

# MINI DUCT SYSTEM

## CEILING AIR SUPPLY APPLICATION

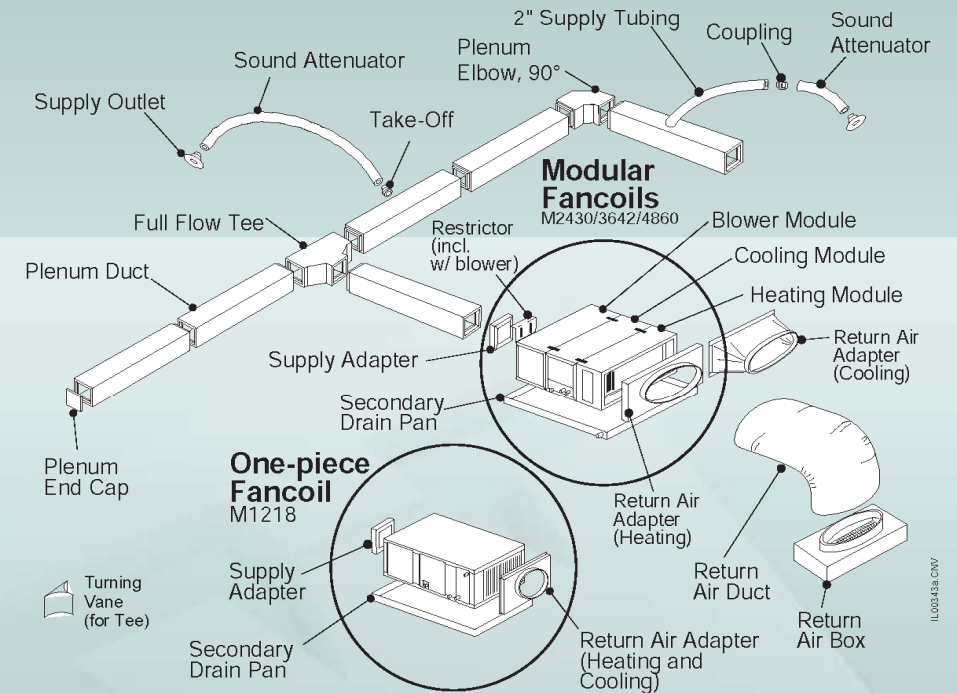
POWER SAVING APPLICATION FOR

- RESIDENTIAL
- COMMERCIAL
- CLASSROOMS
- CLINICS
- OPERATION THEATERS
- STORAGE

COMPARISON WITH STANDARD AC UNITS

ADVANTAGES OF MINI DUCT SYSTEM

MINI DUCT SYSTEM



Marketed By

**WOLF INTERNATIONAL**



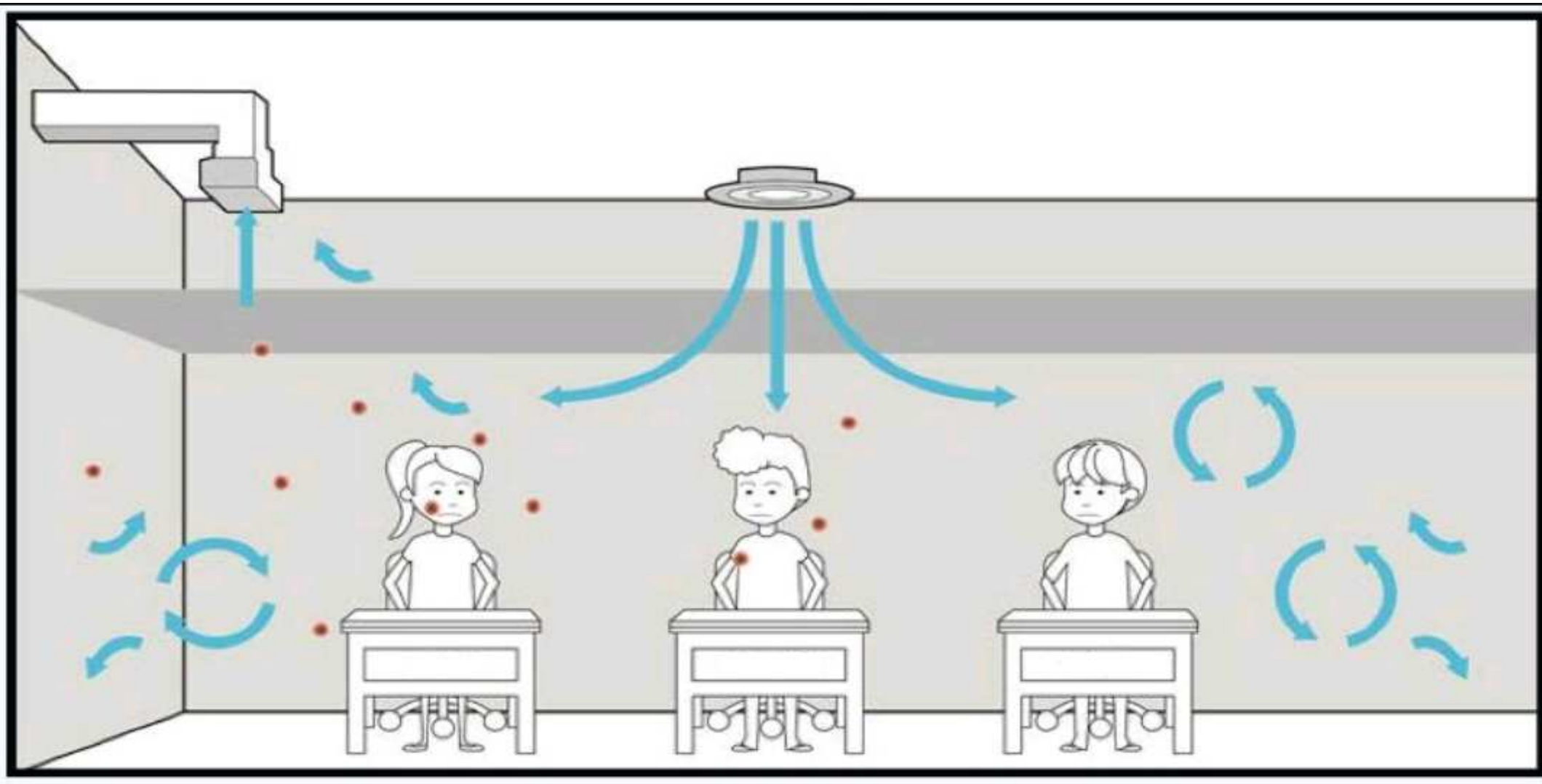
12/12/2020

WOLF INTERNATIONAL

# HOW DOES STANDARD DUCTED AC UNIT WORKS?

# STANDARD AC SYSTEM

- TYPICAL ROOM OF 10M X 10M.
- AIR SUPPLY & RETURN FROM DUMPED FROM CEILING.
- ROOM TEMP 75 °F ( 23.9 °C) / 50% RH
- AMBIENT TEMP 115 °F ( 46 °C) / 30% RH



# STANDARD AC SYSTEM – HEAT LOAD CALCULATION – AMBIENT DATA

**Design Parameters:**

City Name ..... Dubai  
 Location ..... United Arab Emirates  
 Latitude ..... 25.2 Deg.  
 Longitude ..... 55.3 Deg.  
 Elevation ..... 16.0 m  
 Summer Design Dry-Bulb ..... 46.0 °C  
 Summer Coincident Wet-Bulb ..... 29.4 °C  
 Summer Daily Range ..... 9.7 °K  
 Winter Design Dry-Bulb ..... 12.2 °C  
 Winter Design Wet-Bulb ..... 7.4 °C  
 Atmospheric Clearness Number ..... 1.00  
 Average Ground Reflectance ..... 0.20  
 Soil Conductivity ..... 1.385 W/(m·K)  
 Local Time Zone (GMT +/- N hours) ..... -4.0 hours  
 Consider Daylight Savings Time ..... No  
 Simulation Weather Data ..... noneN/A  
 Current Data is ..... User Modified  
 Design Cooling Months ..... January to December

**Design Day Maximum Solar Heat Gains**

(The MSHG values are expressed in W/m²)

