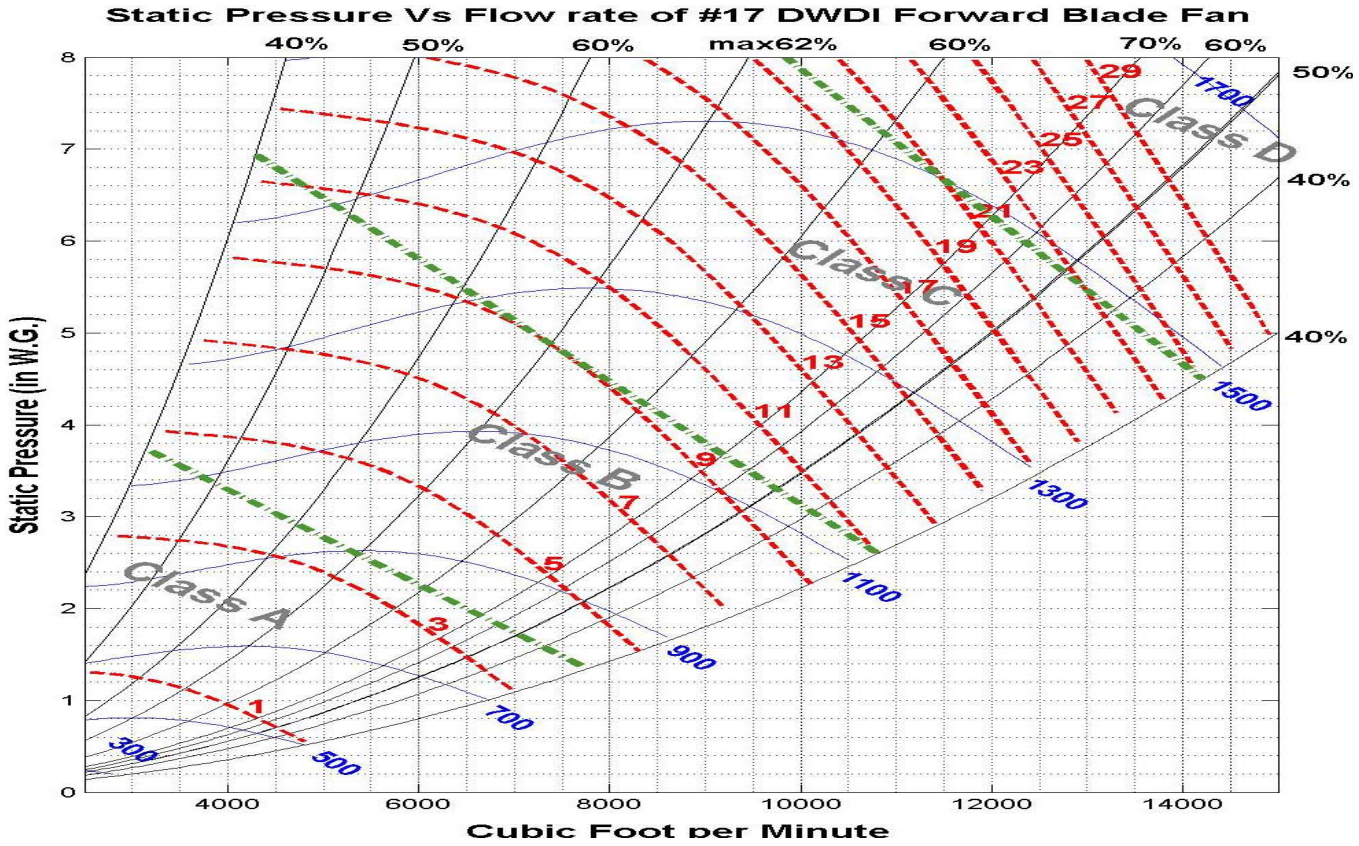
Fan Performance Curves

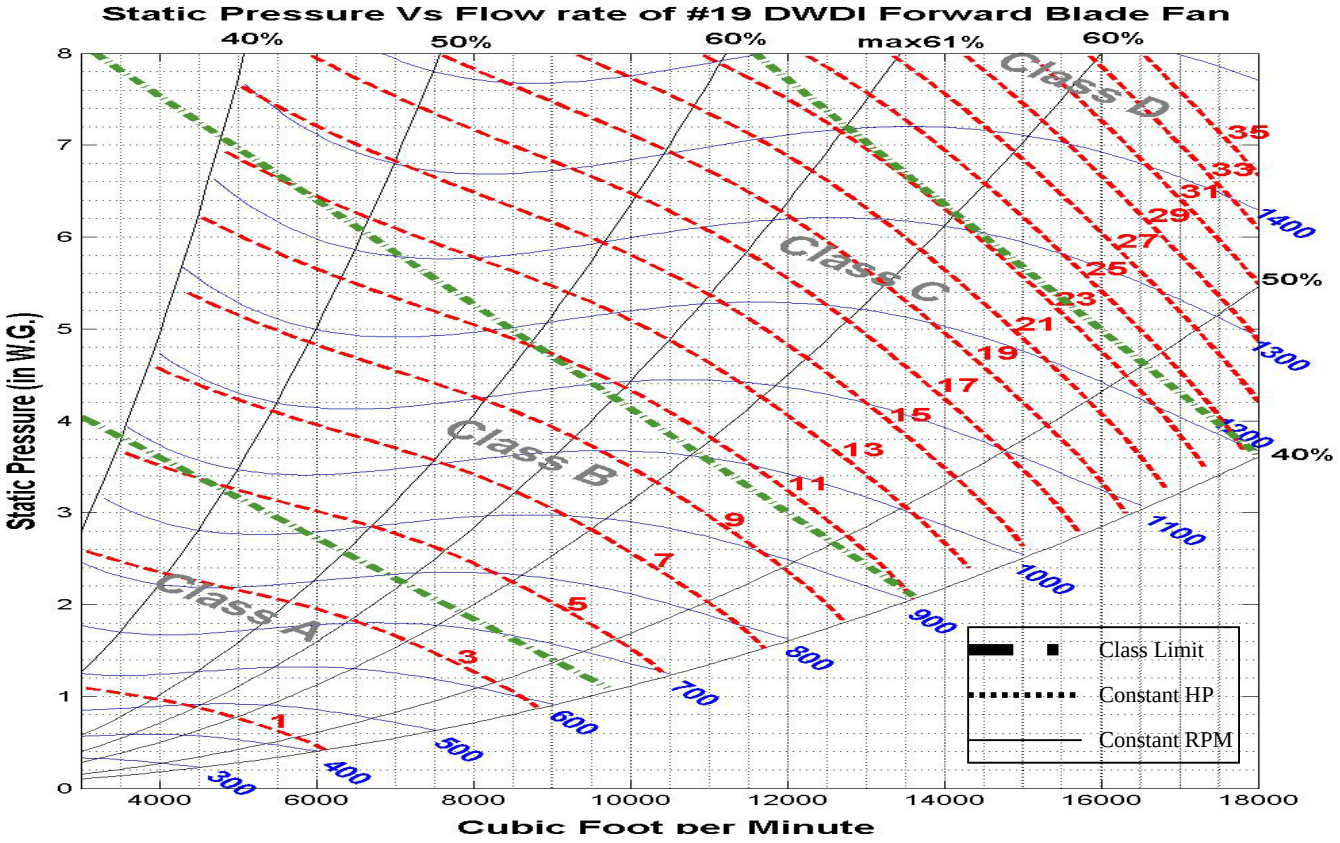
The easier and faster way to release the performance of fan according to specific air flow and static pressure is fan performance curve instead of using fan tables. This way data is shown more readily and comprehensively with the sense of fan performance at other conditions. Moreover, fan class limits which are defined at application data section are presented here.

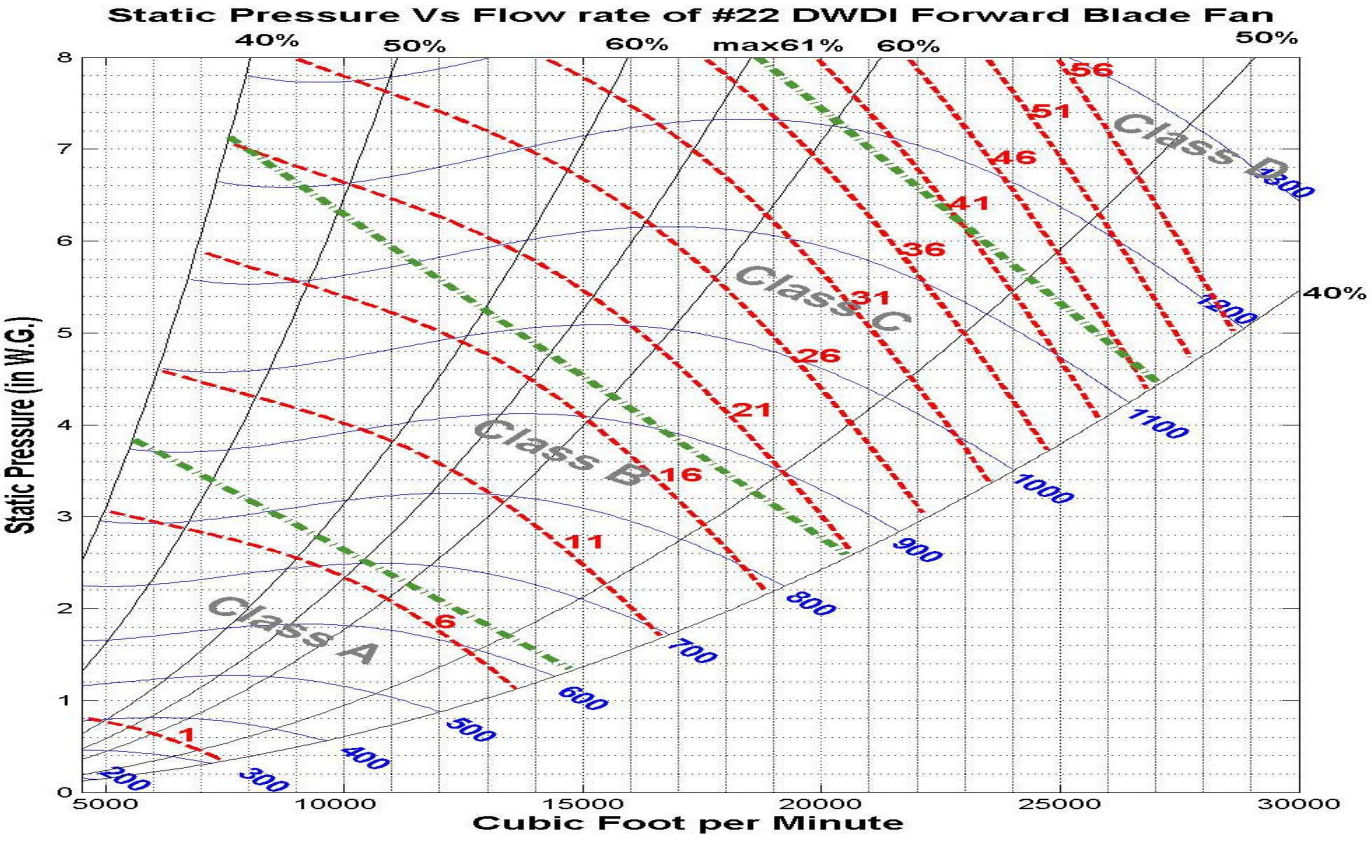


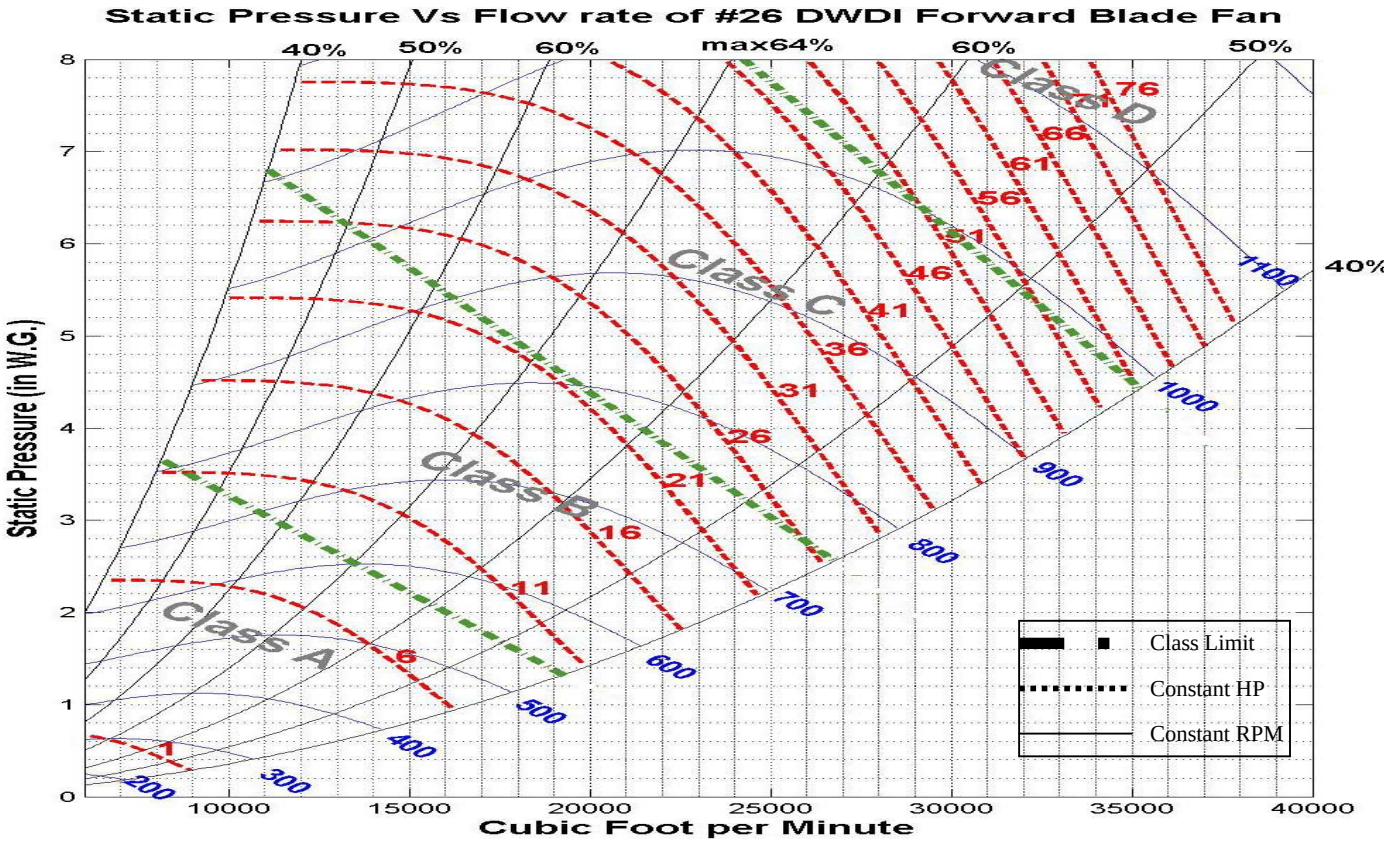


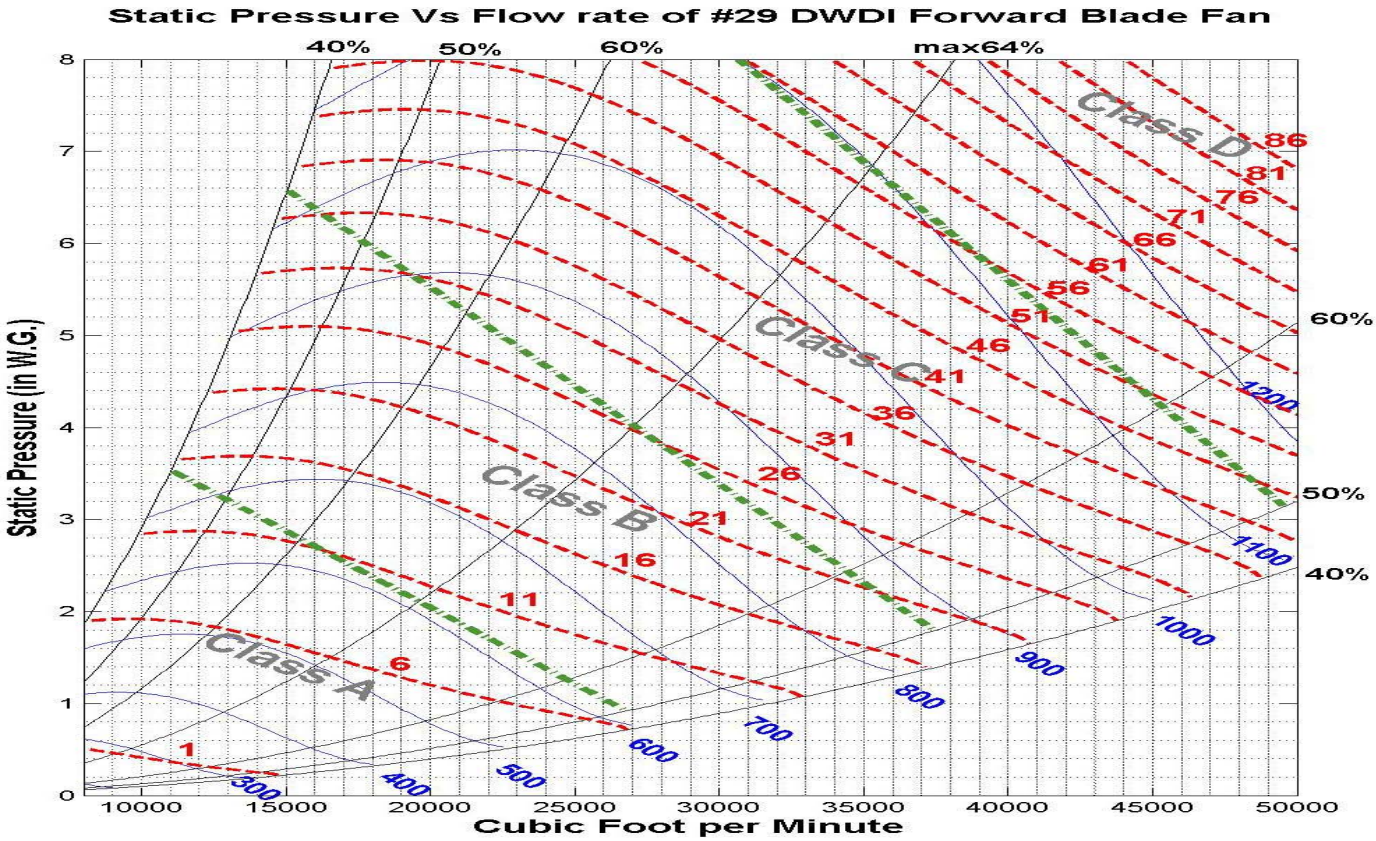

Static Pressure Vs Flow rate of #16 DWDI Forward Blade Fan
Static Pressure (in W.G.)
Cubic Foot per Minute
Class A
Class B
Class C
Class D
40%
50%
60%
max62%
Class Limit
Constant HP
Constant RPM

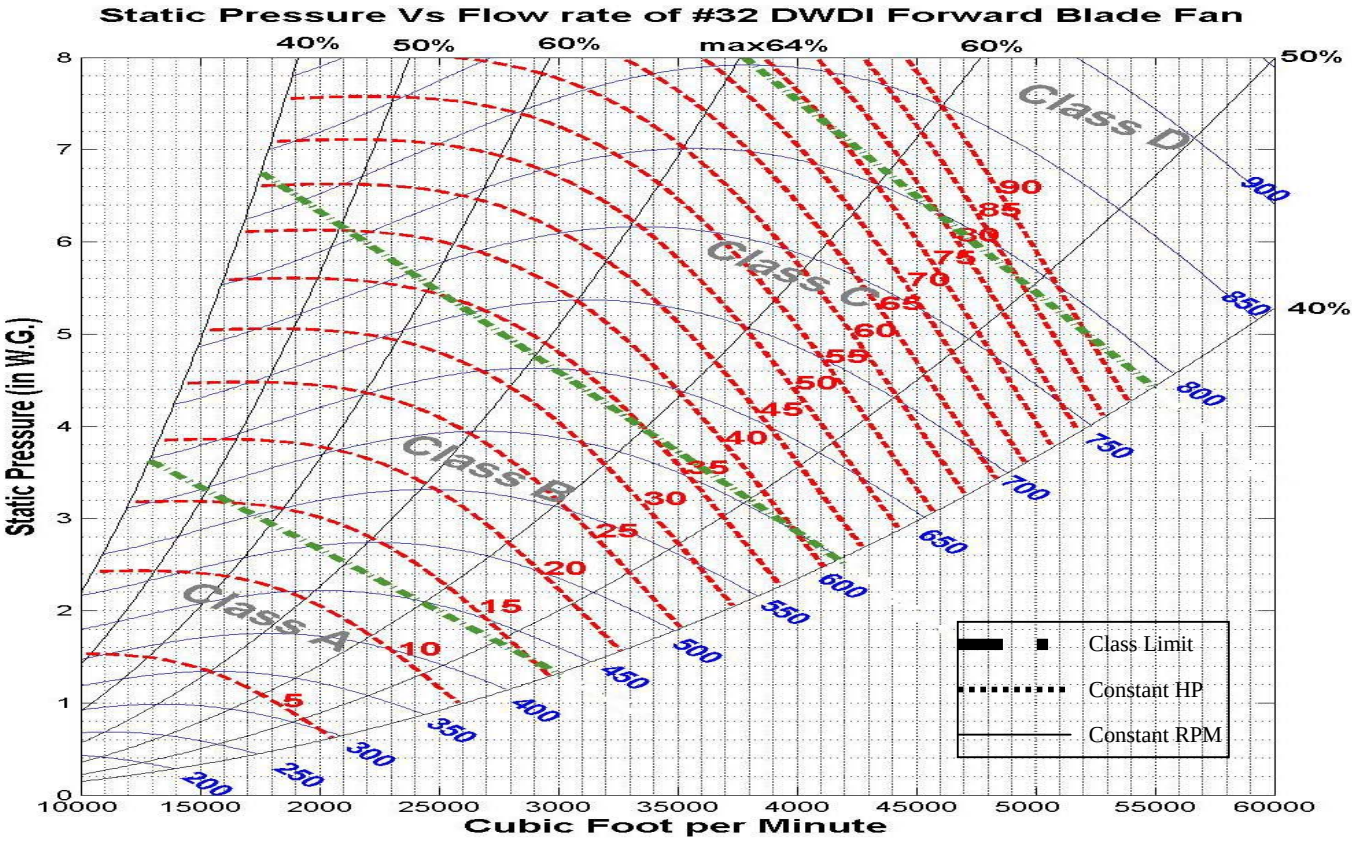

Static Pressure Vs Flow rate of #17 DWDI Forward Blade Fan
Static Pressure (in W.G.)
Cubic Foot per Minute
Class A
Class B
Class C
Class D
40%
50%
60%
70%
max62%

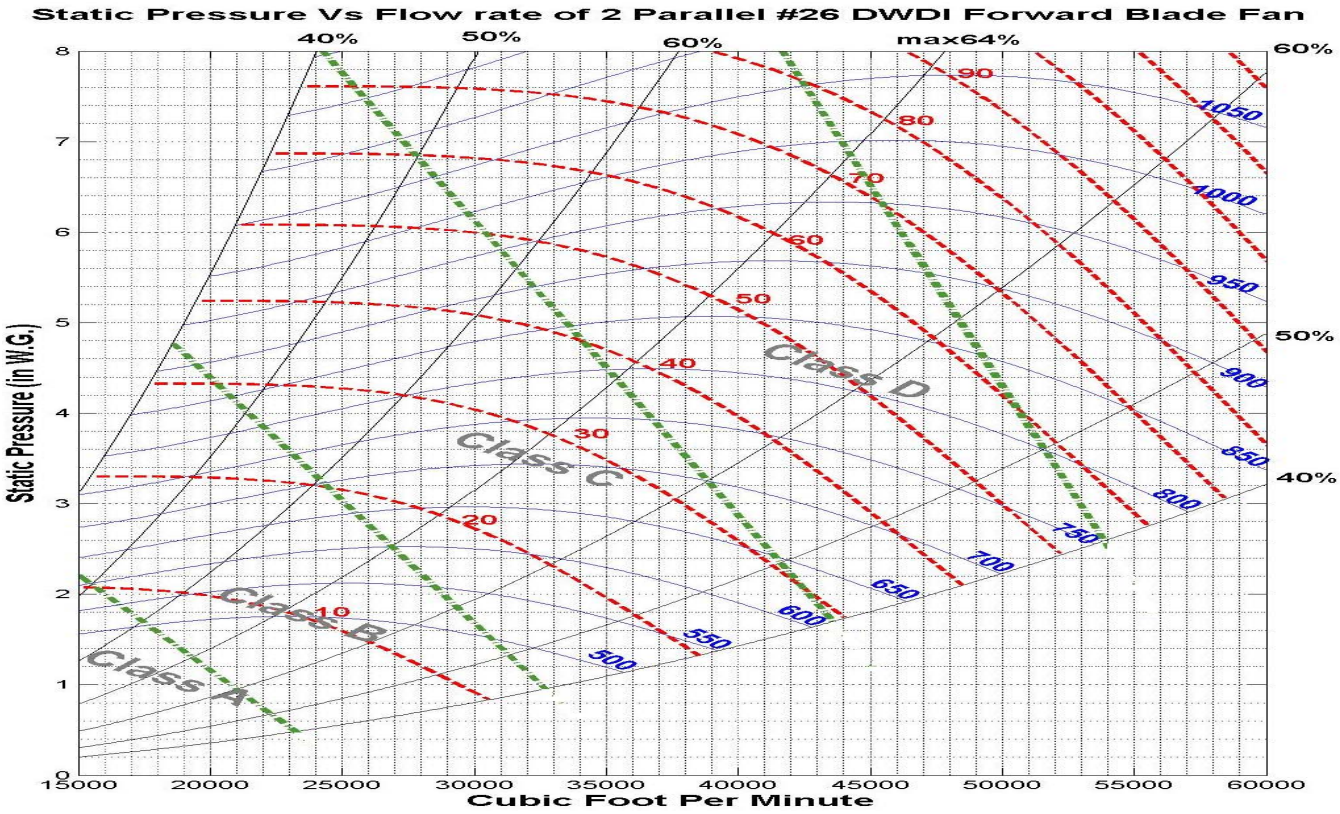

Static Pressure Vs Flow rate of #19 DWDI Forward Blade Fan
Static Pressure (in W.G.)
Cubic Foot per Minute
Class A
Class B
Class C
Class D
40%
50%
60%
max61%
Class Limit
Constant HP
Constant RPM

