ENGINEERING SUBMITTAL DATA

ED 19136

NOVEMBER 2025

REBEL APPLIED®

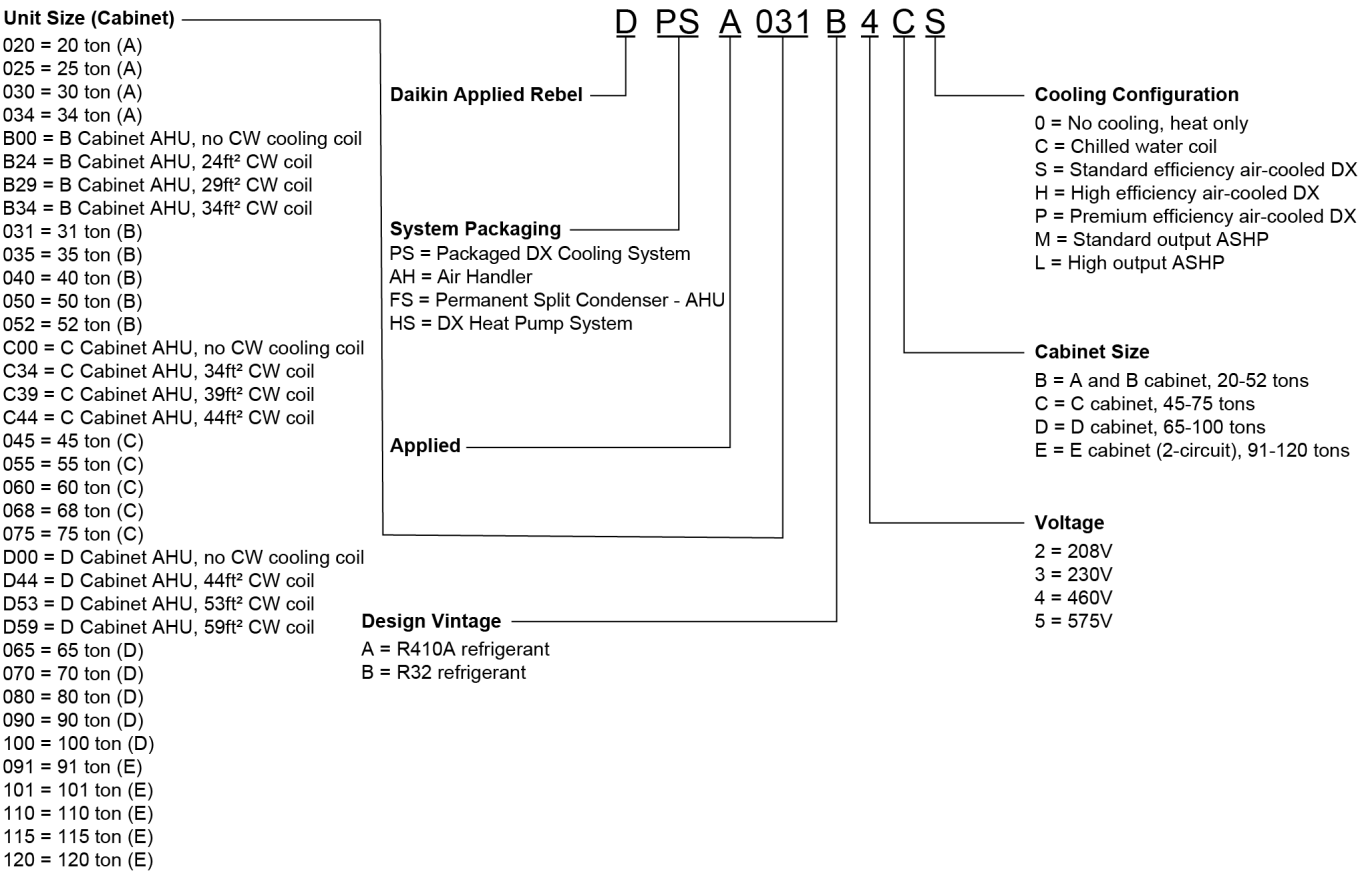
HEATING AND COOLING ROOFTOP SYSTEMS

DPSA - 20 to 120 ton
DAHA - 24 to 59 sq ft
DHSA - 31 to 68 ton

A2L Refrigerant
Heat Pump Technology

NOTE: Refer to the unit installation manual for procedures and model-specific details relating to installation and maintenance of Rebel Applied units.

Nomenclature



Efficiency Ratings

Rebel Applied can be applied to meet a wide range of efficiency needs. Engineers can enhance efficiency by selecting one of 10 fan/array combinations, larger evaporator coils, and modulating condenser fan control.

Table 1: Rebel Applied 020 – 120 Efficiency Ratings - Staged

Cabinet	Nom. Size		Standard Efficiency[2]		Highest Efficiency[3]	
		Condenser Control	Fantrol®		Speedtrol®	
		(Coil Rows)	(4 Row)		(6 Row)	
		Compressor Type	EER[1]	IEER	EER[1]	IEER
A	20	Staged	10.0	16.0	10.8	17.0
	25		10.0	16.2	10.8	17.3
	30		10.1	16.0	11.2	17.2
	31		10.7	17.2	11.2	17.5
	34		10.4	16.3	10.6	16.6
B	35		10.6	16.2	11.2	16.7
	40		10.2	15.9	11.0	16.6
	45		10.8	16.5	11.4	17.1
	50		10.3	16.8	10.6	17.1
	52		10.0	15.7	10.4	16.0
C	55		10.5	15.9	11.5	16.9
	60		10.1	16.0	11.1	16.8
	68		10.2	14.7	10.9	15.9
	75		10.0	15.2	10.4	16.2
D	65		10.4	16	11.4	17.1
	70		10.2	16.1	11.2	17.2
	80		9.9	16	11.2	17
	90		9.9	15.5	10.8	16.3
	100		9.9	15.4	10.3	16.1
E (2-circuit)	91		10.3	15.8	11.6	17.4
	101		9.8	15.6	11.3	17.3
	110		9.9	15.8	10.9	16.5
	115		9.8	15.3	10.7	16.3
	120		9.7	15.2	10.4	16.4

[1]Cooling only/electric/hot water/steam – subtract 0.2 EER and 0.3 IEER for gas heat

[2]Lowest efficiency fan array, 4-row DX coil, staged condenser fans

[3]Highest efficiency fan array, 6-row DX Coil, modulating condenser fans

Table 2: Rebel Applied 020 – 120 Efficiency Ratings - Variable/Fixed

Cabinet	Nom. Size		Standard Efficiency[2]		Highest Efficiency[3]	
		Condenser Control	Speedtrol®		Speedtrol®	
		(Coil Rows)	(4 Row)		(6 Row)	
		Compressor Type	EER[1]	IEER	EER[1]	IEER
A	20	Variable/Fixed	11.2	17.5	11.3	17.6
	25		10.3	16.1	10.8	16.8
	30		10.6	16.5	10.9	16.8
	34		10.1	15.9	10.3	16.2
B	31		10.2	16.3	11.9	17.5
	35		10.3	16.5	11.3	17.2
	40		10.1	15.8	11.1	15.9
	50		N/A	N/A	N/A	N/A
	52		N/A	N/A	N/A	N/A
C	45		11.2	17.6	11.5	17.8
	55		10.6	17.4	11.5	18.4
	60		10.2	16.6	11.2	17.7
	68		10.4	17	10.9	17.3
	75		10.2	16.4	10.5	16.7
D	65		9.5	14.5	11.3	17.5
	70		9.2	14.5	11.2	17.7
	80		9.8	15.1	11.2	17.3
	90		9.9	15.1	10.8	16.7
	100		9.7	14.6	10.4	16.3
E (2-Circuit)	91		9.9	15.1	11.7	17.7
	101		9.7	15.1	11.4	17.6
	110		9.8	15.1	11	17.4
	115		9.8	14.9	10.8	17.2
	120		9.8	15.4	10.4	16.7

[1]Cooling only/electric/hot water/steam – subtract 0.2 EER and 0.3 IEER for gas heat

[2]Lowest efficiency fan array, 4-row DX coil, staged condenser fans

[3]Highest efficiency fan array, 6-row DX Coil, modulating condenser fans

Table 3: Rebel Applied 020 – 120 Efficiency Ratings - Variable/Variable

Cabinet	Nom. Size		Standard Efficiency[2]		Highest Efficiency[3]	
		Condenser Control	Speedtrol®		Speedtrol®	
		(Coil Rows)	(4 Row)		(6 Row)	
		Compressor Type	EER[1]	IEER	EER[1]	IEER
A	20	Variable/Fixed	11	17.9	11.3	18.9
	25		10	17.2	10.8	18.3
	30		10.1	16.6	11.2	17.8
	34		11.1	18.1	11.6	18.7
B	31		10.4	17.1	10.6	17.1
	35		10.7	17.4	11.3	18.1
	40		10.3	16.9	11.1	17.7
	50		10.7	17.3	11.3	18.1
	52		10	16.8	10.6	17.2
C	45		10	16.4	10.3	16.8
	55		10.6	17.1	11.6	18.6
	60		10.3	16.3	11.5	18.2
	68		10.3	17.4	11	17.8
	75		10	16.2	10.8	17.3
D	65		9.5	15.5	11.3	17.5
	70		10.1	16.5	11.2	17.7
	80		9.8	15.9	11.2	17.3
	90		9.9	16	10.7	16.7
	100		9.8	15.7	10.4	16.3
E (2-Circuit)	91		9.9	15.8	11.7	17.7
	101		9.9	16	11.4	17.6
	110		9.7	15.8	11	17.4
	115		9.7	15.7	10.8	17.2
	120		9.7	15.7	10.4	16.7

[1]Cooling only/electric/hot water/steam – subtract 0.2 EER and 0.3 IEER for gas heat

[2]Lowest efficiency fan array, 4-row DX coil, staged condenser fans

[3]Highest efficiency fan array, 6-row DX Coil, modulating condenser fans

Heating Data

Table 4: Natural Gas Heat

MBH Input	200	400	600	800	1125	1500	1600	2000	2400
MBH Output	162	324	486	648	911	1215	1296	1215	1215
Staged	2	2	4	N/A	N/A	N/A	N/A	N/A	N/A
Modulating Turndown	5:1 or 100:1	5:1, 10:1, or 100:1	5:1, 10:1, or 100:1	10:1, 20:1 or 100:1	10:1, 20:1 or 100:1	10:1, 20:1, or 100:1	5:1 or 20:1	5:1 or 20:1	5:1 or 20:1
Minimum Gas Inlet Pressure	7.0 in. W.C								
Maximum Gas Inlet Pressure	0.5 psig								
Gas Pipe Connection Size (N.P.T)	0.75	0.75	1.00	1.25	1.25	1.50	1.50	1.50	1.50

Table 5: Propane Heat

MBH Input	200	400	600	800	1125	1500
MBH Output	162	324	486	648	911	1215
Staged	2	2	2 or 4	N/A	N/A	N/A
Modulating Turndown	3:1	3:1 or 6:1	6:1	6:1 or 12:1		
Minimum Gas Inlet Pressure	7.0 in. W.C					
Maximum Gas Inlet Pressure	0.5 psig					
Gas Pipe Connection Size (N.P.T)	0.75	0.75	1.00	1.25	1.25	1.5

Table 6: Electric Heat

Control	208V		230V		460V		575V	
	kW	MBH	kW	MBH	kW	MBH	kW	MBH
4 stages, SCR	30	102.0	20[1]	62.4	20[1]	62.7	25[1]	170.6
	45	153.0	40	124.7	40	125.0	45	
	60	204.0	55	187.1	55	188.0		
	75	255.0	75	249.4	75	250.2	70	255.9
	90	306.0	90	311.8	90	313.4		
	105	357.0	110	374.3	110	375.1	115	341.2
	120	408.0	130	436.5	130	438.7	135	426.5
			150	498.9	150	500.1		
					165	564.0	160	511.8
					180	625.2	180	597.1
					220	750.2	230	682.4
[1]2-stage only								

NOTE: All electric heaters are available with either 4 stages of control or fully modulating SCR control.

All heaters have a maximum temperature rise of 60°F (33°C).

Table 7: Energy Recovery Defrost Electric Pre-heater Sizes

Control	208V		230V		460V		575V	
	kW	MBH	kW	MBH	kW	MBH	kW	MBH
SCR	10	34.1	10	34.1	10	34.1	10	34.1
	20	68.2	20	68.2	20	68.2	20	68.2
	40	136.5	40	136.5	40	136.5	40	136.5
	60	176.7	60	195.5	60	204.7	60	204.7

NOTE: Electric Preheat does not come with single point power if the unit is configured for electric heat as primary.

Electric Preheat cannot be run simultaneously with mechanical cooling.

Electrical Data

Table 8: Electrical Data for R32 Cooling Configurations

			Compressor	Circuit 1				Compressor	Circuit 2			
Cabinet	Unit Size	Modulation		208	230	460	575		208	230	460	575
A	20	Fixed	Comp1	40.8	36.9	18.5	14.8	Comp2	40.8	36.9	18.5	14.8
A		Vari-Lead	Comp1	40.8	36.9	18.5	14.8	Comp2	40.8	36.9	18.5	14.8
A		Variable All	Comp1	40.8	36.9	18.5	14.8	Comp2	40.8	36.9	18.5	14.8
A	25	Fixed	Comp1	46.3	41.9	20.9	16.7	Comp2	46.3	41.9	20.9	16.7
A		Vari-Lead	Comp1	46.3	41.9	20.9	16.7	Comp2	46.3	41.9	20.9	16.7
A		Variable All	Comp1	46.3	41.9	20.9	16.7	Comp2	46.3	41.9	20.9	16.7
A	30	Fixed	Comp1	51.7	46.8	23.4	18.7	Comp2	51.7	46.8	23.4	18.7
A		Vari-Lead	Comp1	51.7	46.8	23.4	18.7	Comp2	51.7	46.8	23.4	18.7
A		Variable All	Comp1	51.7	46.8	23.4	18.7	Comp2	51.7	46.8	23.4	18.7
A	34	Fixed	Comp1	53.2	48.1	24	19.2	Comp2	53.2	48.1	24	19.2
A		Vari-Lead	Comp1	53.2	48.1	24	19.2	Comp2	53.2	48.1	24	19.2
A		Variable All	Comp1	53.2	48.1	24	19.2	Comp2	53.2	48.1	24	19.2
B	31	Fixed	Comp1	53.2	48.1	24	19.2	Comp2	33.4	30.2	15.1	12.1
B								Comp4	33.4	30.2	15.1	12.1
B		Vari-Lead	Comp1	53.2	48.1	24	19.2	Comp2	33.4	30.2	15.1	12.1
B								Comp4	33.4	30.2	15.1	12.1
B		Variable All	Comp1	53.2	48.1	24	19.2	Comp2	80	80	31	39
B	35	Fixed	Comp1	55.7	50.4	25.2	20.1	Comp2	33.4	30.2	15.1	12.1
B								Comp4	33.4	30.2	15.1	12.1
B		Vari-Lead	Comp1	55.7	50.4	25.2	20.1	Comp2	33.4	30.2	15.1	12.1
B								Comp4	33.4	30.2	15.1	12.1
B		Variable All	Comp1	55.7	50.4	25.2	20.1	Comp2	55.7	50.4	25.2	20.1
B			Comp3	33.4	30.2	15.1	12.1	Comp4	33.4	30.2	15.1	12.1
B	40	Fixed	Comp1	64.9	58.7	29.3	23.5	Comp2	33.4	30.2	15.1	12.1
B								Comp4	33.4	30.2	15.1	12.1
B		Vari-Lead	Comp1	64.9	58.7	29.3	23.5	Comp2	33.4	30.2	15.1	12.1
B								Comp4	33.4	30.2	15.1	12.1
B		Variable All	Comp1	64.9	58.7	29.3	23.5	Comp2	64.9	58.7	29.3	23.5
B			Comp3	33.4	30.2	15.1	12.1	Comp4	33.4	30.2	15.1	12.1
B	50	Fixed	Comp1	47.5	42.9	21.5	17.2	Comp2	37.3	33.7	16.8	12.1
B			Comp3	35	31.7	15.3	11.7	Comp4	37.3	33.7	16.8	12.1
B		Vari-Lead	Comp1	47.5	42.9	21.5	17.2	Comp2	37.3	33.7	16.8	12.1
B			Comp3	35	31.7	15.3	11.7	Comp4	37.3	33.7	16.8	12.1
B		Variable All	Comp1	47.5	42.9	21.5	17.2	Comp2	47.5	42.9	21.5	17.2
B			Comp3	35	31.7	15.3	11.7	Comp4	35	31.7	15.3	11.7

(continued)												
			Compressor	Circuit 1				Compressor	Circuit 2			
Cabinet	Unit Size	Modulation		208	230	460	575		208	230	460	575
B	52	Fixed	Comp1	60.1	54.3	27.2	21.7	Comp2	37.3	33.7	16.8	12.1
B			Comp3	35	31.7	15.3	11.7	Comp4	37.3	33.7	16.8	12.1
B		Vari-Lead	Comp1	60.1	54.3	27.2	21.7	Comp2	37.3	33.7	16.8	12.1
B			Comp3	35	31.7	15.3	11.7	Comp4	37.3	33.7	16.8	12.1
B		Variable All	Comp1	60.1	54.3	27.2	21.7	Comp2	60.1	54.3	27.2	21.7
B			Comp3	35	31.7	15.3	11.7	Comp4	35	31.7	15.3	11.7
C	45	Fixed	Comp1	57.8	52.2	26.2	21.4	Comp2	35.0	31.7	15.3	11.7
C			Comp3	35.0	31.7	15.3	11.7	Comp4	35.0	31.7	15.3	11.7
C		Vari-Lead	Comp1	57.8	52.2	26.2	21.4	Comp2	35.0	31.7	15.3	11.7
C			Comp3	35.0	31.7	15.3	11.7	Comp4	35.0	31.7	15.3	11.7
C		Variable All	Comp1	57.8	52.2	26.2	21.4	Comp2	57.8	52.2	26.2	21.4
C			Comp3	35.0	31.7	15.3	11.7	Comp4	35.0	31.7	15.3	11.7
C	55	Fixed	Comp1	57.8	52.2	26.2	21.4	Comp2	37.3	33.7	16.8	12.1
C			Comp3	37.3	33.7	16.8	12.1	Comp4	37.3	33.7	16.8	12.1
C		Vari-Lead	Comp1	57.8	52.2	26.2	21.4	Comp2	37.3	33.7	16.8	12.1
C			Comp3	37.3	33.7	16.8	12.1	Comp4	37.3	33.7	16.8	12.1
C		Variable All	Comp1	57.8	52.2	26.2	21.4	Comp2	57.8	52.2	26.2	21.4
C			Comp3	37.3	33.7	16.8	12.1	Comp4	37.3	33.7	16.8	12.1
C	60	Fixed	Comp1	57.8	52.2	26.2	21.4	Comp2	43.0	38.8	19.5	15.0
C			Comp3	43.0	38.8	19.5	15.0	Comp4	43.0	38.8	19.5	15.0
C		Vari-Lead	Comp1	57.8	52.2	26.2	21.4	Comp2	43.0	38.8	19.5	15.0
C			Comp3	43.0	38.8	19.5	15.0	Comp4	43.0	38.8	19.5	15.0
C		Variable All	Comp1	57.8	52.2	26.2	21.4	Comp2	57.8	52.2	26.2	21.4
C			Comp3	43.0	38.8	19.5	15.0	Comp4	43.0	38.8	19.5	15.0
C	68	Fixed	Comp1	57.8	52.2	26.2	21.4	Comp2	48.7	44.0	22.0	23.9
C			Comp3	48.7	44.0	22.0	23.9	Comp4	48.7	44.0	22.0	23.9
C		Vari-Lead	Comp1	57.8	52.2	26.2	21.4	Comp2	48.7	44.0	22.0	23.9
C			Comp3	48.7	44.0	22.0	23.9	Comp4	48.7	44.0	22.0	23.9
C		Variable All	Comp1	57.8	52.2	26.2	21.4	Comp2	57.8	52.2	26.2	21.4
C			Comp3	48.7	44.0	22.0	23.9	Comp4	48.7	44.0	22.0	23.9
C	75	Fixed	Comp1	57.8	52.2	26.2	21.4	Comp2	48.7	44.0	22.0	23.9
C			Comp3	48.7	44.0	22.0	23.9	Comp4	48.7	44.0	22.0	23.9
C		Vari-Lead	Comp1	57.8	52.2	26.2	21.4	Comp2	48.7	44.0	22.0	23.9
C			Comp3	48.7	44.0	22.0	23.9	Comp4	48.7	44.0	22.0	23.9
C		Variable All	Comp1	57.8	52.2	26.2	21.4	Comp2	57.8	52.2	26.2	21.4
C			Comp3	48.7	44.0	22.0	23.9	Comp4	48.7	44.0	22.0	23.9