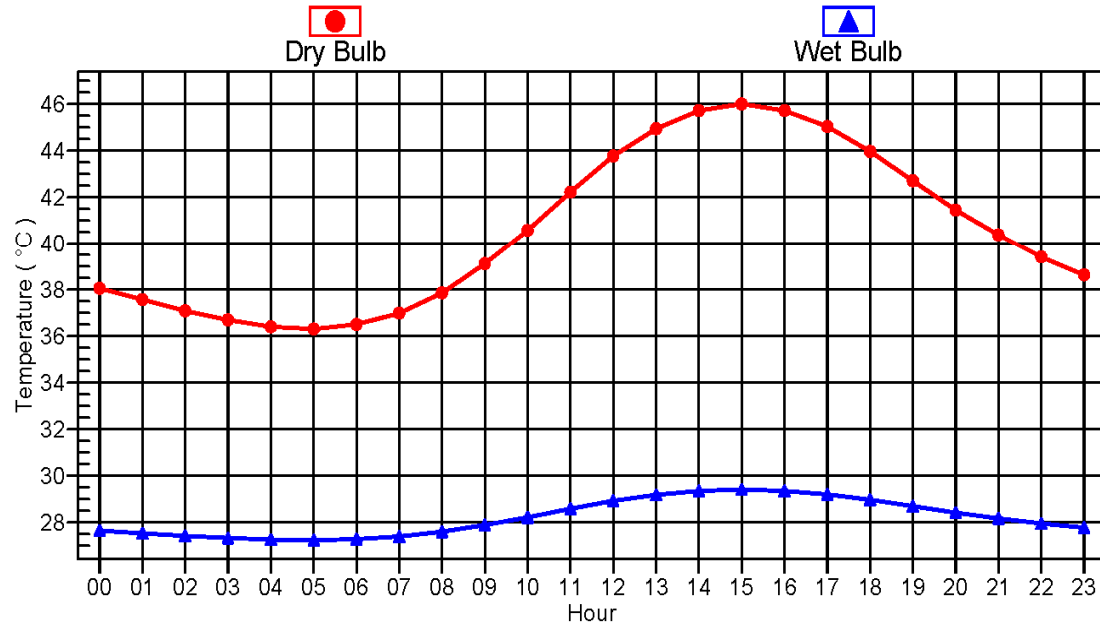
Month	N	NNE	NE	ENE	E	ESE	SE	SSE	S
January	83.3	83.3	133.2	372.2	613.4	753.3	795.4	760.0	724.5
February	93.6	93.6	261.5	493.0	686.2	783.7	759.5	678.5	616.1
March	104.9	121.0	398.8	607.3	719.6	752.9	681.8	543.3	449.5
April	115.5	266.1	501.3	659.0	717.2	665.7	544.3	356.3	252.8
May	133.5	361.1	561.4	676.1	690.0	600.2	432.2	227.3	155.0
June	170.9	398.7	581.4	675.8	669.3	563.3	384.2	185.0	138.2
July	137.2	366.6	558.6	664.5	671.2	577.3	422.5	221.2	153.0
August	120.5	262.5	492.2	637.4	687.4	639.5	524.6	343.4	244.7
September	108.7	126.7	370.0	579.0	696.4	710.9	657.4	528.5	442.8
October	96.7	96.7	235.2	495.3	664.5	742.1	745.7	663.7	603.5
November	84.8	84.8	123.8	389.0	581.8	740.8	785.2	754.7	717.6
December	78.8	78.8	90.9	326.4	569.5	732.5	790.0	779.8	756.0
Month	SSW	SW	WSW	W	WNW	NW	NNW	HOR	Mult
January	785.2	801.4	738.3	614.3	390.7	120.8	83.3	654.8	1.00
February	677.8	763.0	781.9	692.7	495.7	258.1	93.6	765.0	1.00
March	536.7	672.6	759.2	731.7	592.3	393.8	135.5	855.5	1.00
April	350.8	535.7	676.0	716.5	648.2	491.0	278.1	887.4	1.00
May	223.8	430.0	604.6	637.3	667.6	551.0	372.5	887.8	1.00
June	181.7	384.7	569.0	664.5	662.5	573.6	406.6	878.9	1.00
July	218.8	420.8	589.0	667.9	648.6	551.3	373.4	872.8	1.00
August	338.4	514.5	650.9	691.0	627.6	478.2	276.3	866.9	1.00
September	527.6	656.5	714.6	699.8	577.8	363.3	130.6	830.8	1.00
October	663.5	744.4	750.1	653.8	494.0	245.2	96.7	756.1	1.00
November	753.8	782.7	742.5	587.2	386.3	126.9	84.8	654.8	1.00
December	785.6	797.3	728.3	555.8	345.8	80.4	78.8	608.3	1.00

Mult. = User-defined solar multiplier factor.

**Design Temperature Profile**

MINI DUCT SYSTEM SAMPLE  
WOLFrost INTERNATIONAL 12/12/2020  
05:59PM

Design Temperature Profiles for July



# STANDARD DX SYSTEM -- HEAT LOAD CALCULATION -- SPACE INPUT DATA



12/12/2020

## Standard DX Unit System Input Data

Project : Standard DX Unit Vs Mini Duct System

12/14/2020  
07:53AM

### 1. General Details:

Air System Name ..... STANDARD FCU  
 Equipment Type ..... Terminal Units  
 Air System Type ..... Split DX Fan Coil  
 Number of zones ..... 1  
 Ventilation ..... Direct Ventilation

### 2. Ventilation System Components:

(Common Ventilation System not used: no inputs)

### 3. Zone Components:

Space Assignments:

Zone 1: Zone 1	
STANDARD AC	x1

### Thermostats and Zone Data:

Zone ..... All  
 Cooling T-stat: Occ. .... 23.9 °C  
 Cooling T-stat: Unocc. .... 29.4 °C  
 Heating T-stat: Occ. .... 21.1 °C  
 Heating T-stat: Unocc. .... 15.6 °C  
 T-stat Throttling Range ..... 0.83 °K

Thermostat Schedule ..... Schedule 4  
 Unoccupied Cooling is ..... Available

### Common Terminal Unit Data:

#### Cooling Coil:

Design Supply Temperature ..... 14.4 °C  
 Coil Bypass Factor ..... 0.100  
 Cooling Source ..... Air-Cooled DX  
 Schedule ..... JFMAMJJASOND

Fan Control ..... Fan On  
 Ventilation Sizing Method ..... Sum of Space OA Airflows

### Terminal Units Data:

Zone ..... All  
 Terminal Type ..... Fan Coil  
 Minimum Airflow ..... 0.00 L/s/person  
 Fan Performance ..... 0 Pa  
 Fan Overall Efficiency ..... 50 %

### 4. Sizing Data (Computer-Generated):

#### System Sizing Data:

Cooling Supply Temperature ..... 14.4 °C

#### Hydronic Sizing Specifications:

Chilled Water Delta-T ..... 5.6 °K  
 Hot Water Delta-T ..... 11.1 °K

#### Safety Factors:

Cooling Sensible ..... 10 %  
 Cooling Latent ..... 5 %  
 Heating ..... 0 %

### Zone Sizing Data:

Zone Airflow Sizing Method ..... Sum of space airflow rates  
 Space Airflow Sizing Method ..... Individual peak space loads

Zone	Supply Airflow (L/s)	Zone Htg Unit (kW)	Reheat Coil (kW)	Ventilation (L/s)
1	1003.2	-	-	55.0

### 5. Equipment Data Terminal Cooling Units - Air-Cooled DX

Zone	Estimated Maximum Load (kW)	Design OAT (°C)	Equipment Sizing	Gross Cooling Capacity (kW)	Capacity Oversizing Factor (%)	Compressor + OD Fan Power (kW)	ARI Performance Rating (EER)	Conventional Cutoff OAT (°C)
All	14.7	35.0	Auto-Sized	-	0	2.95	2.8	2.8

## Standard DX Unit Space Input Data

Project : Standard DX Unit Vs Mini Duct System

12/14/2020  
07:53AM

### STANDARD DX UNIT

### 1. General Details:

Floor Area ..... 100.0 m<sup>2</sup>  
 Avg. Ceiling Height ..... 3.0 m  
 Building Weight ..... 498.0 kg/m<sup>2</sup>

### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
 OA Requirement 1 ..... 2.5 L/s/person  
 OA Requirement 2 ..... 0.30 L/(s-m<sup>2</sup>)  
 Space Usage Defaults ..... ASHRAE Std 62.1-2004

### 2. Internals:

#### 2.1. Overhead Lighting:

Fixture Type ..... Recessed (Unvented)  
 Wattage ..... 10.00 W/m<sup>2</sup>  
 Ballast Multiplier ..... 1.00  
 Schedule ..... LIGHTING SCHEDULE

#### 2.2. Task Lighting:

Wattage ..... 0.00 W/m<sup>2</sup>  
 Schedule ..... None

#### 2.3. Electrical Equipment:

Wattage ..... 25.00 W/m<sup>2</sup>  
 Schedule ..... EQUIP.SCHEDULE

### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (m <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
N	30.0	1	0	0
E	30.0	1	0	0
S	30.0	1	0	0
W	30.0	1	0	0

#### 3.1. Construction Types for Exposure N

Wall Type ..... Default Wall Assembly  
 1st Window Type ..... W1

#### 3.2. Construction Types for Exposure E

Wall Type ..... Default Wall Assembly  
 1st Window Type ..... W1

#### 3.3. Construction Types for Exposure S

Wall Type ..... Default Wall Assembly  
 1st Window Type ..... W1

#### 3.4. Construction Types for Exposure W

Wall Type ..... Default Wall Assembly  
 1st Window Type ..... W1

### 4. Roofs, Skylights:

Exp.	Roof Gross Area (m <sup>2</sup> )	Roof Slope (deg.)	Skylight Qty.
H	100.0	0	0

#### 4.1. Construction Types for Exposure H

Roof Type ..... Light Weight Roof

### 5. Infiltration:

Design Cooling ..... 1.00 L/s  
 Design Heating ..... 0.00 L/s  
 Energy Analysis ..... 0.00 L/s

Infiltration occurs only when the fan is off.