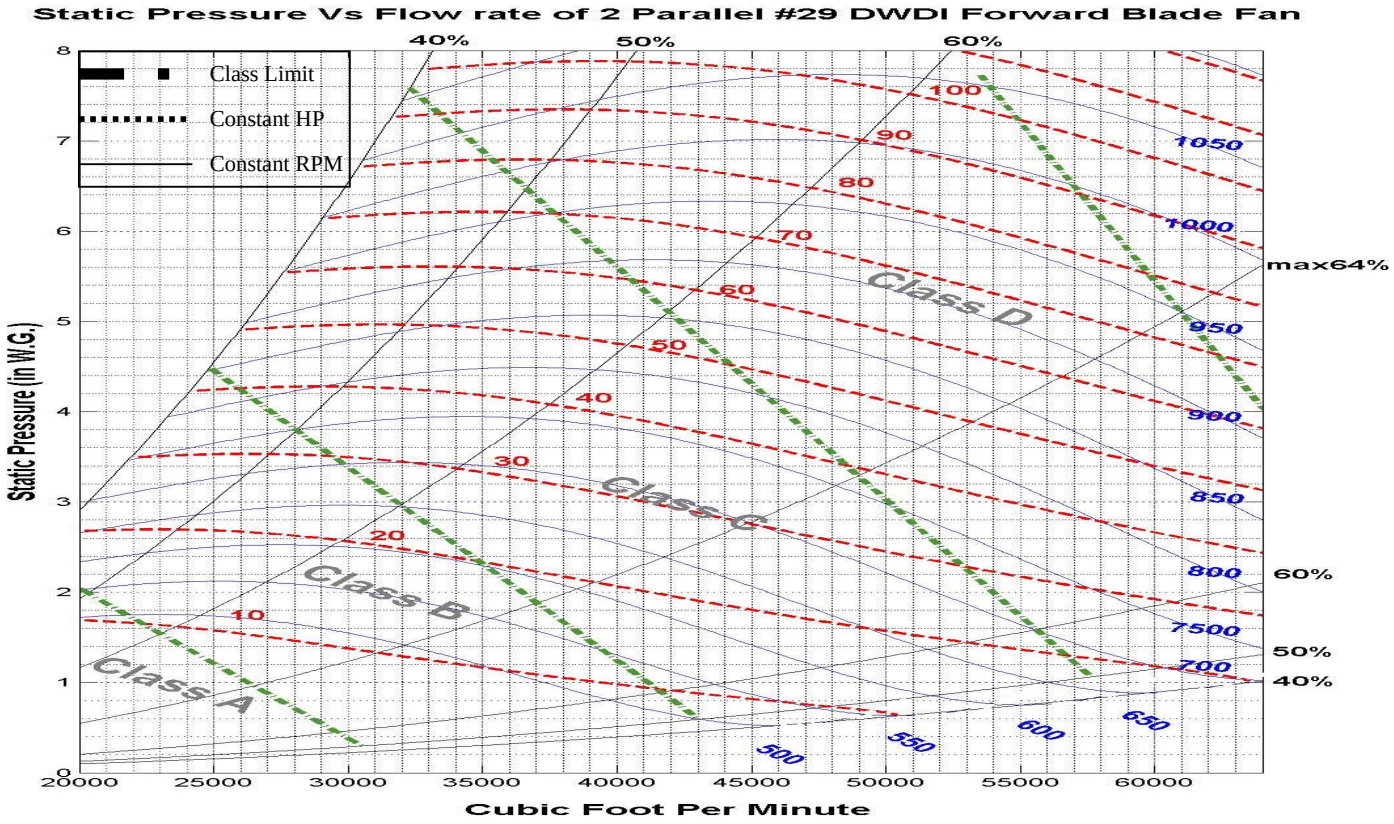

Static Pressure Vs Flow rate of #22 DWDI Forward Blade Fan
Static Pressure (in W.G.)
Cubic Foot per Minute
Class A
Class B
Class C
Class D
40%
50%
60%
max61%

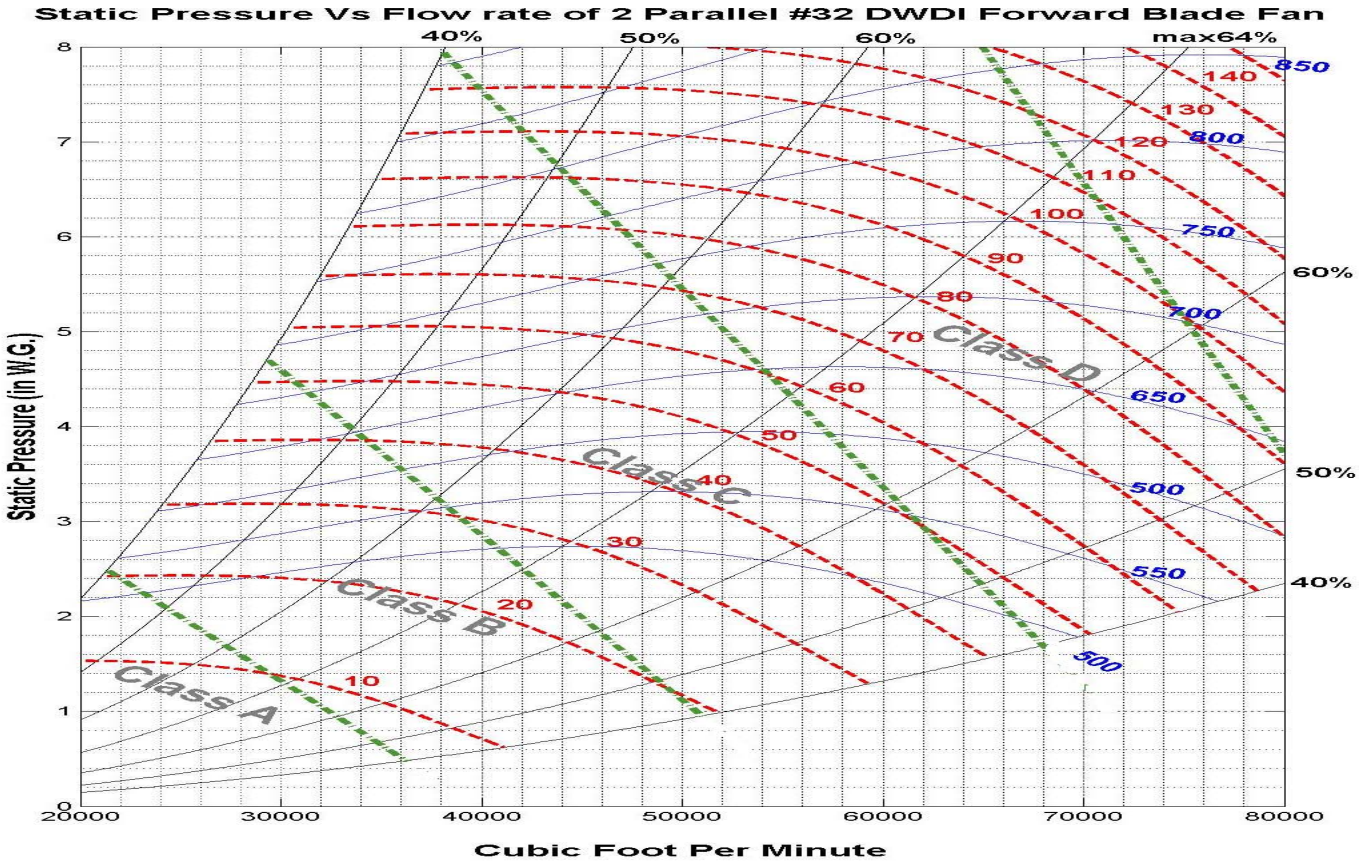

Static Pressure Vs Flow rate of #26 DWDI Forward Blade Fan
Static Pressure (in W.G.)
Cubic Foot per Minute
40%
50%
60%
max64%
60%
50%
40%
Class A
Class B
Class C
Class D
Class Limit
Constant HP
Constant RPM


Static Pressure Vs Flow rate of #29 DWDI Forward Blade Fan
Static Pressure (in W.G.)
Cubic Foot per Minute
40%
50%
60%
max64%
60%
50%
40%
Class A
Class B
Class C
Class D


Static Pressure Vs Flow rate of #32 DWDI Forward Blade Fan
Static Pressure (in W.G.)
Cubic Foot per Minute
40%
50%
60%
max64%
Class A
Class B
Class C
Class D
Class Limit
Constant HP
Constant RPM


Static Pressure Vs Flow rate of 2 Parallel #26 DWDI Forward Blade Fan
Static Pressure (in W.G.)
Cubic Foot Per Minute
40%
50%
60%
max64%
Class A
Class B
Class C
Class D


Static Pressure Vs Flow rate of 2 Parallel #29 DWDI Forward Blade Fan
Class Limit
Constant HP
Constant RPM
40%
50%
60%
max64%
Class A
Class B
Class C
Class D
Static Pressure (in W.G.)
Cubic Foot Per Minute


Static Pressure Vs Flow rate of 2 Parallel #32 DWDI Forward Blade Fan
40%
50%
60%
max64%
Class A
Class B
Class C
Class D
Static Pressure (in W.G.)
Cubic Foot Per Minute

Pressure Drop Calculation

To estimate how much static pressure is required for selecting the best fan internal pressure drops, P.D., should be added to the external P.D. This section helps to estimate P.D. For each section in AHU in the following order. By use of figure 16 and following list of modules find each P.D. at respected tables.

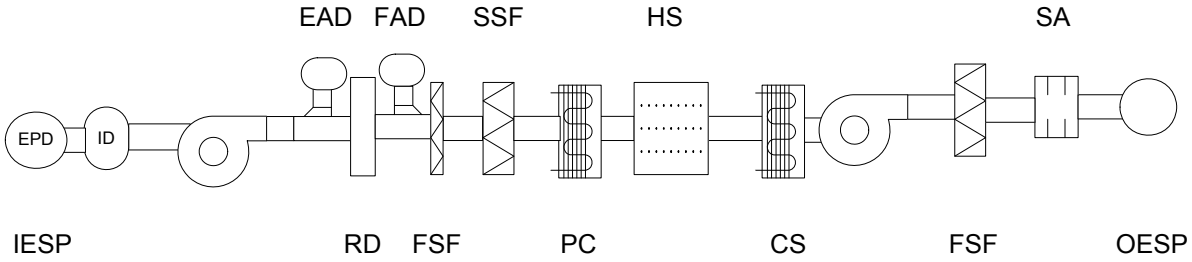


Figure 16. Pressure drop in modules

Calculation of Pressure Drops

Module name	Table	Pressure Drop (in. wg)
1) Inlet damper (ID)	T.18	_____
2) Exhaust air damper (EAD)	T.18	_____
3) Regulator Damper (RD)	T.18	_____
4) Fresh air damper (FAD)	T.18	_____
5) First stage filter (FSF)	T.18	_____
6) Second stage filter (SSF)	T.18	_____
7) Preheat coil (Cooling and Heating) (PC)	T.17	_____
8) Humidifying section (HS)	T.18	_____
9) Coil Section (Cooling and Heating) (CS)	T.17	_____
10) Final stage filtration (FSF)	T.19	_____
11) Sound attenuator (SA)	T.15	_____
Internal Pressure Drop		_____
AHU Inlet external pressure drop		_____
AHU Outlet external pressure drop		_____

Table 17. Parallel baffle sound attenuator pressure drop (in. wg.)

TYPE	MODEL	AIR HANDLING UNIT MODELS													
		250	350	500	700	850	1000	1300	1600	1800	2000	2500	3000	3500	4000
E	L	*0.09*	*0.07*	*0.07*	*0.1*	*0.07*	*0.07*	*0.06*	*0.09*	*0.08*	*0.08*	*0.06*	*0.06*	*0.06*	*0.07*
	H	*0.29*	*0.17*	*0.26*	*0.21*	*0.19*	*0.18*	*0.14*	*0.22*	*0.2*	*0.18*	*0.17*	*0.15*	*0.18*	*0.17*
I	L	*0.01*	*0.01*	*0.01*	*0.01*	*0.01*	*0.01*	*0.01*	*0.01*	*0.01*	*0.01*	*0.01*	*0.01*	*0.01*	*0.01*
	H	*0.01*	*0.02*	*0.02*	*0.02*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*	*0.03*

- Lined duct sound attenuator pressure drop is negligible
- All ratings are based on standard conditions at sea level

System Effect

A system effect factor is a pressure drop, which recognizes the effect of fan inlet restrictions, fan outlet restrictions or other conditions influencing fan performance when installed in the system. Fans within plenums and cabinets or next to walls should be located so that air may flow uniformly into the inlets. Fan performance is reduced if the space between the fan inlet and the enclosure is too restrictive. It is recommended to allow at least one-half impeller diameter between an enclosure wall and the fan inlet. Saravel AHU fans are designed in such way to have more distance between fans and AHU walls and the minimum possible pressure losses are according to table 16 provided that the recommended fans are used in each AHU. When a damper is installed right after fan outlet the approach velocity profile is not uniform and much higher pressure losses through the damper can result. Table 18 expresses the related pressure drop through this kind of damper installation.

Table 18. Fan inlet pressure drop (in. w.g.)

Model	250	350	500	700	850	1000	1300	1600	1800	2000	2500	3000	3500	4000	5000	7000	6000	8000
P.D.	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.12*	*0.1*	*0.1*	*0.1*	*0.15*	*0.12*	*0.12*	*0.1*	*0.15*	*0.15*	*0.15*	*0.15*

Table 19. Coil airside pressure drop (in. w.g.)

FPI	Rows Depth	COIL FACE VELOCITY FPM									
		300		400		500		600		700	800
		DRY	WET*	DRY	WET*	DRY	WET*	DRY	WET*	DRY	DRY
8	1	*0.03*	*0.04*	*0.04*	*0.06*	*0.07*	*0.09*	*0.09*	*0.12*	*0.12*	*0.15*
	2	*0.05*	*0.07*	*0.09*	*0.12*	*0.13*	*0.18*	*0.18*	*0.24*	*0.23*	*0.29*
	3	*0.08*	*0.11*	*0.13*	*0.18*	*0.2*	*0.27*	*0.27*	*0.36*	*0.35*	*0.44*
	4	*0.11*	*0.15*	*0.18*	*0.24*	*0.26*	*0.35*	*0.36*	*0.48*	*0.47*	*0.59*
	5	*0.14*	*0.18*	*0.22*	*0.3*	*0.33*	*0.44*	*0.45*	*0.6*	*0.58*	*0.73*
	6	*0.16*	*0.22*	*0.27*	*0.36*	*0.39*	*0.53*	*0.54*	*0.72*	*0.7*	*0.88*
	7	*0.19*	*0.26*	*0.31*	*0.42*	*0.46*	*0.62*	*0.63*	*0.85*	*0.82*	*1.02*
	8	*0.22*	*0.29*	*0.36*	*0.48*	*0.52*	*0.71*	*0.72*	*0.97*	*0.93*	*1.17*
14	1	*0.03*	*0.04*	*0.05*	*0.06*	*0.07*	*0.09*	*0.1*	*0.13*	*0.12*	*0.16*
	2	*0.06*	*0.08*	*0.1*	*0.13*	*0.14*	*0.19*	*0.19*	*0.26*	*0.25*	*0.31*
	3	*0.09*	*0.12*	*0.14*	*0.19*	*0.21*	*0.28*	*0.29*	*0.39*	*0.37*	*0.47*
	4	*0.12*	*0.16*	*0.19*	*0.26*	*0.28*	*0.38*	*0.38*	*0.52*	*0.5*	*0.63*
	5	*0.15*	*0.2*	*0.24*	*0.32*	*0.35*	*0.47*	*0.48*	*0.64*	*0.62*	*0.78*
	6	*0.17*	*0.24*	*0.29*	*0.39*	*0.42*	*0.57*	*0.57*	*0.77*	*0.75*	*0.94*
	7	*0.2*	*0.28*	*0.33*	*0.45*	*0.49*	*0.66*	*0.67*	*0.9*	*0.87*	*1.09*
	8	*0.23*	*0.31*	*0.38*	*0.51*	*0.56*	*0.75*	*0.76*	*1.03*	*0.99*	*1.25*

Table 18. Accessories air side pressure drop (in. wg.) (At 500 FPM face velocity)

Model	Damper		Fan Outlet Damper (opposed)	Electrical Heater	Diffuser	Air Washer Class 4	Air Washer Class 6,8	Mixing Box Without Filter	Air Blender	Face and Bypass Damper	Dirty Aluminum Filter
	Parallel	Opposed									
250	*0.03*	*0.04*	*0.096*	*0.012*	*0.02*	*0.23*	*0.35*	*0.06*	*0.06*	*0.2*	*0.3*
350	*0.03*	*0.04*	*0.096*	*0.012*	*0.03*	*0.23*	*0.35*	*0.06*	*0.1*	*0.2*	*0.3*
500	*0.02*	*0.05*	*0.12*	*0.012*	*0.03*	*0.23*	*0.35*	*0.06*	*0.1*	*0.2*	*0.3*
700	*0.02*	*0.05*	*0.12*	*0.016*	*0.03*	*0.23*	*0.4*	*0.06*	*0.1*	*0.2*	*0.3*
850	*0.02*	*0.05*	*0.12*	*0.016*	*0.03*	*0.23*	*0.4*	*0.06*	*0.1*	*0.2*	*0.3*
1000	*0.02*	*0.05*	*0.12*	*0.016*	*0.04*	*0.23*	*0.4*	*0.06*	*0.12*	*0.2*	*0.3*
1300	*0.02*	*0.05*	*0.12*	*0.016*	*0.04*	*0.23*	*0.4*	*0.06*	*0.12*	*0.23*	*0.3*
1600	*0.02*	*0.05*	*0.12*	*0.016*	*0.04*	*0.23*	*0.4*	*0.06*	*0.15*	*0.23*	*0.3*
1800	*0.02*	*0.05*	*0.12*	*0.016*	*0.04*	*0.23*	*0.4*	*0.06*	*0.15*	*0.23*	*0.3*
2000	*0.02*	*0.05*	*0.12*	*0.016*	*0.04*	*0.26*	*0.4*	*0.06*	*0.15*	*0.23*	*0.3*
2500	*0.02*	*0.05*	*0.12*	*0.016*	*0.04*	*0.26*	*0.4*	*0.06*	*0.15*	*0.23*	*0.3*
3000	*0.02*	*0.05*	*0.12*	*0.016*	*0.04*	*0.26*	*0.4*	*0.06*	*0.2*	*0.24*	*0.3*
3500	*0.02*	*0.05*	*0.12*	*0.016*	*0.04*	*0.26*	*0.5*	*0.06*	*0.2*	*0.25*	*0.3*
4000	*0.02*	*0.05*	*0.12*	*0.016*	*0.04*	*0.26*	*0.5*	*0.06*	*0.2*	*0.26*	*0.3*
5000	*0.02*	*0.05*	0.12	*0.016*	*0.04*	*0.26*	*0.5*	*0.06*	*0.2*	*0.26*	*0.3*
6000	*0.02*	*0.05*	0.12	*0.016*	*0.04*	*0.26*	*0.5*	*0.06*	*0.2*	*0.26*	*0.3*
7000	*0.02*	*0.05*	0.12	*0.016*	*0.04*	*0.26*	*0.5*	*0.06*	*0.2*	*0.26*	*0.3*

8000	*0.02*	*0.05*	0.12	*0.016*	*0.04*	*0.26*	*0.5*	*0.06*	*0.2*	*0.26*	*0.3*

Table 19 . Higher stage filtration pressure drop

	Initial Pressure Drop		Final Pressure Drop	
Model	(pa)	in.w g	(pa)	in.w g
Bag Filter	*50.00*	*0.20*	*275.00*	*1.10*
Pleated	*55.00*	*0.22*	*225.00*	*0.90*
Hepa & Ulpa	*220.00*	*0.88*	*380.00*	*1.52*
Carbon active	*65.00*	*0.26*	*250.00*	*1.00*

Table 20. Coil (full circuit) waterside pressure drop (feet of water)

Model	Rows Depth	Water Flow Rate (GPM)																	
		20	30	40	50	60	70	80	100	130	150	200	250	300	350	400	450	500	600
250	1	*0.7*	*1.4*	*2.4*	*3.5*	*4.9*	*6.5*	*8.3*											
	2	*0.9*	*1.9*	*3.1*	*4.7*	*6.5*	*8.6*	*11*											
	4	*1.3*	*2.7*	*4.6*	*6.9*	*9.6*	*13*	*16*											
	6	*1.7*	*3.6*	*6.1*	*9.1*	*13*	*17*	*21*											
	8	*2.2*	*4.5*	*7.6*	*11*	*16*	*21*	*27*											
350	1	*0.3*	*0.7*	*1.1*	*1.7*	*2.4*	*3.1*	*4*	*6*	*9.6*									
	2	*0.4*	*0.9*	*1.5*	*2.2*	*3.1*	*4.1*	*5.2*	*7.8*	*13*									
	4	*0.6*	*1.3*	*2.2*	*3.3*	*4.6*	*6.1*	*7.8*	*12*	*19*									
	6	*0.8*	*1.7*	*2.9*	*4.4*	*6.1*	*8.1*	*10*	*15*	*25*									
	8	*1*	*2.2*	*3.7*	*5.5*	*7.6*	*10*	*13*	*19*	*31*									
500	1	*0.3*	*0.6*	*1*	*1.5*	*2*	*2.7*	*3.4*	*5.1*	*8.3*									
	2	*0.4*	*0.8*	*1.3*	*2*	*2.7*	*3.6*	*4.6*	*6.9*	*11*									
	4	*0.6*	*1.2*	*2*	*3*	*4.1*	*5.5*	*7*	*10*	*17*									
	6	*0.8*	*1.6*	*2.7*	*4*	*5.5*	*7.3*	*9.3*	*14*	*22*									
	8	*1*	*2*	*3.3*	*5*	*6.9*	*9.2*	*12*	*18*	*28*									
700	1	*0.2*	*0.4*	*0.7*	*1.1*	*1.5*	*2*	*2.5*	*3.8*	*6.1*	*7.9*								
	2	*0.3*	*0.6*	*1*	*1.5*	*2*	*2.7*	*3.4*	*5.1*	*8.3*	*11*								
	4	*0.4*	*0.9*	*1.5*	*2.2*	*3.1*	*4.1*	*5.3*	*7.9*	*13*	*16*								
	6	*0.6*	*1.2*	*2*	*3*	*4.2*	*5.6*	*7.1*	*11*	*17*	*22*								
	8	*0.7*	*1.5*	*2.5*	*3.8*	*5.3*	*7*	*8.9*	*13*	*21*	*28*								
850	1	0.2	0.4	0.6	1	1.3	1.8	2.3	3.4	5.5	7.1								
	2	0.2	0.5	0.9	1.3	1.8	2.5	3.1	4.7	7.6	10								
	4	0.4	0.8	1.4	2.1	2.9	3.8	4.9	7.3	12	15								
	6	0.5	1.1	1.9	2.8	3.9	5.2	6.6	10.1	16	20								
	8	0.6	1.4	2.3	3.6	5	6.6	8.3	12.5	20	26								
1000	1	*0.2*	*0.3*	*0.6*	*0.9*	*1.2*	*1.6*	*2*	*3*	*4.9*	*6.3*								
	2	*0.2*	*0.5*	*0.8*	*1.2*	*1.7*	*2.2*	*2.8*	*4.3*	*6.8*	*8.9*								
	4	*0.4*	*0.8*	*1.3*	*1.9*	*2.7*	*3.5*	*4.5*	*6.7*	*11*	*14*								
	6	*0.5*	*1*	*1.7*	*2.6*	*3.6*	*4.8*	*6.1*	*9.1*	*15*	*19*								
	8	*0.6*	*1.3*	*2.2*	*3.3*	*4.6*	*6.1*	*7.7*	*12*	*19*	*24*								
1300	1		*0.2*	*0.4*	*0.6*	*0.8*	*1*	*1.3*	*1.9*	*3.1*	*4*	*6.8*	*10*						
	2		*0.3*	*0.5*	*0.8*	*1.1*	*1.4*	*1.8*	*2.7*	*4.3*	*5.6*	*9.5*	*14*						
	4		*0.5*	*0.8*	*1.2*	*1.7*	*2.2*	*2.8*	*4.2*	*6.8*	*8.8*	*15*	*22*						
	6		*0.7*	*1.1*	*1.7*	*2.3*	*3*	*3.9*	*5.8*	*9.3*	*12*	*20*	*30*						
	8		*0.8*	*1.4*	*2.1*	*2.9*	*3.8*	*4.9*	*7.3*	*12*	*15*	*26*	*38*						
1600	1		*0.2*	*0.4*	*0.6*	*0.8*	*1.1*	*1.4*	*2*	*3.3*	*4.2*	*7.1*	*11*						
	2		*0.3*	*0.6*	*0.8*	*1.1*	*1.5*	*1.9*	*2.9*	*4.6*	*6*	*10*	*15*						
	4		*0.5*	*0.9*	*1.3*	*1.8*	*2.4*	*3.1*	*4.6*	*7.4*	*9.6*	*16*	*24*						
	6		*0.7*	*1.2*	*1.8*	*2.5*	*3.3*	*4.2*	*6.3*	*10*	*13*	*22*	*33*						
	8		*0.9*	*1.5*	*2.3*	*3.2*	*4.2*	*5.4*	*8.1*	*13*	*17*	*28*	*42*						

Table 20. Coil (full circuit) waterside pressure drop (feet of water) (Continued)

Model	Rows Depth	Water Flow Rate (GPM)																	
		20	30	40	50	60	70	80	100	130	150	200	250	300	350	400	450	500	600
1800	1	0.2	0.4	0.6	0.8	1	1.3	1.9	3.1	4	6.7	10.2	0.2						
	2	0.3	0.6	0.8	1.1	1.5	1.8	2.8	4.4	5.7	9.5	14.5	0.3						
	4	0.5	0.9	1.3	1.8	2.3	3	4.4	7.1	9.2	15.5	23	0.5						
	6	0.7	1.2	1.8	2.4	3.2	4.1	6.1	9.7	12.5	21	31.5	0.7						
	8	0.9	1.5	2.2	3.1	4.1	5.2	7.8	12.5	1	27	40.5	0.9						
2000	1	0.2	0.3	0.5	0.7	0.9	1.2	1.8	2.8	3.7	6.2	9.3	0.2						
	2	0.3	0.5	0.7	1	1.4	1.7	2.6	4.1	5.4	9	14	0.3						
	4	0.5	0.8	1.2	1.7	2.2	2.8	4.2	6.7	8.7	15	22	0.5						
	6	0.7	1.1	1.7	2.3	3	3.9	5.8	9.3	12	20	30	0.7						
	8	0.8	1.4	2.1	2.9	3.9	4.9	7.4	12	15	26	39	0.8						

- All ratings are based on standard water velocity range (1 to 8 FPS)

Table 21. Coil (full circuit) waterside pressure drop (feet of water) (Continued)