(continued)												
			Compressor	Circuit 1				Compressor	Circuit 2			
Cabinet	Unit Size	Modulation		208	230	460	575		208	230	460	575
D	65	Fixed	Comp1	51.7	46.8	23.4	18.7	Comp2	33.4	30.2	15.1	12.1
D			Comp3	33.4	30.2	15.1	12.1	Comp4	33.4	30.2	15.1	12.1
D			Comp5	33.4	30.2	15.1	12.1	Comp6	33.4	30.2	15.1	12.1
D		Vari-Lead	Comp1	51.7	46.8	23.4	18.7	Comp2	33.4	30.2	15.1	12.1
D			Comp3	33.4	30.2	15.1	12.1	Comp4	33.4	30.2	15.1	12.1
D			Comp5	33.4	30.2	15.1	12.1	Comp6	33.4	30.2	15.1	12.1
D		Variable All	Comp1	51.7	46.8	23.4	18.7	Comp2	51.7	46.8	23.4	18.7
D			Comp3	33.4	30.2	15.1	12.1	Comp4	33.4	30.2	15.1	12.1
D			Comp5	33.4	30.2	15.1	12.1	Comp6	33.4	30.2	15.1	12.1
D	70	Fixed	Comp1	56.3	50.9	25.5	20.4	Comp2	35	31.7	15.3	11.7
D			Comp3	35	31.7	15.3	11.7	Comp4	35	31.7	15.3	11.7
D			Comp5	35	31.7	15.3	11.7	Comp6	35	31.7	15.3	11.7
D		Vari-Lead	Comp1	56.3	50.9	25.5	20.4	Comp2	35	31.7	15.3	11.7
D			Comp3	35	31.7	15.3	11.7	Comp4	35	31.7	15.3	11.7
D			Comp5	35	31.7	15.3	11.7	Comp6	35	31.7	15.3	11.7
D		Variable All	Comp1	56.3	50.9	25.5	20.4	Comp2	56.3	50.9	25.5	20.4
D			Comp3	35	31.7	15.3	11.7	Comp4	35	31.7	15.3	11.7
D			Comp5	35	31.7	15.3	11.7	Comp6	35	31.7	15.3	11.7
D	80	Fixed	Comp1	51.7	46.8	23.4	18.7	Comp2	37.3	33.7	16.8	12.1
D			Comp3	37.3	33.7	16.8	12.1	Comp4	37.3	33.7	16.8	12.1
D			Comp5	37.3	33.7	16.8	12.1	Comp6	37.3	33.7	16.8	12.1
D		Vari-Lead	Comp1	51.7	46.8	23.4	18.7	Comp2	37.3	33.7	16.8	12.1
D			Comp3	37.3	33.7	16.8	12.1	Comp4	37.3	33.7	16.8	12.1
D			Comp5	37.3	33.7	16.8	12.1	Comp6	37.3	33.7	16.8	12.1
D		Variable All	Comp1	51.7	46.8	23.4	18.7	Comp2	51.7	46.8	23.4	18.7
D			Comp3	37.3	33.7	16.8	12.1	Comp4	37.3	33.7	16.8	12.1
D			Comp5	37.3	33.7	16.8	12.1	Comp6	37.3	33.7	16.8	12.1
D	90	Fixed	Comp1	60.1	54.3	27.2	21.7	Comp2	43	38.8	19.5	15
D			Comp3	37.3	33.7	16.8	12.1	Comp4	43	38.8	19.5	15
D			Comp5	37.3	33.7	16.8	12.1	Comp6	43	38.8	19.5	15
D		Vari-Lead	Comp1	60.1	54.3	27.2	21.7	Comp2	43	38.8	19.5	15
D			Comp3	37.3	33.7	16.8	12.1	Comp4	43	38.8	19.5	15
D			Comp5	37.3	33.7	16.8	12.1	Comp6	43	38.8	19.5	15
D		Variable All	Comp1	60.1	54.3	27.2	21.7	Comp2	60.1	54.3	27.2	21.7
D			Comp3	37.3	33.7	16.8	12.1	Comp4	37.3	33.7	16.8	12.1
D			Comp5	37.3	33.7	16.8	12.1	Comp6	37.3	33.7	16.8	12.1

(continued)												
			Compressor	Circuit 1				Compressor	Circuit 2			
Cabinet	Unit Size	Modulation		208	230	460	575		208	230	460	575
D	100	Fixed	Comp1	66.5	60.1	30.1	24.1	Comp2	43	38.8	19.5	15
D			Comp3	43	38.8	19.5	15	Comp4	43	38.8	19.5	15
D			Comp5	43	38.8	19.5	15	Comp6	43	38.8	19.5	15
D		Vari-Lead	Comp1	66.5	60.1	30.1	24.1	Comp2	43	38.8	19.5	15
D			Comp3	43	38.8	19.5	15	Comp4	43	38.8	19.5	15
D			Comp5	43	38.8	19.5	15	Comp6	43	38.8	19.5	15
D		Variable All	Comp1	66.5	60.1	30.1	24.1	Comp2	66.5	60.1	30.1	24.1
D			Comp3	43	38.8	19.5	15	Comp4	43	38.8	19.5	15
D			Comp5	43	38.8	19.5	15	Comp6	43	38.8	19.5	15
E	91	Fixed	Comp1	80	80	31	39	Comp2	43	38.8	19.5	15
E			Comp3	37.3	33.7	16.8	12.1	Comp4	43	38.8	19.5	15
E			Comp5	37.3	33.7	16.8	12.1	Comp6	43	38.8	19.5	15
E		Vari-Lead	Comp1	80	80	31	39	Comp2	43	38.8	19.5	15
E			Comp3	37.3	33.7	16.8	12.1	Comp4	43	38.8	19.5	15
E			Comp5	37.3	33.7	16.8	12.1	Comp6	43	38.8	19.5	15
E		Variable All	Comp1	80	80	31	39	Comp2	80	80	31	39
E			Comp3	37.3	33.7	16.8	12.1	Comp4	37.3	33.7	16.8	12.1
E			Comp5	37.3	33.7	16.8	12.1	Comp6	37.3	33.7	16.8	12.1
E	101	Fixed	Comp1	80	80	31	39	Comp2	48.7	44	22	23.9
E			Comp3	43	38.8	19.5	15	Comp4	48.7	44	22	23.9
E			Comp5	43	38.8	19.5	15	Comp6	48.7	44	22	23.9
E		Vari-Lead	Comp1	80	80	31	39	Comp2	48.7	44	22	23.9
E			Comp3	43	38.8	19.5	15	Comp4	48.7	44	22	23.9
E			Comp5	43	38.8	19.5	15	Comp6	48.7	44	22	23.9
E		Variable All	Comp1	80	80	31	39	Comp2	80	80	31	39
E			Comp3	43	38.8	19.5	15	Comp4	43	38.8	19.5	15
E			Comp5	43	38.8	19.5	15	Comp6	43	38.8	19.5	15
E	110	Fixed	Comp1	80	80	31	39	Comp2	56.3	50.9	25.4	19
E			Comp3	48.7	44	22	23.9	Comp4	56.3	50.9	25.4	19
E			Comp5	48.7	44	22	23.9	Comp6	56.3	50.9	25.4	19
E		Vari-Lead	Comp1	80	80	31	39	Comp2	56.3	50.9	25.4	19
E			Comp3	48.7	44	22	23.9	Comp4	56.3	50.9	25.4	19
E			Comp5	48.7	44	22	23.9	Comp6	56.3	50.9	25.4	19
E		Variable All	Comp1	80	80	31	39	Comp2	80	80	31	39
E			Comp3	48.7	44	22	23.9	Comp4	48.7	44	22	23.9
E			Comp5	48.7	44	22	23.9	Comp6	48.7	44	22	23.9

(continued)												
			Compressor	Circuit 1				Compressor	Circuit 2			
Cabinet	Unit Size	Modulation		208	230	460	575		208	230	460	575
E	115	Fixed	Comp1	80	80	31	39	Comp2	56.3	50.9	25.4	19
E			Comp3	56.3	50.9	25.4	19	Comp4	56.3	50.9	25.4	19
E			Comp5	56.3	50.9	25.4	19	Comp6	56.3	50.9	25.4	19
E		Vari-Lead	Comp1	80	80	31	39	Comp2	56.3	50.9	25.4	19
E			Comp3	56.3	50.9	25.4	19	Comp4	56.3	50.9	25.4	19
E			Comp5	56.3	50.9	25.4	19	Comp6	56.3	50.9	25.4	19
E		Variable All	Comp1	80	80	31	39	Comp2	80	80	31	39
E			Comp3	56.3	50.9	25.4	19	Comp4	56.3	50.9	25.4	19
E			Comp5	56.3	50.9	25.4	19	Comp6	56.3	50.9	25.4	19
E	120	Fixed	Comp1	80	80	31	39	Comp2	56.3	50.9	25.4	19
E			Comp3	71.5	64.7	32.3	22.4	Comp4	56.3	50.9	25.4	19
E			Comp5	71.5	64.7	32.3	22.4	Comp6	56.3	50.9	25.4	19
E		Vari-Lead	Comp1	80	80	31	39	Comp2	56.3	50.9	25.4	19
E			Comp3	71.5	64.7	32.3	22.4	Comp4	56.3	50.9	25.4	19
E			Comp5	71.5	64.7	32.3	22.4	Comp6	56.3	50.9	25.4	19
E		Variable All	Comp1	80	80	31	39	Comp2	80	80	31	39
E			Comp3	71.5	64.7	32.3	22.4	Comp4	71.5	64.7	32.3	22.4
E			Comp5	71.5	64.7	32.3	22.4	Comp6	71.5	64.7	32.3	22.4

Table 9: Electrical Data for R32 Heat Pump Configurations

				Circuit 1					Circuit 2			
Cabinet	**Unit Size**	**Modulation**	**Compressor**	**208**	**230**	**460**	**575**	**Compressor**	**208**	**230**	**460**	**575**
B	31	Standard Output	Comp1	80	80	31	39	Comp2	80	80	31	39
B			Comp3	33.4	30.2	15.1	12.1	Comp4	33.4	30.2	15.1	12.1
B		High Output	Comp1	80	80	31	39	Comp2	80	80	31	39
B			Comp3	33.4	30.2	15.1	12.1	Comp4	33.4	30.2	15.1	12.1
B			Comp5	33.4	30.2	15.1	12.1	Comp6	33.4	30.2	15.1	12.1
B	35	Standard Output	Comp1	80	80	31	39	Comp2	80	80	31	39
B			Comp3	35	31.7	15.3	11.7	Comp4	35	31.7	15.3	11.7
B		High Output	Comp1	80	80	31	39	Comp2	80	80	31	39
B			Comp3	33.4	30.2	15.1	12.1	Comp4	33.4	30.2	15.1	12.1
B			Comp5	33.4	30.2	15.1	12.1	Comp6	33.4	30.2	15.1	12.1
B	40	Standard Output	Comp1	80	80	31	39	Comp2	80	80	31	39
B			Comp3	37.3	33.7	16.8	12.1	Comp4	37.3	33.7	16.8	12.1
B		High Output	Comp1	80	80	31	39	Comp2	80	80	31	39
B			Comp3	37.3	33.7	16.8	12.1	Comp4	37.3	33.7	16.8	12.1
B			Comp5	37.3	33.7	16.8	12.1	Comp6	37.3	33.7	16.8	12.1
B	50	Standard Output	Comp1	80	80	31	39	Comp2	80	80	31	39
B			Comp3	56.3	50.9	25.4	19	Comp4	56.3	50.9	25.4	19
B		High Output	Comp1	80	80	31	39	Comp2	80	80	31	39
B			Comp3	56.3	50.9	25.4	19	Comp4	56.3	50.9	25.4	19
B			Comp5	56.3	50.9	25.4	19	Comp6	56.3	50.9	25.4	19
B	52	Standard Output	Comp1	80	80	31	39	Comp2	80	80	31	39
B			Comp3	56.3	50.9	25.4	19	Comp4	56.3	50.9	25.4	19
B		High Output	Comp1	80	80	31	39	Comp2	80	80	31	39
B			Comp3	56.3	50.9	25.4	19	Comp4	56.3	50.9	25.4	19
B			Comp5	56.3	50.9	25.4	19	Comp6	56.3	50.9	25.4	19
C	45	Standard Output	Comp1	80	80	31	39	Comp2	80	80	31	39
C			Comp3	33.4	30.2	15.1	12.1	Comp4	48.7	44	22	23.9
C	55	Standard Output	Comp1	80	80	31	39	Comp2	80	80	31	39
C			Comp3	56.3	50.9	25.4	19	Comp4	56.3	50.9	25.4	19
C	60	Standard Output	Comp1	80	80	31	39	Comp2	80	80	31	39
C			Comp3	71.5	64.7	32.3	22.4	Comp4	71.5	64.7	32.3	22.4
C	68	Standard Output	Comp1	80	80	31	39	Comp2	80	80	31	39
C			Comp3	71.5	64.7	32.3	22.4	Comp4	71.5	64.7	32.3	22.4

Table 10: **Condenser Fan**

Voltage	Amps per Fan
208	4.2
230	4
460	2
575	1.7

Physical Data Tables

DPSA 020 - 034 A-Cabinet Physical Data

Table 11: DPSA 020 - 034 A-Cabinet Physical Data

DPSA 020 - 034 A-Cabinet				
	020	**025**	**030**	**034**
Compressors - Standard Efficiency				
Staged Control Qty - hp	2-14 (2-speed)	2-14 (2-speed)	2-14 (2-speed)	2-14 (2-speed)
Capacity Control	0/25/50/75/100			
Compressors - High Efficiency				
Variable Lead Circuit Control Qty - hp	1-14 Var, 2-4.5	1-14 Var, 2-5.1	1-20 Var, 1-5.5, 1-6.3	1-20 Var, 2-6.9
Capacity Control	0/20-100%			
Compressors - Premium Efficiency				
Variable All Circuits Control Qty - hp	2-14 Var		2-20 Var	
Capacity Control	0/20-100%			
Condenser Fans				
Qty/Diam/HP	4/26"/1.5			
Evaporator Coil				
Rows/FPI	4 or 6 rows / 12 FPI			
FA (sqft) - Standard	26.5			
FA (Sqft) - Optional	35.4			
Circuits	2, Fully Interlaced			
Condenser Coil				
FA (sqft)	110			
Type	Microchannel			
Supply Fans				
Type	ECM SWSI Plenum Fan Array			
Row × Columns (Qty)	1 × 2 (2) or 2 × 2 (4)			
Diameter (in)	355(12"), 450(18"), 500(20"), 560 (22")			
Motor Range kw (hp)	1.1 kW – 9.8 kW			
High Static Return Fans				
Type	Direct-drive ECM SWSI Plenum Fan Array			
Row × Columns (Qty)	1 × 2 (2)			
Diameter (in)	450(18"), 500(20"), 560 (22")			
Motor Range kw (hp)	1.1 kW – 6.0 kW			
Low Static Propeller Exhaust				
Type	Direct-drive Propeller Exhaust with VFD			
Row × Columns (Qty)	1 × 2 (2), 1 × 3 (3)			
Diameter (in)	26"			
Motor Range (hp)	1.5 HP			
High Static Exhaust				
Type	Direct Drive ECM SWSI Plenum Fan Array			
Row × Columns (Qty)	1 x 2 (2)			

(continued)				
DPSA 020 - 034 A-Cabinet (continued)				
	020	**025**	**030**	**034**
Diameter mm (in)	450(18"), 500(20"), 560 (22")			
Motor Range kW	1.1 kW – 6.0 kW			
Gas Furnace				
Nom. Input (MBH)	200, 400, 600			
Nom. Output (MBH)	162, 324, 486			
Efficiency	81%			
Electric Furnace				
Nom. kW Input (varies by voltage)	10-220kW			
Hot Water Coils				
FA (sqft)/Rows/Fins	20.6ft² / 1 or 2 row / 8,10,12 FPI			
FA (sqft)/Rows/Fins	26.9ft² / 1 or 2 row / 8,10,12 FPI			
Steam Coils				
FA (sqft)/Rows/Fins	20.3 ft² / 1 row / 6,8,10 FPI			
FA (sqft)/Rows/Fins	26.6 ft² / 1 row / 6,8,10 FPI			

DPSA 031 – 052 B-Cabinet Physical Data

Table 12: DPSA 031 – 052 B-Cabinet Physical Data

DPSA 031 – 052 B-Cabinet					
	31	**35**	**40**	**50**	**52**
Compressors - Standard Efficiency					
Staged Control Qty - hp	2-8; 1-20 (2-speed)	2-8; 1-20 (2-speed)	2-8; 1-20 (2-speed)	2-20; 1-9, 1-10 (2-speed)	2-20; 1-9, 1-10 (2-speed)
Capacity Control	0/25/50/75/100				
Compressors - High Efficiency					
Variable Lead Circuit Control Qty - hp	2-8; 1-20 (2-speed)	2-8; 1-20 (2-speed)	2-8; 1-20 (2-speed)	2-20; 1-9, 1-10 (2-speed)	2-20; 1-9, 1-10 (2-speed)
Capacity Control	0/20-100%				
Compressors - Premium Efficiency					
Variable All Circuits Control Qty - hp	2-20 Var	2-20 Var, 2-8 Fixed	2-20 Var, 2-8 Fixed	2-20 Var, 2-9 Fixed	2-20 Var, 2-9 Fixed
Capacity Control	0/20-100%				
Condenser Fans					
Qty/Diam/HP	4/26"/1.5				
Evaporator Coil					
Rows/FPI	4 or 6 rows/ 12 FPI				
FA (sqft) - Standard	26.5				
FA (Sqft) - Optional	35.4				
Circuits	2, Fully Interlaced				
Condenser Coil					
FA (sqft)	110				
Type	Microchannel				