### 6. Floors:

Type ..... Floor Above Unconditioned Space  
 Floor Area ..... 100.0 m<sup>2</sup>  
 Total Floor U-Value ..... 0.568 W/(m<sup>2</sup>-°K)  
 Unconditioned Space Max Temp. .... 23.9 °C  
 Ambient at Space Max Temp. .... 35.0 °C  
 Unconditioned Space Min Temp. .... 23.9 °C  
 Ambient at Space Min Temp. .... 12.8 °C

# STANDARD DX SYSTEM – HEAT LOAD CALCULATION – LOAD SUMMARY



## Standard DX Unit - Air System Design Load Summary

Project : Standard DX Unit Vs Mini Duct System 12/14/2020 07:51 AM

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 2000			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 41.4 °C / 28.4 °C			HEATING OA DB / WB 12.2 °C / 7.4 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	12 m²	305	-	12 m²	-	-
Wall Transmission	108 m²	1187	-	108 m²	511	-
Roof Transmission	100 m²	4071	-	100 m²	675	-
Window Transmission	12 m²	399	-	12 m²	203	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	100 m²	-1	-	100 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	1000 W	1000	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	2500 W	2500	-	0	0	-
People	10	821	791	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 5%	1028	40	0%	0	0
<b>&gt;&gt; Total Zone Loads</b>		<b>11311</b>	<b>831</b>		<b>1389</b>	<b>0</b>
Zone Conditioning	-	11274	831	-	-174	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Exhaust Fan Load	0 L/s	0	-	0 L/s	0	-
Ventilation Load	55 L/s	1124	1427	55 L/s	204	0
Ventilation Fan Load	0 L/s	0	-	0 L/s	0	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
<b>&gt;&gt; Total System Loads</b>		<b>12399</b>	<b>2258</b>		<b>30</b>	<b>0</b>
Terminal Unit Cooling	-	12399	2266	-	0	0
Terminal Unit Heating	-	0	-	-	0	-
<b>&gt;&gt; Total Conditioning</b>		<b>12399</b>	<b>2266</b>		<b>0</b>	<b>0</b>
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

## Standard DX Unit Ventilation Sizing Summary

Project : Standard DX Unit Vs Mini Duct System 12/14/2020 01:47 PM

1. Summary  
Ventilation Sizing Method: Sum of Space OA Airflows

### 2. Space Ventilation Analysis Table

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
STANDARD AC	1	100.0	10.0	1003.2	2.50	0.30	0.0	0.0	55.0
<b>Totals (incl. Space Multipliers)</b>				<b>1003.2</b>					<b>55.0</b>

## Standard DX Unit - Zone Sizing Summary

Project : Standard DX Unit Vs Mini Duct System

12/14/2020 07:51 AM

### Air System Information

Air System Name: STANDARD FCU  
Equipment Class: TERM  
Air System Type: SPLT-FC

Number of zones: 1  
Floor Area: 100.0 m²  
Location: Dubai, United Arab Emirates

### Sizing Calculation Information

Zone and Space Sizing Method:

Zone L/s: Sum of space airflow rates  
Space L/s: Individual peak space loads

Calculation Months: Jan to Dec  
Sizing Data: Calculated

### Zone Sizing Data

Zone Name	Maximum Cooling Sensible (kW)	Design Air Flow (L/s)	Minimum Air Flow (L/s)	Time of Peak Load	Maximum Heating Load (kW)	Zone Floor Area (m²)	Zone L/(s·m²)
Zone 1	11.4	1003	1003	Jul 2100	1.4	100.0	10.03

### Terminal Unit Sizing Data - Cooling

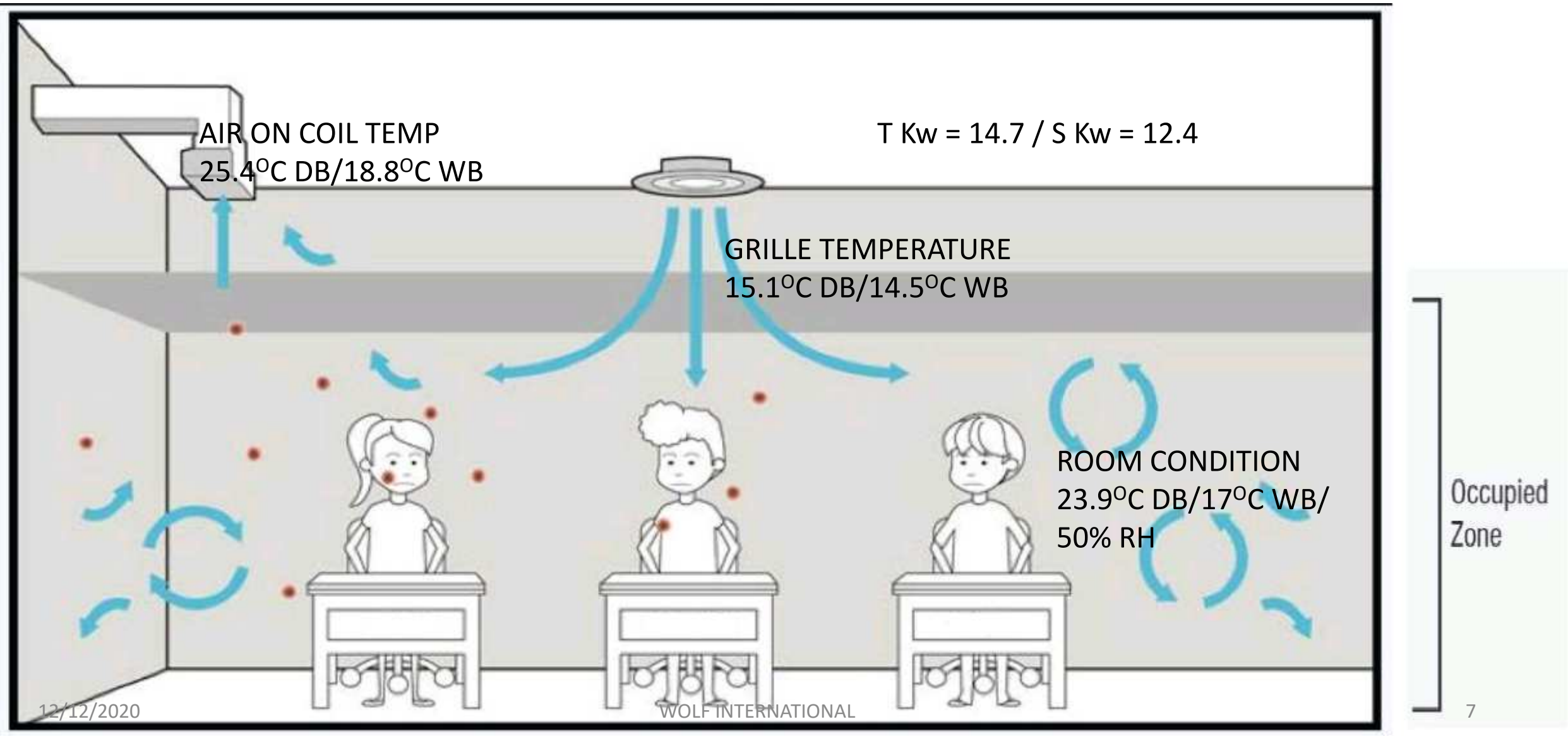
Zone Name	Total Coil Load (kW)	Sens Coil Load (kW)	Coil Entering DB / WB (°C)	Coil Leaving DB / WB (°C)	Water Flow @ 5.6 °K (L/s)	Time of Peak Load
Zone 1	14.7	12.4	25.4 / 18.8	15.1 / 14.5	-	Jul 2000

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m²)	Space L/(s·m²)
<b>Zone 1</b>							
STANDARD AC	1	11.4	Jul 2100	1003	1.4	100.0	10.03