Model	Rows Depth	Water Flow Rate (GPM)															
		60	70	80	100	130	150	200	250	300	350	400	450	500	600	700	800
2500	1				0.4	0.6	0.8	1.3	1.9	2.6	3.5	4.4	5.5	6.6	9.2		
	2				0.5	0.8	1	1.7	2.6	3.6	4.7	6.0	7.5	9.0	12.5		
	4				0.8	1.2	1.6	2.6	3.9	5.5	7.2	9.2	11.4	13.8	19.2		
	6				1	1.6	2.1	3.5	5.3	7.4	9.7	12.4	15.3	18.5	25.8		
	8				1.3	2	2.6	4.4	6.7	9.3	12.2	15.6	19.3	23.3	32.4		
3000	1					0.6	0.8	1.3	2	2.7	3.6	4.6	5.7	6.9	9.6		
	2					0.8	1.1	1.8	2.7	3.8	5	6.4	7.9	9.5	13		
	4					1.3	1.7	2.8	4.2	5.9	7.8	9.9	12	15	21		
	6					1.8	2.3	3.8	5.8	8	11	13	17	20	28		
	8					2.2	2.9	4.9	7.3	10	13	17	21	25	35		
3500	1						0.7	1.2	1.7	2.4	3.2	4.0	5.0	6.0	8.4		
	2						1	1.6	2.4	3.3	4.4	5.6	7.0	8.4	11.7		
	4						1.5	2.5	3.8	5.3	6.9	8.8	10.9	13.2	18.4		
	6						2	3.4	5.1	7.2	9.5	12.0	14.9	18.0	25.0		
	8						2.6	4.4	6.5	9.1	12.0	15.2	18.8	22.8	31.7		
4000	1						0.7	1.2	1.8	2.5	3.3	4.1	5.1	6.2	8.6		
	2						1	1.7	2.5	3.5	4.6	5.9	7.3	8.8	12		
	4						1.6	2.7	4	5.5	7.3	9.3	12	14	19		
	6						2.2	3.6	5.5	7.6	10	13	16	19	27		
	8						2.8	4.6	6.9	9.6	13	16	20	24	34		
5000	1							0.4	0.7	0.9	1.2	1.6	1.9	2.3	3.3	47.8	62.3
	2							0.8	1.2	1.7	2.2	2.8	3.4	4.2	5.8	50.7	66.0
	4							1.5	2.3	3.1	4.1	5.2	6.5	7.8	10.8	19.2	24.6
	6							2.2	3.3	4.6	6.1	7.7	9.5	11.4	15.8	21.0	26.8
	8							3.0	4.4	6.1	8.0	10.1	12.5	15.1	20.8	26.8	34.1
6000	1							0.4	0.6	0.8	1.1	1.4	1.7	2.1	2.9	47.4	61.8
	2							0.7	1.1	1.5	2.0	2.5	3.1	3.8	5.2	50.0	65.1
	4							1.4	2.1	2.8	3.7	4.8	5.9	7.1	9.8	18.0	23.1
	6							2.0	3.0	4.2	5.5	7.0	8.6	10.4	14.4	19.4	24.6
	8							2.7	4.0	5.5	7.3	9.2	11.4	13.7	18.9	24.6	31.3
7000	1							0.35	0.5	0.7	0.95	1.2	1.5	1.85	2.55	47	61
	2							0.65	0.95	1.3	1.75	2.2	2.75	3.3	4.55	49	64
	4							1.25	1.85	2.5	3.3	4.2	5.2	6.25	8.65	17	21
	6							1.8	2.65	3.7	4.85	6.15	7.6	9.15	12.7	17	22
	8							2.4	3.55	4.85	6.45	8.15	10.05	12.1	16.7	22	28

Table 22. Coil (full circuit) waterside pressure drop (feet of water) (Continued)

Model	Rows Depth	Water Flow Rate (GPM)															
		60	70	80	100	130	150	200	250	300	350	400	450	500	600	700	800
8000	1							0.3	0.4	0.6	0.8	1.0	1.3	1.6	2.2	46.5	60.7
	2							0.6	0.8	1.1	1.5	1.9	2.4	2.8	3.9	48.6	63.3
	4							1.1	1.6	2.2	2.9	3.6	4.5	5.4	7.5	15.3	19.7
	6							1.6	2.3	3.2	4.2	5.3	6.6	7.9	11.0	15.4	19.6
	8							2.1	3.1	4.2	5.6	7.1	8.7	10.5	14.5	19.5	24.8

Table 23. Coil (half circuit) waterside pressure drop (feet of water)

Model	Rows Depth	Water Flow Rate (GPM)															
		10	20	30	40	50	60	70	80	100	130	150	200	250	300	350	400
250	1	0.9	3.1	6.5	10.9	16.3											
	2	1.3	4.6	9.6	16.1	24.1											
	4	2.2	7.6	15.8	26.6	39.8											
	6	3	10.6	22	37	55.5											
350	1	0.4	1.5	3.1	5.2	7.8	10.9										
	2	0.6	2.2	4.6	7.8	11.6	16.1										
	4	1	3.7	7.6	12.8	19.1	26.6										
	6	1.5	5.1	10.6	17.8	26.7	37										
500	1	0.4	1.3	2.7	4.6	6.9	9.6	12.7									
	2	0.6	2	4.1	7	10.4	14.5	19.2									
	4	1	3.3	6.9	11.7	17.5	24.3	32.1									
	6	1.3	4.7	9.8	16.4	24.5	34.1	45.1									

Table 22. Coil (half circuit) waterside pressure drop (feet of water) (Continued)

Model	Rows Depth	Water Flow Rate (GPM)																
		40	50	60	70	80	100	130	150	200	250	300	350	400	450	500	600	700	800
700	1	3.4	5.1	7.2	9.5	12													
	2	5.3	7.9	11	14	18													
	4	8.9	13	19	24	31													
	6	13	19	26	34	44													
850	1	3.1	4.7	6.55	8.65	11													
	2	4.9	7.3	10.1	13	17													
	4	8.3	12.5	17.5	22.5	29													
	6	12	17.5	24.5	32	41													
1000	1	2.8	4.3	5.9	7.8	10	15												
	2	4.5	6.7	9.3	12	16	23												
	4	7.7	12	16	21	27	40												
	6	11	16	23	30	38	57												
1300	1	1.8	2.7	3.8	5	6.3	9.5	15											
	2	2.8	4.2	5.9	7.8	9.9	15	24											
	4	4.9	7.3	10	13	17	26	44											
	6	6.9	10	15	19	24	36	59											
1600	1	1.9	2.9	4	5.3	6.8	10	16											
	2	3.1	4.6	6.4	8.5	11	16	26											
	4	5.4	8.1	11	15	19	28	45											
	6	7.7	12	16	21	27	40	65											
1800	1		2.75	3.8	5	6.4	9.5	15.5											
	2		4.4	6.1	8.1	10.4	15.5	25											
	4		7.75	10.5	14.5	18	27	43.5											
	6		11.5	15.5	20.5	26	38.5	62.5											

Table 22. Coil (half circuit) waterside pressure drop (feet of water) (Continued)

Model	Rows Depth	Water Flow Rate (GPM)																	
		40	50	60	70	80	100	130	150	200	250	300	350	400	450	500	600	700	800
2000	1		2.6	3.6	4.7	6	9	15											
	2		4.2	5.8	7.7	9.8	15	24											
	4		7.4	10	14	17	26	42											
	6		11	15	20	25	37	60											
2500	1			0.7	0.9	1.2	1.7	2.8	3.6	6	9	13							
	2			1	1.4	1.8	2.6	4.2	5.5	9.2	14	19							
	4			1.8	2.3	3	4.4	7.1	9.3	16	23	32							
	6			2.5	3.3	4.2	6.3	10	13	22	33	46							
3000	1				1	1.2	1.8	2.9	3.8	6.4	9.5	13							
	2				1.5	1.9	2.8	4.6	5.9	9.9	15	21							
	4				2.5	3.2	4.9	7.8	10	17	25	35							
	6				3.6	4.6	6.9	11	14	24	36	50							
3500	1					1.1	1.6	2.6	3.3	5.6	8.4	12	16	20					
	2					1.7	2.5	4.1	5.3	8.8	13	18	24	31					
	4					2.9	4.4	7	9.1	15	23	32	42	53					
	6					4.1	6.2	9.9	13	22	32	45	60	76					
4000	1						1.7	2.7	3.5	5.9	8.8	12	16	21					
	2						2.7	4.3	5.5	9.3	14	19	26	33					
	4						4.6	7.4	9.6	16	24	34	45	57					
	6						6.6	11	14	23	35	48	64	81					
5000	1						0.8	1.3	1.6	2.8	4.1	5.7	7.6	9.6	11.9	14.4	20	26	34
	2						1.5	2.4	3.1	5.2	7.7	10.7	14.1	17.9	22.1	26.6	37	49	62
	4						2.9	4.7	6.0	10.0	14.9	20.6	27.1	34.4	42.4	51.2	71	93	118
	6						4.4	6.9	8.9	14.9	22.1	30.6	40.2	50.9	62.8	75.7	105	138	175
7000	1						0.75	1.2	1.5	2.6	3.9	5.4	7.2	9.1	11.3	13.6	19	25	32
	2						1.45	2.3	2.9	4.9	7.3	10.2	13.4	17	21	25.3	35	46.5	59
	4						2.8	4.5	5.7	9.5	14.2	19.7	25.9	32	40.5	48.8	67	89	112
	6						4.2	6.6	8.5	14.2	21.1	29.2	38.4	48.6	60	72.3	100	131	167
6000	1						0.7	1.2	1.5	2.5	3.7	5.2	6.8	8.6	10.7	12.9	18	24	30
	2						1.4	2.2	2.8	4.7	7.0	9.7	12.8	16.2	20.0	24.1	33	44	56
	4						2.7	4.3	5.5	9.1	13.6	18.8	24.7	31.3	38.6	46.5	64	85	107
	6						4.0	6.3	8.2	13.6	20.2	27.8	36.6	46.4	57.2	68.9	95	125	159
8000	1						0.5	0.9	1.1	1.9	2.8	3.9	5.1	6.5	8.1	9.7	13	18	23
	2						1.0	1.7	2.2	3.6	5.3	7.4	9.7	12.3	15.2	18.3	25	33	42
	4						2.1	3.3	4.2	7.0	10.4	14.3	18.9	23.9	29.4	35.5	49	65	82
	6						3.1	4.9	6.3	10.4	15.4	21.3	28.0	35.5	43.7	52.7	73	96	

- All ratings are based on standard water velocity range (1 to 8 FPS)

Table 23. Coil (double circuit) waterside pressure drop (feet of water)

Model	Rows Depth	Water Flow Rate (GPM)															
		30	40	50	60	70	80	100	130	150	200	250	300	350	400	450	500
250	1	0.3	0.6	0.9													
	2	0.4	0.7	1													
	4	0.5	0.9	1.3													
	6	0.7	1.1	1.7													
	8	0.8	1.3	2													
350	1	0.2	0.3	0.4	0.6												
	2	0.2	0.3	0.5	0.7												
	4	0.3	0.4	0.6	0.9												
	6	0.3	0.5	0.8	1.1												
	8	0.4	0.6	0.9	1.3												
500	1	0.1	0.2	0.3	0.5	0.6	0.8	1.2									
	2	0.2	0.3	0.4	0.6	0.8	1	1.5									
	4	0.2	0.4	0.6	0.8	1	1.3	2									
	6	0.3	0.5	0.7	1	1.3	1.7	2.5									
	8	0.3	0.6	0.9	1.2	1.6	2	3									
700	1		0.2	0.3	0.4	0.5	0.6	0.9									
	2		0.2	0.3	0.4	0.6	0.7	1.1									
	4		0.3	0.4	0.6	0.8	1	1.5									
	6		0.4	0.5	0.7	1	1.2	1.9									
	8		0.4	0.6	0.9	1.2	1.5	2.2									
850	1		0.1	0.2	0.3	0.4	0.5	0.8	0.9	1.2							
	2		0.2	0.2	0.3	0.5	0.6	1	1.3	1.5							
	4		0.2	0.3	0.5	0.7	0.9	1.3	1.8	2.1							
	6		0.3	0.4	0.6	0.9	1.1	1.7	2.3	3							
	8		0.4	0.5	0.8	1.1	1.4	2.	2.9	3.5							
1000	1		0.1	0.2	0.3	0.4	0.5	0.7	1.1	1.5	2.4	3.7					
	2		0.2	0.2	0.3	0.5	0.6	0.9	1.4	1.8	3	4.6					
	4		0.2	0.3	0.5	0.6	0.8	1.2	2	2.5	4.3	6.4					
	6		0.3	0.4	0.6	0.8	1	1.6	2.5	3.3	5.5	8.2					
	8		0.4	0.5	0.8	1	1.3	1.9	3.1	4	6.7	10					
1300	1			0.1	0.2	0.2	0.3	0.4	0.7	0.9	1.6	2.3	3.2				
	2			0.2	0.2	0.3	0.4	0.6	0.9	1.2	1.9	2.9	4				
	4			0.2	0.3	0.4	0.5	0.8	1.2	1.6	2.7	4	5.6				
	6			0.3	0.4	0.5	0.7	1	1.6	2.1	3.5	5.2	7.2				
	8			0.3	0.5	0.6	0.8	1.2	1.9	2.5	4.2	6.4	8.8				
1600	1					0.2	0.3	0.5	0.7	1	1.6	2.4	3.3	4.4			
	2					0.3	0.4	0.6	0.9	1.2	2	3	4.2	5.6			
	4					0.4	0.6	0.8	1.3	1.7	2.9	4.3	6	7.9			
	6					0.6	0.7	1.1	1.7	2.2	3.8	5.6	7.8	10			
	8					0.7	0.9	1.3	2.1	2.7	4.6	6.9	9.6	13			
1800	1						0.3	0.5	0.7	0.9	1.5	2.2	3.1	4.1			
	2						0.5	0.6	0.9	1.2	1.9	2.8	4.0	5.3			
	4						0.8	0.8	1.3	1.6	2.8	4.1	5.7	7.5			
	6						0.7	1.1	1.6	2.1	3.6	5.4	7.4	9.7			
	8						1	1.3	2	2.6	4.4	6.6	9.2	12.5			
2000	1							0.4	0.6	0.8	1.4	2	2.8	3.8	4.8	5.9	
	2							0.5	0.8	1.1	1.8	2.6	3.7	4.9	6.2	7.7	
	4							0.7	1.2	1.5	2.6	3.8	5.4	7.1	9	11	
	6							1	1.5	2	3.4	5.1	7	9.3	12	15	
	8							1.2	1.9	2.5	4.2	6.3	8.7	12	15	18	

- All ratings are based on standard water velocity range (1 to 8 FPS)

Table 23. Coil (double circuit) waterside pressure drop (feet of water) (Continued)

Model	Rows Depth	Water Flow Rate (GPM)															
		30	40	50	60	70	80	100	130	150	200	250	300	350	400	450	500
2500	1							0.1	0.1	0.2	0.3	0.4	0.6	0.8	1	1.3	1.6
	2							0.1	0.2	0.2	0.4	0.5	0.8	1	1.3	1.6	1.9
	4							0.1	0.2	0.3	0.5	0.7	1	1.4	1.7	2.1	2.6
	6							0.2	0.3	0.4	0.6	0.9	1.3	1.7	2.2	2.7	3.3
	8							0.2	0.3	0.4	0.8	1.1	1.6	2.1	2.6	3.3	3.9
3000	1							0.1	0.1	0.2	0.3	0.5	0.6	0.8	1.1	1.3	1.6
	2							0.1	0.2	0.2	0.4	0.6	0.8	1	1.3	1.6	2
	4							0.1	0.2	0.3	0.5	0.8	1.1	1.4	1.8	2.3	2.7
	6							0.2	0.3	0.4	0.7	1	1.4	1.8	2.3	2.9	3.5
	8							0.2	0.4	0.5	0.8	1.2	1.7	2.2	2.8	3.5	4.2
3500	1					0.1	0.2	0.3	0.4	0.5	0.7	0.9	1.1	1.4	1.9	2.5	
	2					0.2	0.2	0.3	0.5	0.7	0.9	1.2	1.4	1.7	2.4	3.2	
	4					0.2	0.3	0.5	0.7	1	1.3	1.6	2	2.4	3.3	4.4	
	6					0.3	0.4	0.6	0.9	1.2	1.6	2.1	2.6	3.1	4.3	5.7	
	8					0.3	0.4	0.7	1.1	1.5	2	2.5	3.1	3.8	5.3	6.9	
4000	1						0.2	0.3	0.4	0.6	0.7	0.9	1.2	1.4	2	2.6	
	2						0.2	0.3	0.5	0.7	0.9	1.2	1.5	1.8	2.5	3.3	
	4						0.3	0.5	0.7	1	1.3	1.7	2.1	2.5	3.5	4.6	
	6						0.4	0.6	0.9	1.3	1.7	2.2	2.7	3.2	4.5	6	
	8						0.5	0.8	1.1	1.6	2.1	2.7	3.3	4	5.5	7.3	
5000	1							0.1	0.2	0.3	0.3	0.4	0.5	0.7	0.9	1.2	1.5
	2							0.2	0.3	0.5	0.6	0.8	1.0	1.2	1.6	2.2	2.8
	4							0.4	0.7	0.9	1.2	1.5	1.9	2.2	3.1	4.1	5.2
	6							0.7	1.0	1.3	1.8	2.2	2.7	3.3	4.6	6.0	7.6
	8							0.9	1.3	1.8	2.3	2.9	3.6	4.4	6.0	7.9	10
6000	1							0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.8	1.1	1.4
	2							0.2	0.3	0.4	0.6	0.7	0.9	1.1	1.5	2.0	2.5
	4							0.4	0.6	0.8	1.1	1.4	1.7	2.0	2.8	3.7	4.7
	6							0.6	0.9	1.2	1.6	2.0	2.5	3.0	4.2	5.5	6.9
	8							0.8	1.2	1.6	2.1	2.7	3.3	4.0	5.5	7.2	9.1
7000	1							0.1	0.2	0.2	0.3	0.4	0.5	0.5	0.7	1.0	1.2
	2							0.2	0.3	0.4	0.5	0.6	0.8	1.0	1.3	1.8	2.2
	4							0.4	0.6	0.7	1.0	1.2	1.5	1.8	2.5	3.3	4.2
	6							0.6	0.8	1.1	1.4	1.8	2.2	2.7	3.7	4.9	6.1
	8							0.7	1.1	1.4	1.9	2.4	2.9	3.5	4.9	6.4	8.1
8000	1							0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.6	0.8	1
	2							0.2	0.2	0.3	0.4	0.5	0.7	0.8	1.1	1.5	1.9
	4							0.3	0.5	0.6	0.8	1.0	1.3	1.6	2.2	2.8	3.6
	6							0.5	0.7	0.9	1.2	1.6	1.9	2.3	3.2	4.2	5.3
	8							0.6	0.9	1.2	1.6	2.1	2.5	3.0	4.2	5.5	7

- All ratings are based on standard water velocity range (1 to 8 FPS)

Table 24. Coil water side pressure drop correction factor for temperature gradient

Average Water Temperature °F	32	50	60	80	100	120	140	150	160	180	200	220	250
Factor	1.12	1.08	1.04	1.00	0.94	0.89	0.83	0.81	0.80	0.79	0.77	0.76	0.76

Multizone Air Handling unit
Application:

The term zone implies different thermostatic controls in separate spaces. The multizone system supplies several zones from a single, centrally located air handling unit. Different zone requirements are met by mixing cold and warm air through zone dampers at the air handler in response to zone thermostats. The mixed, conditioned air is distributed throughout the building by single-zone ducts. The return air is handled in a conventional manner.

Multizones AHU, Blow-through AHU, are available in two-deck, and three-deck configurations. The two and three-deck units are offered with different number of zone dampers. Perforated plate fan discharge diffuser can be installed after fans section to provide even airflow downstream of the fan. Multizone air handlers typically provide comfort conditioning by distributing a constant air volume at variable temperature. In a typical system a portion of the air is heated by passing through the heating coil and the cooling coil cools the remainder. The heated and cooled airstreams are then mixed in the required proportion to provide the optimum temperature air to the conditioned space.

By adding a third bypass deck to the hot and cold decks, a triple deck multizone is created. The triple deck configuration offers significant energy conservation opportunities by allowing return or outside air to bypass both coils. The thermal inefficiency of mixing heated and cooled air is eliminated by the addition of the bypass deck. Bypass air is mixed with heated air for building zones that require heating. Bypass air is mixed with cooled air for building zones that require cooling. Hot and cold airs in triple deck air handler never mix together. In mild sessions where indoor space does not need continuous heating or cooling triple deck AHU are very effective. For a conditioned space demanding full cooling, the cold air damper will open and the bypass and hot dampers will close. As the cooling load in the conditioned space reduces, the cold air damper will modulate closed and the bypass air damper will modulate open wile the hot air damper remains in the closed position. As the cooling load is reduced to zero, the cold air damper will close completely and the bypass air damper will open fully. When the load changes from cooling to heating, the bypass air damper will modulate with the hot air damper to provide conditioned temperature to the zones.

Multizone air handling systems result in an absence of water; steam and condensate drain piping, wiring, and electrical and mechanical equipment in the conditioned space for more usable commercial floor area.

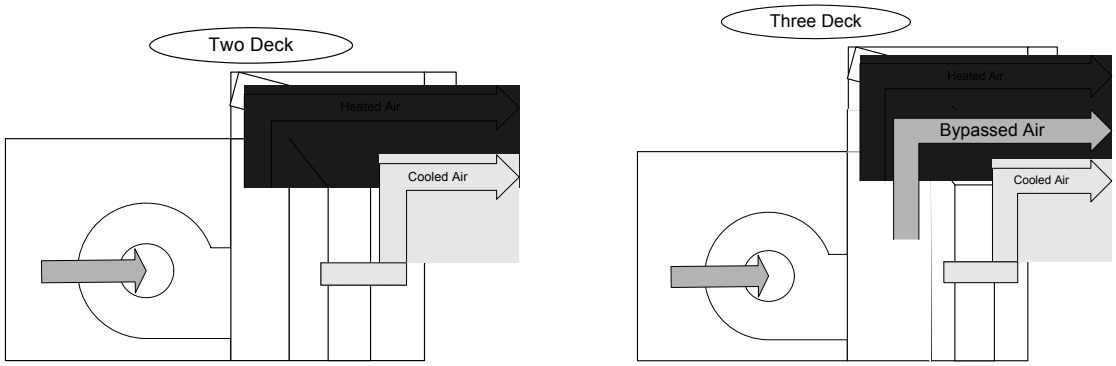


Figure 17. Air flow in double & triple multi zone

Table 25. Multi zone air handlers

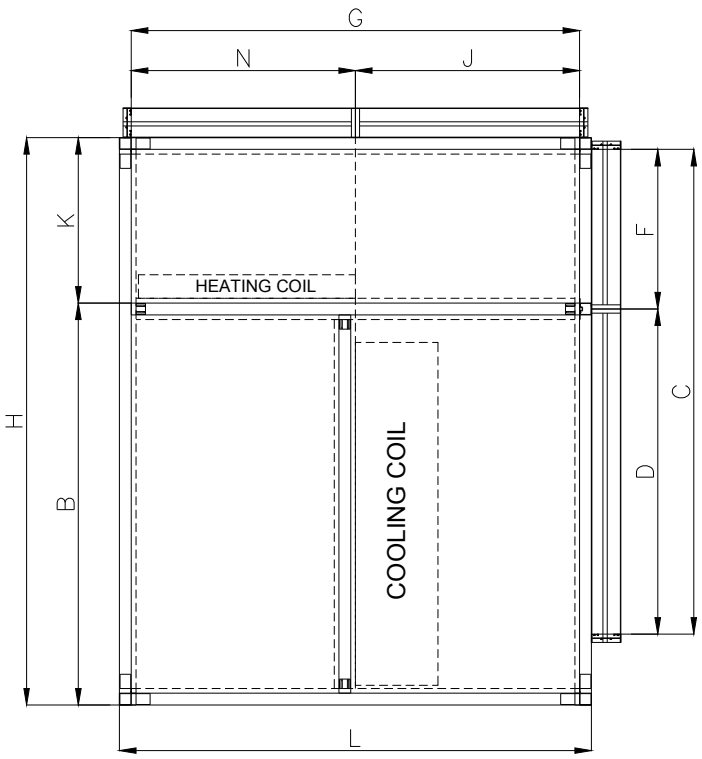
Model	CFM	Fan Size	Cooling Coil*		Heating Coil		Tube Length mm
			Face area ft^2	No coils x tube high	Face area ft^2	No coils x tube high	
MLZ-250	2500	*14*	*5.0*	*1x12*	*4.3*	*1x10*	*1000*
MLZ-350	3500	*16*	*7.5*	*1x18*	*5.9*	*1x14*	*1000*
MLZ-500	5000	*17*	*10.0*	*1x20*	*8.5*	*1x16*	*1250*
MLZ-700	7000	*19*	*13.8*	*1x24*	*10.5*	*1x18*	*1400*
MLZ-1000	10000	*22*	*20.7*	*1x28*	*14.7*	*1x20*	*1800*
MLZ-1300	13000	*22*	*26.9*	*2x18*	*16.7*	*1x22*	*1800*
MLZ-1600	16000	*26*	*32.0*	*2x18*	*21.2*	*1x24*	*2120*
MLZ-2000	20000	*29*	*41.0*	*2x20*	*27.2*	*1x26*	*2500*
MLZ-2500	25000	*29*	*50.0*	*2x22*	*32.6*	*2x28*	*2×1400*
MLZ-3000	30000	*2×26*	*60.0*	*2x22*	*38.4*	*2x28*	*2×1650*
MLZ-3500	35000	*2×26*	*71.0*	*2x24*	*48.0*	*2x32*	*2×1800*
MLZ-4000	40000	*2×29*	*79.0*	*2x24*	*53.4*	*2x32*	*2×2000*

- Cooling coil ratings are the same as single zone.

Table 26. Multizone dimensions (mm)

Model	B	G	H	N	J	K	L	F	D	C
MLZ-250	950	1000	1380	410	590	430	1100	405	625	1030
MLZ-350	1050	1200	1500	570	630	450	1300	425	725	1150
MLZ-500	1100	1320	1600	640	680	500	1420	475	775	1250
MLZ-700	1400	1480	1960	720	760	560	1580	535	1075	1610
MLZ-1000	1400	1600	2000	800	800	600	1700	575	1075	1650
MLZ-1300	1700	1800	2350	870	930	650	1900	625	1375	2000
MLZ-1600	1700	1900	2400	950	950	700	2000	675	1375	2050
MLZ-2000	2000	2000	2650	1020	980	700	2100	625	1575	2200
MLZ-2500	2020	2100	2750	1100	1000	730	2200	705	1595	2300
MLZ-3000	2020	2100	2800	1100	1000	780	2200	755	1595	2350
MLZ-3500	2170	2300	2950	1250	1050	780	2400	755	1745	2500
MLZ-4000	2170	2400	3000	1250	1150	830	2500	780	1745	2550

Figure 18. Double Deck Multizone Dimensions



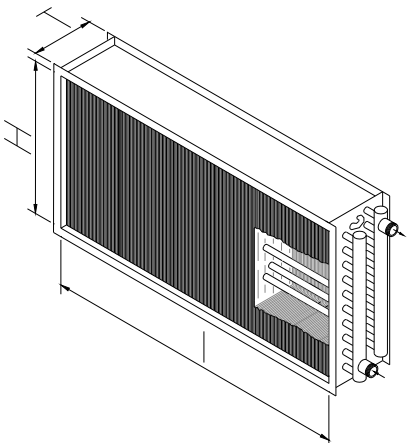
For overall dimensions refer to table 27 on page 52. Other sections are the same as single zone air handling units. AWL of each section is on table 31. For coil inlet & outlet connections refer to page 62.