(continued)					
DPSA 031 – 052 B-Cabinet					
	31	**35**	**40**	**50**	**52**
Supply Fans					
Type	ECM SWSI Plenum Fan Array				
Row × Columns (Qty)	1 × 2 (2) or 2 × 2 (4)				
Diameter (in)	355(12"), 450(18"), 500(20"), 560 (22"), 630 (25")				
Motor Range kw (hp)	1.1 kW – 9.8 kW				
High Static Return Fans					
Type	Direct-dive ECM SWSI Plenum Fan Array				
Row × Columns (Qty)	1 × 2 (2)				
Diameter (in)	450(18"), 500(20"), 560 (22"), 630 (25")				
Motor Range kw (hp)	1.1 kW – 6.0 kW				
Low Static Propeller Exhaust					
Type	Direct-dive Propeller Exhaust with VFD				
Row × Columns (Qty)	1 × 2 (2), 1 × 3 (3)				
Diameter (in)	26"				
Motor Range (hp)	1.5 HP				
High Static Exhaust					
Type	Direct Drive ECM SWSI Plenum Fan Array				
Row × Columns (Qty)	1 x 2 (2)				
Diameter mm (in)	450(18"), 500(20"), 560 (22"), 630 (25")				
Motor Range kW	1.1 kW – 6.0 kW				
Gas Furnace					
Nom. Input (MBH)	200, 400, 600, 800, 1125				
Nom. Output (MBH)	162, 324, 486, 648, 911				
Efficiency	81%				
Electric Furnace					
Nom. kW Input (varies by voltage)	10-220kW				
Hot Water Coils					
FA (sqft)/Rows/Fins	20.6ft² / 1 or 2 row / 8,10,12 FPI				
FA (sqft)/Rows/Fins	26.9ft² / 1 or 2 row / 8,10,12 FPI				
Steam Coils					
FA (sqft)/Rows/Fins	20.3 ft² / 1 row / 6,8,10 FPI				
FA (sqft)/Rows/Fins	26.6 ft² / 1 row / 6,8,10 FPI				

DPSA 045 - 075 C-Cabinet

Table 13: DPSA 045 - 075 C-Cabinet Physical Data

DPSA 045 - 075 C-Cabinet					
	045	**055**	**060**	**068**	**075**
Compressors - Standard Efficiency					
Staged Control Qty - hp	3-9, 1-20 Fix	3-10, 1-20 Fix	3-12, 1-20 Fix	3-13, 1-20 Fix	3-15, 1-20 Fix
Capacity Control	0/25/50/75/100				
Compressors - High Efficiency					
Variable Lead Circuit Control Qty - hp	3-9, 1-20 Var	3-10, 1-20 Var	3-12, 1-20 Var	3-13, 1-20 Var	3-15, 1-20 Var
Capacity Control	0/20-100%				
Compressors - Premium Efficiency					
Variable All Circuits Control Qty - hp	2-9, 2-20 Var	2-10, 2-20 Var	2-12, 2-20 Var	2-13, 2-20 Var	2-15, 2-20 Var
Capacity Control	0/20-100%				
Condenser Fans					
Qty/Diam/HP	6/26"/1.5				
Evaporator Coil					
Rows/FPI	4 or 6 rows/ 12 FPI				
FA (sqft) - Standard	35.4				
FA (Sqft) - Optional	48.7				
Circuits	2, Fully Interlaced				
Condenser Coil					
FA (sqft)	179, Double Stack				
Type	Microchannel				
Supply Fans					
Type	ECM SWSI Plenum Fan Array				
Row × Columns (Qty)	2 x 2 (4) 2 × 3 (6)				
Diameter (in)	355(12"), 450(18"), 500(20"), 560 (22"), 630 (25")				
Motor Range kw (hp)	1.1 kW – 9.8 kW				
High Static Return Fans					
Type	Direct-drive ECM SWSI Plenum Fan Array or Direct-drive Plenum Fan				
Row × Columns (Qty)	1 × 2 (2)				
Diameter (in)	450(18"), 500(20"), 560 (22"), 630 (25") 650 (25.5")				
Motor Range kw (hp)	1.1 kW – 6.0 kW				
High Static Exhaust					
Type	Direct Drive ECM SWSI Plenum Fan Array				
Row × Columns (Qty)	1 x 2 (2)				
Diameter mm (in)	450(18"), 500(20"), 560 (22"), 630 (25")				
Motor Range kW	1.1 kW – 6.0 kW				
Gas Furnace					
Nom. Input (MBH)	400, 600, 800, 1125, 1500				
Nom. Output (MBH)	162, 324, 486, 648, 911				
Efficiency	81%				

(continued)					
DPSA 045 - 075 C-Cabinet					
	045	**055**	**060**	**068**	**075**
Electric Furnace					
Nom. kW Input (varies by voltage)	10-220kW				
Hot Water Coils					
FA (sqft)/Rows/Fins	20.6ft² / 1 or 2 row / 8,10,12 FPI				
FA (sqft)/Rows/Fins	26.9ft² / 1 or 2 row / 8,10,12 FPI				

NOTE: Units equipped with size 450 (18”) supply fans have a 2x3 (6) configuration option.

NOTE: Units equipped with a Direct-drive Plenum Fan will have a fan diameter of 650 (25.5”).

DPSA 065 - 100 D-Cabinet

Table 14: DPSA 065 - 100 D-Cabinet Physical Data

DPSA 065 - 100 D-Cabinet					
	065	**070**	**080**	**090**	**100**
Compressors - Standard Efficiency					
Staged Control Qty - hp	5-20, 1-22 Fix	5-23, 1-22 Fix	5-26, 1-22 Fix	2-26, 3-31, 1-22 Fix	5-31, 1-22 Fix
Capacity Control	0/25/50/75/100				
Compressors - High Efficiency					
Variable Lead Circuit Control Qty - hp	5-20, 1-22 Var	5-23, 1-22 Var	5-26, 1-22 Var	2-26, 3-31, 1-22 Var	5-31, 1-22 Var
Capacity Control	0/20-100%				
Compressors - Premium Efficiency					
Variable All Circuits Control Qty - hp	4-20, 2-22 Var	4-23, 2-22 Var	4-26, 2-22 Var	4-26, 2-22 Var	4-31, 2-22 Var
Capacity Control	0/20-100%				
Condenser Fans					
Qty/Diam/HP	8/26”/1.5				
Evaporator Coil					
Rows/FPI	4 or 6 rows/ 12 FPI				
FA (sqft) - Standard	46.3				
Fin Height/ Fin Length	60"/111"				
FA (Sqft) - Optional	63.6				
Fin Height/ Fin Length	82.5"/111"				
Circuits	2, Fully Interlaced				
Condenser Coil					
FA (sqft)	179, Double Stack				
Type	Microchannel				
Supply Fans					
Type	ECM SWSI Plenum Fan Array				
Row × Columns (Qty)	2 x 2 (4) 2 × 3 (6)				
Diameter (in)	16"-9 Blade, 18"-9 Blade, 22"-9 Blade				
Motor Range kw (hp)	2.2 kW(3 HP) - 14.9 kW (20 HP)				

(continued)					
DPSA 065 - 100 D-Cabinet					
	065	**070**	**080**	**090**	**100**
High Static Exhaust					
Type	Direct-drive Plenum Fan				
Row × Columns (Qty)	1 x 2 (2)				
Diameter mm (in)	18"-9 Blade, 24"-9 Blade, 27"-9 Blade				
Motor Range kW	5.6 kW(7.5 HP) - 11.2 kW (15 HP)				
Gas Furnace					
Nom. Input (MBH)	800, 1200, 1600, 2000, 2400				
Nom. Output (MBH)	648, 972, 1296, 2000, 1944				
Efficiency	81%				
Hot Water Coils					
FA (sqft)/Rows/Fins	34.8ft² / 1 or 2 row / 8,10,12 FPI				
FA (sqft)/Rows/Fins	50ft² / 1 or 2 row / 8,10,12 FPI				

NOTE: Units equipped with size 450 (18”) supply fans have a 2x3 (6) configuration option.

NOTE: Units equipped with a Direct-drive Plenum Fan will have a fan diameter of 650 (25.5”).

DPSA 091 - 120 E-Cabinet

Table 15: DPSA 091 - 120 E-Cabinet Physical Data

DPSA 091 - 120 E-Cabinet					
	091	**101**	**110**	**115**	**120**
Compressors - Standard Efficiency					
Staged Control Qty - hp	3-31, 2-26, 1-22 Fix	3-35.4, 2-31, 1-22 Fix	3-39.6, 2-35.4, 1-22 Fix	5-39.6, 1-22 Fix	3-36.9, 2-52.5, 1-22 Fix
Capacity Control	0/25/50/75/100				
Compressors - High Efficiency					
Variable Lead Circuit Control Qty - hp	3-31, 2-26, 1-22 Var	3-35.4, 2-31, 1-22 Var	3-39.6, 2-35.4, 1-22 Var	5-39.6, 1-22 Var	3-36.9, 2-52.5, 1-22 Var
Capacity Control	0/20-100%				
Compressors - Premium Efficiency					
Variable All Circuits Control Qty - hp	4-26.25, 2-22 Var	4-31, 2-22 Var	4-35.4, 2-22 Var	4-39.6, 22-Var	4-52.5, 22-Var
Capacity Control	0/10-100%				
Condenser Fans					
Qty/Diam/HP	8/26"/1.5				
Evaporator Coil					
Rows/FPI	4 or 6 rows/ 12 FPI				
FA (sqft) - Standard	72.2				
Fin Height/ Fin Length	60"/111"				
FA (Sqft) - Optional	63.6				
Fin Height/ Fin Length	82.5"/111"				
Circuits	2, Fully Interlaced				
Condenser Coil					

(continued)					
DPSA 091 - 120 E-Cabinet					
	091	**101**	**110**	**115**	**120**
FA (sqft)	179, Double Stack				
Type	Microchannel				
Supply Fans					
Type	ECM SWSI Plenum Fan Array				
Row × Columns (Qty)	2 × 3 (6)				
Diameter (in)	16"-9 Blade, 18"-9 Blade, 22"-9 Blade				
Motor Range kw (hp)	2.2 kW(3 HP) - 14.9 kW (20 HP)				
High Static Exhaust					
Type	Direct-drive Plenum Fan				
Row × Columns (Qty)	1 x 2 (2)				
Diameter mm (in)	24"-9 Blade, 27"-9 Blade, 30"-9 Blade				
Motor Range kW	5.6 kW(7.5 HP) - 14.9 kW (20 HP)				
Gas Furnace					
Nom. Input (MBH)	1200, 1600, 2000, 2400				
Nom. Output (MBH)	972, 1296, 2000, 1944				
Efficiency	81%				
Hot Water Coils					
FA (sqft)/Rows/Fins	60ft² / 1 or 2 row / 8,10,12 FPI				

NOTE: Units equipped with size 450 (18”) supply fans have a 2x3 (6) configuration option.

NOTE: Units equipped with a Direct-drive Plenum Fan will have a fan diameter of 650 (25.5”).

DAHA 024 – 034 B-Cabinet

Table 16: DAHA 024 – 034 B-Cabinet Physical Data

DAHA 024 – 034 B-Cabinet			
	24	**29**	**34**
Chilled Water Coil			
Rows/FPI	3-row / 4-row / 6-row		
FA (sqft) - Standard	1	1	2
FA (Sqft) - Optional	42	51	30
Circuits	82	82	82
Supply Fans			
Type	ECM SWSI Plenum Fan Array		
Row × Columns (Qty)	1 × 2 (2) or 2 × 2 (4)		
Diameter (in)	355(12"), 450(18"), 500(20"), 560 (22"), 630 (25")		
Motor Range kw (hp)	1.1 kW – 9.8 kW		
High Static Return Fans			
Type	Direct-dive ECM SWSI Plenum Fan Array		
Row × Columns (Qty)	1 × 2 (2)		
Diameter (in)	450(18"), 500(20"), 560 (22"), 630 (25")		
Motor Range kw (hp)	1.1 kW – 6.0 kW		

(continued)			
DAHA 024 – 034 B-Cabinet			
	24	**29**	**34**
Low Static Propeller Exhaust			
Type	Direct-dive Propeller Exhaust with VFD		
Row × Columns (Qty)	1 × 2 (2), 1 × 3 (3)		
Diameter (in)	26"		
Motor Range (hp)	1.5 HP		
High Static Exhaust			
Type	Direct Drive ECM SWSI Plenum Fan Array		
Row × Columns (Qty)	1 x 2 (2)		
Diameter mm (in)	450(18"), 500(20"), 560 (22"), 630 (25")		
Motor Range kW	1.1 kW – 6.0 kW		
Gas Furnace			
Nom. Input (MBH)	200, 400, 600, 800, 1125		
Nom. Output (MBH)	162, 324, 486, 648, 911		
Efficiency	81%		
Electric Furnace			
Nom. kW Input (varies by voltage)	10-220kW		
Hot Water Coils			
FA (sqft)/Rows/Fins	20.6ft² / 1 or 2 row / 8,10,12 FPI		
FA (sqft)/Rows/Fins	26.9ft² / 1 or 2 row / 8,10,12 FPI		
Steam Coils			
FA (sqft)/Rows/Fins	20.3 ft² / 1 row / 6,8,10 FPI		
FA (sqft)/Rows/Fins	26.6 ft² / 1 row / 6,8,10 FPI		

DAHA 039 - 044 C-Cabinet

Table 17: DAHA 039 - 044 C-Cabinet Physical Data

DAHA 039 - 044 C-Cabinet		
	039	**044**
Chilled Water Coil		
Rows/FPI	3 row / 4 row / 6 row	
FA (sqft) - Standard	2	2
FA (Sqft) - Optional	36	39
Circuits	78	82
Supply Fans		
Type	ECM SWSI Plenum Fan Array	
Row × Columns (Qty)	2 x 2 (4) 2 × 3 (6)	
Diameter (in)	355(12"), 450(18"), 500(20"), 560 (22"), 630 (25")	
Motor Range kw (hp)	1.1 kW – 9.8 kW	
High Static Return Fans		
Type	Direct-drive ECM SWSI Plenum Fan Array or Direct-drive Plenum Fan	

(continued)		
DAHA 039 - 044 C-Cabinet		
	039	**044**
Row × Columns (Qty)	1 × 2 (2)	
Diameter (in)	450(18"), 500(20"), 560 (22"), 630 (25") 650 (25.5")	
Motor Range kw (hp)	1.1 kW – 6.0 kW	
High Static Exhaust		
Type	Direct Drive ECM SWSI Plenum Fan Array	
Row × Columns (Qty)	1 x 2 (2)	
Diameter mm (in)	450(18"), 500(20"), 560 (22"), 630 (25")	
Motor Range kW	1.1 kW – 6.0 kW	
Gas Furnace		
Nom. Input (MBH)	400, 600, 800, 1125, 1500	
Nom. Output (MBH)	162, 324, 486, 648, 911	
Efficiency	81%	
Electric Furnace		
Nom. kW Input (varies by voltage)	10-220kW	
Hot Water Coils		
FA (sqft)/Rows/Fins	20.6ft² / 1 or 2 row / 8,10,12 FPI	
FA (sqft)/Rows/Fins	26.9ft² / 1 or 2 row / 8,10,12 FPI	

NOTE: Units equipped with size 450 (18") supply fans have a 2x3 (6) configuration option.

NOTE: Units equipped with a Direct-drive Plenum Fan will have a fan diameter of 650 (25.5").

DAHA 053 - 059 D-Cabinet

Table 18: DAHA 053 - 059 D-Cabinet Physical Data

DAHA 053 - 059 D-Cabinet		
	053	**059**
Chilled Water Coil		
Rows/FPI	3 row / 4 row / 6 row	
FA (sqft) - Standard	2	
FA (Sqft) - Optional	36	39
Circuits	106	108
Supply Fans		
Type	ECM SWSI Plenum Fan Array	
Row × Columns (Qty)	2 x 2 (4) 2 × 3 (6)	
Diameter (in)	355(12"), 450(18"), 500(20"), 560 (22"), 630 (25")	
Motor Range kw (hp)	1.1 kW – 9.8 kW	
High Static Return Fans		
Type	Direct-drive ECM SWSI Plenum Fan Array or Direct-drive Plenum Fan	
Row × Columns (Qty)	1 × 2 (2)	
Diameter (in)	450(18"), 500(20"), 560 (22"), 630 (25") 650 (25.5")	

(continued)		
DAHA 053 - 059 D-Cabinet		
	053	**059**
Motor Range kw (hp)	1.1 kW – 6.0 kW	
High Static Exhaust		
Type	Direct Drive ECM SWSI Plenum Fan Array	
Row × Columns (Qty)	1 x 2 (2)	
Diameter mm (in)	450(18"), 500(20"), 560 (22"), 630 (25")	
Motor Range kW	1.1 kW – 6.0 kW	
Gas Furnace		
Nom. Input (MBH)	400, 600, 800, 1125, 1500	
Nom. Output (MBH)	162, 324, 486, 648, 911	
Efficiency	81%	
Electric Furnace		
Nom. kW Input (varies by voltage)	10-220kW	
Hot Water Coils		
FA (sqft)/Rows/Fins	20.6ft² / 1 or 2 row / 8,10,12 FPI	
FA (sqft)/Rows/Fins	26.9ft² / 1 or 2 row / 8,10,12 FPI	

NOTE: Units equipped with size 450 (18") supply fans have a 2x3 (6) configuration option.

NOTE: Units equipped with a Direct-drive Plenum Fan will have a fan diameter of 650 (25.5").