# STANDARD DX SYSTEM - ISSUES

- UNEVEN AIR DISTRIBUTION
- UNEVEN TEMPERATURE IN ROOM
- CONTAMINATION OF AIR LINGERS IN ROOM
- HIGHER POWER CONSUMPTION



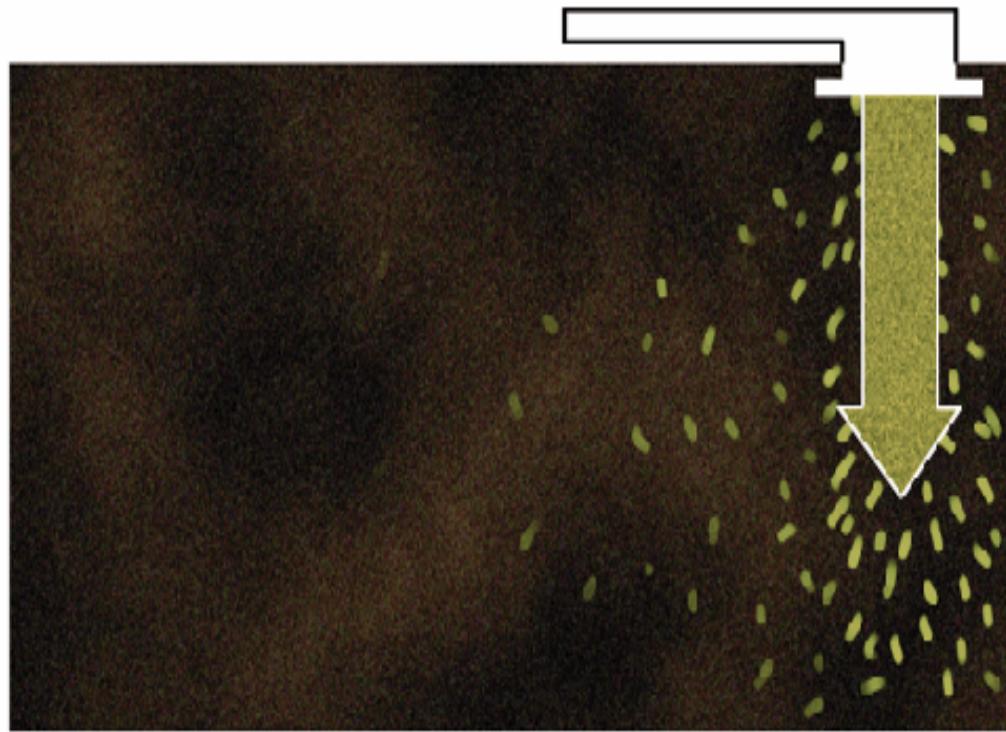
# SOLUTION – ALTERNATIVE AIR DISTRIBUTION METHOD MINI DUCT SYSTEM - HOW DOES IT WORK?



# SOLUTION – AIR SUPPLY BY ASPIRATION METHOD

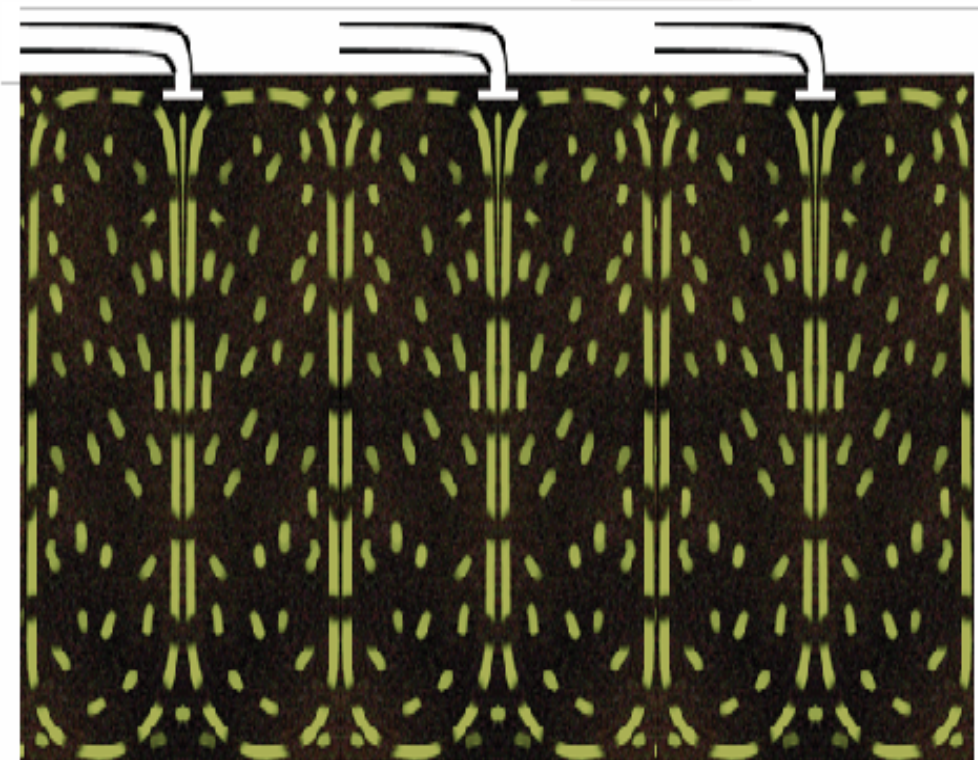
- STANDARD AC UNITS – AIR DUMPING IN CONDITIONED SPACE

- The conventional AC system is designed to dump air into the room, causing uncomfortable drafts, hot and cold spots.



- MINI DUCT UNITS – ASPIRATION WAY OF AIR MOVEMENT IN CONDITIONED SPACE

- The Unico System gently circulates air throughout each room, eliminating drafts, and thermal shocks, providing even temperatures from ceiling to floor and in each room corner.



# MINI DUCT SYSTEM – CEILING AIR SUPPLY – INPUT DATA



12/12/2020

## MINI DUCT SYSTEM - CEILING AIR SUPPLY Space Input Data

MINI DUCT - CEILING AIR SUPPLY

12/27/2020  
01:46PM

### MINI DUCT SYSTEM - CEILING AIR SUPPLY

#### 1. General Details:

Floor Area ..... 100.0 m<sup>2</sup>  
Avg. Ceiling Height ..... 3.0 m  
Building Weight ..... 498.0 kg/m<sup>2</sup>

#### 1.1. OA Ventilation Requirements:

Space Usage ..... OFFICE: Office space  
OA Requirement 1 ..... 2.5 L/s/person  
OA Requirement 2 ..... 0.30 L/(s·m<sup>2</sup>)  
Space Usage Defaults ..... ASHRAE Std 62.1-2004

#### 2. Internals:

##### 2.1. Overhead Lighting:

Fixture Type ..... Recessed (Unvented)  
Wattage ..... 10.00 W/m<sup>2</sup>  
Ballast Multiplier ..... 1.00  
Schedule ..... LIGHTING SCHEDULE

##### 2.2. Task Lighting:

Wattage ..... 0.00 W/m<sup>2</sup>  
Schedule ..... None

##### 2.3. Electrical Equipment:

Wattage ..... 25.00 W/m<sup>2</sup>  
Schedule ..... EQUIP.SCHEDULE

#### 3. Walls, Windows, Doors:

Exp.	Wall Gross Area (m <sup>2</sup> )	Window 1 Qty.	Window 2 Qty.	Door 1 Qty.
N	30.0	1	0	0
E	30.0	1	0	0
S	30.0	1	0	0
W	30.0	1	0	0

#### 3.1. Construction Types for Exposure N

Wall Type ..... Default Wall Assembly  
1st Window Type ..... W1

#### 3.2. Construction Types for Exposure E

Wall Type ..... Default Wall Assembly  
1st Window Type ..... W1

#### 3.3. Construction Types for Exposure S

Wall Type ..... Default Wall Assembly  
1st Window Type ..... W1

#### 3.4. Construction Types for Exposure W

Wall Type ..... Default Wall Assembly  
1st Window Type ..... W1

#### 4. Roofs, Skylights:

Exp.	Roof Gross Area (m <sup>2</sup> )	Roof Slope (deg.)	Skylight Qty.
H	100.0	0	0

#### 4.1. Construction Types for Exposure H

Roof Type ..... Light Weight Roof

#### 5. Infiltration:

Design Cooling ..... 1.00 L/s  
Design Heating ..... 0.00 L/s  
Energy Analysis ..... 0.00 L/s  
Infiltration occurs only when the fan is off.