Table 24. Air handling unit external dimensions

Model	Dimension					
	A	B	G	H	I	J
AHU-250	*1320*	*950*	*380*	*457*	*1000*	*60*
AHU-350	*1400*	*1050*	*419*	*686*	*1000*	*80*
AHU-500	*1580*	*1100*	*442*	*762*	*1250*	*80*
AHU-700	*1750*	*1400*	*455*	*914*	*1400*	*80*
AHU-850	*2000*	*1400*	*455*	*914*	*1600*	*80*
AHU-1000	*2150*	*1400*	*504*	*1067*	*1800*	*100*
AHU-1300	*2150*	*1700*	*504*	*2×686*	*1800*	*100*
AHU-1600	*2630*	*1700*	*586*	*2×686*	*2120*	*100*
AHU-1800	*2630*	*2000*	*586*	*2×762*	*2280*	*100*
AHU-2000	*2850*	*2000*	*618*	*2×762*	*2500*	*100*
AHU-2500	*3330*	*2020*	*618*	*2×838*	*2×1400*	*100*
AHU-3000	*3830*	*2020*	*586*	*2×838*	*2×1650*	*100*
AHU-3500	*4230*	*2170*	*586*	*2×914*	*2×1800*	*100*
AHU-4000	*4530*	*2170*	*618*	*2×914*	*2×2000*	*100*
AHU-5000	4730	2600	760	2×1067	2×2110	100
AHU-6000	5200	2700	661	2×1220	2×2325	100
AHU-7000	5400	3000	661	2×1371	2×2425	100
AHU-8000	5700	3250	--	2×1448	2×2575	100

Table 28. Coil thickness

Rows	T(mm)
1	100
2	140
3	170
4	210
5	240
6	280
8	350



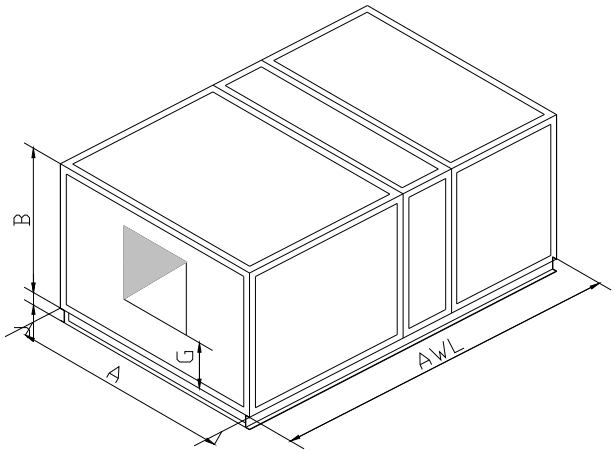


Table 29. Number of coils and fans in AHU

Model	AHU Internal Area (Ft^2)	Coil Face Area (Ft^2)	Fan	Coil	
			Size	NO.	TH
AHU-250	10	4.9	*14*	*1*	*12*
AHU-350	12	7.3	*16*	*1*	*18*
AHU-500	15	10.2	*17*	*1*	*20*
AHU-700	22	13.7	*19*	*1*	*24*
AHU-850	24	15.7	*19*	*1*	*24*
AHU-1000	27	20.6	*22*	*1*	*28*
AHU-1300	34	26.5	*22*	*2*	*18*
AHU-1600	42	31.3	*26*	*2*	*18*
AHU-1800	50	37.8	*26*	*2*	*20*
AHU-2000	54	41	*29*	*2*	*20*
AHU-2500	65	50.5	*29*	*4*	*22*
AHU-3000	75	59.5	*2×26*	*4*	*22*
AHU-3500	90	70.8	*2×26*	*4*	*24*
AHU-4000	96	78.7	*2×29*	*4*	*24*
AHU-5000	122	96.9	2×32	4	28
AHU-6000	140	118	2×32	4	32
AHU-7000	161	141	2×32	4	36
AHU-8000	187	161	--	4	38

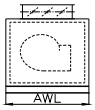
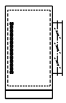
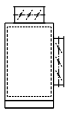
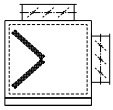
Table 30. DWDI Forward Fan shaft diameters by fan

Model	9	11	13	14	16	17	19	22	26	29	32
Class A	*20*	*20*	*20*	*25*	*25*	*25*	*30*	*35*	*35*	*45*	*50*
Class B	*20*	*25*	*25*	*25*	*30*	*30*	*30*	*35*	*40*	*45*	*50*
Class C	*30*	*30*	*30*	*35*	*40*	*40*	*40*	*40*	*45*	*50*	*55*

All air handling units have these external dimensions regardless of their profile type and construction. The AWL of each section is stated in table 28. class

Air Way Length & Weight

Table 25. Air way length (AWL) & weight of AHU sections

Sections	Code	Symbol	Description	Air way Length & Weight of AHU Modules (mm)																
				250	350	500	700	850	1000	1300	1600	1800	2000	2500	3000	3500	4000	5000	7000	6000	8000
Return Fan	RFS		Return Fan Section motor back	1310 mm	1440	1530	1660	1735	1810	1810	2000	2070	2140	2140	2000	2000	2140	2290	2290	2290	--
				150 Kg	170	200	250	270	290	320	380	435	490	610	640	720	780	920	955	990	--
			Return Fan Section motor side	950 mm	1050	1050	1190	1260	1330	1330	1520	1590	1660	1660	1520	1520	1660	1810	1810	1810	--
				110 Kg	140	150	190	210	230	250	300	350	400	510	530	600	650	780	815	850	--
Mixing Section	MS1.1		Full Fresh or Return with Flat Filter	500 mm	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
				60 Kg	70	80	90	95	100	120	110	130	150	240	260	300	310	380	400	420	530
	MS1.2		Full Fresh or Return with staggered Filter	600 mm	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600
				80 Kg	80	90	110	110	110	140	140	160	180	270	290	350	350	430	450	470	600
	MS1.3		Full Fresh or Return with Angle Filter	700 mm	700	700	700	700	700	700	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
				90 Kg	100	100	120	125	130	150	160	180	200	290	320	380	380	460	485	510	650
	MS2.1		Mixing Box without Flat Filter	580 mm	680	780	780	830	880	980	980	1080	1180	1180	1180	1280	1280	1480	1530	1580	1780
				50 Kg	70	80	80	85	90	120	90	130	170	310	320	400	390	520	555	590	770
	MS2.2		Mixing Box with Flat Filter	640 mm	740	840	840	890	940	1040	1040	1140	1240	1240	1240	1340	1340	1540	1590	1640	1840
				70 Kg	90	100	100	105	110	150	120	165	210	360	380	470	460	610	650	690	900
	MS2.3		Mixing Box with staggered Filter	640 mm	740	840	840	890	940	1040	1040	1140	1240	1240	1240	1340	1340	1540	1590	1640	1840
				70 Kg	90	100	110	115	120	160	130	175	220	370	390	480	480	630	670	710	930
	MS2.4		Mixing Box with Angle Filter	730 mm	830	930	930	980	1030	1330	1330	1430	1530	1530	1530	1630	1630	1830	1880	1930	2130
				80 Kg	100	110	120	125	130	170	150	195	240	400	420	510	510	660	705	750	980

Air Way Length & Weight

Table 26. Air way length (AWL) & weight of AHU sections (Continued)

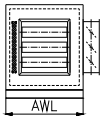
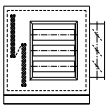
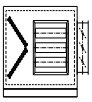
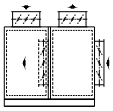
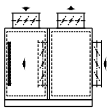
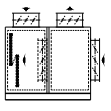
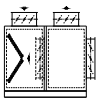
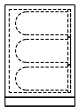
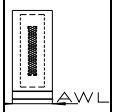
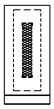
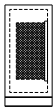
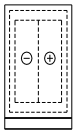
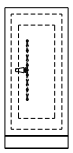
Sections	Code	Symbol	Description	Air way Length & Weight of AHU Modules (mm)																
				250	350	500	700	850	1000	1300	1600	1800	2000	2500	3000	3500	4000	5000	6000	7000	8000
Mixing Section	MS3.1		Side Input Mixing Box with Flat Filter	630 mm	730	830	830	880	930	1030	1030	1130	1230	1230	1230	1330	1330	1530	1630	1730	1830
				80 Kg	90	110	130	145	160	190	200	245	290	390	420	510	520	670	770	885	1000
	MS3.2		Side Input Mixing Box with staggered Filter	640 mm	740	840	840	890	940	1040	1040	1140	1240	1240	1240	1340	1340	1540	1640	1740	1840
				80 Kg	100	120	140	150	160	200	210	255	300	400	440	530	540	700	790	910	1030
	MS3.3		Side Input Mixing Box with Angle Filter	730 mm	830	930	930	980	1030	1130	1130	1230	1330	1330	1330	1430	1430	1630	1730	1830	1930
				90 Kg	110	130	150	150	180	220	230	275	320	430	460	560	570	730	830	950	1070
	MS4.1		3-way mixing box without filter	1160 mm	1360	1560	1560	980	1760	1960	1960	2160	2360	2360	2360	2560	2560	2960	3160	3360	3560
				90 Kg	130	140	150	165	160	220	170	240	310	530	540	670	660	880	990	1140	1290
	MS4.2		3-way Mixing Box with Flat Filter	1220 mm	1420	1620	1620	1660	1820	2020	2020	2220	2420	2420	2420	2620	2620	3020	3220	3420	3620
				110 Kg	140	160	170	155	190	250	210	280	350	580	600	740	730	960	1090	1255	1420
	MS4.3		3-way Mixing Box with staggered Filter	1220 mm	1420	1620	1620	1720	1820	2020	2020	2220	2420	2420	2420	2620	2620	3020	3220	3420	3620
				110 Kg	140	160	170	180	190	260	210	285	360	590	610	750	740	990	1120	1290	1460
	MS4.4		3-way Mixing Box with Angle Filter	1290 mm	1490	1690	1690	1790	1890	2090	2090	2290	2490	2490	2490	2690	2690	3090	3290	3490	3690
				120 Kg	150	170	180	190	200	270	230	305	380	610	640	780	770	1010	1150	1320	1490
Second Stage Filter	SSFS1		Bag Filter	640 mm	640	640	640	640	640	640	640	640	640	640	640	640	640	640	640	640	640
				80 Kg	80	90	110	120	130	140	160	170	180	210	230	260	270	310	340	370	400

Table 27. Air way length (AWL) & weight of AHU sections (Continued)

Sections	Code	Symbol	Description	Air way Length & Weight of AHU Modules (mm)																
				250	350	500	700	850	1000	1300	1600	1800	2000	2500	3000	3500	4000	5000	6000	7000	8000
Second Stage Filter	SSFS2		Pleated Filter Flat	250 mm	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
				30 Kg	40	40	50	55	60	70	80	85	90	100	120	140	140	170	190	210	230
Second Stage Filter	SSFS3		Carbon Active Filter Flat	250 mm	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
				30 Kg	40	40	50	55	60	70	80	85	90	100	120	140	140	170	190	210	230
	SSFS4		Hepa & Ulpa Filter Flat	800 mm	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800
				80 Kg	90	100	130	145	160	180	220	240	260	310	350	400	430	510	580	655	730
Coil Section	CS1 Water		Water Coil 1 Row	260 mm	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260
				40 Kg	50	50	60	65	70	80	100	110	120	140	160	190	200	220	230	240	250
			2 Rows	360 mm	360	360	360	360	360	360	360	360	360	360	360	360	360	360	360	360	360
				50 Kg	70	70	90	100	110	130	160	170	180	220	260	300	330	350	380	400	420
			3 Or 4 Rows	440 mm	440	440	440	440	440	440	440	440	440	440	440	440	440	440	440	440	440
				80 Kg	90	110	140	160	180	220	260	285	310	390	440	510	570	610	650	675	700
			5 Or 6 Rows	510 mm	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510	510
				100 Kg	120	140	190	215	240	300	360	395	430	540	630	720	810	880	960	1005	1050
			7 Or 8 Rows	580 mm	580	580	580	580	580	580	580	580	580	580	580	580	580	580	580	580	580
				110 Kg	150	180	230	265	300	370	450	495	540	690	790	940	1030	1140	1340	1395	1450
	CS2 (3)		DX Coil 1 Row	430 mm	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430	430
				50 Kg	60	70	80	90	100	110	130	140	150	170	200	230	250	260	290	300	310
			2 Rows	530 mm	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530	530
				70 Kg	80	90	110	125	140	160	180	200	220	260	300	340	370	400	440	460	480
			3 Or 4 Rows	610 mm	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
				90 Kg	110	120	160	180	200	240	290	315	340	420	480	550	610	660	700	725	750
			5 Or 6 Rows	680 mm	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680
				110 Kg	140	160	210	240	270	320	390	425	460	580	670	760	850	930	1010	1060	1110

Air Way Length & Weight

Table 31. Air way length (AWL) & weight of AHU sections (Continued)

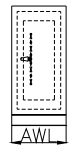
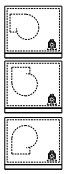
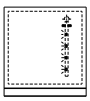
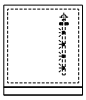
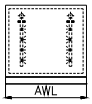
Sections	Code	Symbol	Description	Air way Length & Weight of AHU Modules (mm)																
				250	350	500	700	850	1000	1300	1600	1800	2000	2500	3000	3500	4000	5000	6000	7000	8000
Coil Section	CS2		DX Coil 7 Or 8 Rows	750 mm	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750
				130 Kg	160	190	250	290	330	400	480	530	580	730	830	980	1080	1190	1390	1450	1510
	CS3 (1)		Steam Coil 1 or2 Rows	360 mm	360	360	360	360	360	360	360	360	360	360	360	360	360	360	360	360	360
				70 Kg	100	110	150	170	190	240	280	310	340	420	490	570	640	690	750	780	810
Access Section	AS		Access Section with or without sight glass	500 mm	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
				50 Kg	50	60	70	75	80	80	90	95	100	110	120	140	140	150	170	180	190
Supply Fan	SFS1		Supply Fan Section Motor Back	1290 mm	1420	1510	1640	1720	1790	1790	1980	2050	2120	2120	1980	1980	2120	2270	2270	2270	--
				240 Kg	300	330	400	480	560	590	690	805	920	1030	1270	1340	1670	2200	2270	2270	--
	SFS2		Supply Fan Section Motor Side-	1290 mm	1420	1510	1640	1715	1790	1790	1980	2050	2120	2120	1980	1980	2120	2270	2270	2270	--
				240 Kg	300	330	400	480	560	590	690	805	920	1030	1270	1340	1670	2200	2270	2270	--
Supply Fan	SFS3		Plug Fan	950 mm	1050	1050	1190	1260	1330	1330	1520	1590	1660	1660	1520	1520	1660	--	--	--	--
				210 Kg	270	280	350	420	490	520	620	730	840	940	1160	1220	1550	--	--	--	--
Air washer	AW4 (1)		Air Washer Class 4	1200 mm	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	--	--	--	--
				145 Kg	165	200	240	250	270	330	380	430	470	530	600	690	800	--	--	--	--
Air washer	AW6 (1)		Air Washer Class 6	1750 mm	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	--	--	--	--
				190 Kg	220	260	300	330	350	370	390	410	430	470	540	670	950	--	--	--	--

Table 31. Air way length (AWL) & weight of AHU sections (Continued)

Sections	Code	Symbol	Description	Air way Length & Weight of AHU Modules (mm)																
				250	350	500	700	850	1000	1300	1600	1800	2000	2500	3000	3500	4000	5000	6000	7000	8000
Air washer	AW8 (1)		Air Washer Class 8	2400 mm	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	--	--	--	--
				430 Kg	500	590	680	740	790	810	900	930	950	1050	1200	1500	2140	--	--	--	--

1) Steam coil AWLs are for steel tube coils with spiral fins, for copper tube with plate fins use AWL for water coils.
2) This is only Weight of section without its internal components.
3) If DX coil has not additional space for expansion valve and other tubes use AWL of water coil.

Lengths recommended for AWLs of sections are basically calculated for double skin panels with galvanized structure but can be used for single skin panels and aluminum structure, too. Customer must order lengths out of these standard lengths, In case of length limitations.

Table 32. Horizontal air handling unit

Model	Face Area (ft^2)	Fan Model	A	B	C	D	E	F	J	N	Q
250	*10*	*14*	*1320*	*950*	*2230*	*--*	*450*	*470*	*80*	*580*	*1650*
350	*12*	*16*	*1400*	*1050*	*2460*	*--*	*465*	*524*	*80*	*680*	*1780*
500	*15*	*17*	*1580*	*1100*	*2650*	*--*	*500*	*570*	*100*	*780*	*1870*
700	*22*	*19*	*1750*	*1400*	*2780*	*--*	*550*	*620*	*100*	*780*	*2000*
850	*24*	*19*	*2000*	*1400*	*2900*		*550*	*620*	*100*	*830*	*2000*
1000	*27*	*22*	*2150*	*1400*	*3030*	*--*	*645*	*733*	*120*	*880*	*2150*
1300	*34*	*22*	*2150*	*1700*	*3130*	*--*	*645*	*733*	*120*	*980*	*2150*
1600	*42*	*26*	*2630*	*1700*	*3320*	*--*	*840*	*833*	*120*	*980*	*2340*
1800	*50*	*26*	*2630*	*2000*	*3550*	*--*	*840*	*833*	*120*	*1080*	*2480*
2000	*54*	*29*	*2850*	*2000*	*3660*	*--*	*943*	*787*	*120*	*1180*	*2480*
2500	*65*	*29*	*3330*	*2020*	*3660*	*--*	*943*	*787*	*120*	*1180*	*2480*
3000	*75*	*2x26*	*3830*	*2020*	*3520*	*1000*	*840*	*833*	*140*	*1180*	*2340*
3500	*90*	*2x26*	*4230*	*2170*	*3620*	*1000*	*840*	*833*	*140*	*1280*	*2340*
4000	*96*	*2x29*	*4530*	*2170*	*3760*	*1100*	*943*	*787*	*140*	*1280*	*2480*
5000	*122*	*2x29*	*4730*	*2600*	*4110*	*1100*	*943*	*787*	*140*	*1480*	*2630*
6000	*140*	*2x32*	*5200*	*2700*	*4210*	*1200*	*871*	*1047*	*80*	*1530*	*2630*
7000	*161*	*2x32*	*5400*	*3000*	*4210*	*1200*	*871*	*1047*	*80*	*1580*	*2630*
8000	*187*	*--*	*5700*	*3250*	*--*	*1200*	*--*	*--*	*100*	*1780*	*--*

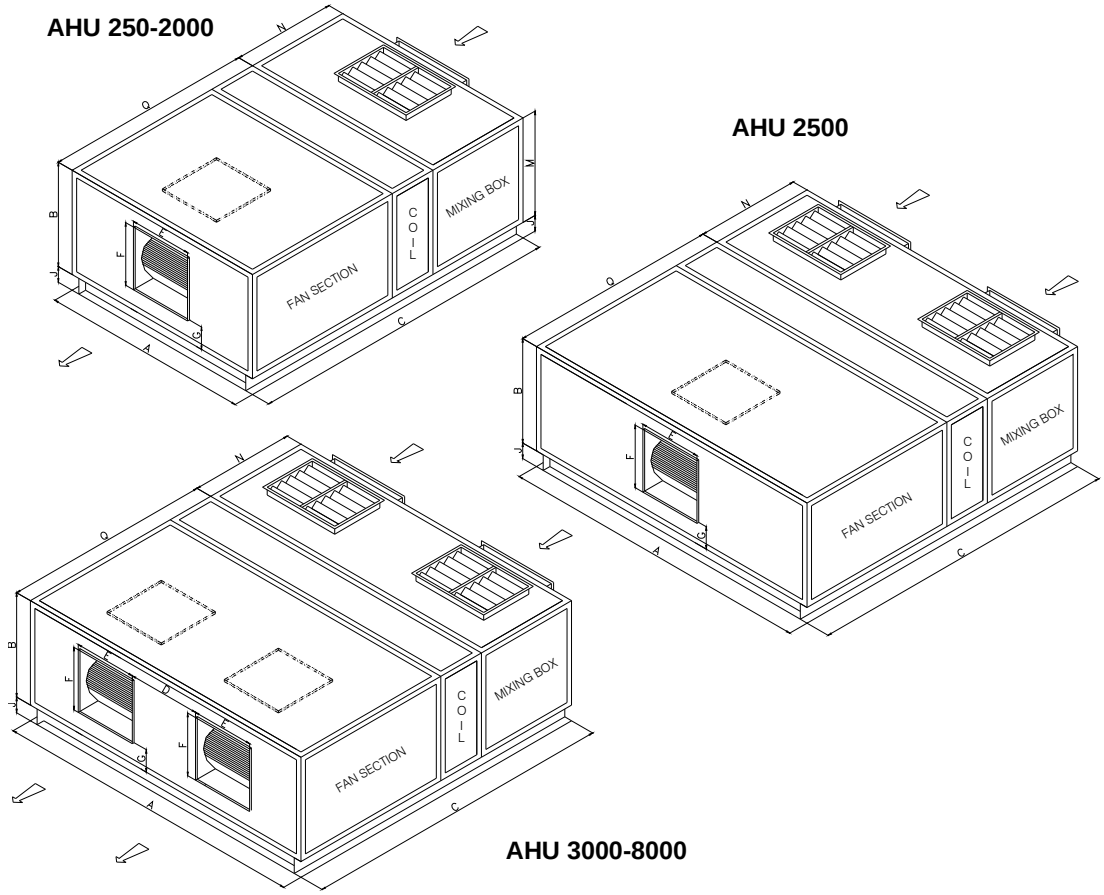


Figure 19. Horizontal AHU

Coil connections are at right hand side of a person standing in front of AHU mixing box

Table 33. L-type air handling unit dimensions

Model	Face Area (ft^2)	Fan Model	A	B	C	D	E	F	J	N	R	Q
250	*10*	*14*	*1320*	*1900*	*1870*	*--*	*450*	*470*	*80*	*950*	*580*	*1290*
350	*12*	*16*	*1400*	*2100*	*2100*	*--*	*465*	*524*	*80*	*1050*	*680*	*1420*
500	*15*	*17*	*1580*	*2200*	*2290*	*--*	*500*	*570*	*100*	*1100*	*780*	*1510*
700	*22*	*19*	*1750*	*2800*	*2420*	*--*	*550*	*620*	*100*	*1400*	*780*	*1640*
850	*24*	*19*	*2000*	*2800*	*2550*	*--*	*550*	*620*	*100*	*1400*	*830*	*1720*
1000	*27*	*22*	*2150*	*2800*	*2670*	*--*	*645*	*733*	*120*	*1400*	*880*	*1790*
1300	*34*	*22*	*2150*	*3400*	*2770*	*--*	*645*	*733*	*120*	*1700*	*980*	*1790*
1600	*42*	*26*	*2630*	*3400*	*2960*	*--*	*840*	*833*	*120*	*1700*	*980*	*1980*
1800	*50*	*26*	*2630*	*4000*	*3130*	*--*	*840*	*833*	*120*	*2000*	*1080*	*2050*
2000	*54*	*29*	*2850*	*4000*	*3300*	*--*	*943*	*787*	*120*	*2000*	*1180*	*2120*
2500	*65*	*29*	*3330*	*4040*	*3300*	*--*	*943*	*787*	*120*	*2020*	*1180*	*2120*
3000	*75*	*2x26*	*3830*	*4040*	*3160*	*1000*	*840*	*833*	*140*	*2020*	*1180*	*1980*
3500	*90*	*2x26*	*4230*	*4340*	*3260*	*1000*	*840*	*833*	*140*	*2170*	*1280*	*1980*
4000	*96*	*2x29*	*4530*	*4340*	*3400*	*1110*	*943*	*787*	*140*	*2170*	*1280*	*2120*
5000	*122*	*2x29*	*4730*	*5200*	*3750*	*1110*	*943*	*787*	*140*	*2600*	*1480*	*2270*

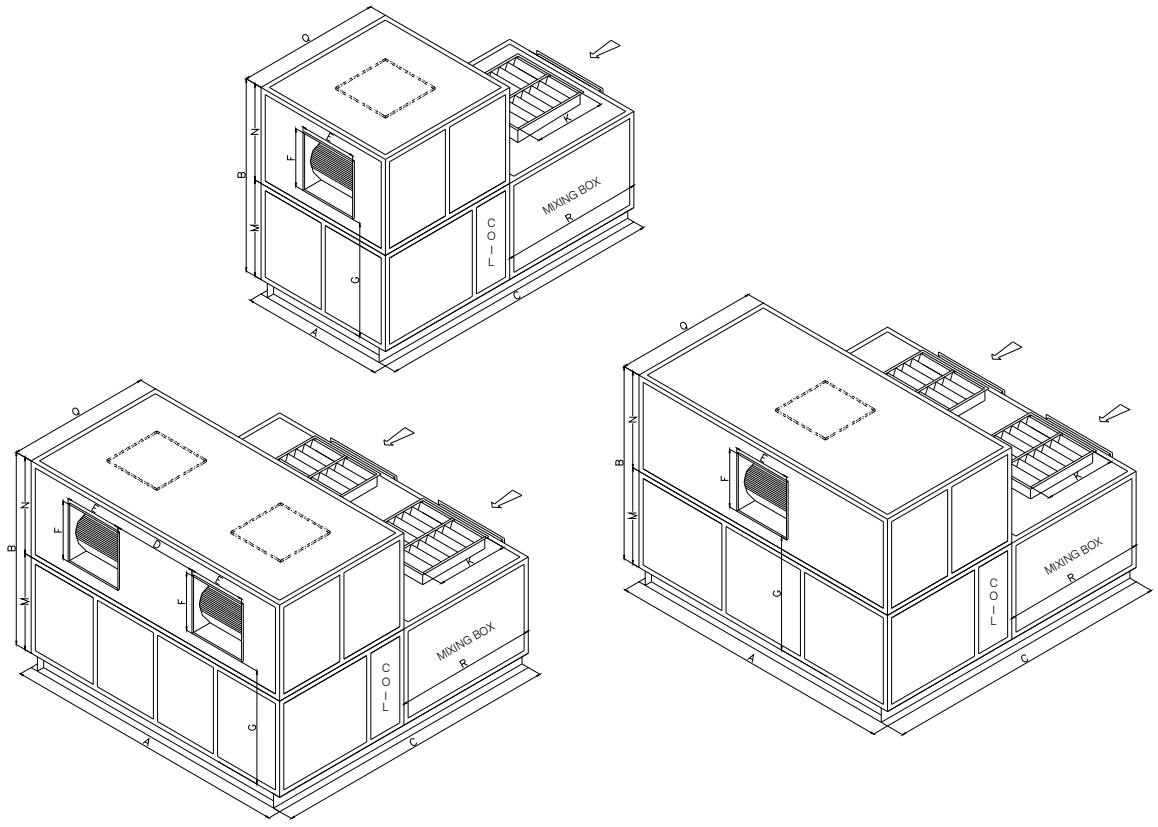


Figure 20. L-type AHU

Coil connections are at right hand side of a person standing in front of AHU mixing box.
L-type air handling units are for the places with little length limitations. It is recommended to build and ship AHU's model 1000 through 8000 in three separate sections. Additional modules such as second stage filtration, humidifier, preheat coil or return fan can be placed before main coil section.