DHSA 031 – 052 B-Cabinet

Table 19: DHSA 031 – 052 B-Cabinet Physical Data

DHSA 031 – 052 B-Cabinet					
	31	**35**	**40**	**50**	**52**
Compressors - Premium Efficiency					
Variable All Circuits Control Qty - hp	2-8, 2-20 Var	2-9, 2-20 Var	2-10, 2-20 Var	2-15, 2-20 Var	N/A
Capacity Control	0/20-100%				
Condenser Fans					
Qty/Diam/HP	4/26"/1.5				
Heat Pump Capacity					
Output Options	Standard				
	High				
Evaporator Coil					
Rows/FPI	4 or 6 rows/ 12 FPI				
FA (sqft) - Standard	26.5				
FA (Sqft) - Optional	35.4				
Circuits	2, Fully Interlaced				
Condenser Coil					
FA (sqft)	31 (Standard) 41(High)	31 (Standard) 41(High)	31 (Standard) 41(High)	41 (Both)	41 (Both)
Type	Tub and Fin				

(continued)					
DHSA 031 – 052 B-Cabinet					
	31	**35**	**40**	**50**	**52**
Supply Fans					
Type	ECM SWSI Plenum Fan Array				
Row × Columns (Qty)	1 × 2 (2) or 2 × 2 (4)				
Diameter (in)	355(12"), 450(18"), 500(20"), 560 (22"), 630 (25")				
Motor Range kw (hp)	1.1 kW – 9.8 kW				
High Static Return Fans					
Type	Direct-dive ECM SWSI Plenum Fan Array				
Row × Columns (Qty)	1 × 2 (2)				
Diameter (in)	450(18"), 500(20"), 560 (22"), 630 (25")				
Motor Range kw (hp)	1.1 kW – 6.0 kW				
Low Static Propeller Exhaust					
Type	Direct-dive Propeller Exhaust with VFD				
Row × Columns (Qty)	1 × 2 (2), 1 × 3 (3)				
Diameter (in)	26"				
Motor Range (hp)	1.5 HP				
High Static Exhaust					
Type	Direct Drive ECM SWSI Plenum Fan Array				
Row × Columns (Qty)	1 x 2 (2)				
Diameter mm (in)	450(18"), 500(20"), 560 (22"), 630 (25")				
Motor Range kW	1.1 kW – 6.0 kW				
Gas Furnace					
Nom. Input (MBH)	200, 400, 600, 800, 1125				
Nom. Output (MBH)	162, 324, 486, 648, 911				
Efficiency	81%				
Electric Furnace					
Nom. kW Input (varies by voltage)	10-220kW				
Hot Water Coils					
FA (sqft)/Rows/Fins	20.6ft² / 1 or 2 row / 8,10,12 FPI				
FA (sqft)/Rows/Fins	26.9ft² / 1 or 2 row / 8,10,12 FPI				
Steam Coils					
FA (sqft)/Rows/Fins	20.3 ft² / 1 row / 6,8,10 FPI				
FA (sqft)/Rows/Fins	26.6 ft² / 1 row / 6,8,10 FPI				

DHSA 045 - 068 C-Cabinet

Table 20: DHSA 045 - 068 C-Cabinet Physical Data

DHSA 045 - 068 C-Cabinet				
	045	**055**	**060**	**068**
Compressors - Premium Efficiency				
Variable All Circuits Control Qty - hp	2-9, 2-20 Var	2-10, 2-20 Var	2-12, 2-20 Var	2-13, 2-20 Var
Capacity Control	0/20-100%			
Condenser Fans				
Qty/Diam/HP	6/26"/1.5			
Heat Pump Capacity				
Output Options	Standard			
Evaporator Coil				
Rows/FPI	4 or 6 rows/ 12 FPI			
FA (sqft) - Standard	35.4			
FA (Sqft) - Optional	48.7			
Circuits	2, Fully Interlaced			
Condenser Coil				
FA (sqft)	41 (Both)	41 (Both)	41 (Both)	41 (Both)
Type	Tube and Fin			
Supply Fans				
Type	ECM SWSI Plenum Fan Array			
Row × Columns (Qty)	2 x 2 (4) 2 × 3 (6)			
Diameter (in)	355(12"), 450(18"), 500(20"), 560 (22"), 630 (25")			
Motor Range kw (hp)	1.1 kW – 9.8 kW			
High Static Return Fans				
Type	Direct-drive ECM SWSI Plenum Fan Array or Direct-drive Plenum Fan			
Row × Columns (Qty)	1 × 2 (2)			
Diameter (in)	450(18"), 500(20"), 560 (22"), 630 (25") 650 (25.5")			
Motor Range kw (hp)	1.1 kW – 6.0 kW			
High Static Exhaust				
Type	Direct Drive ECM SWSI Plenum Fan Array			
Row × Columns (Qty)	1 x 2 (2)			
Diameter mm (in)	450(18"), 500(20"), 560 (22"), 630 (25")			
Motor Range kW	1.1 kW – 6.0 kW			
Gas Furnace				
Nom. Input (MBH)	400, 600, 800, 1125, 1500			
Nom. Output (MBH)	162, 324, 486, 648, 911			
Efficiency	81%			
Electric Furnace				
Nom. kW Input (varies by voltage)	10-220kW			
Hot Water Coils				
FA (sqft)/Rows/Fins	20.6ft² / 1 or 2 row / 8,10,12 FPI			

(continued)				
DHSA 045 - 068 C-Cabinet				
	045	**055**	**060**	**068**
FA (sqft)/Rows/Fins	26.9ft² / 1 or 2 row / 8,10,12 FPI			

NOTE: Units equipped with size 450 (18”) supply fans have a 2x3 (6) configuration option.

NOTE: Units equipped with a Direct-drive Plenum Fan will have a fan diameter of 650 (25.5”).

Filter Information

Table 21: Rebel Applied 020 – 120 Filter Information

	A and B-Cabinet	**C-Cabinet**	**D-Cabinet**	**E-Cabinet**
	020, 025, 030, 031, 034, 035, 040, 050, 052	**045, 055, 060, 068, 075**	**065, 070, 080, 090, 100**	**091, 101, 110, 115, 120**
Panel Filters				
Thickness (MERV)	2" (8), 4" (13)		2” (8), 2” (13, combo 2”(8)/4”(13)	
Area (sqft)	42.67 ft²	56.7 ft²	73.3 ft²	83.1 ft²
Qty – Size	(8) - 20"" x 24", (4) - 24" x 24"	(8) 24" x 24", (8) 20" x 24"	(10) 24”x24”, (10) 20”x24”	(8) 24”x24”, (12) 20”x24”, (4) 20”x20”
Pre Filters (for cartridge filters)				
Thickness (MERV)	2" (8)			
Area (sqft)	38.3 ft²	51.1 ft²	64.4 ft²	75.6 ft²
Qty – Size	(9) - 20" x 24", (3) - 20" x 20"	(12) 20" x 24", (4) 20" x 20"	(16) 20”x 24”, (4) 20” x 20”	(16) 20”x24”, (8) 20”x20”
Cartridge Filters				
Thickness (MERV)	4" (15), 12" (11,14,16)			
Area (sqft)	38.3 ft²	51.1 ft²	64.4 ft²	75.6 ft²
Qty – Size	(9) - 20" x 24", (3) - 20" x 20"	(12) 20" x 24", (4) 20" x 20"	(16) 20”x 24”, (4) 20” x 20”	(16) 20”x24”, (8) 20”x20”
Cartridge Final Filters				
Thickness (MERV)	12" (14, 16)			
Area (sqft)	35.6 ft²	48.3 ft²	61.7 ft²	72.8
Qty – Size	(9) - 20" x 24", (2) - 20" x 20"	(12) 20" x 24", (3) 20" x 20"	(16) 20” x 24”, (3) 20”x20”	(16) 20”x24”, (7) 20”x20”
Face Load Final Filters				
Thickness (MERV)	12" (HEPA)			
Area (sqft)	34.0 ft²	48.0 ft²	62 ft²	68 ft²
Qty – Size	(6) - 24" x 24", (5) - 12" x 24"	(9) 24" x 24", (6) 12" x 24"	(12) 24”x24”, (7) 12”x24”	(15) 24”x24”, (4) 12”x24”
Large Wheel Filters				
Thickness (MERV)	RA = 2" (8) / OA = 4" (8)			
Area (sqft)	29.3 ft²		33.3 ft²	
Qty - Size	(4) - 20" x 24", (4) - 24" x 24"		(10) - 20” x 24”	
Small Wheel with Bypass Filters				
Thickness (MERV)	RA = 2" (8) / OA = 4" (8)			
Area (sqft)	29.3 ft²		24.4 ft²	
Qty – Size	(4) – 20" × 24", (4) – 24" × 24"		(4) – 20” × 20”, (4) – 20” × 24”	

Dimensional Drawings

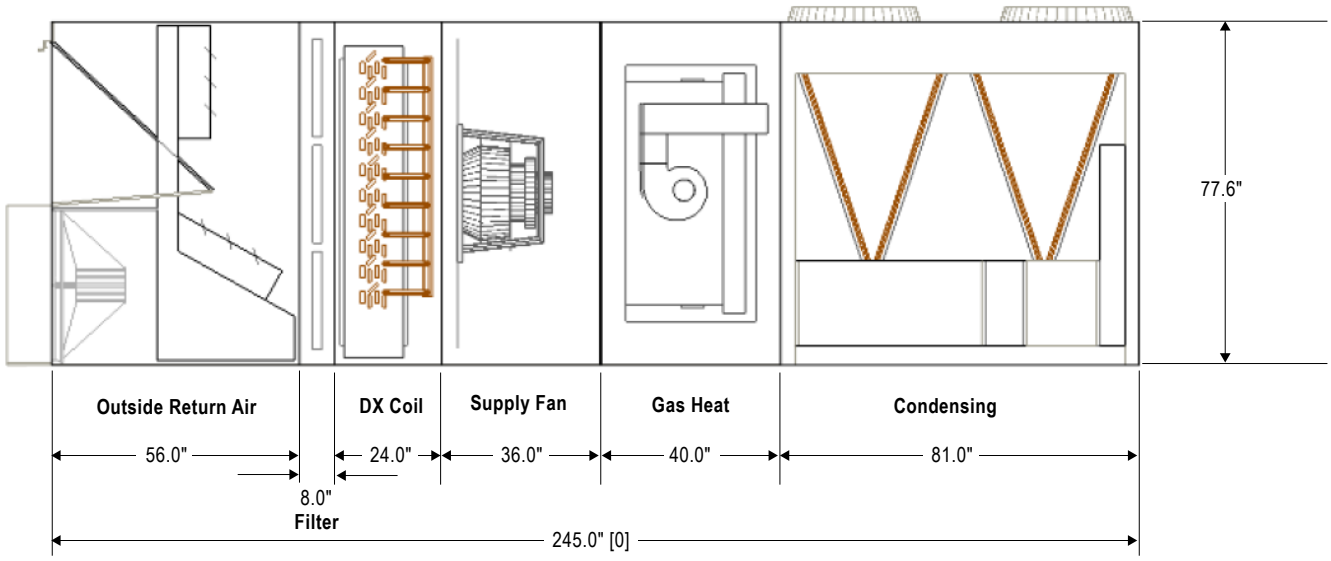
Example Layouts

Rebel Applied offers many section variations for application optimization. The section lengths of the different features and arrangements can vary greatly. Use Table 22 as reference for the range of length possible per section and consult your local sales rep for a weight and length specific to your application needs.

Table 22: Rebel Applied 020 – 052 Dimensions

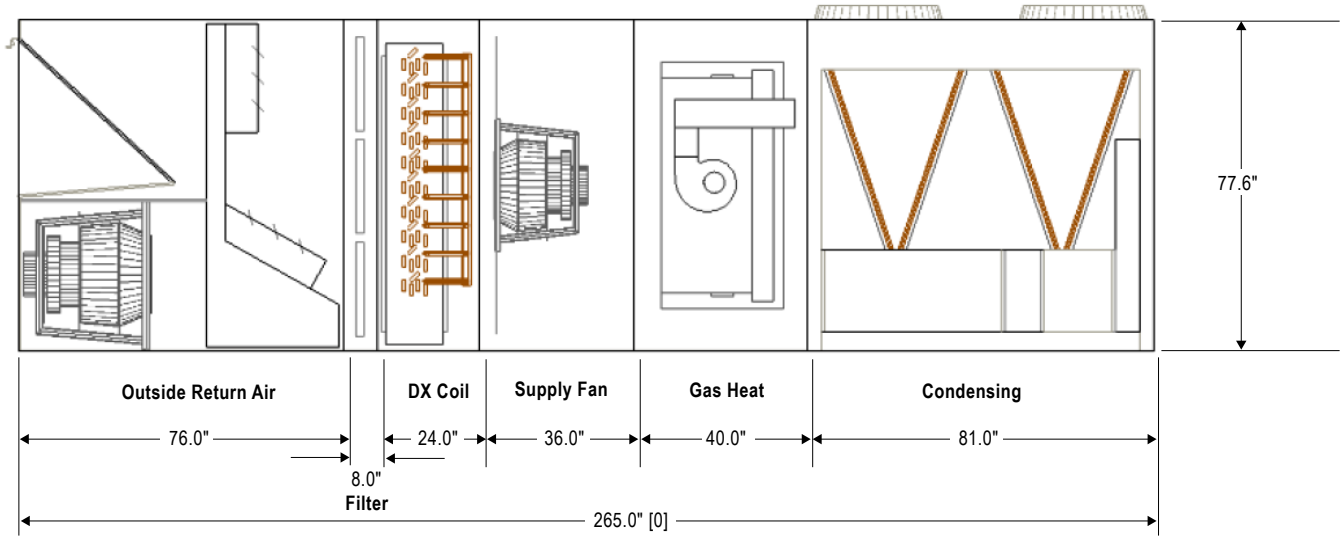
Section	Features/Arrangements	Length	Door Swing
Return	0–30% Outside Air	64-192”	Varies per filter configuration. Maximum door swing is 36”
	100% Outside Air		
	100% Outside Air with Energy Recovery		
	0–100% Economizer with Barometric Relief		
	0–100% Economizer with Propeller Fans		
	0–100% Economizer with High Static Exhaust Fans		
	0–100% Economizer with High Static Return Fans		
	0–100% Economizer with Energy Recovery		
Filter	2" Pleated Filter	8–32"	16"
	2"/4" Pleated Filter		16"
	2"/12" Cartridge		24"
Hot Water/Steam Preheat	Hot Water	36"	24"
	Steam Coil		24"
DX Coil	Modulating Hot Gas Reheat	24"	12" Standard 24" Extended
	UV Lights		20"
Reheat	Modulating Hot Gas Reheat	12"	16"
Electric Heat	Electric Heat	36"	20"/28"
Hot Water/Steam Heat	Hot Water/Steam Coil	36"	24"
Backdraft Dampers	(2) or (4) Damper	24"	N/A
Supply Fan	Blow Through Fan Section	36 - 48"	28"
	Discharge Fan Section		28"
Gas Heat	200-1125 MBH furnace	40–48"	28"
Final Filters	Side Load Cartridge Filter	32–44"	24"
	Face Load Filter		36"
Blank/Access Sections	Add up to 6 blank sections in 24 to 48" lengths	24–48"	Selected Door Size
Discharge Plenum	Bottom, Right, Left, Top Discharge	48"	28"
Out of Air Stream Vestibule	48" Vestibule Section	48-72"	32
	72" Vestibule Section		20" & 32"

Figure 1: Basic Commercial Layout Example



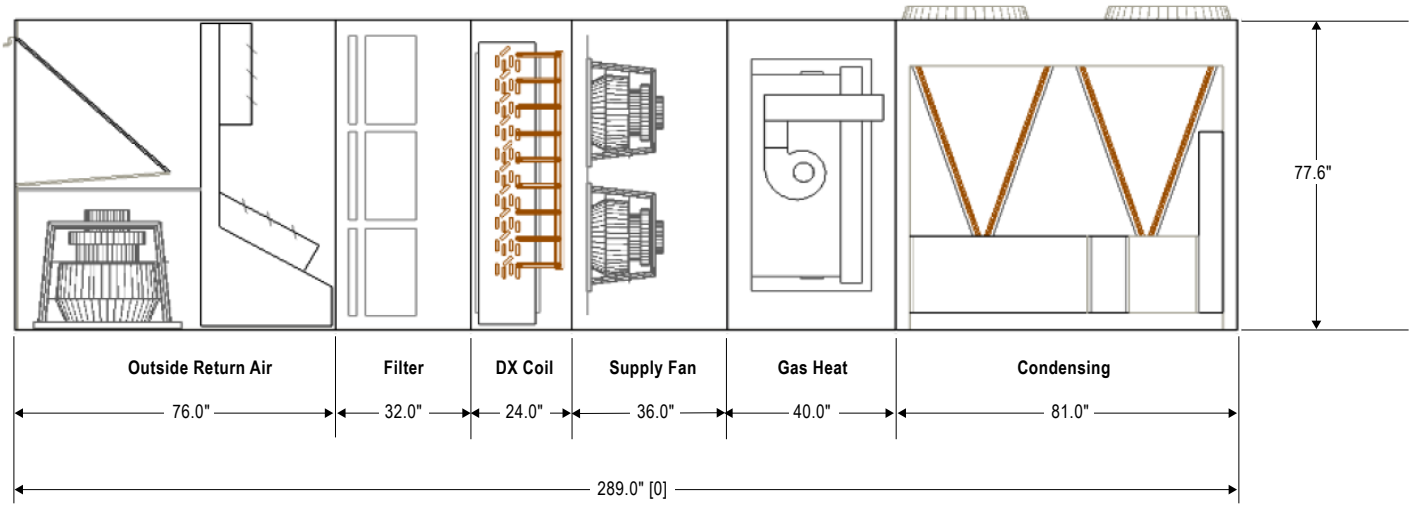
NOTE: 50 ton, economizer with propeller exhaust, gas heat, 1x2 ECM fan array, 2" MERV 8 filters.

Figure 2: Office Layout Example



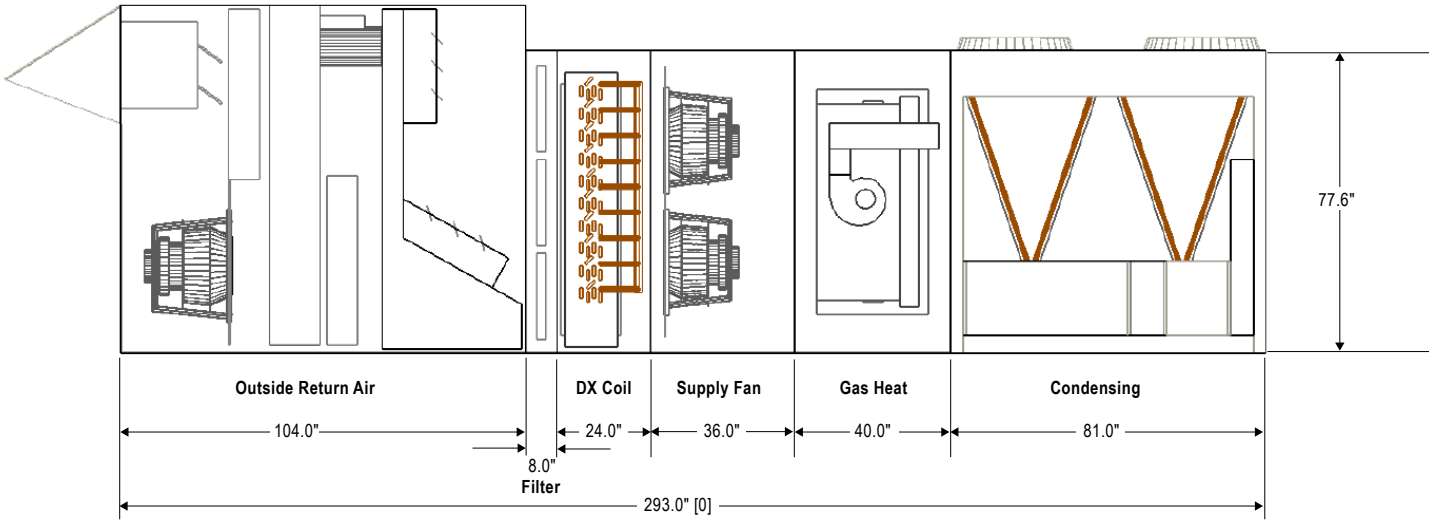
NOTE: 50 ton, economizer with high static exhaust, gas heat, 1x2 ECM fan array, 2" MERV 8 filters.