#### 2.4. People:

Occupancy ..... 10.0 People  
Activity Level ..... Sedentary Work  
Sensible ..... 82.1 W/person  
Latent ..... 79.1 W/person  
Schedule ..... EQUIP.SCHEDULE

#### 2.5. Miscellaneous Loads:

Sensible ..... 0 W  
Schedule ..... None  
Latent ..... 0 W  
Schedule ..... None

#### 6. Floors:

Type ..... Floor Above Unconditioned Space  
Floor Area ..... 100.0 m<sup>2</sup>  
Total Floor U-Value ..... 0.568 W/(m<sup>2</sup>·°K)  
Unconditioned Space Max Temp. .... 23.9 °C  
Ambient at Space Max Temp. .... 35.0 °C  
Unconditioned Space Min Temp. .... 23.9 °C  
Ambient at Space Min Temp. .... 12.8 °C

## MINI DUCT CEILING AIR SUPPLY Input Data

MINI DUCT - CEILING AIR SUPPLY

12/27/2020  
01:46PM

#### 1. General Details:

Air System Name ..... MINI DUCT CEILING AIR SUPPLY  
Equipment Type ..... Terminal Units  
Air System Type ..... Split DX Fan Coil  
Number of zones ..... 1  
Ventilation ..... Direct Ventilation

#### 2. Ventilation System Components:

(Common Ventilation System not used: no inputs)

#### 3. Zone Components:

##### Space Assignments:

Zone 1: Zone 1	
STANDARD AC	x1

##### Thermostats and Zone Data:

Zone ..... All  
Cooling T-stat: Occ. .... 23.9 °C  
Cooling T-stat: Unocc. .... 29.4 °C  
Heating T-stat: Occ. .... 21.1 °C  
Heating T-stat: Unocc. .... 15.6 °C  
T-stat Throttling Range ..... 0.83 °K

Thermostat Schedule ..... Schedule 4  
Unoccupied Cooling is ..... Available

##### Common Terminal Unit Data:

Cooling Coil:  
Design Supply Temperature ..... 14.4 °C  
Coil Bypass Factor ..... 0.100  
Cooling Source ..... Air-Cooled DX  
Schedule ..... JFMAMJJASOND

Fan Control ..... Fan On  
Ventilation Sizing Method ..... Sum of Space OA Airflows

##### Terminal Units Data:

Zone ..... All  
Terminal Type ..... Fan Coil  
Minimum Airflow ..... 0.00 L/s/person  
Fan Performance ..... 0 Pa  
Fan Overall Efficiency ..... 50 %

#### 4. Sizing Data (User-Modified):

##### System Sizing Data:

Cooling Supply Temperature ..... 17.0 °C

##### Hydronic Sizing Specifications:

Chilled Water Delta-T ..... 5.6 °K  
Hot Water Delta-T ..... 11.1 °K

##### Safety Factors:

Cooling Sensible ..... 10 %  
Cooling Latent ..... 5 %  
Heating ..... 0 %

##### Zone Sizing Data:

Zone Airflow Sizing Method ..... Sum of space airflow rates  
Space Airflow Sizing Method ..... Individual peak space loads

Zone	Supply Airflow (L/s)	Zone Htg Unit (kW)	Reheat Coil (kW)	Ventilation (L/s)
1	600.0	-	-	55.0

# MINI DUCT SYSTEM – CEILING AIR SUPPLY – LOAD SUMMARY

## Air System Design Load Summary for MINI DUCT CEILING AIR SUPPLY

Project Name: MINI DUCT SYSTEM SAMPLE  
Prepared by: SAP ELECTROMECHANICAL

12/27/2020  
12:25PM

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 2000			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 41.4 °C / 28.4 °C			HEATING OA DB / WB 12.2 °C / 7.4 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	12 m²	305	-	12 m²	-	-
Wall Transmission	108 m²	1187	-	108 m²	511	-
Roof Transmission	100 m²	4071	-	100 m²	675	-
Window Transmission	12 m²	399	-	12 m²	203	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	100 m²	-1	-	100 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	1000 W	1000	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	2500 W	2500	-	0	0	-
People	10	821	791	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 5%	1028	40	0%	0	0
<b>&gt;&gt; Total Zone Loads</b>		<b>11311</b>	<b>831</b>		<b>1389</b>	<b>0</b>
Zone Conditioning	-	11311	831	-	-185	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Exhaust Fan Load	0 L/s	0	-	0 L/s	0	-
Ventilation Load	55 L/s	1124	1427	55 L/s	201	0
Ventilation Fan Load	0 L/s	0	-	0 L/s	0	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
<b>&gt;&gt; Total System Loads</b>		<b>12435</b>	<b>2258</b>		<b>17</b>	<b>0</b>
Terminal Unit Cooling	-	12435	2258	-	0	0
Terminal Unit Heating	-	0	-	-	0	-
<b>&gt;&gt; Total Conditioning</b>		<b>12435</b>	<b>2258</b>		<b>0</b>	<b>0</b>
<b>Key:</b>	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

## Zone Sizing Summary for MINI DUCT CEILING AIR SUPPLY

12/27/2020  
12:25PM

### Air System Information

Air System Name: MINI DUCT CEILING AIR SUPPLY  
Equipment Class: TERM  
Air System Type: SPLT-FC

Number of zones: 1  
Floor Area: 100.0 m²  
Location: Dubai, United Arab Emirates

### Sizing Calculation Information

Zone and Space Sizing Method:

Zone L/s: Sum of space airflow rates  
Space L/s: Individual peak space loads

Calculation Months: Jan to Dec  
Sizing Data: User-Modified

### Zone Sizing Data

Zone Name	Maximum Cooling Sensible (kW)	Design Air Flow (L/s)	Minimum Air Flow (L/s)	Time of Peak Load	Maximum Heating Load (kW)	Zone Floor Area (m²)	Zone L/(s-m²)
Zone 1	12.4	600	600	Jul 2100	1.4	100.0	6.00

### Terminal Unit Sizing Data - Cooling

Zone Name	Total Coil Load (kW)	Sens Coil Load (kW)	Coil Entering DB / WB (°C)	Coil Leaving DB / WB (°C)	Water Flow @ 5.6 °K (L/s)	Time of Peak Load
Zone 1	14.7	12.4	30.6 / 21.5	17.0 / 16.1	-	Jul 2000

### Terminal Unit Sizing Data - Heating, Fan, Ventilation

Zone Name	Heating Coil Load (kW)	Heating Coil Ent/Lvg DB (°C)	Htg Coil Water Flow @ 11.1 °K (L/s)	Fan Design Airflow (L/s)	Fan Motor (BHP)	Fan Motor (kW)	OA Vent Design Airflow (L/s)
Zone 1	0.0	-18.3 / -18.3	0.00	600	0.000	0.000	55

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m²)	Space L/(s-m²)
Zone 1 STANDARD AC	1	11.4	Jul 2100	1375	1.4	100.0	13.75



# MINI DUCT SYSTEM – UNIT SELECTION

## STANDARD AC UNITS

- T kW = 14.7
- S kW = 12.4
- L/s = 1003
- External Static Pressure = 50 Pa
- Design Condition
  - Room Db = 23.9 °C
  - Room Wb = 16.9 °C
- Air Entering Room
  - Room Db = 15.1 °C
  - Room Wb = 14.5 °C
- Air Leaving Room
  - Room Db = 25.4 °C
  - Room Wb = 18.8 °C