Table 28. Vertical air handling units

Model	Face Area (ft^2)	Fan Model	A	B	C	D	E	F	J	N
250	*10*	*14*	*1320*	*1900*	*1290*	*--*	*450*	*470*	*80*	*950*
350	*12*	*16*	*1400*	*2100*	*1420*	*--*	*465*	*524*	*80*	*1050*
500	*15*	*17*	*1580*	*2200*	*1510*	*--*	*500*	*570*	*100*	*1100*
700	*22*	*19*	*1750*	*2800*	*1640*	*--*	*550*	*620*	*100*	*1400*
850	*24*	*19*	*2000*	*1400*	*1790*	*--*	*550*	*620*	*100*	*1400*
1000	*27*	*22*	*2150*	*2800*	*1790*	*--*	*645*	*733*	*120*	*1400*
1300	*34*	*22*	*2150*	*3400*	*1790*	*--*	*645*	*733*	*120*	*1700*
1600	*42*	*26*	*2630*	*3400*	*1980*	*--*	*840*	*833*	*120*	*1700*
1800	*50*	*26*	*2630*	*4000*	*1980*	*--*	*840*	*833*	*120*	*2000*
2000	*54*	*29*	*2850*	*4000*	*2120*	*--*	*943*	*787*	*120*	*2000*
2500	*65*	*29*	*3330*	*4040*	*2120*	*--*	*943*	*787*	*120*	*2020*
3000	*75*	*2x26*	*3830*	*4040*	*1980*	*1000*	*840*	*833*	*140*	*2020*
3500	*90*	*2x26*	*4230*	*4340*	*1980*	*1000*	*840*	*833*	*140*	*2170*
4000	*96*	*2x29*	*4530*	*4340*	*2120*	*1110*	*943*	*787*	*140*	*2170*
5000	*122*	*2x29*	*4730*	*5200*	*2270*	*1110*	*943*	*787*	*140*	*2600*

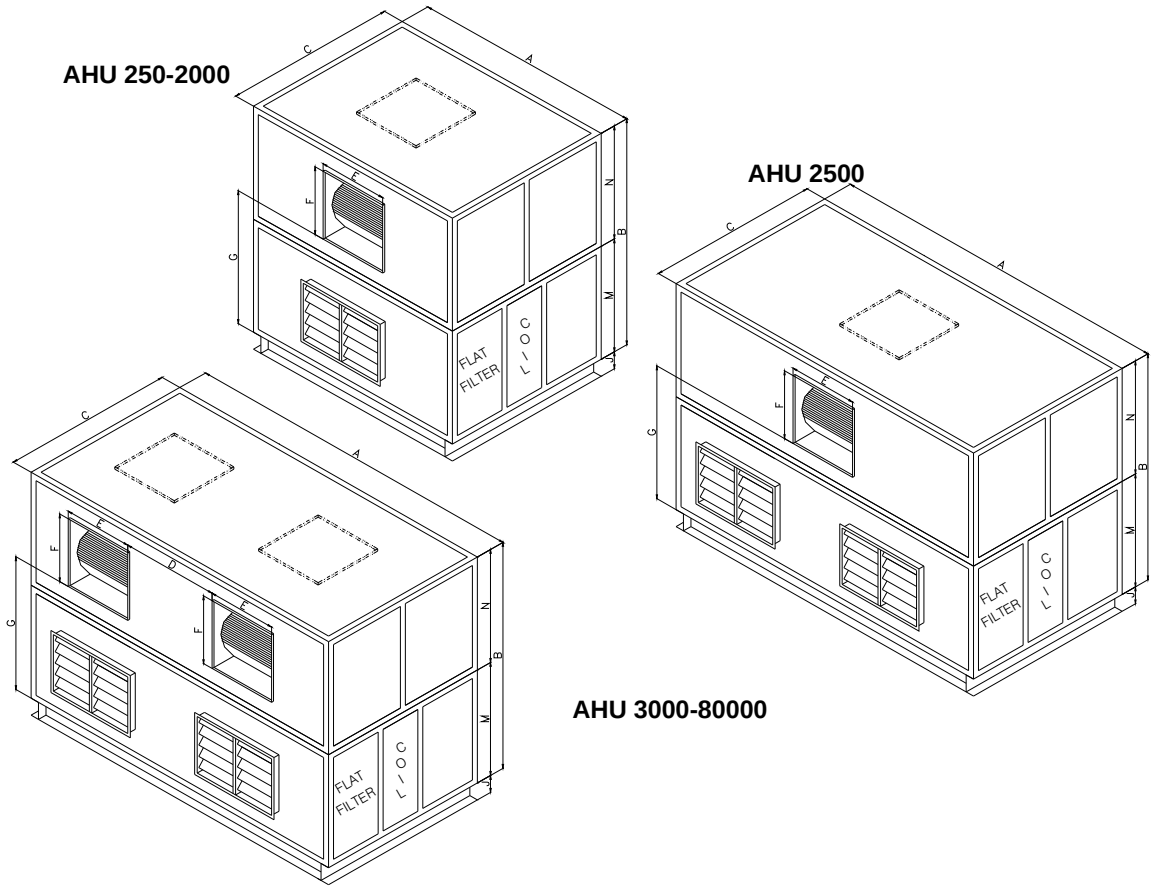


Figure 21. Vertical AHU

Coil connections are at right hand side of a person standing in front of AHU mixing box.

Connections

This section helps the customer to find coil and channel dimensions for his piping and ductwork design.

Table 29. Damper Dimensions

Model	No. Damper	Short Blade			Long Blade			Opposed Blade			Arosio Blade		
		K	L	P	K	L	P	K	L	P	K	L	P
250	**1**	*290*	*700*	*170*	*410*	*500*	*210*	*340*	*700*	*170*	*310*	*700*	*125*
350	**1**	*410*	*700*	*170*	*410*	*700*	*210*	*490*	*700*	*170*	*410*	*700*	*125*
500	**1**	*530*	*900*	*170*	*600*	*900*	*210*	*490*	*900*	*170*	*510*	*900*	*125*
700	**1**	*530*	*1200*	*170*	*600*	*1200*	*210*	*490*	*1200*	*170*	*510*	*1200*	*125*
850	**1**	*600*	*1200*	*170*	*720*	*1200*	*210*	*620*	*1500*	*170*	*610*	*1400*	*125*
1000	**1**	*650*	*1200*	*170*	*770*	*1200*	*210*	*620*	*1500*	*170*	*610*	*1500*	*125*
1300	**1**	*770*	*1500*	*170*	*770*	*1500*	*210*	*760*	*1500*	*170*	*710*	*1500*	*125*
1600	**1**	*770*	*1800*	*170*	*770*	*1800*	*210*	*760*	*1800*	*170*	*810*	*1800*	*125*
1800	**1**	*900*	*1800*	*170*	*900*	*1800*	*210*	*900*	*1800*	*170*	*810*	*2000*	*125*
2000	**1**	*900*	*1800*	*170*	*950*	*1800*	*210*	*900*	*1800*	*170*	*810*	*2000*	*125*
2500	**2**	*900*	*1200*	*170*	*950*	*1200*	*210*	*900*	*1200*	*170*	*810*	*1200*	*125*
3000	**2**	*900*	*1500*	*170*	*950*	*1500*	*210*	*900*	*1500*	*170*	*810*	*1500*	*125*
3500	**2**	*1020*	*1500*	*170*	*950*	*1500*	*210*	*1030*	*1500*	*170*	*910*	*1500*	*125*
4000	**2**	*900*	*1800*	*170*	*950*	*1800*	*210*	*900*	*1800*	*170*	*910*	*1800*	*125*
5000	**2**	*1140*	*1800*	*170*	*1130*	*1800*	*210*	*1170*	*1800*	*170*	*1110*	*1800*	*125*
7000	**2**	*1200*	*2000*	*170*	*1200*	*1800*	*210*	*1170*	*2000*	*170*	*1210*	*2000*	*125*
6000	**2**	*1260*	*2000*	*170*	*1300*	*1800*	*210*	*1170*	*2000*	*170*	*1210*	*2000*	*125*
8000	**2**	*1630*	*2000*	*170*	*1660*	*2000*	*210*	*1580*	*2000*	*170*	*1610*	*2000*	*125*

Inlet Duct connections:

Inlet dampers are designed with air velocity between 800 to 1200 fpm according to Carrier handbook.

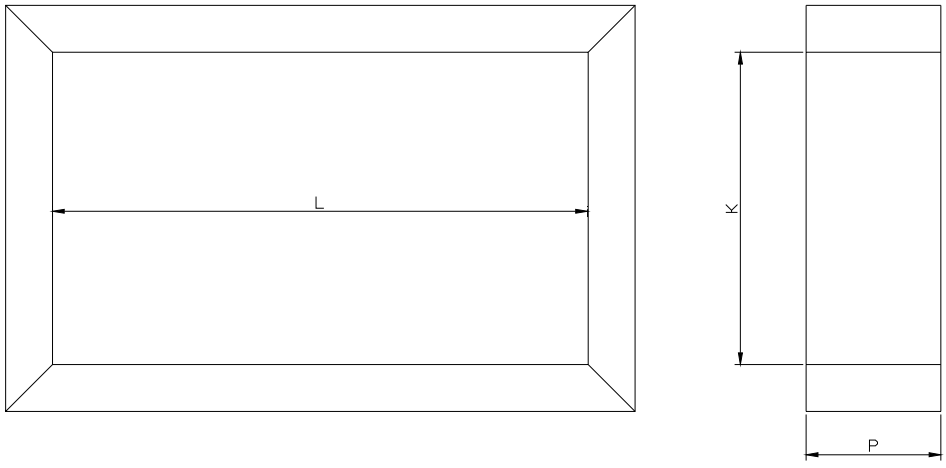


Figure 22. Damper Dimensions

Table 30. Cooling and hot water coil connection

Model	Chilled Water				Hot water			
	2 Rows	4 Rows	6 Rows	8 Rows	1 Rows	2 Rows	3 Rows	4 Rows
250	*1"*	*1 1/4"*	*1 1/4"*	*1 1/2"*	*3/4"*	*1"*	*1 1/4"*	*1 1/2"*
350	*1 1/4"*	*1 1/2"*	*1 1/2"*	*2"*	*1"*	*1 1/4"*	*1 1/2"*	*1 1/2"*
500	*1 1/4"*	*1 1/2"*	*2"*	*2"*	*1"*	*1 1/4"*	*1 1/2"*	*1 1/2"*
700	*1 1/2"*	*2"*	*2 1/2"*	*2 1/2"*	*1 1/4"*	*1 1/2"*	*1 1/2"*	*1 1/2"*
850	*1 1/2"*	*2"*	*2 1/2"*	*2 1/2"*	*1 1/4"*	*1 1/2"*	*1 1/2"*	*1 1/2"*
1000	*1 1/2"*	*2"*	*2 1/2"*	*2 1/2"*	*1 1/4"*	*1 1/2"*	*2"*	*2 1/2"*
1300	*2x1 1/2"*	*2x2"*	*2x2 1/2"*	*2x2 1/2"*	*2x1 1/4"*	*2x2 1/2"*	*2x2"*	*2x2 1/2"*
1600	*2x1 1/2"*	*2x2"*	*2x2 1/2"*	*2x2 1/2"*	*2x1 1/4"*	*2x2 1/2"*	*2x2"*	*2x2 1/2"*
1800	*2x1 1/2"*	*2x2"*	*2x2 1/2"*	*2x2 1/2"*	*2x1 1/4"*	*2x2 1/2"*	*2x2 1/2"*	*2x2 1/2"*
2000	*2x1 1/2"*	*2x2"*	*2x2 1/2"*	*2x2 1/2"*	*2x1 1/4"*	*2x2 1/2"*	*2x2 1/2"*	*2x2 1/2"*
2500	*4x1 1/2"*	*4x2"*	*4x2 1/2"*	*4x2 1/2"*	*4x1 1/4"*	*4x1 1/2"*	*4x2"*	*4x2 1/2"*
3000	*4x1 1/2"*	*4x2"*	*4x2 1/2"*	*4x2 1/2"*	*4x1 1/4"*	*4x1 1/2"*	*4x2"*	*4x2 1/2"*
3500	*4x1 1/2"*	*4x2"*	*4x2 1/2"*	*4x2 1/2"*	*4x1 1/4"*	*4x1 1/2"*	*4x2 1/2"*	*4x2 1/2"*
4000	*4x1 1/2"*	*4x2"*	*4x2 1/2"*	*4x2 1/2"*	*4x1 1/4"*	*4x1 1/2"*	*4x2 1/2"*	*4x2 1/2"*
5000	*4x1 1/2"*	*4x2"*	*4x2 1/2"*	*4x2 1/2"*	*4x1 1/4"*	*4x1 1/2"*	*4x2 1/2"*	*4x2 1/2"*
7000	*4x1 1/2"*	*4x2"*	*4x2 1/2"*	*4x2 1/2"*	*4x1 1/4"*	*4x1 1/2"*	*4x2 1/2"*	*4x2 1/2"*
6000	*4x1 1/2"*	*4x2"*	*4x2 1/2"*	*4x2 1/2"*	*4x1 1/4"*	*4x1 1/2"*	*4x2 1/2"*	*4x2 1/2"*
8000	*4x1 1/2"*	*4x2"*	*4x2 1/2"*	*4x2 1/2"*	*4x1 1/4"*	*4x1 1/2"*	*4x2 1/2"*	*4x2 1/2"*

Coil connections are at right hand side of a person standing in front of AHU mixing box.

Table 31. DX coil connections

Model	4 Row		6 Row		8 Row	
	Suction	Liquid	Suction	Liquid	Suction	Liquid
250	*1 1/8"*	*5/8"*	*1 3/8"*	*5/8"*	*1 3/8"*	*5/8"*
350	*1 3/8"*	*5/8"*	*1 3/8"*	*3/4"*	*1 5/8"*	*3/4"*
500	*1 5/8"*	*3/4"*	*1 5/8"*	*7/8"*	*2 1/8"*	*7/8"*
700	*1 5/8"*	*7/8"*	*2 1/8"*	*1 1/8"*	*2 1/8"*	*1 1/8"*
850	*2 1/8"*	*1 1/8"*	*2 5/8"*	*1 1/8"*	*2 5/8"*	*1 1/8"*
1000	*2 1/8"*	*1 1/8"*	*2 5/8"*	*1 1/8"*	*2 5/8"*	*1 1/8"*
1300	*2x1 5/8"*	*2x7/8"*	*2x2 1/8"*	*2x7/8"*	*2x2 1/8"*	*2x7/8"*
1600	*2x2 1/8"*	*2x7/8"*	*2x2 1/8"*	*2x1 1/8"*	*2x2 1/8"*	*2x1 1/8"*
1800	*2x2 1/8"*	*2x7/8"*	*2x2 5/8"*	*2x1 1/8"*	*2x2 1/8"*	*2x1 1/8"*
2000	*2x2 1/8"*	*2x7/8"*	*2x2 5/8"*	*2x1 1/8"*	*2x2 1/8"*	*2x1 1/8"*
2500	*4x1 5/8"*	*4x7/8"*	*4x2 1/8"*	*4x7/8"*	*4x2 1/8"*	*4x1 1/8"*
3000	*4x2 1/8"*	*4x7/8"*	*4x2 1/8"*	*4x1 1/8"*	*4x2 1/8"*	*4x1 1/8"*
3500	*4x2 1/8"*	*4x1 1/8"*	*4x2 5/8"*	*4x1 1/8"*	*4x2 5/8"*	*4x1 1/8"*
4000	*4x2 1/8"*	*4x1 1/8"*	*4x2 5/8"*	*4x1 1/8"*	*4x2 5/8"*	*4x1 1/8"*
5000	*4x2 1/8"*	*4x1 1/8"*	*4x2 5/8"*	*4x1 1/8"*	*4x2 5/8"*	*4x1 1/8"*
6000	*4x2 1/8"*	*4x1 1/8"*	*4x2 5/8"*	*4x1 1/8"*	*4x2 5/8"*	*4x1 1/8"*
7000	*4x2 1/8"*	*4x1 1/8"*	*4x2 5/8"*	*4x1 1/8"*	*4x2 5/8"*	*4x1 1/8"*
8000	*4x2 1/8"*	*4x1 1/8"*	*4x2 5/8"*	*4x1 1/8"*	*4x2 5/8"*	*4x1 1/8"*

Table 32. Steam coil connections

Model	Supply		Condensate	
	1 Row	2 Row	3 Row	4 Row
250	*1 1/2"*	*2"*	*1 1/2"*	*1 1/2"*
350	*1 1/2"*	*2"*	*1 1/2"*	*1 1/2"*
500	*2"*	*2"*	*1 1/2"*	*1 1/2"*
700	*2"*	*2"*	*1 1/2"*	*1 1/2"*
850	*2"*	*2"*	*1 1/2"*	*1 1/2"*
1000	*2"*	*2"*	*1 1/2"*	*1 1/2"*
1300	*2x2"*	*2x2"*	*2x1 1/2"*	*2x1 1/2"*
1600	*2x2"*	*2x2"*	*2x1 1/2"*	*2x1 1/2"*
1800	*2x2"*	*2x2"*	*2x1 1/2"*	*2x1 1/2"*
2000	*2x2"*	*2x2"*	*2x1 1/2"*	*2x1 1/2"*

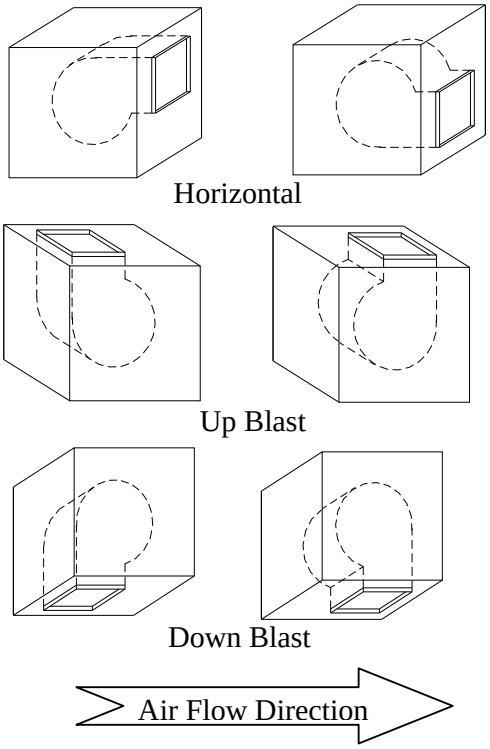
Model	Supply		Condensate	
	1 Row	2 Row	3 Row	4 Row
2500	*4x2"*	*4x2"*	*4x 1 1/2"*	*4x 1 1/2"*
3000	*4x2"*	*4x2"*	*4x 1 1/2"*	*4x 1 1/2"*
3500	*4x2"*	*4x2"*	*4x 1 1/2"*	*4x 1 1/2"*
4000	*4x2"*	*4x2"*	*4x 1 1/2"*	*4x 1 1/2"*
5000	*4x2"*	*4x2"*	*4x 1 1/2"*	*4x 1 1/2"*
7000	*4x2"*	*4x2"*	*4x1 1/2"*	*4x1 1/2"*
6000	*4x2"*	*4x2"*	*4x 1 1/2"*	*4x 1 1/2"*
8000	*4x2"*	*4x2"*	*4x 1 1/2"*	*4x 1 1/2"*

Outlet Duct connections

AHU's fan cannot be predicted before knowing flow rate and required pressure. So, the following table suggests appropriate fans according to nominal conditions. Different types of outlet arrangement are also shown.

Table 33. Fan outlet dimensions

Model	Fan Model	E	F	G	D	Outlet Area (ft^2)
250	**14**	*450*	*470*	*340*	*--*	*1.34*
350	**16**	*465*	*524*	*379*	*--*	*1.62*
500	**17**	*500*	*570*	*401*	*--*	*1.93*
700	**19**	*550*	*620*	*416*	*--*	*2.26*
850	**19**	*550*	*620*	*416*	*--*	*2.26*
1000	**22**	*645*	*733*	*462*	*--*	*3.03*
1300	**22**	*645*	*733*	*462*	*--*	*3.03*
1600	**26**	*840*	*833*	*555*	*--*	*4.03*
1800	**26**	*840*	*833*	*555*	*--*	*4.03*
2000	**29**	*943*	*787*	*584*	*--*	*5.06*
2500	**29**	*943*	*787*	*594*	*--*	*5.06*
3000	**2x26**	*840*	*833*	*565*	*1000*	*4.03*
3500	**2x26**	*840*	*833*	*565*	*1000*	*4.03*
4000	**2x29**	*943*	*787*	*594*	*1110*	*5.06*
5000	**2x29**	*943*	*787*	*594*	*1110*	*5.06*
6000	**2x32**	*871*	*1047*	*639*	*1200*	*6.17*
7000	**2x32**	*871*	*1047*	*639*	*1200*	*6.17*
8000	**--**	*--*	*--*	*--*	*1200*	*--*



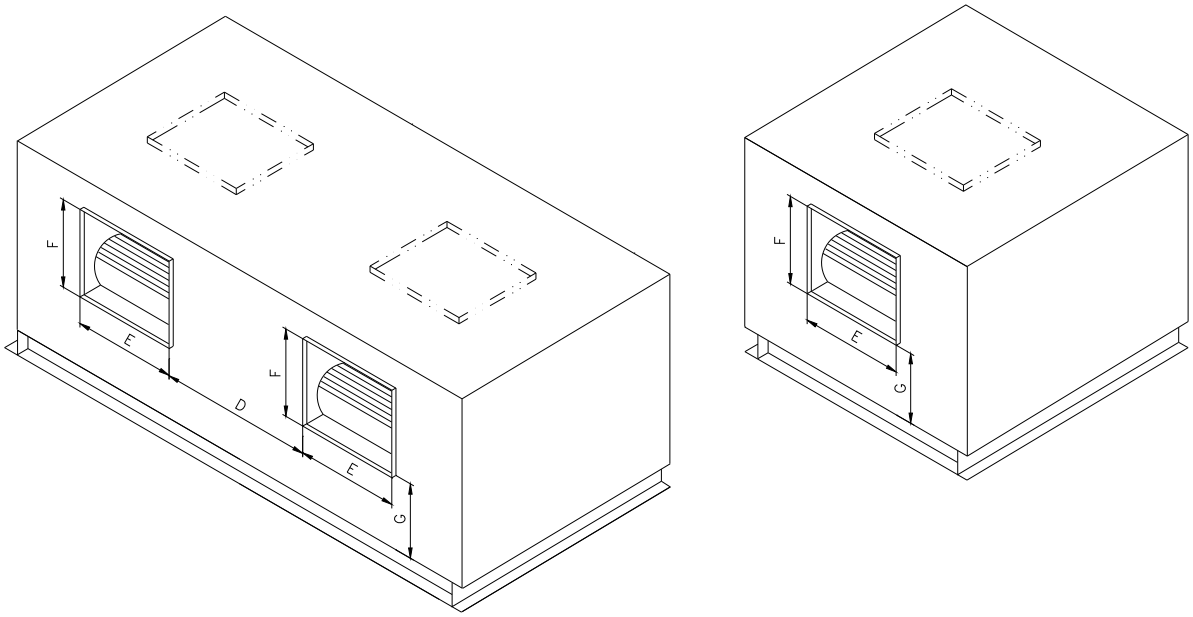


Figure 23. Fan Outlet Dimensions

Humidification

Pure heating or Cooling don't make the outside air well conditioned always. Sometimes humidifying or dehumidifying the outside air is necessary in order to reach human comfort zone, which is defined by ASHREA. Low humidity can lead to drying of the skin and mucous surfaces. Comfort complaints about dry nose, throat, eyes, and skin occur in low humidity conditions, typically when the dew point is less than 32°F. ASHREA Standard 55 recommends that the dew point temperature of occupied spaces not be less than 36°F.

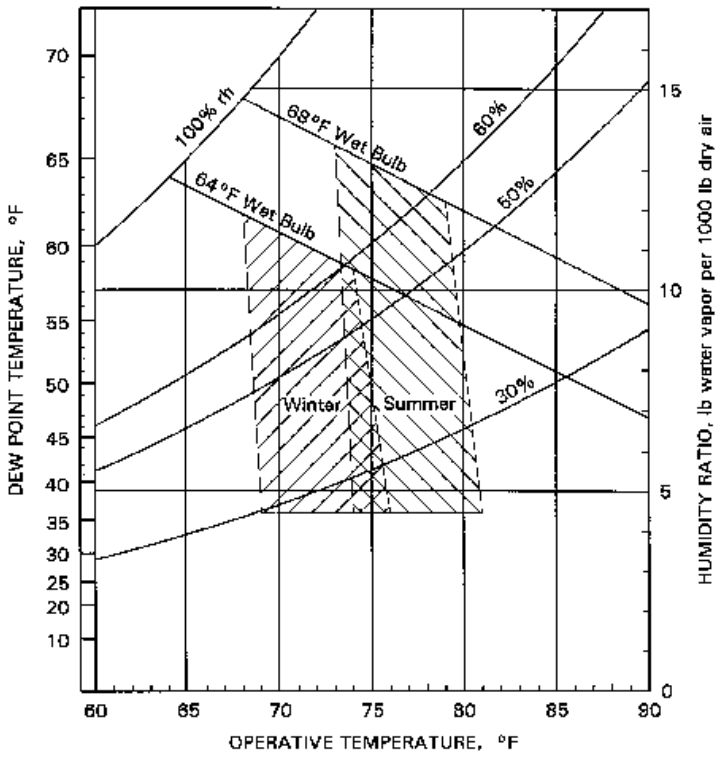


Figure 24. ASHREA summer & winter comfort zones

Saravel humidifiers are of type below:

- Air washer
- Steam Pan
- Steam grid(Single & double jacket)

Air Washer

An air washer is an apparatus designed primarily to produce an intimate contact between air and water for the purpose of obtaining transfer of heat or moisture from one to the other, for removing impurities from the air, or for the combination of both effects. Essentially an air washer consists of a chamber enclosing a system of water sprays, a tank for collecting the water falling from the sprays, inlet louvers over the air entering face of the washer, moisture eliminator at the air leaving the end and a circulating pump to create necessary pressure for sprays. Inlet louvers aid in producing a uniform flow of air into the washer so as to reach the full benefit of the sprays and prevent of backlash sprayed water. The eliminators remove drops of moisture entrained in the air leaving the chamber.

Application:

Air washers have long been a favorite means of providing winter humidification and summer evaporative cooling in commercial and industrial buildings. Usually dry and cold air is preheated before entering air washer in winter. Since the power consumption is only due to pump, it is a cheap and simple method of cooling which goes very effective in hot and dry regions where refrigeration is unavailable or uneconomical. The water obtains the required amount of heat for evaporation from the higher temperature air. This process cools and humidifies the air passing the chamber.

Air washer classes
There are three classes of air washers according to each AHU model having humidifying capacities from low to high. For the dimensional information of air washers refer to table 40.

Class 4 air washer:
The Saravel Class 4 air washer is designed to provide a very compact, inexpensive and effective spray apparatus for air cleaning, evaporative cooling and humidifying. It is appropriate for low humidification in not too low humidity regions. There is one bank of spray nozzles located in chamber spraying the water in the direction of airflow.

Class 6 air washer:
The Saravel Class 6 air washer is designed to provide a compact, inexpensive and effective spray apparatus for air cleaning, evaporative cooling and humidifying. It is appropriate to many industrial and light duty comfort jobs. There are two banks of spray nozzles facing each other with the optimum distance apart.

Class 8 air washer:
The Saravel Class 8 air washer is designed to provide effective spray apparatus for air cleaning, evaporative cooling and humidifying. It has a large capacity for water spraying and humidifying. With its larger spray capacity comparing to other classes, it is a good option for evaporative cooling and humidifying at large sensible loads. There are two banks of spray nozzles facing each other with the optimum distance apart.