Figure 3: Office Layout Example #2



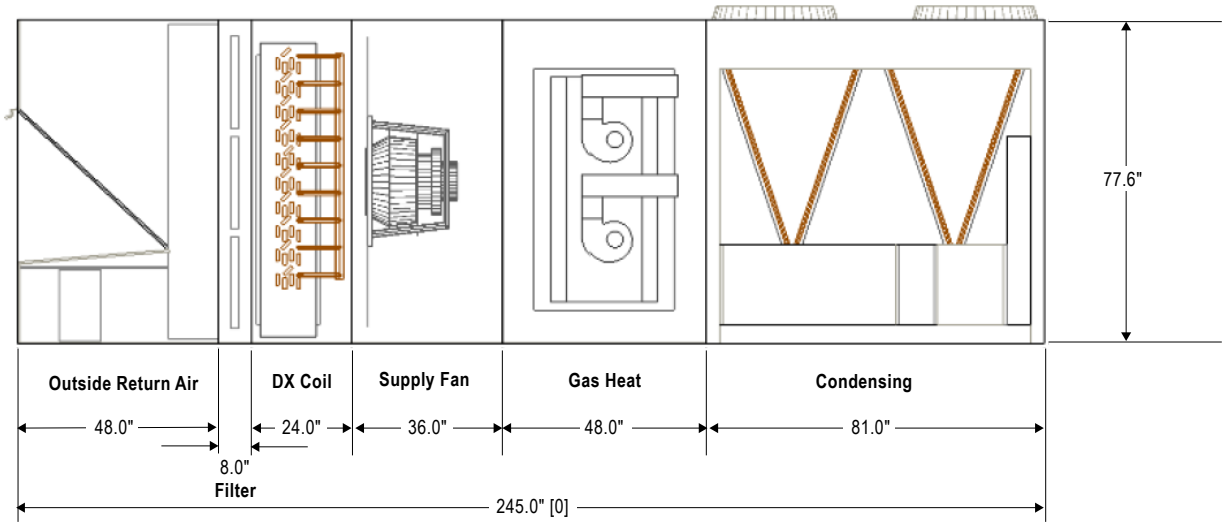
NOTE: 50 ton, economizer with return fan, gas heat, 2x2 ECM fan array, 2" MERV 8 pre-filters, 12" MERV 14 cartridge filters.

Figure 4: Education Layout Example



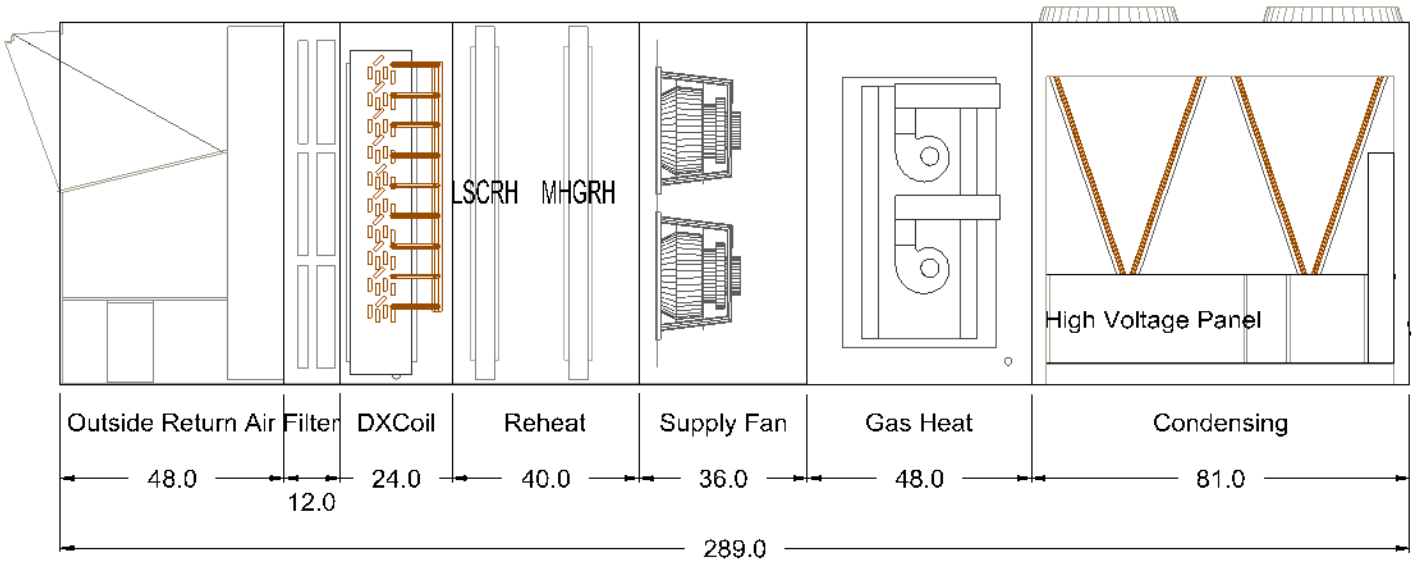
NOTE: 50 ton, energy recovery wheel, gas heat, 2x2 ECM fan array, 2" MERV 8 filters.

Figure 5: 100% Outside Air Layout Example



NOTE: 50 ton unit, 100% outside air damper, 100-degree rise furnace, 1x2 ECM fan array, 2" MERV 8 filters.

Figure 6: 100% Outside Air Layout Example #2



NOTE: 50 ton unit, 100% outside air damper, modulating liquid subcool coil, 100-degree rise furnace, 2x2 ECM fan array, MERV 8 filters.

Unit Clearances

Service Clearance

Allow service clearance as indicated in Figure 7 or Figure 8. Figure 7 denotes clearances required if large component replacement would be completed through side access doors. Figure 8 denotes clearances needed if large component replacement would be completed from the top of the unit (with a crane) after removing roof panels. Also, Daikin Applied recommends providing a walkway around the entire unit for access to controls and serviceable components.

Table 23: DPSA Unit Service Clearances by Unit Size

DPSA Cabinet Configuration	"A" Dimension	"B" Dimension
A Cooling	96	60
B Cooling	96	60
B Standard Output Heat Pump	96	100
B High Output Heat Pump	96	100
C Cooling	96	100
C Heat Pump	96	100
D Cooling	120	72
E Cooling	144	72

Table 24: DAHA Unit Service Clearances by Unit Size

DAHA Cabinet Configuration	"A" Dimension	"B" Dimension
B Cooling	96	48
C Cooling	96	48
D Cooling	120	48

Figure 7: DPSA/DHSA Unit Service Clearances (Scenario A)

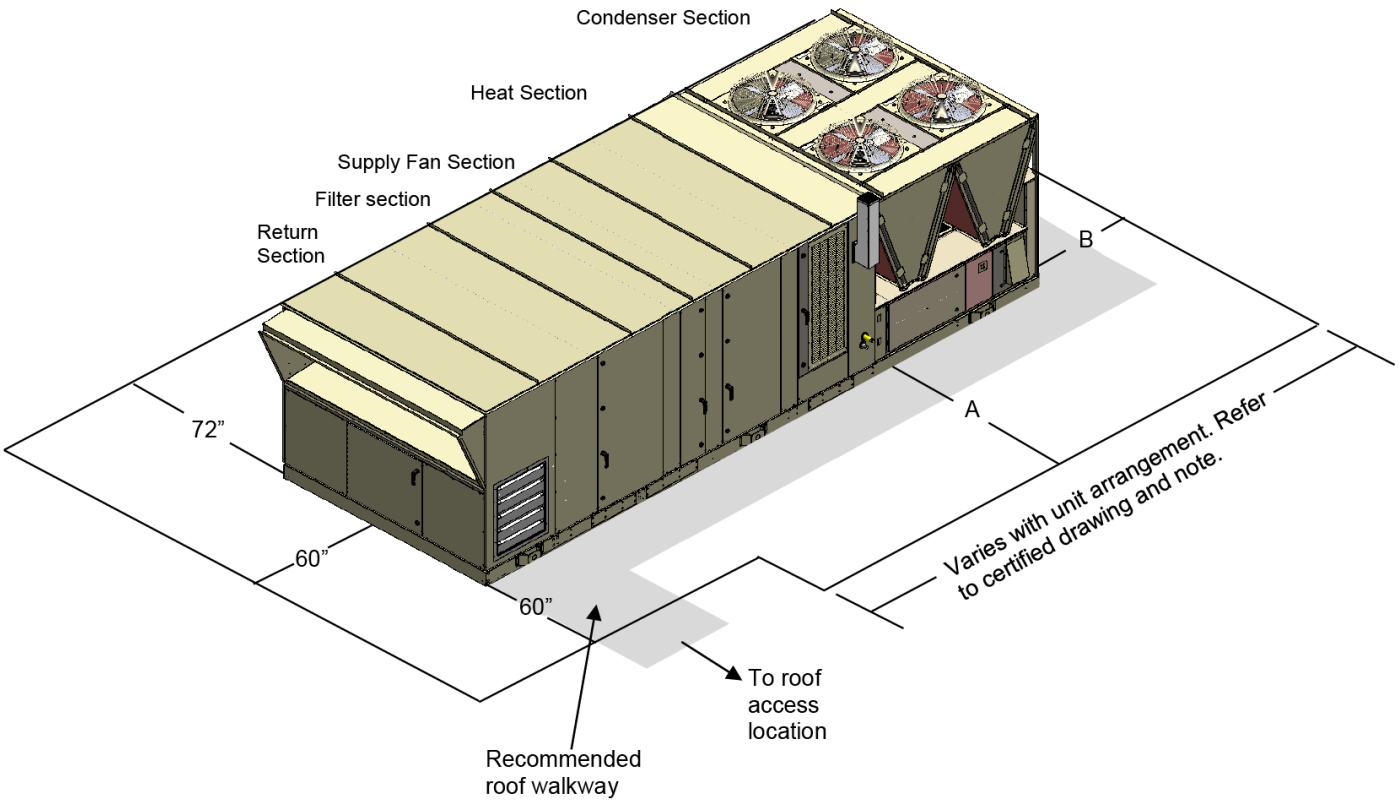


Figure 8: DPSA/DHSA Unit Service Clearances (Scenario B)

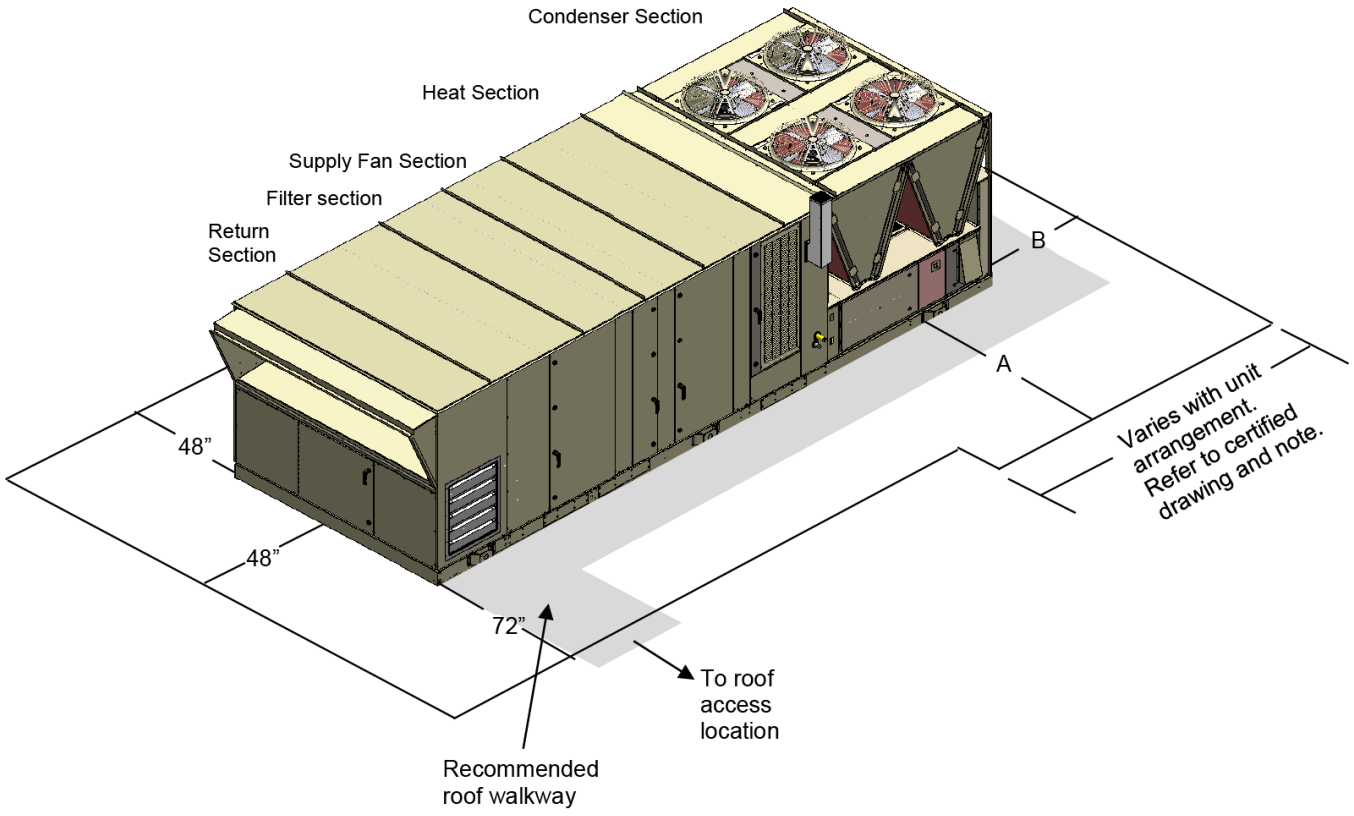


Figure 9: DAHA Unit Service Clearances (Scenario A)

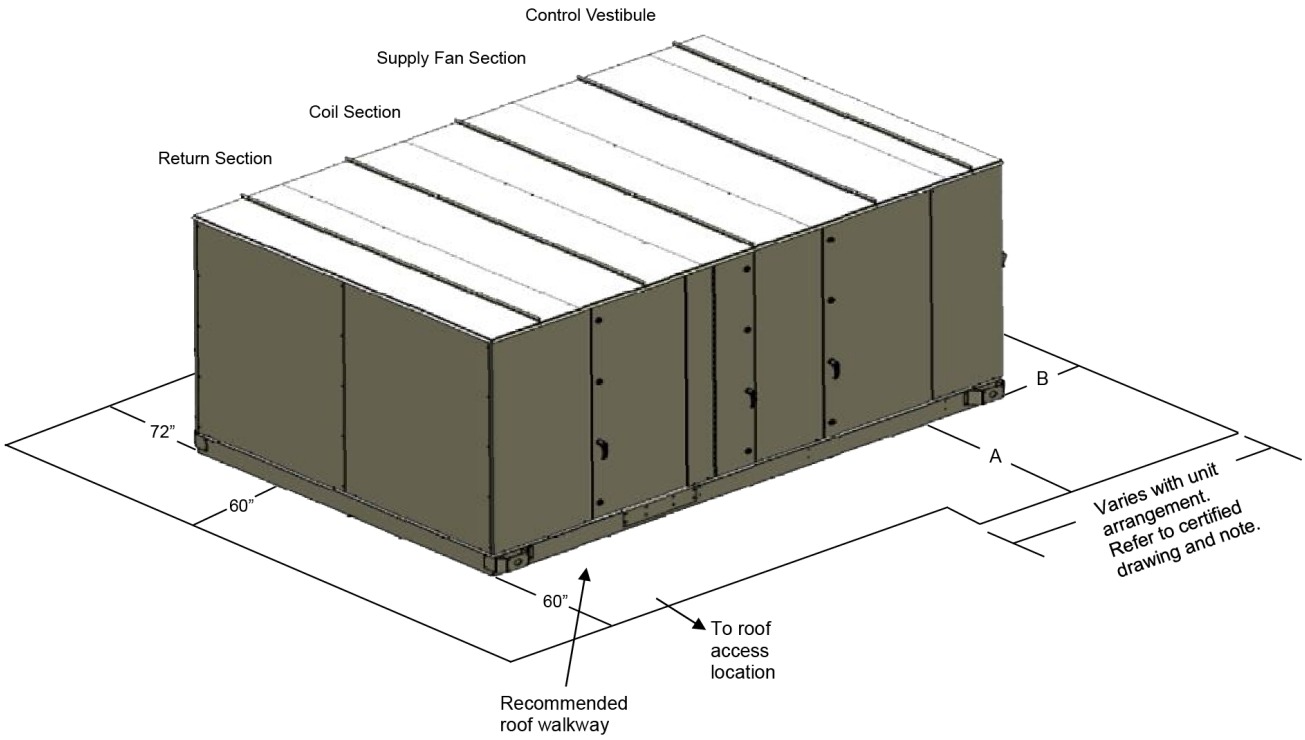
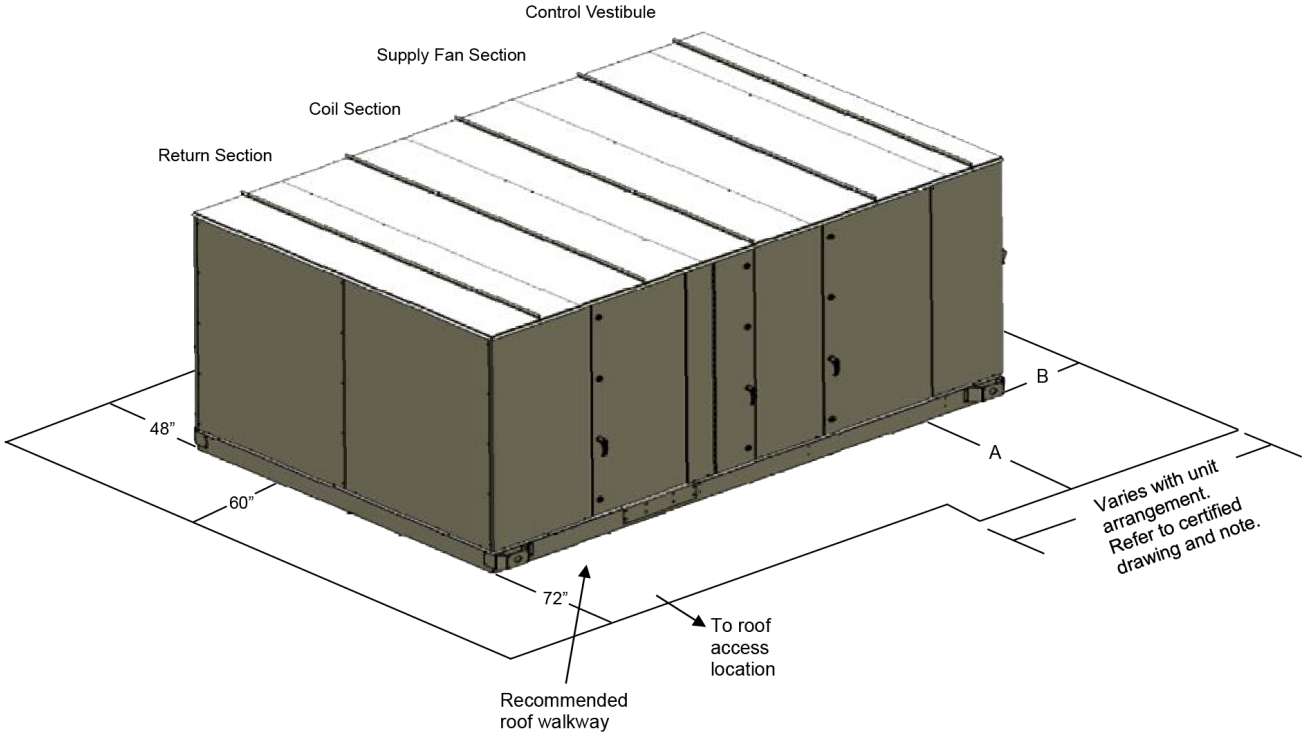


Figure 10: DAHA Unit Service Clearances (Scenario B)



Ventilation Clearance

Figure 11 denotes minimum ventilation clearance recommendations. The system designer must consider each application and provide adequate ventilation. If this is not done, the unit will not perform properly.