## MINI DUCT SYSTEM – AIR ON COIL CONDITIONS

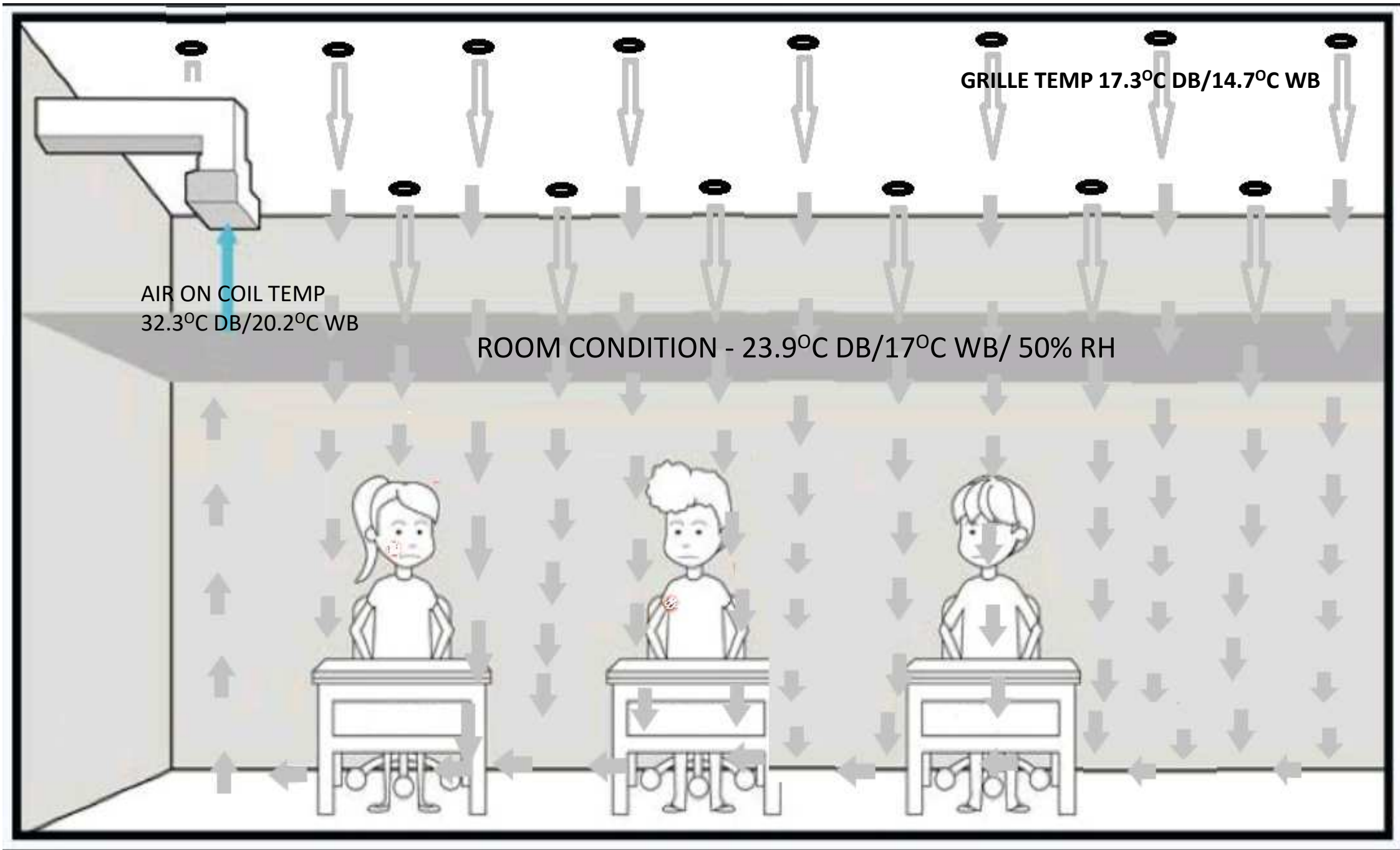
- Fresh Air Condition
  - Room Db = 41.4 °C
  - Room Wb = 28.4 °C
  - Air Volume = 55 L/s
- Room Condition
  - Room Db = 23.9
  - Room Wb = 16.9
  - Air Volume = 698-55 = 643
- Mixing Condition
$$Db = ( 643 \times 23.9 + 41.4 \times 55 ) / 698$$
**Db = 25.3 °C**
$$\text{Enthalpy} = ( 643 \times 47.8 + 91.6 \times 55 ) / 698$$
$$= 51.25 \text{ KJ/kg d.a}$$
**Wb = 18.4 °C**

## UNIT SELECTION PARAMETERS

- **T kW = 14.62**
- **S kW = 12.4**
- **L/s = 698**
- **External Static Pressure = 1"**
- **Design Condition**
  - **Room Db = 23.9 °C**
  - **Room Wb = 16.9 °C**
- **Air On Coil**
  - **Room Db = 25.3 °C**
  - **Room Wb = 18.4 °C**







# MINI DUCT SYSTEM – CEILING SUPPLY UNIT SELECTION

## M SERIES BLOWER MODULE



ENGINEERING SPECIFICATIONS

### Blower Module Specifications – 60 Hz

Model No.	M2430B-	M3642BL	M4860BL	
Electrical Characteristics	208 – 230 Volts / 60 / 1 phase			
Motor Size, HP (kW)	1/2 (0.37)	1 (0.75)		
Motor Type	-STD, -ACB	PSC		
	-SCB	EC (variable speed)		
Motor Capacitor, mfd.	-STD, -ACB	10		
Motor Capacitor, mfd.	-SCB	none		
Motor Full Load Amps	-STD	3.0	6.2	6.2
	-ACB	3.3	4.8	4.8
	-SCB	3.2	6.1	6.1
Motor Speed, RPM	-STD	1700		
	-ACB	1700/800		
	-SCB	400-1800		
Blower Wheel Nom. Diameter, in. (mm)	9.5 (241)			
Blower Wheel Width, inch (mm)	3.75 (95)	5.0 (127)	7.75 (197)	
*Nominal Air Flow Rate, CFM (L/s)	600 (283)	900 (425)	1250 (590)	
*Plenum Static Pressure, in. water (Pa)	1.5 (373)	1.5 (373)	1.5 (373)	
Minimum Plenum Size, ID, inch (mm)	7 (178)	9 (229)	10 (254)	
Sound Pressure Level	dB(A)	56	56	58
	NC	50	47	50
Shipping Weight, lb (kg)	62 (28)	72 (33)	72 (33)	

\* based on full open restrictor and minimum plenum size at 230V.

#### Measuring airflow.

To determine the airflow when using the single or two-speed motors (-STD, -ACB models), measure the amperage and look up the airflow in the following table. This is not necessary for the variable speed motors because they are programmed to deliver the airflow that you need.

#### Blower Performance (with cooling module installed) –STD and –ACB models

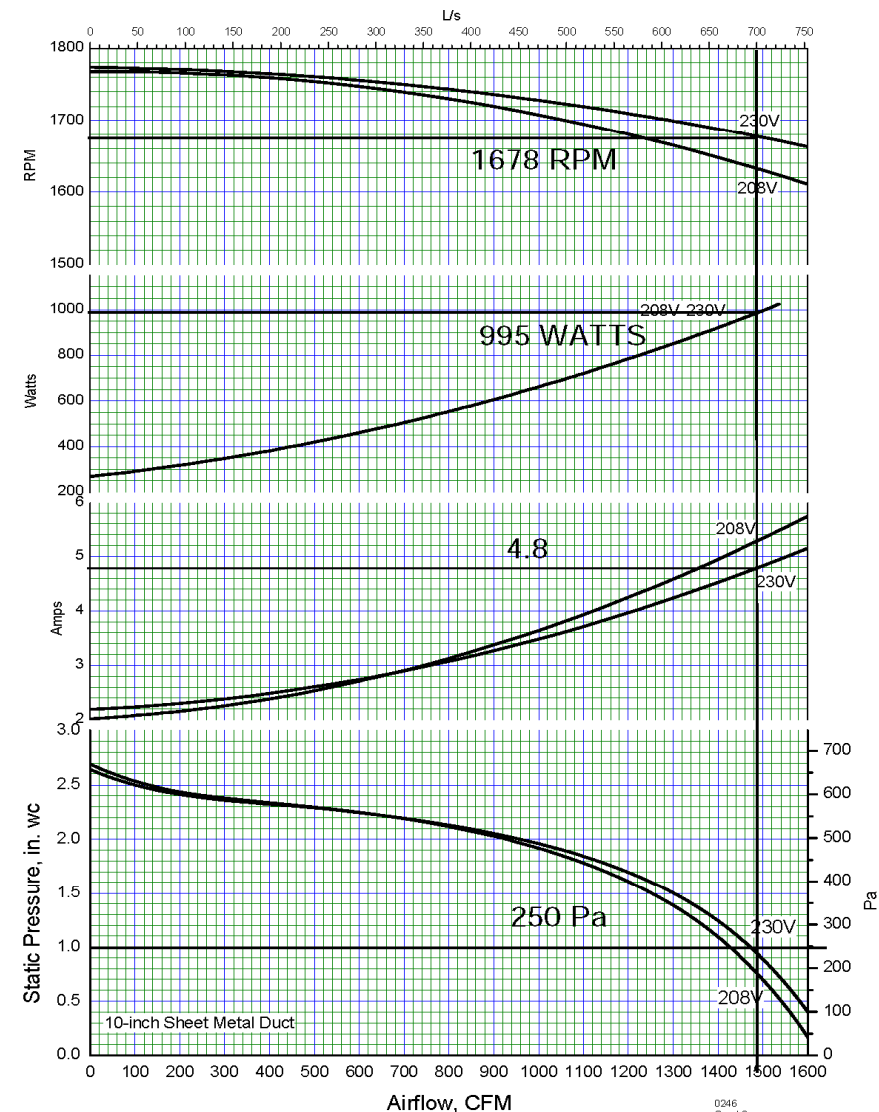
External Static Pressure, in. water (Pa)	1.0 (250)		1.25 (310)		1.5 (370)		1.75 (435)		2.0 (500)	
	CFM (L/s)	Amps	CFM (L/s)	Amps	CFM (L/s)	Amps	CFM (L/s)	Amps	CFM (L/s)	Amps
60 Hz – 230V										
<b>STD models</b>										
M2430LB	870 (410)	3.1	810 (383)	2.9	740 (351)	2.7	660 (310)	2.4	510 (240)	2.0
M3642LB	1240 (585)	4.8	1170 (552)	4.5	1070 (505)	4.1	925 (437)	3.6	745 (352)	3.1
M4860LB	1472 (695)	4.7	1400 (660)	4.5	1300 (610)	4.2	1162 (548)	3.9	953 (450)	3.4
<b>ACB models</b>										
M2430LB+ACB	760 (360)	2.3	700 (330)	2.1	640 (302)	2.0	550 (260)	1.7	450 (212)	1.5
M3642LB+ACB	1380 (617)	5.2	1300 (613)	4.9	1200 (566)	4.5	1090 (514)	4.0	950 (448)	3.6
M4860LB+ACB	1480 (698)	5.0	1430 (674)	4.4	1360 (642)	4.5	1220 (575)	4.0	930 (439)	3.1