Table 34. Air washer evaporative cooling efficiency

Model	Air Face Velocity (FPM)	450	500	550	600	650
	Classification	Saturation efficiency (E_{AW})				
250,350, 500	Class 4	0.59	0.56	0.52	--	--
	Class 6	0.65	0.65	0.64	0.63	0.62
	Class 8	0.88	0.87	0.86	0.85	0.83
700,850, 1000	Class 4	0.59	0.56	0.52	--	--
	Class 6	0.67	0.67	0.66	0.65	0.64
	Class 8	0.91	0.9	0.89	0.87	0.85
1300,1600,1800, 2000	Class 4	0.59	0.56	0.52	--	--
	Class 6	0.69	0.69	0.68	0.67	0.66
	Class 8	0.94	0.93	0.92	0.9	0.88
2500, 3000, 3500, 4000	Class 4	0.59	0.56	0.52	--	--
	Class 6	0.7	0.69	0.68	0.67	0.66
	Class 8	0.95	0.94	0.92	0.91	0.89
5000, 6000,7000, 8000	Class 4	0.59	0.56	0.52	--	--
	Class 6	0.7	0.69	0.69	0.68	0.66
	Class 8	0.96	0.95	0.93	0.92	0.9

Table 35. Air washer water flow rate (GPM)

Model	250	350	500	700	850	1000	1300	1600	1800	2000	2500	3000	3500	4000	5000	6000	7000	8000
Class 4	10	14	20	28	34	40	52	64	72	80	100	120	140	160	200	240	280	320
Class 6	15	21	30	42	51	60	78	96	108	120	150	180	210	240	300	360	420	480
Class 8	20	28	40	56	68	80	104	128	144	160	200	240	280	320	400	480	560	640

Air washer performance

The long length of chamber allows the sprayed and atomized water to contact with air and evaporates. 4-millimeter orifice of nozzles powders water finely for absorption in air. The humidifying efficiency is the amount of moisture added to air compared with the amount necessary to saturate it adiabatically and this is in great proportion to the cooling effect. Air entering the air washer undergoes an ideal process if the air be saturated at inlet wet bulb temperature. However, the leaving air is not always cooled to the entering wet bulb temperature thus efficiency is defined as follows:

$$E_{AW} = \frac{EDB - LDB}{EDB - EWB}$$

The saturation efficiency is dependent of air velocity and EWB. Thus for constant EWB it remains constant for different EDB temperatures, therefore cooling effect of air washer can be calculated by use table 40 and following formula:

$$LDB = EDB - E_{AW}(EDB - EWB)$$

Nozzle

Working pressure for nozzles is 30 PSI. Air washer nozzles are working according to the following diagram.

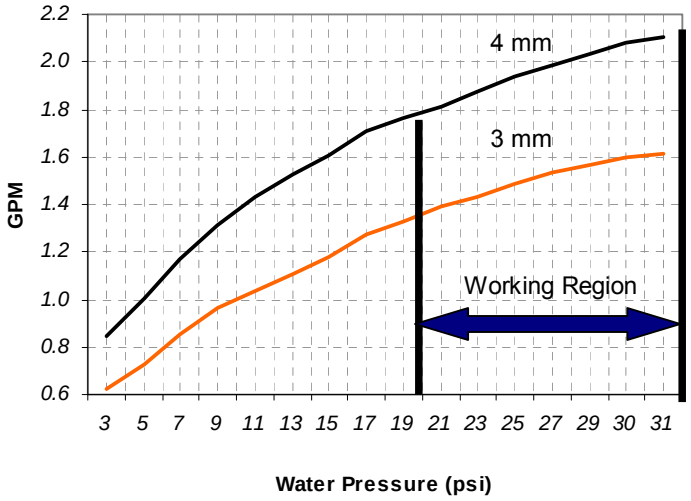


Figure 25. Air washer performance

Table 36. Air washer dimensions

Model	Face Area (ft^2)	A	B	D	J	D1	D2	D4	D5	Class 4		Class 6		Class 8	
										D3	C	D3	C	D3	C
AW-250	10	1320	950	200	80	3/4"	1"	2"	2"	1 1/2"	1200	1 1/2"	1750	1 1/2"	2400
AW-350	12	1400	1050	200	80	3/4"	1"	2"	2"	1 1/2"	1200	1 1/2"	1750	2"	2400
AW-500	15	1580	1100	200	80	3/4"	1"	2"	2"	1 1/2"	1200	2"	1750	2"	2400
AW-700	22	1750	1400	200	100	3/4"	1"	2"	2"	2"	1200	2"	1750	2 1/2"	2400
AW-850	25	2000	1400	250	100	3/4"	1"	2"	2"	2"	1200	2"	1750	2 1/2"	2400
AW-1000	27	2150	1400	250	100	3/4"	1"	2"	2"	2"	1200	2 1/2"	1750	3"	2400
AW-1300	34	2150	1700	250	100	3/4"	1"	2 1/2"	2"	2 1/2"	1200	2 1/2"	1750	3"	2400
AW-1600	41	2630	1700	250	120	3/4"	1"	2 1/2"	2 1/2"	3"	1200	3"	1750	4"	2400
AW-1800	48	2630	2000	250	120	1"	1"	2 1/2"	2 1/2"	3"	1200	3"	1750	4"	2400
AW-2000	52	2850	2000	300	120	1"	1"	2 1/2"	2 1/2"	3"	1200	3"	1750	4"	2400
AW-2500	62	3330	2020	300	120	1"	1"	2 1/2"	2 1/2"	3"	1200	4"	1750	4"	2400
AW-3000	69	3830	2020	350	140	1"	1 1/4"	3"	2 1/2"	3"	1200	4"	1750	4"	2400
AW-3500	83	4230	2170	350	140	1"	1 1/4"	3"	2 1/2"	4"	1200	4"	1750	5"	2400
AW-4000	89	4530	2170	350	140	1"	1 1/4"	4"	2 1/2"	4"	1200	5"	1750	5"	2400
AW-5000	112	4730	2600	400	140	1 1/4"	1 1/4"	4"	2 1/2"	4"	1200	5"	1750	5"	2400
AW-6000	126	5200	2700	450	140	1 1/4"	1 1/4"	4"	2 1/2"	5"	1200	5"	1750	6"	2400
AW-7000	145	5400	3000	500	140	1 1/4"	1 1/4"	4"	2 1/2"	5"	1200	5"	1750	6"	2400
AW-8000	169	5700	3250	500	140	1 1/4"	1 1/4"	4"	2 1/2"	5"	1200	6"	1750	6"	2400

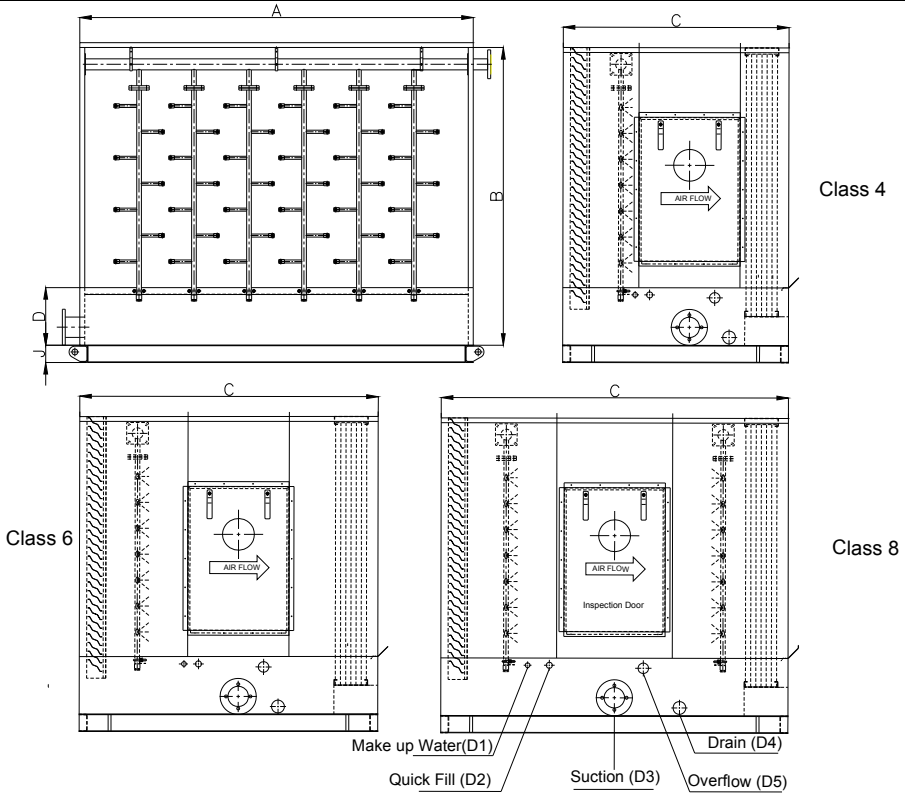


Figure 26. Air washer dimensions

Sound Attenuator

Acoustic silencers are designed to attenuate sound power levels that propagated in air handling units as shown in figure 27. Sound attenuators are made of a special sound absorbing material which are installed in the supply, return and fresh are plenum or inside of AHU. Two different configurations are available for the construction of sound attenuator, namely: parallel baffle model and lined duct model as shown in figure 28. SARAVEL sound attenuator are made from galvanized steel sheets in rectangular duct form which could be divided either in internal or external types. Furthermore, each type can be categorized in two classes as L and H, which the latest indicates the baffle thickness.

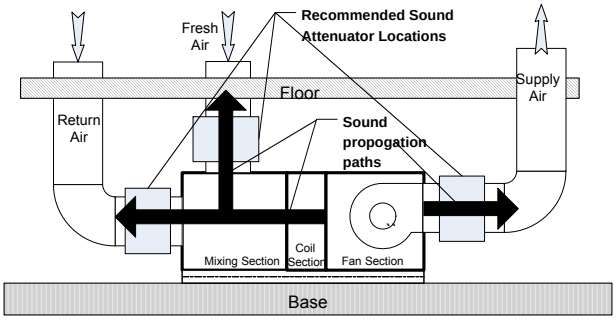


Figure 27. Sound propagation through ducts

The absorbed sound power and pressure drop in the parallel baffle model is higher than the lined duct model and also this rule exists between H and L classes.

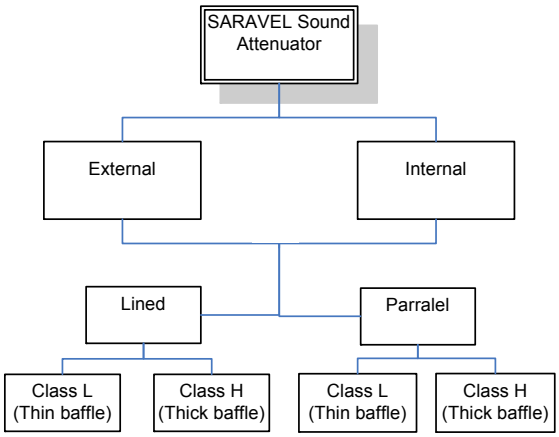


Figure 28. Classification of SARAVEL sound attenuators

Selection Examples

Example 1: Lined duct sound attenuator
Given Data:
SARAVEL AHU-1300
Air flow ..... 13000 CFM
Pressure drop..... 1 ¼" W.G

Selection:

Based on 22" fan curve on page 37, RPM is 580. Fan blade frequency from figure 30 is 685 Hz. From figure 32,33 for AHU-1300 with 2" W.G. static pressure drop, the fan sound generation, L1, is 87.5 db. If the parallel baffle sound attenuator has been chosen, there are four options to determine the types and classes of silencers. For example with external, E, H-class

Example 2: Parallel baffle sound attenuator
Given Data:
SARAVEL AHU-1300
Air flow ..... 14795 CFM
Pressure drop.....2" W.G

sound attenuator insertion loss, IL, is interpolated to be 28.8 db. Then the, L12, is obtained from the following formula:

$$L_{12} = L_1 - IL = 85.5 - 28.8 = 56.7 \text{ db}$$

The generated noise, GN, can be obtained from 50. This value must be corrected if the required CFM does not correspond to the nominal CFM of the chosen model. To determine the

corrected generated noise, GN_C, the following formula must be used:

$GN_C = GN + (Correction\ factor)$

The correction factor must be obtained from table 44 with the aid of the following percentage:

CFM / (Nominal CFM) = 14795/13000 = 1.14 = 114 %

Therefore with GN of 41 db and 3 db offset:

$GN_C = 41 + 3 = 44$ db

The output sound power of sound attenuator is influenced by reduced sound power, L_{12}, and sound attenuator generated sound power, GN_C. In order to obtain the resultant sound power, a parameter from monograph of figure 29 must be obtained with the difference of L_{12} and GN_C.

$L_{12} - GN_C = 56.7 - 44 = 12.7$

$A = 0.2$

The resultant sound power can be calculated this way:

$L_2 = Max\ \{L12, GN_C\} + A$

$L_2 = 56.7 + 0.2 = 56.9$ db

Finally, the absorbed sound power is:

$SA = L_1 - L_2 = 85.5 - 56.9 = 28.6$ db

Table 37. Generated noise, GN, in parallel sound attenuator* (db)

Type	Class	Air Handling Unit Models													
		250	350	500	700	850	1000	1300	1600	1800	2000	2500	3000	3500	4000
E	L	33	31	33	38	37	36	36	41	41	41	39	40	41	43
	H	40	37	43	42	42	42	41	46	46	46	46	45	48	48
I	L	3	11	14	16	18	19	20	21	21	22	23	24	25	26
	H	9	17	19	21	23	24	25	27	28	29	29	30	31	32

GN ratings are based on nominal CFM

Table 38. Correction factor for generated noise (db)

CFM/NOM. CFM	50%	75%	100%	125%	150%	175%	200%
Correction Factor	-16.6	-6.9	0	5.3	9.7	13.4	16.6

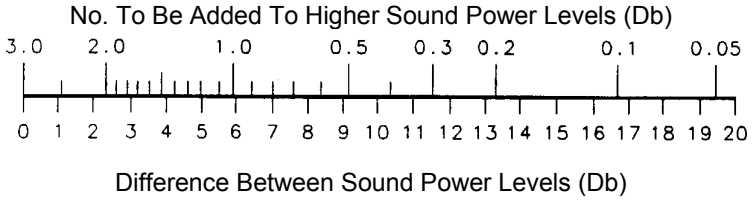


Figure 29. Monograph for adding two sound power levels

Table 39. Insertion loss (IS) in lined duct sound attenuator (db)

Type	Class	Feq. (Hz)	250	350	500	700	850	1000	1300	1600	1800	2000	2500	3000	3500	4000	5000	6000	7000	8000
E	L	63	0.19	0.17	0.15	0.14	0.13	0.12	0.10	0.10	0.10	0.09	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07
		125	0.64	0.56	0.50	0.45	0.42	0.39	0.34	0.34	0.32	0.31	0.28	0.26	0.25	0.24	0.24	0.24	0.24	0.24
		500	7.39	6.45	5.77	5.25	4.83	4.48	3.95	3.95	3.65	3.56	3.25	3.00	2.89	2.79	2.79	2.79	2.79	2.79
		1000	9.91	8.28	7.05	6.09	5.56	4.72	3.80	3.80	3.5	3.15	2.67	2.30	2.15	2.02	2.02	2.02	2.02	2.02
		2000	7.06	6.50	6.00	5.55	5.03	4.83	4.27	4.27	4.05	3.82	3.46	3.17	3.04	2.92	2.92	2.92	2.92	2.92
	H	63	0.46	0.39	0.34	0.31	0.29	0.26	0.23	0.23	0.21	0.20	0.18	0.17	0.16	0.16	0.16	0.16	0.16	0.16
		125	1.53	1.30	1.15	1.03	0.95	0.87	0.75	0.75	0.71	0.68	0.62	0.57	0.55	0.53	0.53	0.53	0.53	0.53
		500	17.58	15.01	13.21	11.88	10.94	10.0	8.73	8.73	8.32	7.81	7.09	6.53	6.28	6.06	6.06	6.06	6.06	6.06
		1000	6.31	5.75	5.19	4.67	4.25	3.83	3.20	3.21	3.01	2.73	2.35	2.06	1.94	1.82	1.82	1.82	1.82	1.82
		2000	4.25	4.31	4.25	4.12	3.97	3.82	3.52	3.52	3.42	3.25	3.01	2.80	2.70	2.61	2.61	2.61	2.61	2.61
I	L	63	0.11	0.11	0.1	0.09	0.09	0.08	0.07	0.07	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.05
		125	0.37	0.37	0.33	0.3	0.29	0.27	0.25	0.23	0.23	0.22	0.2	0.19	0.18	0.17	0.17	0.17	0.17	0.17
		500	4.26	4.26	3.82	3.47	3.29	3.1	2.89	2.69	2.58	2.5	2.27	2.16	2.05	1.99	1.99	1.99	1.99	1.99
		1000	4.52	4.52	3.69	3.15	2.84	2.53	2.28	1.99	1.84	1.7	1.37	1.16	1.06	0.94	0.94	0.94	0.94	0.94
		2000	4.61	4.61	4.05	3.71	3.47	3.22	3.14	2.84	2.62	2.55	2.18	1.9	1.78	1.61	1.61	1.61	1.61	1.61
	H	63	0.25	0.25	0.22	0.2	0.19	0.18	0.16	0.15	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.11	0.11	0.11
		125	0.83	0.83	0.73	0.66	0.63	0.59	0.55	0.51	0.49	0.47	0.43	0.4	0.38	0.37	0.37	0.37	0.37	0.37
		500	9.53	9.53	8.47	7.66	7.23	6.8	6.3	5.85	5.65	5.42	4.91	4.67	4.43	4.3	4.3	4.3	4.3	4.3
		1000	3.64	3.64	3.06	2.68	2.44	2.2	2.04	1.79	1.62	1.55	1.25	1.07	0.97	0.87	0.87	0.87	0.87	0.87
		2000	3.61	3.61	3.28	3.09	2.92	2.75	2.77	2.52	2.44	2.29	1.97	1.72	1.63	1.41	1.41	1.41	1.41	1.41

Table 40. Insertion loss (IS) in parallel baffle sound attenuator (db)

Type	Class	Feq. (Hz)	250	350	500	700	850	1000	1300	1600	1800	2000	2500	3000	3500	4000	5000	6000	7000	8000
E	L	63	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
		125	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		500	16	11	11	14	14	11	10	10	10	12	10	10	10	11	11	11	11	11
		1000	37	27	26	31	25	25	25	25	25	28	25	25	25	27	27	27	27	27
		2000	71	66	65	66	66	63	62	62	62	62	61	60	60	61	61	61	61	61
	H	63	5	3	4	3	3	3	3	3	3	3	3	3	4	3	3	3	3	3
		125	8	6	7	5	5	5	5	5	5	5	5	5	6	5	5	5	5	5
		500	30	23	27	22	22	21	21	21	21	21	21	21	22	21	21	21	21	21
		1000	52	45	48	43	42	42	42	42	42	41	41	41	42	41	41	41	41	41
		2000	66	68	64	66	64	64	63	63	63	63	62	62	61	62	62	62	62	62
I	L	63	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
		125	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		500	11	11	11	10	10	12	11	11	11	10	10	11	11	10	10	10	10	10
		1000	26	26	26	25	27	27	27	25	25	24	25	26	25	24	24	24	24	24
		2000	64	64	62	62	62	62	61	60	60	60	60	60	60	60	60	60	60	60
	H	63	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
		125	5	5	5	5	5	5	5	5	5	6	6	5	6	6	6	6	6	6
		500	22	22	21	21	21	21	21	21	21	21	22	21	21	21	21	21	21	21
		1000	43	43	41	40	42	42	41	41	41	41	41	41	41	41	41	41	41	41
		2000	65	65	61	61	62	63	62	63	63	63	61	62	61	61	61	61	61	61

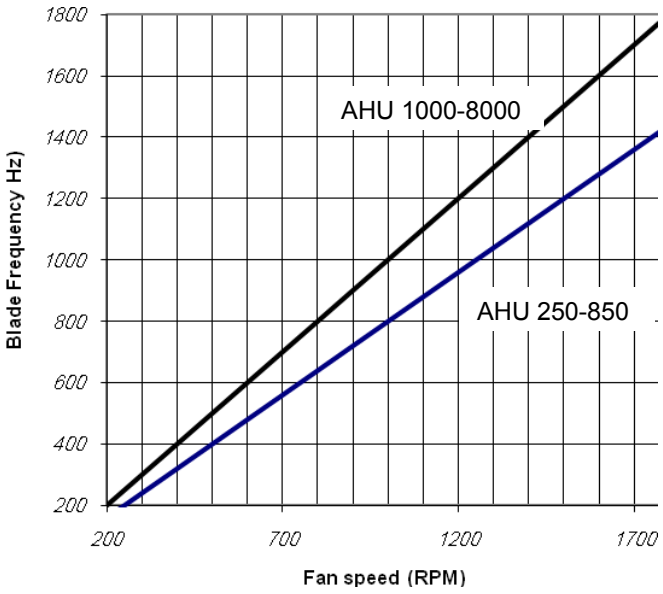


Figure 30. Fan blade frequency (Hz)

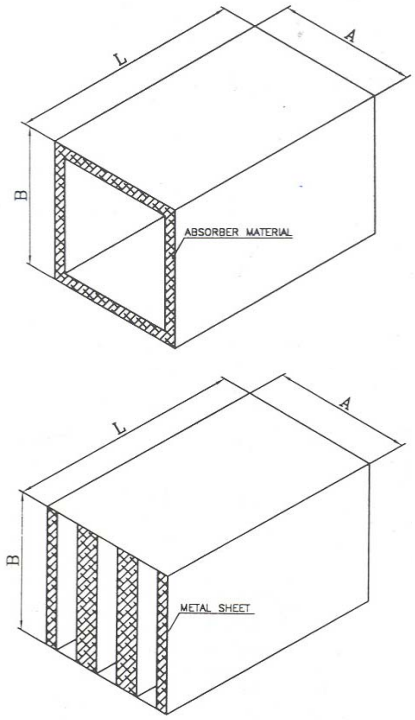


Table 41. Sound attenuator dimensions

MODEL	PARRALLEL BAFFLE						LINED DUCT			
	TYPE E				TYPE I		TYPE E		TYPE I	
	L		H		L & H		L & H		L & H	
	A	B	A	B	A	B	A	B	A	B
250	500	500	500	500	1320	950	500	500	1320	950
350	600	600	600	600	1400	1050	600	600	1400	1050
500	750	700	700	700	1580	1100	700	700	1580	1100
700	800	800	800	800	1750	1400	800	800	1750	1400
850	800	800	800	800	2000	1400	800	800	2000	1400
1000	1050	1000	1000	1000	2150	1400	1000	1000	2150	1400
1300	1200	1200	1200	1200	2150	1700	1200	1200	2150	1700
1600	1200	1200	1200	1200	2630	1700	1200	1200	2630	1700
1800	1400	1400	1400	1400	2630	2000	1400	1400	2630	2000
2000	1400	1400	1400	1400	2850	2000	1400	1400	2850	2000
2500	1650	1600	1600	1600	3330	2020	1600	1600	3330	2020
3000	1800	1800	1800	1800	3830	2020	1800	1800	3830	2020
3500	1950	1900	1900	1900	4230	2170	1900	1900	4230	2170
4000	2000	2000	2000	2000	4530	2170	2000	2000	4530	2170
5000	2400	2400	2400	2400	4730	2600	2400	2400	4730	2600
6000	2500	2500	2500	2500	5200	2700	2500	2500	5200	2700
7000	3000	3000	3000	3000	5400	3000	3000	3000	5400	3000
8000	3000	3000	3000	3000	5700	3250	3000	3000	5700	3250

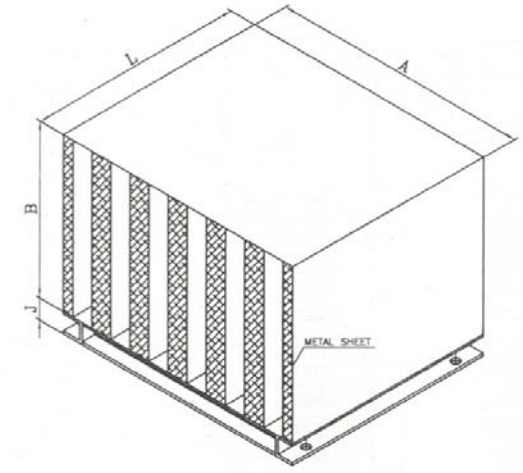


Figure 31. Sound Attenuator Dimensions

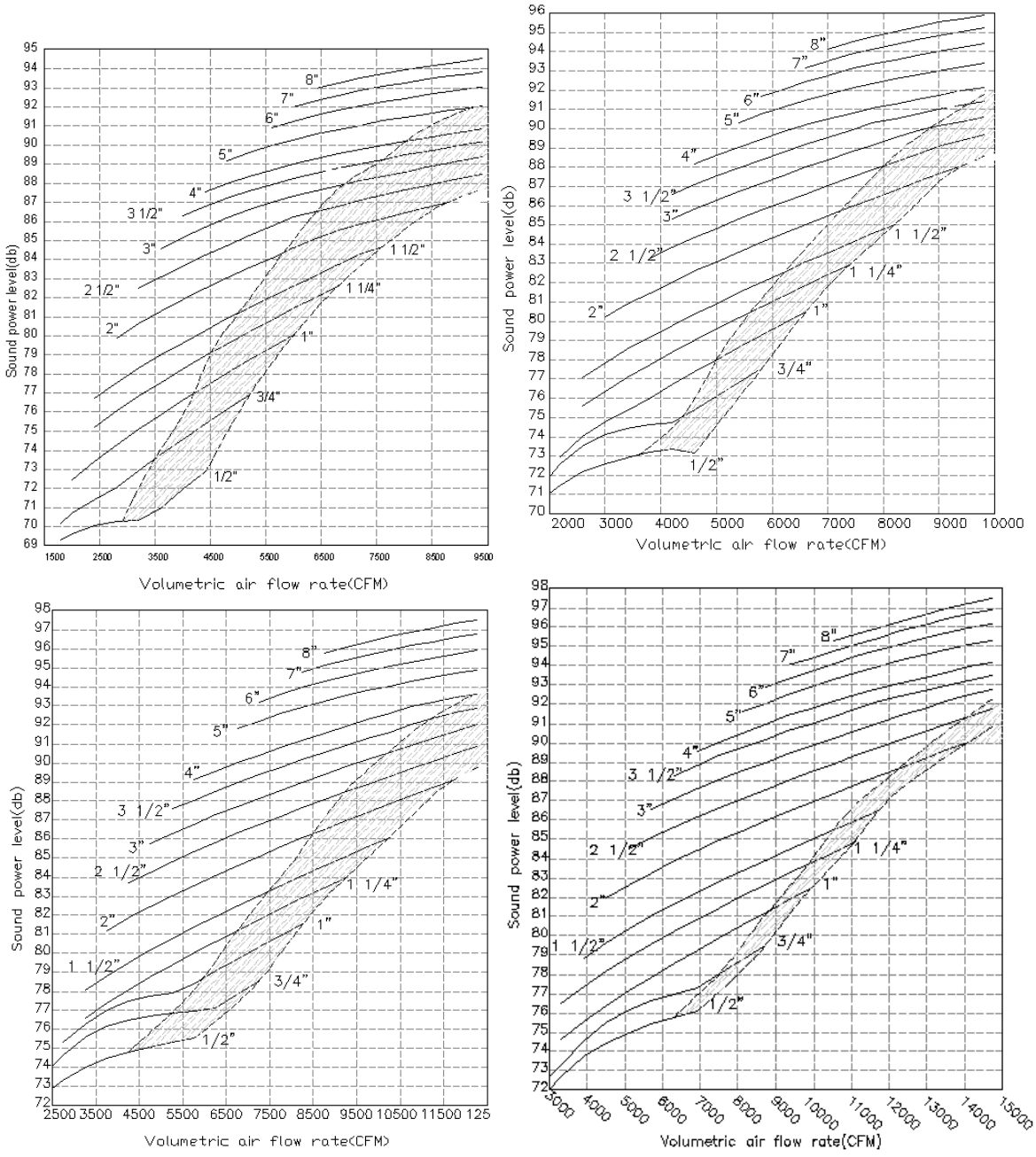


Figure 30. Sound power levels of Fans

Note:

1- When sound power level falls within the shaded area, add 3 to 6 db to the given sound power level from left boundary of the region to the right boundary respectively.