NOTICE

Units equipped with furnace flues should have no overhead obstructions. There should also be no obstructions within 9 in of the flue in any other direction.

Unit(s) Surrounded by a Screen or a Fence:

1. The bottom of the screen or fence should be at least 1 ft. (305 mm) above the roof surface.
2. The distance between the unit and a screen or fence should be as described in (Figure 7 or Figure 8 on page 33).
3. The distance between any two units within a screen or fence should be at least 120" (3048 mm).

Unit(s) Surrounded by Solid Walls:

1. If there are walls on one or two adjacent sides of the unit, the walls may be any height. If there are walls on more than two adjacent sides of the unit, the walls should not be higher than the unit.
2. The distance between the unit and the wall should be at least 96" (2438 mm) on all sides of the unit.
3. The distance between any two units within the walls should be at least 120" (3048 mm).

Do not locate outside air intakes near exhaust vents or other sources of contaminated air.

If the unit is installed where windy conditions are common, install wind screens around the unit, maintaining the clearances specified (Figure 7 or Figure 8 on page 33). This is particularly important to prevent blowing snow from entering outside air intake and to maintain adequate head pressure control when mechanical cooling is required at low outdoor air temperatures.

Overhead Clearance

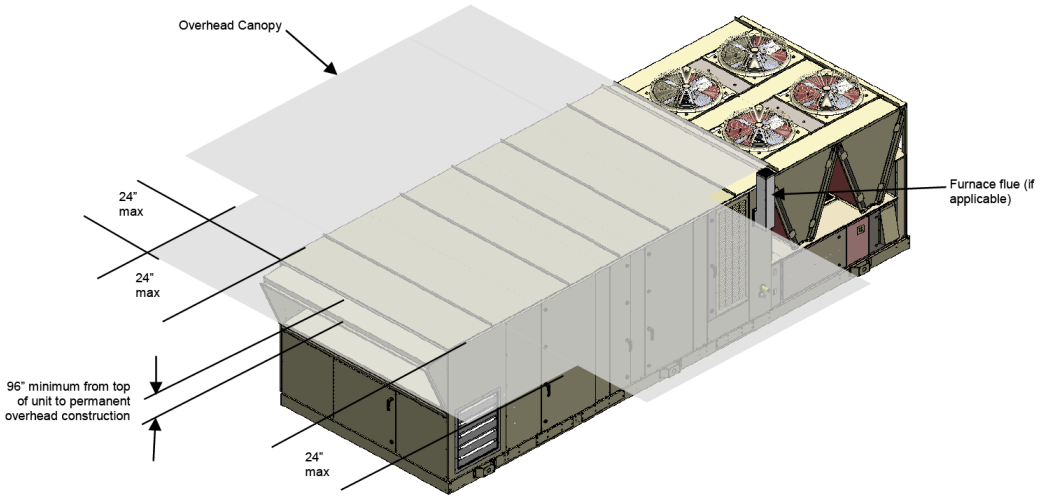
⚠ WARNING

Obstructions above models equipped with heat pump technology could result in the formation of icicles in colder ambient temperatures. Do not examine, operate, or service the unit if icicle formations are present above the unit, as serious injury or property damage may occur.

1. If clearances from Scenario B (Figure 8 on page 33) are applied to the installation, then unit must not have any overhead obstructions over any part of the unit.
2. If unit is surrounded by solid walls or screens, then unit must not have any overhead obstructions over any part of the unit.
3. The area above the condenser must be unobstructed in all installations to allow vertical air discharge.
4. The following restrictions must be observed for overhead obstructions above the air handler section where ground clearances noted in scenario A are applied (i.e. if Figure 7 on page 33 or Figure 9 on page 34 is applicable, then Figure 11 shows allowable overhead canopy):
    a. Overhead obstructions must be no less than 96" (2438 mm) above the top of the unit.
    b. There must be no overhead obstructions in the areas above the outside air intake and exhaust dampers that are farther than 24" (610 mm) from the side of the unit.

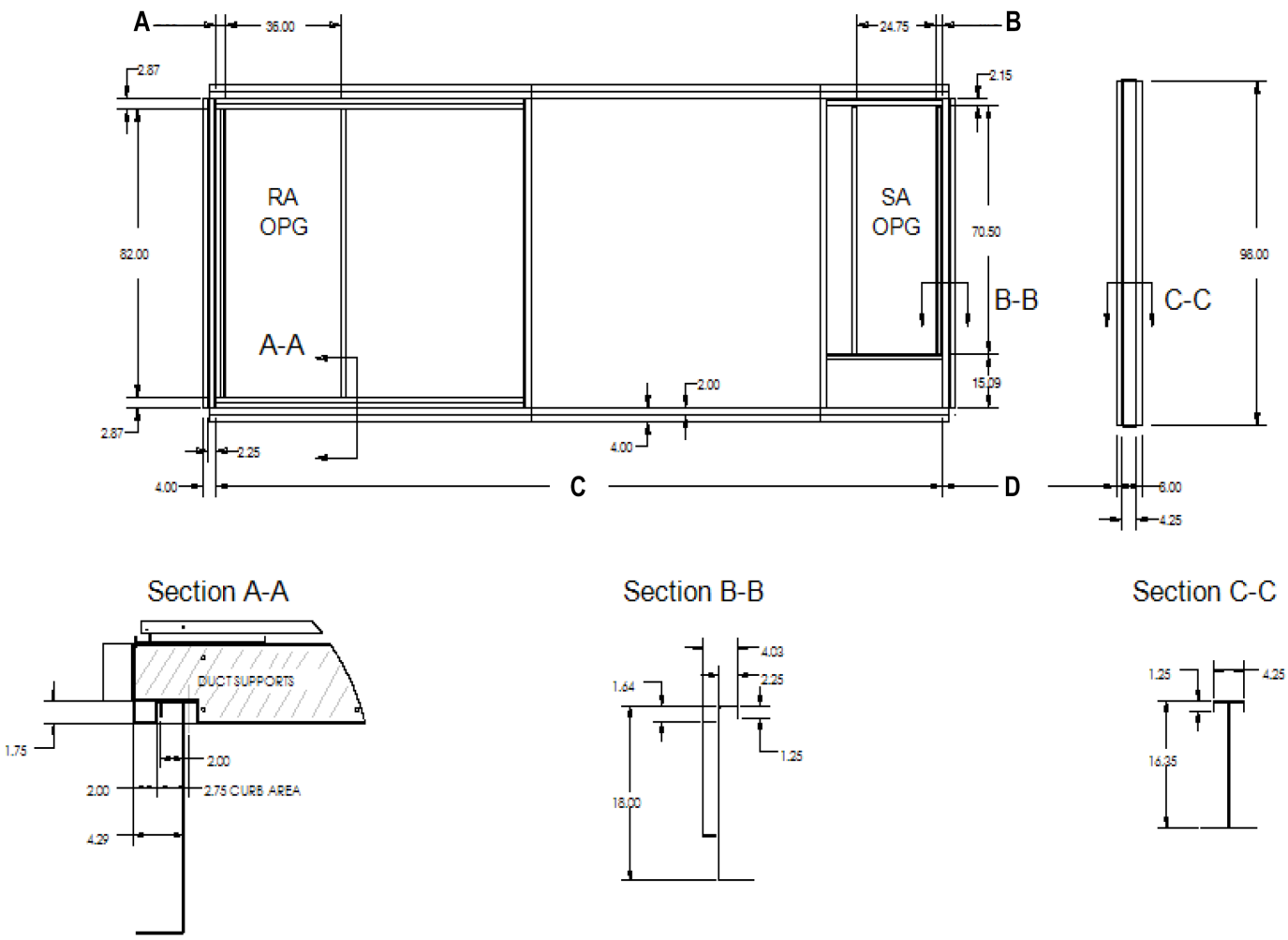
NOTE: See specific configuration clearance in DST.

Figure 11: Overhead Clearance



Curb Drawings

Figure 12: Example of Rebel Applied Roof Curbs



NOTE: This roof curb drawing is representative and may not be correct for your application; drawings for a specific application need to be generated by your Daikin Applied Sales Representative using the DaikinTools™ selection software.

Table 25: Roof Curb Variable Dimensions

31-50 Tons					
A		B		C	D
Return End Configuration		Out of Air Stream Vestibule		AHU Length - 8"	Condenser Size
Standard Return[2]	2.93	48" Section	49.78	Configured[1]	54"
High Static Exhaust	30.11	72" Section	73.78		
Energy Recovery	56.11				

NOTE: The unit length is configured based on the application and selection. For exact job specific curb drawings, talk with your Daikin Applied Sales Representative.

NOTE: Standard Return Includes, 0-30% OA, 100% OA, Economizer with Low Pressure Exhaust, Economizer with Return Fan, Economizer with Offset Return Fan.

System Considerations

The following section contains basic application and installation guidelines that must be considered as part of the detailed analysis of any specific project.

General

Units are intended for use in normal heating, ventilating and air conditioning applications and 100% outdoor air application. Consult your local Daikin Applied Sales Representative for applications involving operation at abnormal temperatures, high altitudes, non-cataloged voltages and for applications requiring modified or special control sequences. Consult your local Daikin Applied sales representative for job specific unit selections that fall outside of the range of the catalog.

Unit Location

The structural engineer must verify that the roof has adequate strength and ability to minimize deflection. Locate the unit fresh air intakes away from the building flue stacks or exhaust ventilators to reduce possible reintroduction of contaminated air to the system. Unit condenser coils should be located to avoid contact with any heated exhaust air.

Service Clearances

Allow sufficient space around the unit for maintenance/service clearance. Refer to Figure 7 on page 33 for recommended clearances. Where code considerations, such as the NEC require extended clearances, these take precedence. Provide a roof walkway along sides of the unit for service and access to controls and components. Consult your Daikin Applied sales representative if available clearances do not meet minimum recommendations

Operating Range

Daikin Applied Rebel Applied rooftop systems are designed to operate over an extensive operating range. However, for proper system operation some limits do apply.

Most rooftop applications take advantage of the significant energy savings provided by economizer operation. When an economizer system is used, mechanical refrigeration is not typically required below an ambient temperature of 50°F. Standard Rebel Applied refrigeration systems are designed to operate in ambient temperatures down to 50°F. For applications where economizers cannot be used, the Rebel Applied is provided with a modulating condenser fan head pressure control and low ambient condenser coil control system for mechanical cooling operation in ambient temperatures down to -10°F.

To help prevent moisture blow-off, design guidelines have been established for cooling coil selection. Based on laboratory testing, average coil face velocities should not exceed 600 ft./min. For applications outside of these limits, consult your Daikin Applied sales representative. Velocities exceeding these limits not only present the potential for moisture carryover, but also high face velocities generate high air pressure drops, resulting in poor fan energy performance.

In addition to maximum face velocity limitations, minimum velocity guidelines must also be followed. In order to maintain proper refrigeration performance, the minimum coil face velocity is 150 ft./min. When selecting a variable air volume unit, it is necessary to design the system such that the 150 ft./min. limit is maintained at light load conditions.

Acoustics

There are many sound sources in rooftop systems. Fans, compressors, condenser fans, duct take-offs, etc., all generate sound. Good acoustical design is critical for any installation and should start at the earliest stages in the design process. The common sound paths for rooftop equipment must be addressed are:

- Radiated sound through the bottom of the unit (air handler and condensing unit section) into the space
- Radiated sound to the property line
- Structure-borne vibration from the unit into the building
- Airborne sound through the supply air and return air ductwork

Some basic guidelines for good acoustical performance are:

- Provide proper structural support under all areas of the unit
- Locate equipment over less sensitive areas like corridors, toilet facilities or auxiliary spaces and away from office spaces, conference rooms and classrooms
- Design duct systems to minimize turbulence
- Place acoustical material in the area directly beneath the condensing section
- Apply for vibration isolation curb systems for sound transmission critical applications
- Account for low frequency duct breakout in system design. Route the first 20 ft. of rectangular duct over non-sensitive areas and avoid large duct aspect ratios. Consider round or oval duct to reduce breakout

Contact your local Daikin Applied Sales Representative for equipment supply, return and radiated sound power data specific to your application.

Ductwork Considerations

A well-designed duct system is required to allow the rooftop equipment to provide rated performance and to minimize system resistance and sound generation. Duct connections to and from units should allow straight, smooth airflow transitions. Avoid any abrupt changes in duct size and sharp turns in the fan discharge. Refer to the ASHRAE Applications Handbook for specific guidelines relevant to rooftop equipment.

The return duct path is the most often overlooked. A section of return duct is required to avoid “line of sight” to the return air opening and to provide attenuation of return air sound. Install an insulated tee with a maximum duct velocity of 1000 to 1200 feet per minute. Extend the duct 15 feet to provide adequate attenuation.

Engineering Specifications

Standard Features

Performance

- Premium efficiency inverter compressors on all refrigeration circuits
- High efficiency inverter compressor on lead refrigeration circuit
- Dual refrigeration circuits with fully interlaced evaporator coils
- 2-inch, double-wall, foam-injected panel with thermal resistance of R-13
- Integral thermal break in all walls, doors, floors and roof panels
- Minimum mechanical cooling operation down to 50°F ambient
- A minimum of four stages of compressor capacity control for stable discharge air temperature and humidity control
- A minimum of (2) direct-drive ECM supply fans to offer redundancy, reduced maintenance, and higher efficiency
- Multi-stage gas heat with 439 stainless steel heat exchanger
- Hot water or steam heat
- 2” MERV 8 filtration with dirty filter monitoring

Durability

- Pre-paint exterior surfaces withstand a minimum 3000 hr salt spray test per ASTM B117
- Low air leakage: <0.5% air leakage at +/- 5 in WC of static pressure; CL6 @ 6 in WC per ASHRAE Std 111

Electrical

- Single point power block connection
- 208V/230V/460V/575V
- Multi-staged electric heat
- 10 KAIC SCCR
- Phase voltage monitor
- MicroTech® controls

Access

- Access doors are mounted with durable full length stainless steel piano style hinge
- A single, lockable handle and latch mechanism plus door holders on each access door
- Separated high and low voltage control panels for safe access to human control interfac-es

Warranty

- Standard 1-year parts, labor and compressor warranty
- Standard 10-year gas heat exchanger warranty

Customizable Options

Performance

- Factory installed insulated or uninsulated humidifier grid with stainless steel drain pan with wetting distances from 15” to 36”
- Fixed blade position air blender to promote the best mixing of outdoor and return air
- Utility out of airstream vestibule section with optional floor supports for field mounted humidifier generators and floor treadplate for user safety
- Sorbent ventilation module to increase indoor air quality
- 100% or 0–30% outisde air damper or 0-100% economizer damper
- Low static exhaust or high static exhaust or return fans
- Energy efficiency (coil face area, 6 row coils)
- Modulating hot gas reheat for dehumidification
- Low ambient mechanical cooling
- Quiet condensing and compressor sound blankets
- Speedtrol®, modulating head pressure control
- Outdoor and fan airflow measuring
- Refrigerant system monitoring (liquid, suction, and condensing refrigerant pressure/temperature sensors)
- Modulating gas heat control between 5:1 and 100:1 turndown

NOTE: 100:1 turndown with SCR preheater only.

- Modulating hot water and steam control valves
- ECM supply fan array with backdraft dampers for redundancy
- 2”/4” filter rack with Merv 8 or 13 filters
- 2” Merv 8 pre-filter with 12” rigid cartridge Merv 11, 14,16, or carbon filters
- Final filters – 12” rigid cartridge MERV 14, 16, HEPA, side load or front load.

Electrical

- Non-fused, unit mounted disconnect switch
- Dual point power for back-up power systems
- 115V service outlet
- 65 KAIC electrical rating
- Line reactor, power factor correction
- MicroTech controls with BAS integration and power measuring

Warranty

- Extended 5-year parts, labor and compressor warranty
- Extended 20-year heat exchanger warranty

Replacement Capabilities

The Rebel Applied product has been designed to be able to fit to existing curbs of other Daikin Applied or Trane packaged equipment of similar nominal tonnage size. Contact sales support for specific model/size/matches.

Supports Trane configurations:

- Gas heat
- Hot water heat
- Steam heat
- Extended cabinet
- Economizer (with or without fans)
- 0-degree ambient cooling

Supports Daikin Applied RoofPak® configurations:

- Gas heat
- Hot water heat
- Steam heat
- Electric heat
- Economizer (with or without fans)
- 0-degree ambient cooling

Controls

MicroTech Unit Controller

The MicroTech unit controller rises above legacy systems by offering more advanced technology with controls that make equipment management easier. Manage equipment performance with fan airflow measuring, refrigeration and filter system performance analytics and power consumption in real time.

The unit controller is preprogrammed with the software necessary to control the unit. Use the unit controller keypad display to keep schedules, set points and parameters from being lost, even during a long-term power outage. The unit controller processes system input data and then determines and controls output responses.

BACnet / LonWorks Interfaces

An optional field- or factory- mounted BACnet or LonWorks communication module provides a network interface to the BAS.

Add optional field configurable I/O modules to add additional sensors or points that are not standard on rooftop equipment and report them through the BAS.

SiteLine Building Controls

- Easy installation with out-of-the box functionality for both new and retrofit applications
- Simple operation that brings insight to system performance and is intuitive to manage
- Low upfront costs that enable you to work with other equipment systems
- Scalable solutions for both standalone equipment and building systems
- Advanced security that protects customer data

Refrigeration Only Controls

Refrigeration Only Controls provides the benefits of Daikin Applied refrigeration system protections but allows for direct third-party control of major system components. Cooling, Heating, Damper and Fan Capacities are all controlled directly by a third-party controller.

A2L Mitigation Controls

Every Rebel Appled unit is equipped with standard A2L leak mitigation controls to ensure safe operation in the event of a refrigerant leak.