ENGINEERING SPECIFICATIONS

Wheel: FC950-775D  
 Housing: 950M  
 Motor: 1 HP, 1650 RPM, (Dayton Model 9MTV8)  
 Equip: MB4860L-MC4860C  
 Supply: 10" sheet metal duct reduced to 9" to tee (see photo)  
 Return: UPC-104 connected to UPC-05C terminating into UPC-02E with one 90° bend

### MB4860L



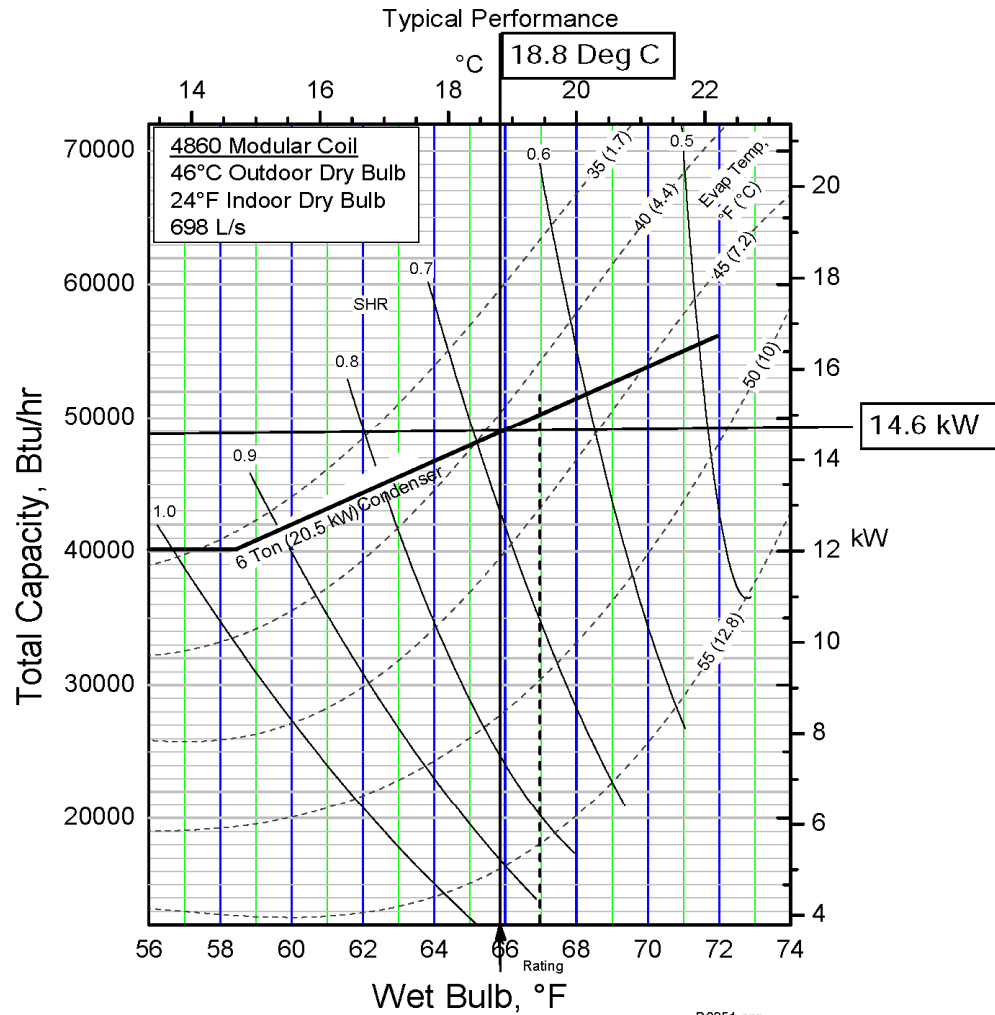
0246  
 Graphs  
 09/30/2002  
 Tested by: J. Riley  
 Approved by: C. Messner



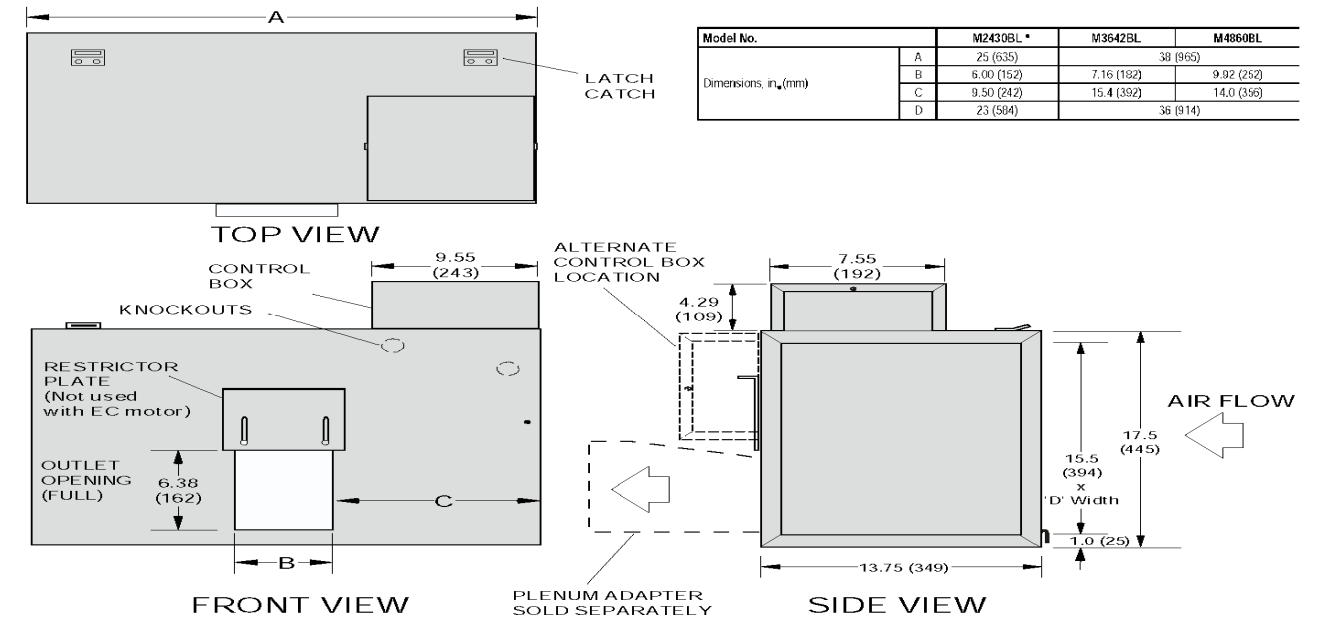
**M SERIES COOLING MODULE**  
REFRIGERANT COILS for R-22, R-407C, R-410A