2- Sound ratings are based on a distance of 1 m from the air handling unit.

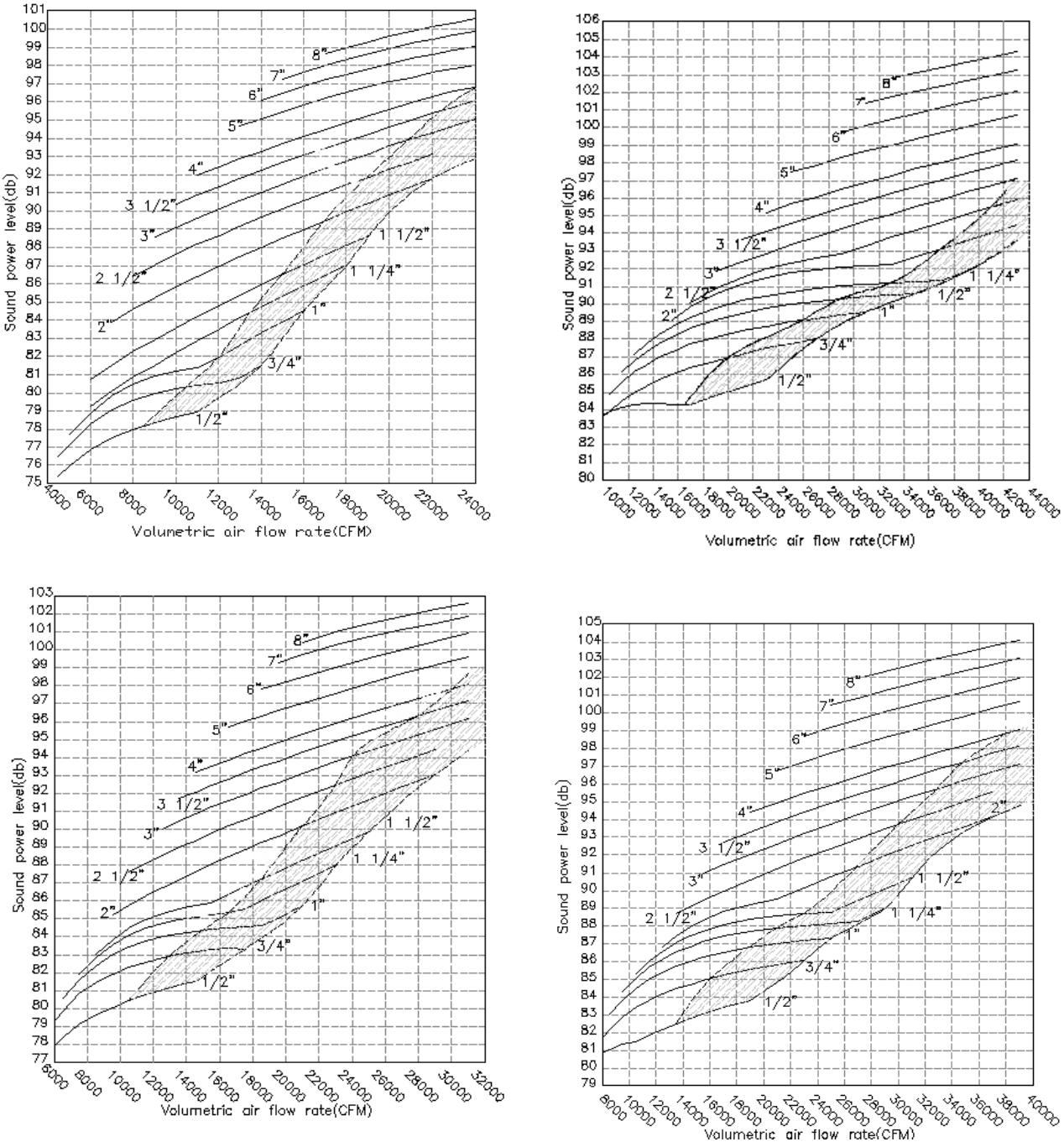
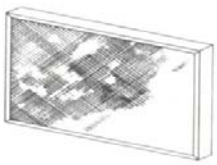
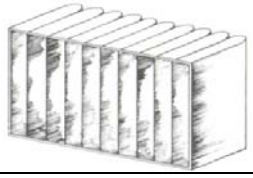
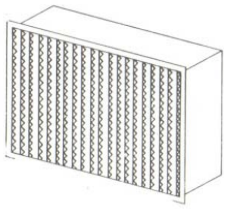
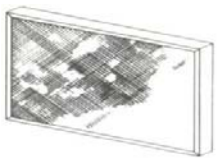


Figure 31. Sound power levels of Fans

Note:
1. When sound power level falls within the shaded area, add 3 to 6 db to the given sound power leve from left boundary of the region to the right boundary respectively.
2.Sound ratings are based on a distance of 1 m from the air handling unit.

Filter Type	Application Data	Description
Aluminum washable mesh	Initial pressure drop=0.04“ Face Velocity=(400-500) fpm Average arrestance=40% Filter grade to EUROVENT is 4/5 (B.S. 6540)=EU	Permanent washable panel type air filter, constructed with corrugated aluminum expanded sheet. Used as a pre-filter in the first stage air filtration in AHU to trap visible particles from air stream.
Pleated filter 	Initial pressure drop=0.22“ Face Velocity=(400-550) fpm Atmospheric dust spot efficiency=25% to 70% Filter grade to EUROVENT is 4/5 (B.S. 6540 or ASHREA 52/76)=EU 3&4	Panel type pre-filter is constructed from no woven material, pleated and retained in a diamond shape cardboard that provides 70% open area to allow reasonable efficient filtration.
Bag filter 	Initial pressure drop=0.2“ Face Velocity=(400-500) fpm Atmospheric dust spot efficiency=45% to 95% Filter grade to EUROVENT is 4/5 (B.S. 6540 or ASHREA 52/76)=EU 4 or EU9	Bag filters made from high quality glass fiber media or non-woven material for separation of fine dust and suitable for applications in air conditioning units.
HEPA, ULPA & SULPA 	Initial Pressure drop:0.9 " Face velocity = (250-550) fpm Efficiency of HEPA, ULPA & SULPA filters range from 99% - 99.9999% for Particles equal or greater than 0.3 Micron (HEPA) & 99.99% for particles equal or greater than 0.12 micron, (ULPA) SULPA. EUROVENT 4/4 (B.S 3928).	High efficiency particulate air filters (HEPA) and ultra low penetration air filters (ULPA) are constructed from glass micro fiber media and corrugated aluminum foil separators, packed in a plywood or aluminum case. Applicable for operating theaters, pharmaceutical production, electronic production, clean rooms, & laboratories. The test carried out for these types of air filters is based on sodium flame test.
Active carbon 	Initial pressure drop = 0.26” Adsorptive capacity for some gases: (Gasoline 10%-20%) (Methanol 50%) (Benzene 45%-55%) (Ethanol 50%) (Acetone 51 %) (Acetic acid 70%) (Isopropanol 50%). Area of active carbon site that provides effective adsorptivity is 500-1500 m2/g.	Activated carbon is made by the pyrogenic decomposition of suitable coal and wood in special retorts. Active carbon is very effective in adsorbing non-polar organic molecules, particularly solvents. In addition, it has a large capacity to catalytically destroy ozone, a major component of smog.

DAMPERS

A damper is a device that controls the flow of air in an air-conditioning system. The damper accomplishes airflow control by varying resistance for flow. Volume control dampers are manufactured with either "opposed" blades or "parallel" blades. Dampers may be hand operated and locked into position after adjustment or may be power operated and controlled by temperature and pressure sensors or by other remote signal.

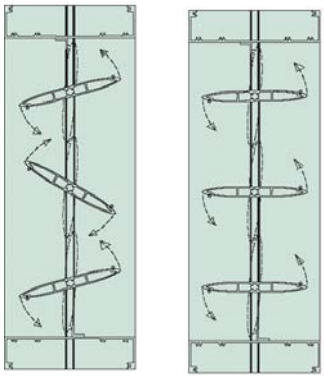
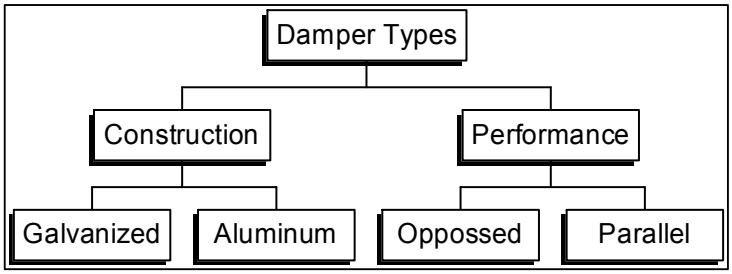


Figure 32. Opposed and Parallel mechanism



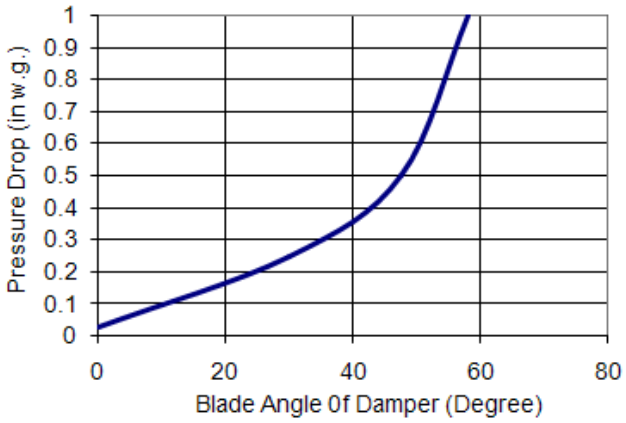


Figure 33. Pressure drop-Vs- damper blade angle

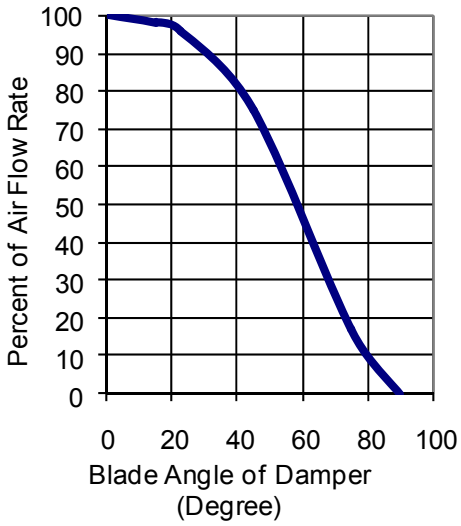


Figure 34. Percent air flow-Vs- damper blade angle

Table 42. Damper leakage rate (CFM/Ft^2) & conversion factor

Model	System Pressure Rate (in. w.g.)	
All Sizes	1"	2"
	80	160

Static Pressure	Conversion Factor
2"	1.41
3"	1.73

Vibration Absorber

In Order to reduce transmitted vibrations from mechanical equipment to foundations and support structures, neoprene vibration isolators or spring type isolators such as the one shown in figure 37 are commonly employed.

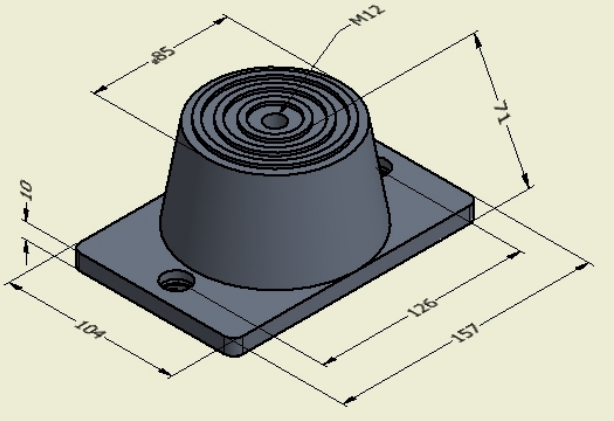


Figure 35. Neoprene Vibration Absorber

Application Data

Air handling unit application

Air handling units may be classified into three classes. Recirculation AHU are appropriate for industrial zones and factory processes. Heat treatment AHU is mostly used in commercial and residential zones. Humidifying AHU is equipped with a humidifier. They are the best choice for not humid climates with air washers as evaporative coolers.

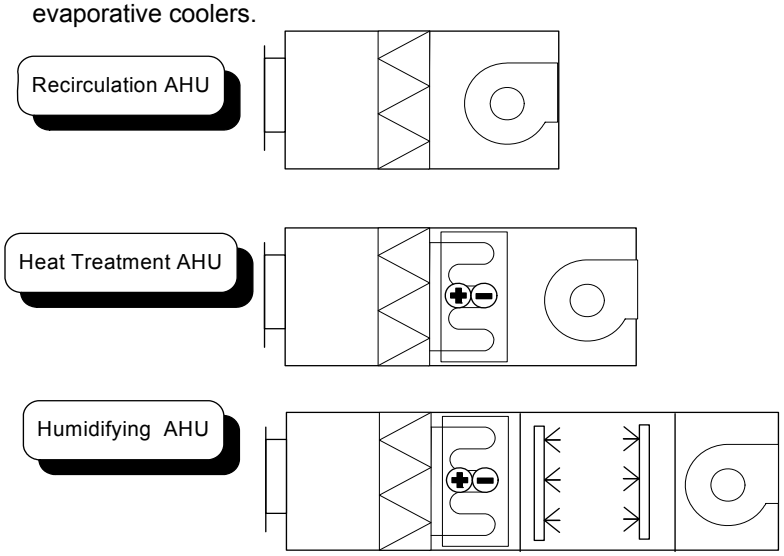


Figure 39. Application classification of AHU

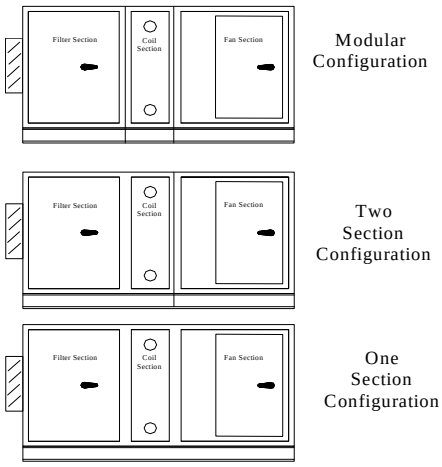


Figure 38. AHU sections installation type

AHU section installation

SARAVEL AHU can be constructed comprehensively modulated, that is all the sections can be separated from each other upon customer's order. The standard AHU is constructed in separate modules. Different Assembling types is shown on figure above.

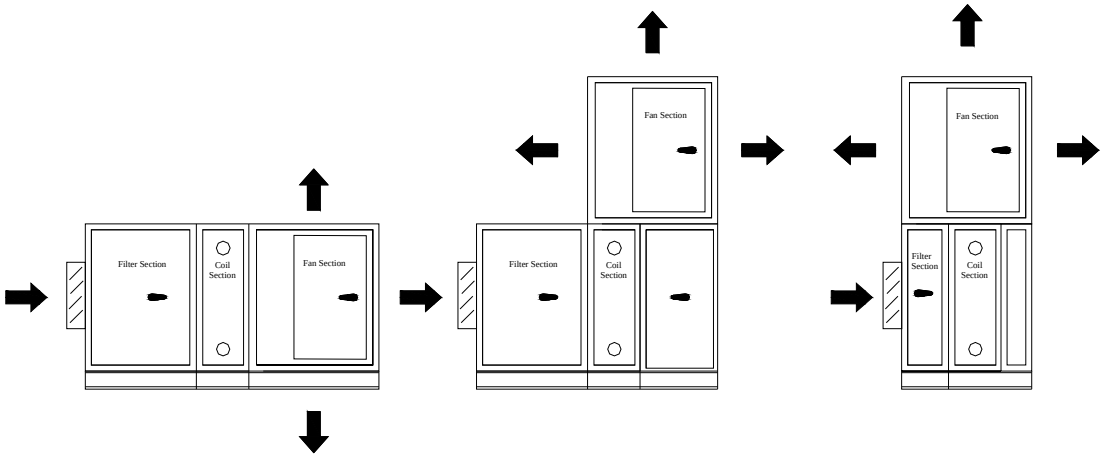


Figure 40 Fan discharge directions

Fans

AHU fans are completely constructed at SARAVEL. Although double width and double inlet, DWDI Forward blade fans are used, SARAVEL backward blade fans are available too. The fans have been classified according to AMCA standard 210-90. Shaft diameter and other mechanical specifications change due to related fan class. Each fan would fall into one of the following classes:

1. Class A Saravel Fan
2. Class B Saravel Fan
3. Class C Saravel Fan
4. Class D Saravel Fan

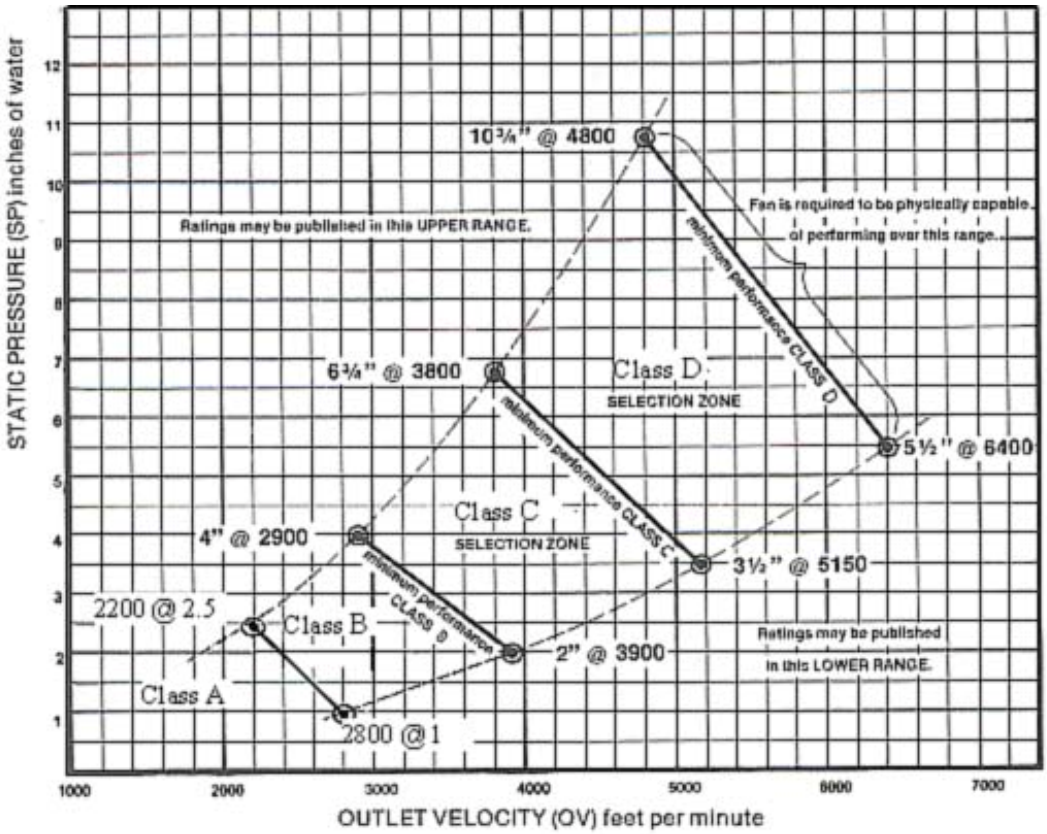


Figure 36. SARAVEL Forward blade DWDI fan Classification according to AMCA

Fan Laws

Fan laws are interesting formulas, which help engineers to predict the performance of fans by changing any of the fan related parameters. The following symbols indicate these parameters:

CFM: Fan flow rate
RPM: Rotational speed of the impeller
P: Static Pressure
Hp: Horsepower
D: Fan wheel diameter
W: Air density

Table 43. Fan Laws

VARIABLE	CONSTANT	LAW	FORMULA
SPEED (RPM)	Air Density Fan Size Distribution System	Airflow varies directly with the Speed.	$\frac{CFM_1}{CFM_2} = \frac{RPM_1}{RPM_2}$
		Pressure varies as the square of the Speed.	$\frac{P_1}{P_2} = \left(\frac{RPM_1}{RPM_2}\right)^2$
		Horsepower varies as the cube of the Speed.	$\frac{Hp_1}{Hp_2} = \left(\frac{RPM_1}{RPM_2}\right)^3$
FAN SIZE (D)	Air Density Tip Speed	Capacity and Horsepower vary as the square of the Fan Size.	$\frac{CFM_1}{CFM_2} = \frac{Hp_1}{Hp_2} = \left(\frac{D_1}{D_2}\right)^2$
		Speed varies inversely as the Fan Size.	$\frac{RPM_1}{RPM_2} = \frac{D_2}{D_1}$
		Pressure remains constant.	$P_1 = P_2$
	Air Density Wheel Speed	Capacity varies as the cube of the Size.	$\frac{CFM_1}{CFM_2} = \left(\frac{D_1}{D_2}\right)^3$
		Pressure varies as the square of the Size.	$\frac{P_1}{P_2} = \left(\frac{D_1}{D_2}\right)^2$
		Horsepower varies as the fifth power of the Size.	$\frac{Hp_1}{Hp_2} = \left(\frac{D_1}{D_2}\right)^5$
AIR DENSITY (W)	Pressure Fan Size Distribution System	Speed, Capacity, and Horsepower vary inversely as the square root of Density.	$\frac{RPM_1}{RPM_2} = \frac{CFM_1}{CFM_2} = \frac{Hp_1}{Hp_2} = \left(\frac{W_2}{W_1}\right)^{1/2}$
	Airflow Fan Size Distribution System	Pressure and Horsepower vary with Density.	$\frac{P_1}{P_2} = \frac{Hp_1}{Hp_2} = \frac{W_1}{W_2}$
		Speed remains constant.	$RPM_1 = RPM_2$

Duct Design Considerations

Figure 42 shows changes in velocity profiles at various distances from centrifugal fan outlet. By definition, 100% effective duct design is a distance where flow should takes until achieve uniform velocity profile. In order to calculate 100% effective duct length, assume a minimum of 2-½ duct diameter for 2500 fpm or less and add 1 duct diameter for each additional 1000 fpm. Elbows, high efficiency filters, sound attenuators and any other device should be installed after effective duct length in order to cause less pressure drop. For 100% recovery of velocity pressure into static pressure, the straight portion of the discharge duct must be at least at least 21/2 times the discharge diameter in length for velocities of 2500 fpm or less. For each additional 1000 fpm, add one duct diameter to the length of the straight portion of the ductwork.

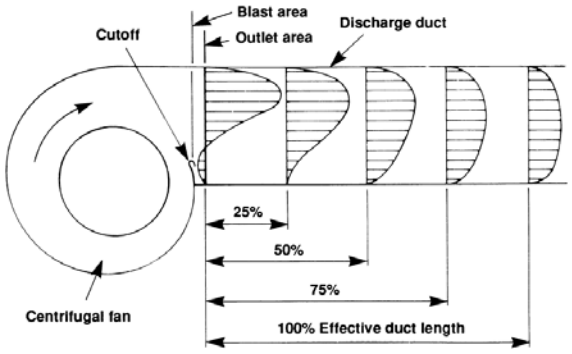


Figure 37. Fan outlet velocity profile

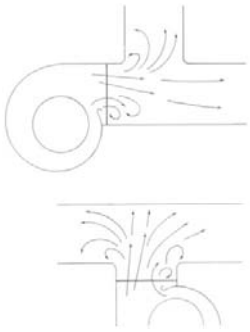


Figure 38. Improper Duct design

Avoid using such designs shown on figure 42. Since the pressure drop would become much more.

The figure shown below, illustrate the requirement of pants connection to achieve optimum air flow conditions. There should be 1 ½ fan diameters of straight duct before the transition. The convergence angle should be 30o at most.

When the air is to be discharged into a plenum and the plenum is situated opposite the fan the fan, plenum outlet should be at least 1 ½ fan diameter away for low outlet velocity (1500 fpm) and 3 diameters away for high outlet velocity (3500 fpm). The cross section area of the plenum should be at least four times larger than the fan outlet area.

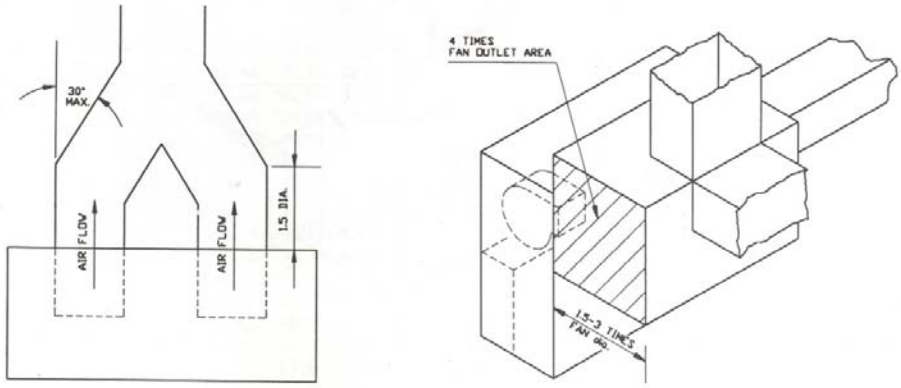


Figure 40. Outlet Plenum Instruction

Plenum fans (sometimes called ‘‘plug’’ fans) are typically used in medium to high static pressure applications where ductwork requires discharge location flexibility. They can reduce the need for ductwork turns or diffusers, especially when equipment room space is limited. Plenum fans are less efficient than double-width, double inlet airfoil fans. General construction also differs from that of FC or AF fans. The fan does not have a scroll to enclose the fan wheel and direct airflow. Instead, the fan pressurizes the entire interior of the plenum fan section. Plenum fans have single-width, single-inlet (SWSI) construction. The fan shaft is parallel with the airflow, and the motor and bearings are located inside the plenum in the pressurized airstreams. An optional inlet screen and wheel cage can be installed to help protect personnel during maintenance. Because the casing of a plenum fan section acts as a sound attenuator, plenum fans are also sometimes used when discharge sound levels need to be reduced. Duct takeoffs from plenum fans can have relatively high-pressure losses and can also create turbulence that causes a larger pressure drop across coil and filter sections. When selecting a plenum fan, the pressure drop for the duct takeoffs must be added to the external static pressure for the rest of the system. To calculate the pressure losses from plenum fan duct takeoffs, use the following formula:

$$P_L = P_P - P_D = (C_V)\,(V_P)$$

Where P_L is the pressure loss, P_P is the plenum pressure, P_D is the duct pressure, C_V is the pressure loss coefficient, and V_P is the velocity pressure in the duct. Note that for radial duct takeoffs, C_V is 1.5 in. w.g., while for axial duct takeoffs, C_V is 2.0 in. w.g. To calculate velocity pressure (V_P) in the duct, use the following formula, where V is the air velocity in the duct:

$$V_P = [(V) \div (4005)]^2$$

Also note that with more than one duct takeoff and different duct velocities, the highest duct velocity and highest C_V value should be used in the formulas. Plenum fans do not require straight ductwork of a particular minimum length, because velocity pressure is converted to static pressure inside the plenum fan section. Outlet ducts, however, should not be installed directly in line with the air discharge from the fan wheel.