General Specification

PART 1: GENERAL

1.01 Section Includes:

A. Semi-custom packaged rooftop air conditioners

1.02 References

A. AFBMA 9 - Load ratings and fatigue life for ball bearings

B. AMCA 99 - Standards handbook

C. AMCA 210 - Laboratory methods of testing fans for rating purposes

D. AMCA 300 - Test code for sound rating air moving devices

E. AMCA 500 - Test methods for louver, dampers, and shutters

F. AHRI Standard 340/360- Unitary large equipment

G. AHRI Standard 920 - DOAS

H. AHRI Standard 1060 - Rating air-to-air heat exchangers for energy recovery ventilation equipment

I. ASTM B117 - Standard practice for operating salt spray apparatus

J. NEMA MG1 - Motors and generators

K. NFPA 70 - National Electrical Code

L. UL 723 - Test for surface burning characteristics of building materials

M. UL 900 - Test performance of air filter units

N. UL 1995 - Standard for heating and cooling equipment

O. UL 94 - Test for flammability of plastic materials for parts in devices and appliances

P. IBC 2000, 2003 - International Building Code

Q. NFPA 90A - Standard for the installation of air conditioning and ventilating systems

R. NFPA 5000 - Building construction and safety code

S. ASHRAE 90.1 Energy Code

T. ASHRAE Std. 111 - Measurement, testing, adjusting, and balancing of building hvac systems

1.03 Submittals

A. Shop drawings: Indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, electrical characteristics and connection requirements.

B. Product data:

1. Provide literature that indicates dimensions, weights, capacities, ratings, and electrical characteristics and connection requirements.
2. Provide data on filter media, filter performance, filter assembly, and filter frames.
3. Provide computer generated fan curves with specified operating point clearly plotted.

D. Manufacturers must clearly define any exceptions made to plans and specifications. Any deviations in layout, arrangement, or efficiency shall be submitted to the consulting engineer prior to bid date. Acceptance of deviation (s) from specifications shall be in the form of written approval from the consulting engineer.

1.04 Operation and Maintanence Data

A. Maintenance data: provide instructions for installation, maintenance and service.

1.05 Qualifications

A. Manufacturer: company specializing in manufacturing the products specified in this section with minimum five years documented experience, who issues complete catalog data on total product.

B. Certify packaged rooftop performance in accordance with AHRI 340/360 standards.

C. Product energy efficiency compliant with ASHRAE 90.1 minimum energy efficiency requirements.

D. Startup must be done by trained personnel experienced with rooftop equipment.

E. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters and remote controls are in place, bearings lubricated, and manufacturers' installation instructions have been followed.

1.06 Delivery, Storage, and Handling

A. Deliver, store, protect and handle products to site.

B. Handle carefully to avoid damage to components, enclosures, and finish.

C. Store in a clean, dry place to protect from weather and construction traffic.

PART 2: PRODUCTS

2.01 Approved Manufacturers

A. Basis of Design: Daikin Applied

B. AAON: RL

C. Trane: Intellipak

D. Governaire

E. Seasons 4

F. Engineered Air

G. Energy Labs

2.02 General Description

A. Each unit shall be specifically designed for outdoor rooftop application and include a weatherproof cabinet. Units shall be of a modular design with factory installed access sections available to provide maximum design flexibility.

B. Furnish unit configuration, layout, performance and electrical characteristics as shown on project plans and schedule.

C. The unit shall undergo a complete factory run test prior to shipment. The factory test shall include final test of all fan assemblies, a refrigeration circuit runtest, a unit control system operations checkout, a unit refrigerant leak test, and a final unit inspection.

D. The complete unit shall be ETL listed.

E. Unit shall be completely factory assembled and shipped in one piece.

F. Unit to be shipped fully charged with R32.

G. All units shall have decals and tags to indicate caution areas and aid unit service. Unit nameplates shall be fixed to the main control panel door. Electrical wiring diagrams shall be attached to the control panels. Installation, operating and maintenance bulletins and start-up forms shall be supplied with each unit.

H. Submittals must demonstrate that scheduled unit leaving air temperature (LAT) is met, that fan and motor heat temperature rise (TR) have been considered, and scheduled entering air temperature (EAT) equals mixed air temperature (MAT). Draw-thru cooling - Scheduled EAT equals cooling coil EAT and scheduled unit LAT equals cooling coil LAT plus TR.

2.03 Cabinet

A. Unit construction for all walls, doors, ceiling and floor shall be double wall with a solid galvanized steel liner with a thermal break integral to the panel construction that provides a cleanable interior, prevents conductive heat transfer through the panel, and prevents exterior condensation on the panel.

B. Unit construction for all walls, doors, ceiling and floor shall be double wall with a solid stainless steel liner with a thermal break integral to the panel construction that provides a cleanable interior, prevents conductive heat transfer through the panel and prevents exterior condensation on the panel.

C. Foam Insulation shall provide a minimum thermal resistance R-value of 13.0.

D. Unit construction shall be designed to operate at total static pressures up to 8.0 inches w.g.

E. Provide quality unit construction with performance tested in accordance with ASHRAE Std 111 – cabinet air leakage shall not exceed leak class 6 ($C_L = 6$), at +/- 5 in. w.c. casing pressure, where maximum cabinet leakage (cfm/100 ft^2 of casing surface area) = $C_L \times P^{0.65}$.

F. Provide quality unit construction with air leakage less than 0.5% of design airflow up to 5 in. w.c.

G. Provide quality unit construction with air leakage less than 1.0% of design airflow up to 7 in. w.c..

H. Exterior surfaces shall be constructed of pre-painted galvanized steel for aesthetics and long term durability. Paint finish to include a base primer with a high quality, polyester resin topcoat of a neutral beige color. Finished surface to withstand a minimum 3000-hour salt spray test in accordance with ASTM B117 standard for salt spray resistance.

I. Access shall be provided to filters, dampers, cooling coils, fan sections, compressors and electrical and controls components.

J. Access doors shall be provided for each critical maintenance section in order to provide user easy access to components. All access doors shall be mounted on full length stainless steel piano hinges and shall be secured by linkage and latch system that is operated by a single handle. Doors secured by multiple, mechanical fasteners are not acceptable.

K. The unit base frame shall be constructed of 13 gauge pre-painted steel to prevent base rail corrosion.

L. The unit base shall overhang the roof curb for positive water runoff and shall have a formed recess that seats on the roof curb gasket to provide a positive, weathertight seal. Lifting brackets shall be provided on the unit base with lifting holes to accept cable or chain hooks.

M. Service Lights

1. Service lights shall be provided throughout the air handling unit and control panel. Lights shall be turned on from a single exterior switch on the

exterior of the control panel. The lights will remain powered when the unit disconnect is OFF.

2. Service light enclosures shall have a minimum IP rating of 65 meaning the lights are dust tight and protected against jets of water. The light bulbs provided are a light-emitting diode (LED) type to minimize amperage draw and shall produce 1100 lumens in a warm white color.

C. Burglar Bars

4. A combination burglar bar shall be provided in the bottom supply air opening. Burglar bar shall be made of 3/4" diameter ground and polished steel shaft welded to a galvanized steel frame.

E. Isolation Damper

6. Isolation dampers shall be provided in the bottom supply air opening. A two-position actuator shall be provided to close the dampers when the fans are not running.

7. Isolation dampers shall be provided in the bottom return air opening. A two-position actuator shall be provided to close the dampers when the fans are not running.

8. Isolation dampers shall be provided in the bottom supply and return air openings. A two-position actuator shall be provided to close the dampers when the fans are not running.

I. Safety Grates

10. Walk on safety grates shall be provided in the bottom supply air opening and able to support a concentrated load of 1000lbs at mid-span.

11. Walk on safety grates shall be provide in the bottom return air opening and able to support a concentrated load of 1000lbs at mid-span.

12. Walk on safety grates shall be provided in the bottom supply and return air openings and be able to support a concentrated load of 1000lbs at mid-span.

2.04 Acoustics

A. Equipment sound performance shall meet the scheduled discharge and return sound power.

B. Discharge plenum sections shall be lined with a perforated acoustic liner to enhance sound attenuation.

C. Discharge and return plenum sections shall be lined with a perforated acoustic liner to enhance sound attenuation.

2.05 Supply, Return and Exhaust Fans

A. All supply, return and exhaust fans shall be configured in an array with a minimum number fans specified in the schedule for each unit.

B. Redundancy

1. Size all fans for N-1 per the schedule.

2. Each supply, exhaust, and return fan motor shall have an independent integral inverter or a dedicated variable frequency drive per motor for redundancy.

3. Provide the supply fan array with a backdraft damper section to prevent recirculation during redundant operation.

D. All fans shall be dynamically balanced as an assembly in planes as per DIN / ISO 21940 to balancing grade G 6.3 or better or provide 2" Spring isolation for each fan.

C. All fans shall be provided with totally enclosed maintenance-free ball bearings and permanent lubrication. Bearings shall be selected for a minimum life in excess of 350,000 hrs (L50) at selected operating point.

D. Fan airflow measuring

1. All supply fans shall include a factory installed flow measuring station. Airflow needs to be readable through the unit controller and building automation system.

2. All supply and exhaust fans shall include a factory installed flow measuring station. Airflow needs to be readable through the unit controller and building automation system.

3. All supply and return fans shall include a factory installed flow measuring station. Airflow needs to be readable through the unit controller and building automation system.

D. ECM Supply Fans

5. All fans shall be a single width, single inlet (SWSI) airfoil centrifugal fan. The fan wheel shall be Class II construction with aluminum fan blades that are continuously welded to the hub plate and end rim. The fan shall be a direct drive fan mounted to the motor shaft. Belts and sheaves are not acceptable due to the additional maintenance.

6. The fan motor shall be a totally enclosed electrically commutated motor that is speed controlled by the rooftop unit controller. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase. Motors shall be premium efficiency.

E. Direct Drive Plenum Supply Fans

1. Supply fans will be provided as a direct-drive airfoil plenum fan array. Fan assemblies including fan, motor, and sheaves shall be dynamically balanced by the manufacturer on all three planes and at all bearing supports. Manufacturer must ensure maximum fan RPM is below the first critical speed.

2. Fan array shall have number of fans as scheduled.

3. Fan array section shall have fans individually isolated with spring isolation.
4. Fan array shall be factory wired from motors to factory mounted variable speed drives.

E. Propeller Exhaust Fan

6. Direct-drive axial exhaust fans shall be provided. Blades shall be constructed with fabricated steel and shall be securely attached to fan shafts. All exhaust fan assemblies shall be statically and dynamically balanced. Totally enclosed motors shall be permanently lubricated, heavy-duty type, carefully matched to the fan load. Ground and polished steel fan shafts shall be mounted in permanently lubricated and sealed ball bearings. Bearings shall be selected for a minimum (L10) life in excess of 100,000 hours at maximum cataloged operating speeds.
7. The unit DDC controller shall provide building static pressure control. A factory mounted exhaust fan variable frequency drive shall provide proportional control of the exhaust fans from 25% to 100% of the scheduled exhaust air fan designed airflow and ESP. The field shall mount the required sensing tubing from the building to the factory mounted building static pressure sensor.

H. ECM Exhaust Fan

9. All fans shall be a single width, single inlet (SWSI) airfoil centrifugal fan. The fan wheel shall be Class II construction with aluminum fan blades that are continuously welded to the hub plate and end rim. The fan shall be a direct drive fan mounted to the motor shaft. Belts and sheaves are not acceptable due to the additional maintenance.
10. The fan motor shall be a totally enclosed electrically commutated motor that is speed controlled by the rooftop unit controller. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase. Motors shall be premium efficiency.

K. ECM Return Fans

12. All fans shall be a single width, single inlet (SWSI) airfoil centrifugal fan. The fan wheel shall be Class II construction with aluminum fan blades that are continuously welded to the hub plate and end rim. The fan shall be a direct drive fan mounted to the motor shaft. Belts and sheaves are not acceptable due to the additional maintenance.
13. The fan motor shall be a totally enclosed electrically commutated motor that is speed controlled by the rooftop unit controller. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase. Motors shall be premium efficiency.
14. Exhaust Fan configurations are not allowed as alternate.

2.06 Electrical

A. Unit wiring shall comply with NEC requirements and with all applicable UL standards. All electrical components shall be UL recognized where applicable. All wiring and electrical components provided with unit shall be number and color coded and labeled according to the electrical diagram provided for easy identification.

B. The unit shall be provided with a factory wired weatherproof control panel. Unit shall have a power terminal block for main power connection. A terminal board shall be provided for low voltage control wiring. Branch circuit short circuit protection, 115 volt control circuit transformer and fuse, system switches, and a high temperature sensor. Each compressor and condenser fan motor shall be furnished with contactors and inherent thermal overload protection. Supply and return fan motors shall have contactors and external overload protection. Knockouts shall be provided in the of the main control panels for field wiring entrance.

C. All 115-600 volt internal and external wiring between control boxes and components shall be protected from damage by dedicated electrical raceways.

D. The receptacle shall be powered by a field supplied 115V source.

E. The receptacle shall be powered by a factory supplied 115V transformer and will be available when the disconnect is in the OFF position.

F. Single non-fused disconnect swtich shall be provided for connecting electrical power at the unit. Disconnect switches shall be mounted internal to the control panel and operated by an externally mounted handle.

G. Unit SCCR Rating to be 10 kAIC minimum.

H. Unit SCCR Rating to be 22 kAIC. minimum.

I. Unit SCCR Rating to be 65 kAIC. minimum.

J. Unit shall be provided with phase, voltage and brown out protection which shuts down all motors in the unit if the electrical phases are more than 10% out of balance on voltage or on phase reversal.

K. A dual non-fused disconnect switchs shall be provided for connecting two power sources to the unit. Each disconnect switch shall be mounted internal to the control panel and operated by an externally mounted handle. Circuit 1 shall have the compressors, condenser fan, and electric heat (if present); Circuit 2 shall have the supply, return, exhaust fans, controls, and gas heat if present.

L. Unit shall be provided with a safety shutdown terminal for installation of field emergency input.

M. All electrical options shall have a +/- 10 percent voltage utilization range to protect against voltage variation.

2.07 Safety Options

A. Unit Shall be provided with a safety shutdown terminal for installation of field emergency input.

B. Unit Shall be provided with factory installed supply air smoke detector.

C. Unit shall be provided with factory installed return air smoke detector.

D. Unit shall be provided with factory installed supply and return air smoke detector.

E. Unit shall be provided with A2L refrigeration leak detection system.

2.08 Cooling Coil

A. The cooling coil section shall be installed in a draw-through configuration, upstream of the supply air fan. The coil section shall be complete with factory piped cooling coil and sloped drain pan.

B. Direct expansion (DX) cooling coils shall be fabricated of seamless 1/2” diameter high efficiency copper tubing that is mechanically expanded into high efficiency aluminum plate fins. Coils shall be a multi-row, staggered tube design with a minimum of 4 rows. All units shall have two independent refrigerant circuits and shall use an interlaced coil circuiting that keeps the full coil face active at all load conditions.

C. Each refrigeration circuit shall be equipped with a thermostatic expansion valve for control refrigerant flow control.

D. The cooling coil casing and all coil block offs shall be constructed with stainless steel to prevent corrosion.

E. The refrigerant suction lines shall be fully insulated from the expansion valves to the compressors.

F. The distributor tubes shall be sleeved or coated to provide longevity and protection from leaks.

G. All coils shall be factory leak tested with high pressure air under water.

H. The drain pan shall be stainless steel and designed to comply with ASHRAE- 62.1 double sloped requirements drain pan shall be provided with the cooling coil. The drain pan shall extend beyond the leaving side of the coil and underneath the cooling coil connections. The drain pan shall have a minimum slope of 1/8” per foot to provide positive draining. The drain pan shall be connected to a threaded drain connection extending through the unit base. Units with stacked cooling coils shall be provided with a secondary drain pan piped to the primary drain pan.

I. Insulation under the drain pan should be a closed cell structure to prevent moisture from wicking under the drain pan. Fiberglass is not allowed.

2.09 Corrosion Protection

A. All Indoor Heating and Cooling coils shall be provided with a corrosion protection coating rated for a minimum of 6000 hours of salt spray resistance per ASTM B 117-90 salt spray performance testing, ASTM B 117-90 salt spray performance.

B. All Outdoor condenser coils shall be provided with a corrosion protection coating rated for a minimum of 6000 hours of salt spray resistance per ASTM B 11-7-90 salt spray performance testing, ASTM B 117-90 salt spray performance.

C. All Indoor Heating and Cooling coils and the outdoor condenser coils shall be provided with a corrosion protection coating rated for a minimum of 6000 hours of salt spray resistance per ASTM B 11-7-90 salt spray performance testing, ASTM B 117-90 salt spray performance.

2.10 Modulating Hot Gas and Liquid Reheat

A. Hot gas reheat: Unit shall be equipped with a fully modulating hot gas reheat coil with hot gas coming from the unit condenser.

1. Hot gas reheat coil shall be a Microchannel design. The aluminum tube shall be a micro channel design with high efficiency aluminum fins. Fins shall be brazed to the tubing for a direct bond. The capacity of the reheat coil shall allow for a 20°F temperature rise at all operating conditions.
2. The modulating hot gas reheat systems shall allow for independent control of the cooling coil leaving air temperature and the reheat coil leaving air temperature. The cooling coil and reheat coil leaving air temperature set points shall be adjustable through the unit controller. During the dehumidification cycle the unit shall be capable of 100% of the cooling capacity. The hot gas reheat coil shall provide discharge temperature control within +/- 2°F.
3. Each coil shall be factory leak tested with high-pressure air under water.

D. Liquid sub-cool reheat: Unit shall be equipped with a fully modulating liquid sub-cool reheat coil using hot liquid coming leaving the unit condenser to reheat saturated leaving evaporator air to neutral air temperatures leaving the unit.

5. Liquid sub-cool reheat coil shall be a Microchannel design. The aluminum tube shall be a micro channel design with high efficiency aluminum fins. Fins shall be brazed to the tubing for a direct bond.
6. The modulating liquid sub-cool reheat system shall be utilized for independent control of the cooling coil leaving air temperature and the leaving/supply air temperature.

G. Dehumidification operation with Hot gas reheat shall use direct air temperature feedback from the leaving face of the evaporator coil for controlling the compressor cooling capacity and the reheat will be fully modulate to maintain the leaving/supply

air temperature set point. The leaving/supply air temperature set point can be reset based on outside, space, and return temperature or humidity.

H. Dehumidification operation with liquid sub-cool reheat shall use direct air temperature feedback from the leaving face of the evaporator coil for controlling the compressor cooling capacity and the reheat will be fully modulate to maintain the leaving/supply air temperature set point. If the liquid sub-cool coil does not have the capacity to meet the leaving air temperature set point, then the modulating hot gas reheat will trim the remaining reheat load required. The leaving/supply air temperature set point can be reset based on outside, space, and return temperature or humidity.