ENGINEERING SPECIFICATIONS

UNIT PERFORMANCE AT REQUIRED PARAMETERS - BLOWER MB4860L+ COIL MC4860C



**Dimensional Data**

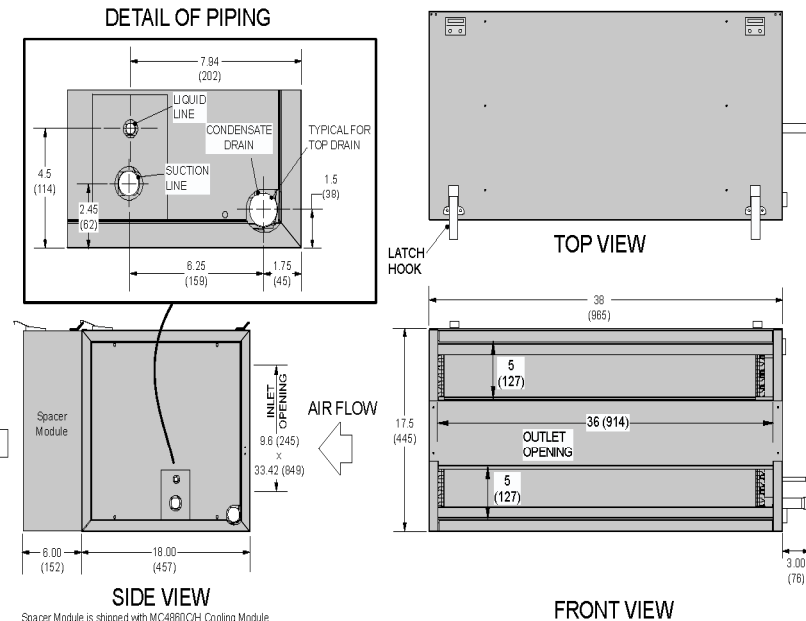


Model No.	M2430BL*	M3642BL	M4860BL
Dimensions, in. (mm)	A 25 (635)	7.16 (182)	9.92 (252)
	B 6.00 (152)	15.4 (392)	14.0 (356)
	C 9.50 (242)		36 (914)
	D 23 (584)		

**MC4860x Specifications**

Type of System	Cooling Only	Heat Pump
Model No.	MC4860C	MC4860H
Compatible Condenser Size, Ton (kW)	4-5 (14-17.6)	
Evaporator Coil	Net Face Area, ft <sup>2</sup> (m <sup>2</sup> )	7.44 (0.69)
	Tube diameter, in. (mm)	3/8 (9.5)
	Number of rows	3
	Fin pitch, in. (mm)	14 (355)
	Suction line, in. (mm) OD	7/8 (22.2)
	Liquid line, in. (mm) OD	3/8 (9.5)
	Fin Type	sinewave
	Number of Circuits	10
Valve, R-22, Part No.	A00805-005	A00808-005
Valve, R-410A, Part No.	A00805-015	A00808-015
Design Pressure, psig (kPa)	500 (3447)	
Condensate Connection, in. (mm) FPT	3/4 (19)	
Refrigerant	R-22, R-407C, R-410A*	
Coil Shipping Weight, lb. (kg)	88 (40)	
Factory Installed Expansion Device	TXV	TXV with Check Valve

\* TXV shipped loose



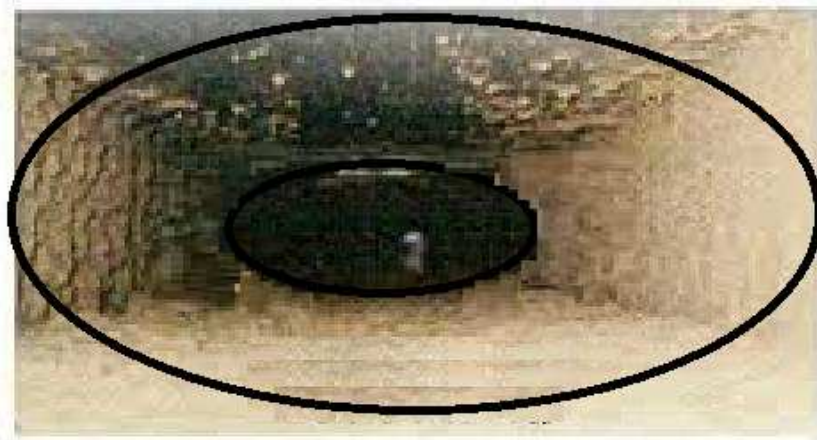


# MINI DUCT SYSTEM – ADVANTAGES

# STANDARD DX UNITS VS MINI DUCT UNITS

## STANDARD AC UNITS – AIR DISTRIBUTION

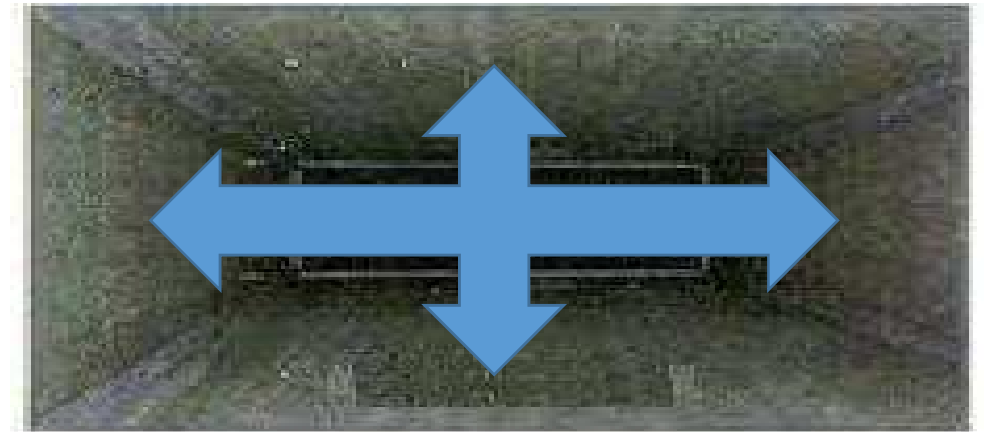
- High Volume – Low External Static Fan.
- Air is pushed through low pressure ducting. Fan is the source of Air. Air terminal units are the Air Exit point.



- Air moves in elliptical path in Rectangular duct. It leaves corners in most condition forming fungus. Dry fungus drops in duct, get carried in AC are causing allergies to occupants.

## MINI DUCT UNITS – AIR DISTRIBUTION

- Low Volume – High External Static Fan.
- Main Duct is closed form all sides. Air is delivered under high pressure in the duct. Once desired pressure is built, air moves out through tapings into flexible duct, the delivered into conditioned area. Small Air terminal units are the exit points.

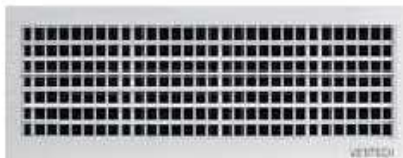


- Due to High pressure Air is filled in Duct completely leaving no space for fungus to form.

# STANDARD DX UNITS VS MINI DUCT UNITS

## STANDARD AC UNITS – TERMINAL UNITS

- The conventional AC system provides similar looking grilles / diffusers taking prominent position in your room décor with identical finish in any premises.
- Any attempt to change the look proves expensive to buy and to maintain later on.



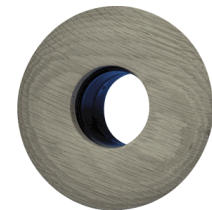
- Fungus from duct, settles on these air outlets which is very difficult to clean as construction of these air outlets are very fragile.

## MINI DUCT UNITS – TERMINAL UNITS

- Outlets are small, subtle and blend into any décor.
- For the look that best suits your needs, a variety of styles and finishes are available.
- Choose from white or black plastic, chrome, brass and several wood species or simply paint or stain the outlet to perfectly match room color scheme.



ORIGINAL  
5" Outer Diameter Plastic Outlet  
for Ceiling Applications  
(Available in white, black, brass  
or chrome finishes)



WOODEN  
5" Outer Diameter Wood Outlet  
for Hardwood Floor Applications  
(Available in a variety of  
wood species)



SLOPED  
15° and 25° Angled Outlets  
for Sloped Ceilings and Walls



SLOTTED  
1/2" x 8" Slotted Outlet for Sidewall Applications  
(Available in a variety of finishes and wood species)

# STANDARD DX UNITS VS MINI DUCT UNITS

## STANDARD AC UNITS – AIR FILTRATION

- Limited Filtration options.
- Due to low static fans, filtration ints will increase external static pressure and reduce air volume
- This will affect cooling and increase power consumption.



## MINI DUCT UNITS – AIR FILTRATION

- Due to High External Static fans its possible to add any Electrostatic or Electronic filter with out any effect on Air Volume.
- So no effect on cooling hence power consumption



# STANDARD UNITS VS MINI DUCT UNITS

## STANDARD AC UNITS – OPTIONS

- ---
- ---
- ---
- NA
- Capillary expansion.
- Single module.
- Standard Filtration option
- Due to dirty ducts, in long run Unhygienic operation
- Interior design needs to be adjusted based on Air terminal unit design. No design freedom.

## MINI DUCT UNITS – OPTIONS

- DX – UNITS – R22/407C/410A
- Matching Single Split / VRV system
- CHILLED WATER COIL – Chiller / District Cooling Application.
- MOTOR with Variable speed EC Motor & SMART CONTROL BOX.
- Thermostatic Expansion valve for precise control.
- Modular Construction.
- Multiple Filtration Options
- Hygienic operation due to pressurized duct
- Aesthetically pleasant Air terminal units. Interior design freedom get preference
- Reduced power consumption.