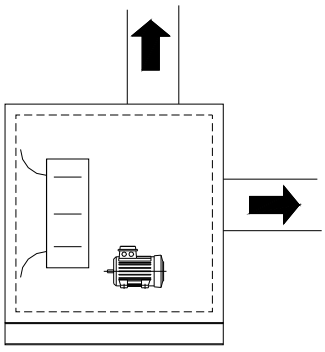


Figure 41. Plenum fan section

Table 44. Plenum Fans Suited for each AUH

Model	AHU	250	350	500	700	850	1000	1300	1600	1800	2000	2500	3000	3500	4000
Nicotra Plug Fan	PNF1	250 RD	280 RD	280 RD	355 RD	355 RD	400 RD	400 RD	450 RD	450 RD	500 RD	560 RD	560 RD	630 RD	710 RD

Air Trap

Condensate water in coil section is collected at the bottom of coil section. Concerning the fan induced pressure at coil section, there is a pressure difference between inside the coil section and ambient. Therefore, water draining will stop and coil will be drown in water. In order to overcome this problem air trap must be used.

Fig-47 illustrates suggested sizing guidelines for drain traps. “A” is equal to system static pressure in Pa×0.102 mm at drain point. Condensate drainpipe size is the same as connection size of the unit drain (minimum 25 mm). Prior to start-up and after a long period of shutdown-operation siphon/P-trap must be filled with water with water additional port.

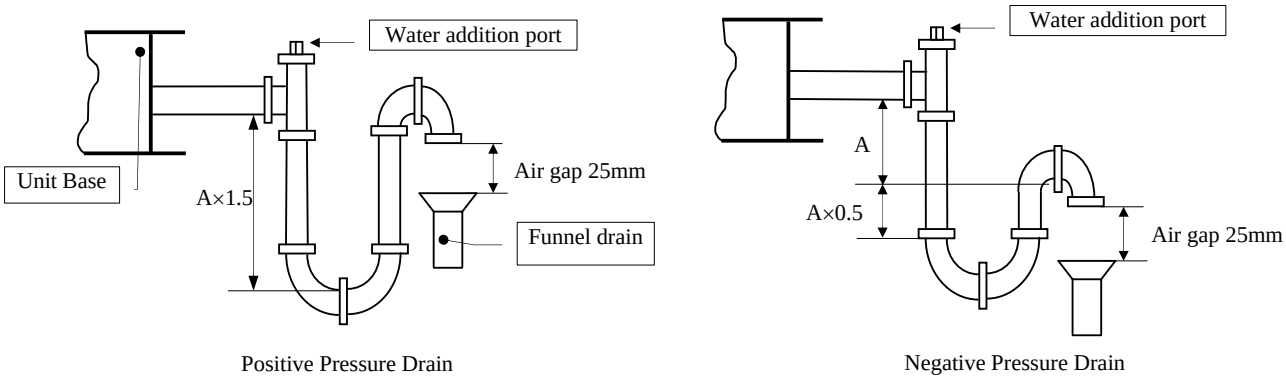


Figure 42. Air Trap

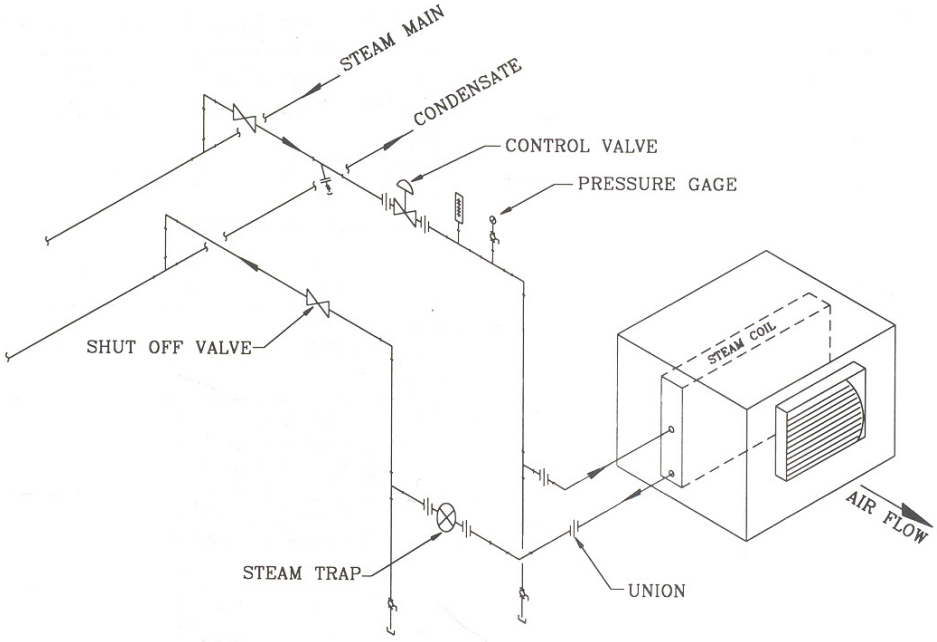


Figure 43. Suggested coil connection details for steam coils

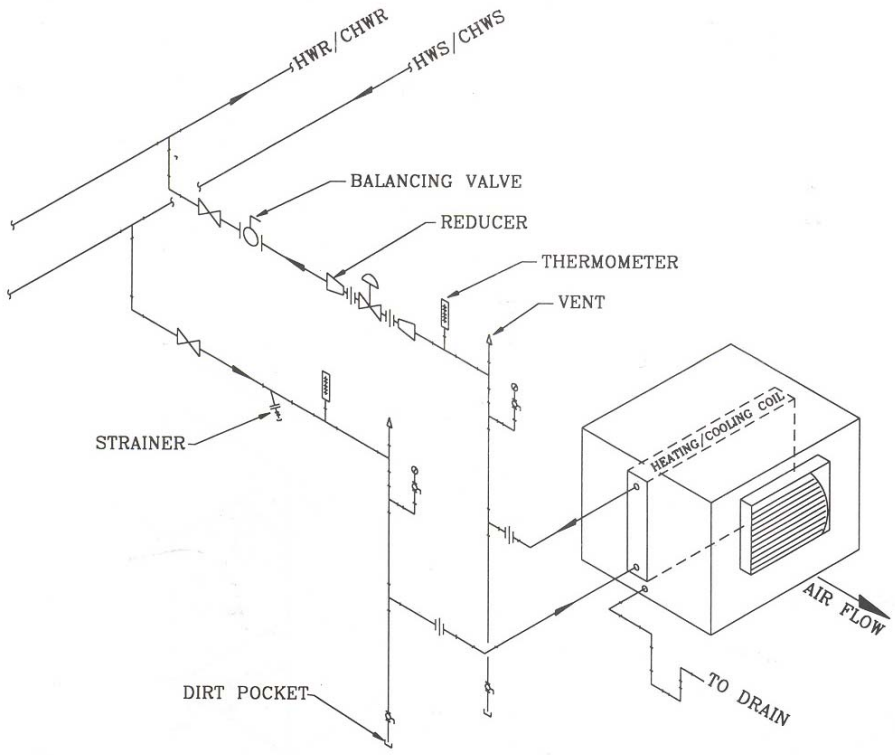


Figure 44. Suggested coil connection details for heating and cooling coils

GENERAL

All air handling units of type, size and capacity shall be designed, constructed, and tested in accordance with Air Conditioning and Refrigeration Institute (ARI) and ASHRAE standards. All internal components specified in multi-zone air handling units schedule shall be factory furnished and installed.

UNIT

All units shall be constructed to conform to ARI standard 410-91. All cabinet modules shall be constructed of heavy gauge galvanized steel sheet, formed and reinforced to provide a rigid assembly. Durable access doors shall be provided into all sections of the multi-zone air handling equipment for easy access of all components. The doors shall be of the same gauge as the unit cabinet. All side and roof exterior panels shall be insulated with 1" rock wool insulation. For cooling applications, the coil sections will have drain pans with drain connections provided on either side of the pan for installation versatility. Units shall be completely factory assembled. Units shall ship in one (1) piece where possible.

COILS

All coils shall be designed to meet ARI standard 410 and tested in accordance to ASH RAE standard 151992 (Safety Code for Mechanical Refrigeration). Coil casing to be constructed of heavy gauge galvanized steel. For heating and cooling applications, the coils shall be made of 5/8" 00 seamless copper tubes. For high pressure steam applications with pressures greater than 30 psig, coils shall be constructed of seamless steel tubes with spiral wound fins. All tubes shall be mechanically bonded to aluminum or copper fins to provide 100% contact around the periphery.

Hot and Chilled Water coils shall be designed to operate at 250 psig and shall be tested with 325 psig compressed air under water. Circuiting shall provide easy draining and venting when installed.

Steam coils shall be designed for operations up to 430 of saturated steam temperature and shall be tested with 325 psig compressed air under water. The core shall be of pitched construction in one direction providing positive condensate drainage.

Blygold® protective coating assures efficient performance of coils in corrosive conditions. With its aluminum and copper substrates thermal resistance due to 25 to 30 µm coating thickness only increases 3%. Neutral-salt spray test according to ASTM B117 and acid-salt spray test according to ASTM G-85 indicated more than 3000 hours of performance. Coating's temperature resistance is up to 150 ^{o}C and its is silver.

FANS

All fans are available with standard forward curved blades (backward curved blades optional). All fan wheel and shaft assemblies shall be statically and dynamically balanced. All fan wheels used on units shall be keyed to precision-machined, solid or hollow steel shaft and phosphatized for corrosion protection. A standard full size access door shall be provided in units with internally mounted motors allowing easy access to the fan/motor assembly. A standard belt guard shall be provided on all units with externally mounted motors.

FILTER SECTIONS

Standard filter shall be a washable two inch thick aluminum mesh filter. Rolomatic, HEPA, ULPA, bag, activated carbon, and oil filters shall be provided as per request.

DAMPERS

Dampers shall be parallel or opposed blade type with interconnecting linkage. Blade bearings shall be plastic bushings and shall provide smooth operation and corrosion resistance. Hot and cold air dampers to be opposite acting (secured at 90° to each other) and rotate in nylon bushing.

MIXING BOX

Mixing box shall be furnished with or without an angular filter section and have either top (back) or bottom (back) openings. Openings shall be furnished with (without) parallel blade dampers. When an angular filter section is included, removable panels shall be provided on each side for filter access.

HUMIDIFIERS

Standard humidifier shall be water spray type, hot water pan, or steam grid.

Air Enthalpy and Density

Table 45. Air Enthalpy Vs Altitude

Wet Bulb Temp. °F	Altitude					
	0	1000 (ft)	2000 (ft)	3000 (ft)	4O00 (ft)	5000 (ft)
	0	315(m)	625(m)	940(m)	1250(m)	1560(m)
	Enthalpy of Air (BTU/lb)					
35	*13.01*	*13.18*	*13.36*	*13.54*	*13.74*	*13.94*
36	*13.44*	*13.62*	*13.8*	*14*	*14.20*	*14.41*
37	*13.87*	*14.06*	*14.25*	*14.46*	*14.67*	*14.89*
38	*14.32*	*14.51*	*14.71*	*14.92*	*15.14*	*15.37*
39	*14.77*	*14.97*	*15.18*	*15.4*	*15.63*	*15.87*
40	*15.23*	*15.44*	*15.66*	*15.89*	*16.12*	*16.37*
41	*15.7*	*15.92*	*16.14*	*16.38*	*16.63*	*16.89*
42	*16.17*	*16.42*	*16.64*	*16.88*	*17.14*	*17.41*
43	*16.66*	*16.89*	*17.14*	*17.39*	*17.66*	*17.94*
44	*17.15*	*17.39*	*17.65*	*17.92*	*18.20*	*18.49*
45	*17.65*	*17.91*	*18.17*	*18.45*	*18.74*	*19.04*
46	*18.16*	*18.43*	*18.7*	*18.99*	*19.29*	*19.61*
47	*18.68*	*18.96*	*19.25*	*19.55*	*19.86*	*20.19*
48	*19.21*	*19.5*	*19.8*	*20.11*	*20.44*	*20.78*
49	*19.75*	*20.05*	*20.36*	*20.69*	*21.03*	*21.38*
50	*20.30*	*20.61*	*20.94*	*21.27*	*21.63*	*22.00*
51	*20.86*	*21.19*	*21.52*	*21.87*	*22.24*	*22.62*
52	*21.44*	*21.77*	*22.12*	*22.49*	*22.87*	*23.27*
53	*22.02*	*22.37*	*22.73*	*23.11*	*23.51*	*23.92*
54	*22.62*	*22.98*	*23.36*	*23.75*	*24.16*	*24.59*
55	*23.22*	*23.6*	*23.99*	*24.4*	*24.83*	*25.28*
56	*23.84*	*24.24*	*24.64*	*25.07*	*25.51*	*25.98*
57	*24.48*	*24.88*	*25.31*	*25.75*	*26.21*	*26.69*
58	*25.12*	*25.55*	*25.99*	*26.44*	*26.92*	*27.42*
59	*25.78*	*26.22*	*26.68*	*27.15*	*27.65*	*28.17*
60	*26.46*	*26.92*	*27.39*	*27.88*	*28.40*	*28.94*
61	*27.15*	*27.62*	*28.11*	*28.62*	*29.16*	*29.72*
62	*27.85*	*28.34*	*28.85*	*29.39*	*29.94*	*30.52*
63	*28.57*	*29.08*	*29.61*	*30.16*	*30.74*	*31.35*
64	*29.31*	*29.84*	*30.39*	*30.96*	*31.56*	*32.19*
65	*30.06*	*30.61*	*31.18*	*31.77*	*32.39*	*33.05*
66	*30.83*	*31.4*	*31.99*	*32.61*	*33.25*	*33.93*
67	*31.62*	*32.21*	*32.82*	*33.46*	*34.13*	*34.83*
68	*32.42*	*33.03*	*33.67*	*34.33*	*35.03*	*35.75*
69	*33.25*	*33.88*	*34.54*	*35.32*	*35.95*	*36.70*
70	*34.09*	*34.74*	*35.43*	*36.14*	*36.89*	*37.67*
71	*34.95*	*35.63*	*36.34*	*37.08*	*37.85*	*38.67*
72	*35.83*	*36.54*	*37.27*	*38.04*	*38.84*	*39.69*
73	*36.74*	*37.46*	*38.23*	*39.02*	*39.86*	*40.73*
74	*37.66*	*38.42*	*39.2*	*40.03*	*40.89*	*41.80*
75	*38.61*	*39.39*	*40.21*	*41.06*	*41.96*	*42.90*
76	*39.57*	*40.39*	*41.23*	*42.12*	*43.05*	*44.02*
77	*40.57*	*41.41*	*42.29*	*43.21*	*44.17*	*45.18*
78	*41.58*	*42.45*	*43.36*	*44.32*	*45.32*	*46.36*
79	*42.62*	*43.53*	*44.47*	*45.46*	*46.49*	*47.58*
80	*43.69*	*44.62*	*45.6*	*46.63*	*47.70*	*48.83*

Table 46. Air Density Vs Altitude

Altitude Feet (meters)		Density	Temp.	Press.
		Lb/ft^3	°F	in. w.g
0	**0**	*0.0750*	*59.0*	*29.92*
500	**(160)**	*0.0739*	*59.6*	*29.38*
1000	**(310)**	*0.0728*	*60.1*	*28.85*
1500	**(460)**	*0.0718*	*60.6*	*28.33*
2000	**(610)**	*0.0707*	*61.2*	*27.82*
2500	**(770)**	*0.0697*	*61.7*	*27.31*
3000	**(920)**	*0.0686*	*62.3*	*26.82*
3500	**(1070)**	*0.0676*	*62.8*	*26.32*
4000	**(1220)**	*0.0666*	*63.4*	*25.84*
4500	**(1380)**	*0.0656*	*63.9*	*25.36*
5000	**(1530)**	*0.0646*	*64.5*	*24.90*
5500	**(1680)**	*0.0637*	*65.0*	*24.43*
6000	**(1830)**	*0.0627*	*65.5*	*23.98*
6500	**(1990)**	*0.0617*	*66.1*	*23.53*
7000	**(2140)**	*0.0608*	*66.6*	*23.09*
7500	**(2290)**	*0.0599*	*67.2*	*22.65*
8000	**(2440)**	*0.0590*	*67.7*	*22.22*
8500	**(2600)**	*0.0580*	*68.3*	*21.80*
9000	**(2750)**	*0.0571*	*68.8*	*21.39*
9500	**(2900)**	*0.0563*	*69.3*	*20.98*
10000	**(3050)**	*0.0554*	*69.9*	*20.58*

Table 47. Practical conversion factors

	Pressure					
	in. wg.	psi	bar	atm	pa	mmHg
1 in. wg.	1	0.04	0.002	0.002	249.08	1.868
1 psi	27.67	1	0.068	0.068	6894.8	51.71
1 bar	401.46	14.5	1	0.98	100000	750.06
1 atm	401.78	14.69	1.01	1	101325	760
1 pa	0.004	0.0002	0.00001	0.00001	1	0.007
1 mmHg	0.53	0.02	0.001	0.001	133.32	1

	Enthalpy	
	Kj/kg	Btu/Lb
1 Kj/kg	1	0.49
1 Btu/Lb	2.32	1

	Density	
	Kg/m^3	Lb/ft^3
1 Kg/m^3	1	0.06
1 Lb/ft^3	16.01	1

	Temperature	
	Y (°F)	Y (°C)
X (°F)	Y=X	Y=0.55x(X)-17.8
X (°C)	Y=1.8x(X)+32	Y=X

	Volumetric Flow Rate		
	CFM	m^3/Hour	GPM
1 CFM	1	1.67	7.48
1 m^3/Hour	0.59	1	4.04
1 GPM	0.13	0.23	1

	Power			
	Hp	KW	Btu/Hour	Ton(Ref.)
1 Hp	1	0.746	2545.45	0.21
1 KW	1.34	1	3412.14	0.28
1 Btu/Hour	0.0004	0.0003	1	0.00008
1 Ton(Ref.)	4.71	3.51	12000	1

	Energy		
	Kj	Btu	Kcal
1 Kj	1	0.94	0.23
1 Btu	1.05	1	0.25
1 Kcal	4.18	3.96	1

	Length			
	m	Ft	In	mm
1 m	1	3.28	39.37	1000
1 Ft	0.3	1	12	304
1 In	0.025	0.083	1	25.4
1 mm	0.001	0.003	0.037	1

Index

ADP .....ADPAparatus Dew Point (^{0}F)
AHU .....Air handling unit
AWT..... Average Temp. (^{0}F)
BF ..... Bypass Factor
CF.....Correction factor
CFM..... Air flow rate (ft^3/min)
Db .....Sound Power Level(decibel)
DX ..... Direct Expansion Coil
E_{AW} ..... Air Washer Efficiency
E ..... External Type
EDB ..... Entering Dry Bulb Temp. (^{0}F)
ESP .....External Static Pressure
EWB .....Entering Wet Bulb Temp. (^{0}F)
FA..... Face Area (ft^2)
FPI.....Fin Per Inch
FPS..... Air Velocity (ft/sec)
FV..... Coil Face Velocity (fpm)
FPM..... Air Velocity (ft/min)
g ..... Gravitational acceleration (mm/sec^2)
GCF .....GPM Correction Factor
GN ..... Generated Noise (db)
GN_c..... Corrected Generated Noise (db)
GPM ..... Volumetric Water Flow Rate (gal/min)
H.....Enthalpy of Air (BTU/lb)
HCF ..... Heating Coil Correction Factor
HP .....Horsepower
Hz ..... Frequency (sec^{-1})
I ..... Internal Type
IDB..... Indoor Dry Bulb Temp (^{0}F)
IL..... Insertion Loss (db)
IRH..... Indoor Relative Humidity
ISP ..... Internal Static Pressure (in. w.g.)
IWB .....Indoor Wet Bulb Temp. (^{0}F)
L_1 .....Fan Sound Generation (db)
LDB.....Leaving Dry Bulb Temp. (^{0}F)
LWB ..... Leaving Wet Bulb Temp. (^{0}F)
LWT ..... Leaving Water Temp. (^{0}F)
MBH.....1000 BTU/hr
ODB .....Outdoor Dry Bulb Temp. (^{0}F)
ORH..... Outdoor Relative Humidity
OWB .....Outdoor Wet Bulb Temp. (^{0}F)
ΔP .....Pressure Drop
RH..... Relative Humidity
RPM.....Revolution Per minute
RSHF ..... Room Sensible Heat Factor
SA ..... Absorbed Sound (db)
SHF.....Sensible Heat Factor
SP ..... Static Pressure (in. w. g.)
ST ..... Suction Temp (^{0}F)
TC .....Total Cooling Load (MBH)
TCF..... Temperature Correction Factor
VCF.....Velocity Correction Factor
WB .....Wet Bulb Temp (^{0}F)
WCF..... Wet Bull Correction Factor
W.g. .....Water Gauge
ΔW .....Moisture Difference

Air handling unit selection sheet guide

Project Name :
Project Place :
Area Used for :
Estimated by :

☐ Cooling Coil
☐ Heating Coil
☐ Steam Coil
☐ DX Coil

Date : / /
Altitude : Ft.
Pressure : in. Hg
Client :

Total Air Quantity = C.F.M.
Fresh Air Quantity = C.F.M.
Return Air Quantity = C.F.M.

Indoor : IDB = °F ; IWB = °F ; IRH = %
Outdoor : ODB = °F ; OWB = °F ; ORH = %

ERSH = Effective Room Sensible Heat = Btu/hr.
ERTH = Effective Room Total Heat = Btu/hr.
THL = Total Heating Load = Btu/hr.

$ESHF = \frac{ERSH}{ERTH} = \frac{\quad}{\quad} =$

Selected ADP = °F

EWT = °F ; LWT = °F ; AWT = (EWT + LWT)/2 = °F ; Air Face Velocity = fpm
Suction Temperature = °F ; Steam Pressure = psig
Refrigerant: R-22 ; By Pass Factor = *T - 16,17*

Required Coil Face Area = CFM / FV = / = sqft
Selected Unit (Model) ..... *T- 31* ..... ; Coil Face Area ..... *T- 31* ..... sqft
Actual Air Face Velocity = CFM / sqft = / = fpm

Selected Rows / Fins *(T - 3,4,5,6,7,8)*

$EDB = \frac{(FCFM \times ODB) + (RCFM \times IDB)}{Total\ CFM} = \frac{(\quad \times \quad) + (\quad \times \quad)}{\quad} =$ °F ; EWB = °F ; ERH = %

Correction Factors : Velocity Factor = *T-14*, GPM Factor = *T-15*, Temp. Factor = *T-40*, Coil Factor = *T-9, F-4,5,6*
Circuiting: Double ☐ ; Full ☐ ; Half ☐ ; One Third ☐ ; Quarter ☐
Actual Coil Capacity = *T-3,4,5,6,7,8* x (WCF or HCF) *T-9* , *F-4,5,6* x (VCF) *T-14* = Btu/hr
Actual GPM = [(Coil Capacity) / (500 x (EWT- LWT)] = / (500 x) = GPM
Water Flow For P.D. Estimation = GPM x (GCF) *T - 15* = GPM
Actual Water Pressure Drop = Ft. x (TCF) *T - 44* = Ft. wg.
Coil Airside Pressure Drop = $\Delta P_1 \times (V_2/V_1)^2$ = *T - 41* x (/ *T - 41*)^2 = In. wg.
Coil Tube High = *T - 31* ; Coil No.: *T - 31* ; Coil connection : *T - 12* Inches
Steam Coil Connection (Supply / Return) : *(T - 10 / T - 10)* Dx Coil Connection (Suction/Liquid) : *(T - 13 / T - 13)*
LDB = ADP + BF (EDB - ADP) ; LDB = EDB + Coil Capacity / (1.08 or ..... x ..... cfm) = °F
LDB = °F ; LWB = °F ; LWB = °F; (For heating coil selection use only)

Cooling Coil	Static Pressure = *T - 41*	in.wg.	[Duct Length (meter) x 3.28 x Pressure Drop (in.wg./100ft) x Factor for Eqivalent Fiting] /100 = in.wg.
Heating Coil	Static Pressure = *T - 41*	in.wg.	
Mixing Box (MB-)	Static Pressure = *T - 42*	in.wg.	
Filter	Static Pressure = *P - 51,T-42*	in.wg.	
Damper	Static Pressure = *T - 42*	in.wg.	Duct Line Pressure Drop = in.wg.
Air Blender	Static Pressure = *T - 42*	in.wg.	Supply Register Pressure Drop = in.wg.
Sound Attenuator	Static Pressure = *T - 43*	in.wg.	Return Register Pressure Drop = in.wg.
Airwasher Class...	Static Pressure = *T - 42*	in.wg.	..... = in.wg.
.....	Static Pressure =	in.wg.	..... = in.wg.

Total Internal Static Pressure Drop = in.wg. ; External Static Pressure Drop = in.wg.
Total Static Pressure = ISP + ESP = + = in.wg.
Fan Size : *T - 31* dia. ; R.P.M. = *T -18,19* ; Motor brake power = *T -18,19* hp
Unit type P - 31 : Horizontal ☐ ; Vertical ☐ ; L - type ☐
Physical Data : Total Length = *T - 31* cm ; Width = *T - 31* cm ; Height = *T - 31* cm
Motor Arrangement : IDR ☐ IDL ☐ EDR ☐ EDL ☐ ETR ☐ ETL ☐

Air Washer Selection

Selected: Class - 4 ☐ Class - 6 ☐ Class - 8 ☐
GPM = *T - 39*

$Efficiency = \frac{EDB - LDB}{EDB - EWB} = \frac{\quad}{\quad} =$

(E_{AW} = %)
(Based on a design pressure of 30 psi.)

Fan Arrangement *(P-26,27)*

Front	☐	- Top	☐
Up	☐	- Bottom	☐
Rear	☐	- Front	☐
Bottom	☐	- Rear	☐

Humidifier Type	Steam Grid				Fog Nozzle			
Inlet Condition	DB = °F	RH = %	W =	gr/lb	DB = °F	RH = %	W =	gr/lb
Outlet Condition	DB = °F	RH = %	W =	gr/lb	DB = °F	RH = %	W =	gr/lb
Humidifier Capacity	*F - 1*	lb/hr.	ΔW =	gr/lb	*F - 2*	lb/hr.	ΔW = 10	gr/lb

Based on "SARAVEL AIR HANDLING UNIT" CAT. ..... *P - 1* ..... (Tehran / Iran)

"T" stands for TABLE. *"F" stands for FIGURE.* *"P" stands for PAGE.*

SARAVEL CORP.

Mar 2011

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

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