2.11 Chilled Water Coils

A. The cooling coil section shall be installed in a draw-through configuration, upstream of the supply air fan. The coil section shall be complete with factory piped cooling coil and sloped drain pan. Selectable hinged access doors on both sides of the section shall provide convenient access to the cooling coil and drain pan for inspection and cleaning.

B. All coils are fabricated of seamless 5/8” diameter copper tubing that is mechanically expanded into high efficiency aluminum plate fins. Coils shall be multi-row, staggered tube design per the job schedule. All coils shall be factory leak tested with high-pressure air under water. All coils shall be AHRI certified.

C. Chilled water coils shall have copper headers complete with supply, return and threaded vent connections. Chilled water coils shall also include threaded drain connections. Glycol shall be used to the water circuit to protect against coil freeze-up.

D. 2-way chilled water control valves shall be factory installed and controlled and will be characterized Cv ball valves.

2.12 Hot Water Heat Coils

A. A hot water heating coil shall be factory installed in the heat section. The rooftop unit shall include a piping vestibule. The coil connection shall terminate in the vestibule. All coil connections shall be copper, steel connections shall not be allowed in order to prevent dielectrics and corrosion.

B. Coils shall be fabricated of seamless 5/8” diameter copper tubing that is mechanically expanded into high efficiency rippled and corrugated aluminum plate fins. All coil vents and drains shall be factory installed. Hot water coil shall be fully cased to allow for easy replacement.

C. The coil shall have freeze protection and shall be controlled by the unit DDC controller. With the detection of a freeze condition the heating coil valve shall be driven fully open. The unit controller shall indicate an alarm.

D. Coil shall be factory leak tested with high pressure air under water.

E. Provide with a factory installed and control two-way characterized control valve with a normally open spring close actuator.

F. Provide with a factory installed and control two-way characterized control valve with a normally open spring close actuator and valve isolation valves

G. Provide with a factory installed and control three-way characterized control valve with a normally open spring close actuator.

H. Provide with a factory installed and control three-way characterized control valve with a normally open spring close actuator and valve isolation valves.

2.13 Steam Heat Coils

A. A steam heating coil shall be factory installed in the unit heat section. Coils shall be fabricated of seamless 5/8” diameter copper tubing that is mechanically expanded into high efficiency HI-F rippled and corrugated aluminum plate fins. Steam coils shall be of the jet distributing type. A factory-tested diffuser shall be used in order to provide air distribution across the coil. Hinged access doors shall provide convenient access to the coil and valve for inspection and cleaning.

B. A factory installed two-way modulating control valve and spring return valve actuator shall provide control of the steam. The valve actuator shall be controlled by the factory installed main unit control system.

C. Coils shall be factory leak tested with high pressure air under water.

2.14 Electric Heat

A. The rooftop unit shall include an electrical resistance heating coil section. Heating coils shall be constructed of a low watt density, nickel-chromium alloy resistance wire with intermediate supports that include ceramic bushings. The electrical contractors shall be of the full line-breaking type with all the electrical power legs being disconnected when the contactors are not energized. All electrical circuit wiring shall be designed with copper conductors, aluminum wires are not acceptable. Heating element branch circuits shall be individually fused to a maximum of 48 Amps per NEC requirements. The power supply for the electric heater shall be factory wired into the units main power block or disconnect switch.

B. The heating modules shall have an automatic reset, high temperature limit safety protection. A secondary high limit protection shall also be provided that requires a manual reset. An airflow switch shall be provided with the heating module to prevent the electric heater from operating in the event of no airflow.

C. The electric heat elements shall be controlled by the factory installed DDC unit control system. The heater shall have proportional SCR control. The unit controller shall modulate the electric heater to maintain the discharge air temperature set point.

2.15 Gas Heat

A. The gas furnace design shall be factory installed downstream of the supply air fan in the heat section.

B. The heat exchanger shall include a 439 grade stainless steel. Aluminized steel heat exchangers are not acceptable. The heat exchanger design shall collect condensate in a collection point and have a condensate drain.

C. The furnace will be supplied with a staged induced draft burner. The burner shall be capable of 2 stages of control and will operate at either 50% or 100% of rated capacity.

D. The furnace will be supplied with a staged induced draft burner. The burner shall be capable of 4 stages of control and will operate at either 25, 50, 75 or 100% of rated capacity.

E. The furnace will be supplied with a modulating induced draft burner. The burner shall be controlled for low fire start. The burner shall be capable of continuous modulation between 20% and 100% (5:1 control) of rated capacity.

F. The furnace will be supplied with a modulating induced draft burner. The burner shall be controlled for low fire start. The burner shall be capable of continuous modulation between 10% and 100% (10:1 control) of rated capacity.

G. The furnace will be supplied with a modulating induced draft burner. The burner shall be controlled for low fire start. The burner shall be capable of continuous modulation between 5% and 100% (20:1 control) of rated capacity.

H. The burner shall be specifically designed to burn natural gas and shall include a micro-processor based flame safeguard control, combustion air proving switch, pre-purge timer and spark ignition. Status and alarm codes are available at the unit controller via a network connection and are available for BAS integration.

I. Provide with a 10 year gas heat exchanger warranty.

J. Provide with a 20 year gas heat exchanger warranty.

2.16 Heat Pump Heating

NOTE: Items A-E are applicable to heat pump selected units.

A. The evaporator coil, condenser coil, compressors and refrigerant circuit shall be designed for heat pump operation. The refrigerant circuit shall contain a 4-way reversing valve for the heat pump operation. The outdoor coil shall have an electronic expansion valve to control the refrigerant flow. The unit controller shall modulate the expansion valve to maintain compressor operation within the compressor operational envelope.

B. The refrigerant system shall have a pump-down cycle.

C. (ITEMS C-E REFLECT THE DIFFERENT SUPPLEMENTAL HEAT TYPES. REFER TO SPECIFIC SUPPLEMENTAL HEAT TYPE SELECTED) The unit shall have a natural gas furnace for hybrid heating. When the heatpump operation cannot maintain the discharge air temperature setpoint the natural gas furnace shall temper the airstream to the discharge air temperature setpoint.

D. The unit shall have an electric resistance heating coil for auxiliary heating. When the heatpump operation cannot maintain the discharge air temperature setpoint the electric heating coil shall temper the airstream to the discharge air temperature setpoint.

E. The unit shall have a hot water coil for hybrid heating. When the heatpump operation cannot maintain the discharge air temperature setpoint the hot water coil shall temper the airstream to the discharge air temperature setpoint.

2.17 Draw-through Filters

A. All units shall be provided with clogged filter switches and alarm enunciation.

B. All units shall be provided with electronic pressure transducer filter measuring controls integrated with the BAS and alarm annunciation.

C. All units shall be provided with a through the wall magnehelic filter gauge that displays filter loading.

D. Unit shall be provided with a draw-through filter section.

E. The filter rack shall be designed to accept a 2” pleated filter. The manufacturer shall ship the rooftop unit with 2” MERV 8 filters. The contractor shall furnish and install, at building occupancy, the final set of filters per the contract documents.

F. The filter rack shall be designed to accept a 2” pleated Merv 8 pre-filter and a 4” post filter. The manufacturer shall ship the rooftop unit with 2” MERV 8 filter. The contractor shall furnish and install, at building occupancy, the final set of filters per the contract documents.

G. The filter rack shall be designed to accept a 2” pleated pre-filter and a 1” header for a up to a 12” cartridge filter. The manufacturer shall ship the rooftop unit with 2” MERV 8 pre-filters and a 12” MERV 14 cartridge filter.

H. The filter rack shall be designed to accept a 2” pleated pre-filter and a 1” header for a up to a 12” cartridge filter. The manufacturer shall ship the rooftop unit with 2” MERV 8 pre-filters and a 12” MERV 16 cartridge filter.

I. The filter rack shall be designed to accept a 2” pleated pre-filter and a 1” header for a up to a 12” cartridge filter. The manufacturer shall ship the rooftop unit with 2” MERV 8 pre-filters and a 12” Carbon Impregnatuded cartridge filter. The contractor shall furnish and install, at building occupancy, the final set of filters per the contract documents.

2.18 Blow-through Final Filters

A. All units shall be provided with clogged filter switches and alarm enunciation.

B. All units shall be provided with electronic pressure transducer filter measuring controls integrated with the BAS and alarm annunciation.

C. All units shall be provided with a through the wall magnehelic filter gauge that displays filter loading.

D. Unit shall be provided with a blow-through final filter section.

E. The filter rack shall be designed to accept a side load 12” cartridge filter with a 1” header. The manufacturer shall ship the rooftop unit with 12” MERV 14 cartridge filter.

F. The filter rack shall be designed to accept a face load 12” cartridge filter. The manufacturer shall ship the rooftop unit with 12” MERV 16 face load cartridge filter. A walk in access section upstream of face load filters is required for filter maintenance.

G. The filter rack shall be designed to accept a face load 12” cartridge filter. The manufacturer shall ship the rooftop unit with 12” HEPA face load cartridge filter. A walk-in access section upstream of face load filters is required for filter maintenance.

2.19 Outdoor/Return Air Section

A. Unit shall be provided with a Metal Mesh pre-filter in the outdoor air hood/section to prefilter large particulate to prevent early filter clogging.

B. Unit shall be provided with a 0–30% Outside Air damper. The outdoor air hood shall be factory installed and constructed from galvanized steel finished with the same durable paint finish as the main unit. The hood shall include moisture eliminator filters to drain water away from the entering air stream. The outside and return air dampers shall be sized to handle 100% of the supply air volume. The dampers shall be parallel blade design. Damper blades shall be gasketed with side seals to provide an air leakage rate of 1.5 cfm/square foot of damper area at 1" differential pressure in according with testing defined in AMCA 500. Control of the dampers shall be by a factory installed direct coupled actuator.

C. Unit shall be provided with a 100% Outside Air damper. The outdoor air hood shall be factory installed and constructed from galvanized steel finished with the same durable paint finish as the main unit. The hood shall include moisture eliminator filters to drain water away from the entering air stream. The outside and return air dampers shall be sized to handle 100% of the supply air volume. The dampers shall be parallel blade design. Damper blades shall be gasketed with side seals to provide an air leakage rate of 1.5 cfm/square foot of damper area at 1" differential pressure in according with testing defined in AMCA 500. Control of the dampers shall be by a factory installed direct coupled actuator.

D. Unit shall be provided with an outdoor air economizer section. The economizer section shall include outdoor, return, and exhaust air dampers. The economizer operation shall be fully integral to the mechanical cooling and allow up to 100% of mechanical cooling if needed to maintain the cooling discharge air temperature. The outdoor air hood shall be factory installed and constructed from galvanized steel finished with the same durable paint finish as the main unit. The hood shall include moisture eliminator filters to drain water away from the entering air stream. The outside and return air dampers shall be sized to handle 100% of the supply air volume. The dampers shall be parallel blade design. Damper blades shall be gasketed with side seals to provide an air leakage rate of 1.5 cfm/square foot of damper area at 1" differential pressure in according with testing defined in AMCA 500. Control of the dampers shall be by a factory installed direct coupled actuator.

E. Damper actuator shall be fully modulating and spring return type. A comparative drybulb control shall be provided to sense and compare drybulb in both the outdoor and return air streams to determine if outdoor air is suitable for "free" cooling. If outdoor air is suitable for "free" cooling, the outdoor air dampers shall modulate in response to the unit's temperature control system.

F. Damper actuator shall be fully modulating and spring return type. A comparative enthalpy control shall be provided to sense and compare enthalpy in both the outdoor and return air streams to determine if outdoor air is suitable for "free" cooling. If outdoor air is suitable for "free" cooling, the outdoor air dampers shall modulate in response to the unit's temperature control system.

G. A barometric exhaust damper shall be provided to exhaust air out of the unit. A bird screen shall be provided to prevent infiltration of rain and foreign materials.

H. A power closure barometric exhaust damper shall be provided to exhaust air out of the back of the unit. The actuator will hold the damper shut during unoccupied mode. A bird screen shall be provided to prevent infiltration of rain and foreign materials.

I. All units must be capable of CO2 control. Outside air damper position will modulate between the Demand Control Ventilation Limit (minimum position setpoint) and the Ventilation Limit (maximum non-economizer position setpoint) to satisfy the space requirements. Damper position will be controlled to the greater of the two command signals, either minimum outside air flow or space IAQ (CO2).

J. Provide the units with factory installed, and tested thermal dispertion style outdoor air flow measuring station.

2.20 Energy Recovery

A. The rooftop unit shall be provided with an AHRI certified rotary wheel air-to-air heat exchanger in a cassette frame complete with seals, drive motor and drive belt. The energy recovery wheel shall be an integral part of the rooftop unit with unitary construction, power supply and controls and does not require field assembly. Bolt-on energy recovery units that require field assembly and section to section gasketing and sealing are not acceptable.

B. The energy recovery wheels supplied must meet the scheduled capacity and air pressure drop.

C. The wheel capacity, air pressure drop and effectiveness shall be AHRI certified per AHRI Standard 1060. Thermal performance shall be certified by the manufacturer in accordance with ASHRAE Standard 84, Method of Testing Air-to-Air Heat Exchangers and AHRI Standard 1060, Rating Air-to-Air Heat Exchangers For Energy Recovery Ventilation Equipment.

D. The rooftop unit shall be designed with a track so the entire energy recovery wheel cassette can slide out from the rooftop unit to facilitate cleaning.

E. The unit shall have 4" Merv 8 filters for the outdoor air before the wheel to help keep the wheel clean and reduce maintenance. A dirty filter switch and alarm shall be provided on the energy wheel filter rack.

F. The total energy recovery wheel shall have an aluminum or polymer substrate and a 3 angstrom desiccant and shall have an adjustible purge for field balancing.

G. A VFD shall be provided an modulated for wheel

capacity and frost prevention control by the unit controller.

H. A electric preheat coil with SCR control shall be provided and modulated to prevent frost on the energy recovery device. Provide sizing equivalent to the schedule.

I. The rooftop unit with the energy recovery wheel shall incorporate the economizer operation. Units with economizers and energy recovery wheels shall have a bypass damper. When the unit is in the economizer mode of operation the energy recovery wheel shall stop and the bypass dampers shall be opened. The outdoor air shall be drawn through the bypass dampers to reduce the pressure drop of the outdoor airstream.

2.21 Discharge and Return Plenum Options

A. A supply air discharge plenum shall be provided. The plenum section connection shall have a bottom, right, left, or top discharge opening consult the schedule and drawings for the final orientation.

2.22 Condensing Section

A. Units shall be provided with A2L refrigeration leak detection system (RDS).

1. RDS shall be factory wired to unit controller for leak detection shutdown and mitigation sequences.
2. RDS shall be factory wired to terminal strip and emergency output for field provided controller to initiate mitigation sequences.

B. (APPLICABLE TO HEAT PUMP MODELS) Outdoor coils shall have seamless copper tubes, mechanically bonded into aluminum plate-type fins. The fins shall have full drawn collars to completely cover the tubes. Each outdoor air coil shall be factory leak tested with high-pressure air under water.

C. All Units shall provide the Energy Efficiency specified EER and IEER per the schedule equipment or higher.

D. Condenser fans shall be direct drive, axial type designed for low tip speed and vertical air discharge. Fan blades shall be constructed of steel and riveted to a steel center hub. Condenser fan motors shall be heavy-duty, inherently protected, three-phase, non-reversing type with permanently lubricated ball bearing and integral rain shield.

E. Condenser coils shall be an all aluminum design, and mounted on polymer brackets, to minimize di-electric corrosion. The aluminum tube shall be a micro channel design with high efficiency aluminum fins. Fins shall be brazed to the tubing for a direct bond. Each condenser coil shall be factory leak tested with high-pressure air under water.

F. Condenser coils shall be protected from incidental contact to coil fins by a coil guard. Coil guard shall be constructed of cross wire welded steel with PVC coating.

G. Head Pressure Control

1. Units shall have at least one condenser fan per circuit to maintain positive head pressure and an ambient temperature based fan cycling control to provide mechancial cooling down to 50°F.
2. Units shall have at least one condenser fan per circuit to maintain positive head pressure and a pressure transducer feedback per circuit to provide mechancial cooling down to 50°F.
3. Units shall have at least one condenser fan per circuit to maintain positive head pressure and a VFD on each circuit to modulate condenser fans to provide mechancial cooling down to 25°F.
4. Units shall have at least one condenser fan per circuit to maintain positive head pressure and a VFD on each circuit to modulate condenser fans to provide mechancial cooling down to -10°F.
5. Units shall have at least one condenser fan controlled to maintain positive head pressure. SpeedTrol condenser fan speed control shall be added to the last fan OFF on each refrigeration circuit to provide cooling operation to ambient temperatures down to 0°F. Fan speed control shall be field adjustable.

F. Each unit shall have multiple, heavy-duty scroll compressors. Each compressor shall be complete with gauge ports, crankcase heater, sight-glass, anti-slug protection, motor overload protection and a time delay to prevent short cycling and simultaneous starting of compressors following a power failure. Compressors shall be isolated with resilient rubber isolators to decrease noise transmission.

H. Each unit shall have two independent refrigeration circuits for redundancy. Each circuit shall be complete with a low pressure control, filter-drier, liquid moisture indicator/sight-glass, electronic expansion valve, and a manual reset high pressure safety switch. The electronic expansion valve shall be capable of modulation from 100% to 25% of its rated capacity. Sight-glasses shall be accessible for viewing without disrupting unit operation. Each circuit shall be dehydrated and factory charged with Refrigerant R32 and oil.

I. Option for sizes 20-50 – Each unit shall have at least 4 compressor stages of cooling capacity control for better part load control as required by ASHRAE 90.1-2013.

2.23 Roof Curbs

A. A prefabricated 12-gauge galvanized steel, mounting curb, designed and manufactured by the unit manufacturer, shall be provided for field assembly on the roof decking prior to unit shipment. The roof curb shall be a full perimeter type with complete perimeter support of the air handling section and rail support of the condensing section. Supply and return opening duct frames shall be provided as part of the curb structure allowing duct connections to be made directly to the curb prior to unit arrival. The curb shall be a minimum of 20” high and include a nominal 2”×4” wood nailing strip. Gasket shall be provided for field mounting between the unit base and roof curb.

2.24 Controls

A. Each unit shall be equipped with a complete MicroTech microprocessor based control system. The unit control system shall include all required temperature and pressure sensors, input/output boards, main microprocessor and operator interface. All boards shall be individually replaceable for ease of service. All microprocessors, boards, and sensors shall be factory mounted, wired and tested.

B. The microprocessor shall be a stand-alone DDC controller not dependent on communications with any on-site or remote PC or master control panel. The microprocessor shall maintain existing set points and operate stand alone if the unit loses either direct connect or network communications. The microprocessor memory shall be protected from voltage fluctuations as well as any extended power failures. All factory and user set schedules and control points shall be maintained in nonvolatile memory. No settings shall be lost, even during extended power shutdowns.

C. The main microprocessor shall support an RS-232 direct connection to a product service tool or a modem. A communications module shall be provided for direct communication into the BAS network.

D. All digital inputs and outputs shall be protected against damage from transients or wrong voltages. Each digital input and digital output shall be equipped with an LED for ease of service. All field wiring shall be terminated at a separate, clearly marked terminal strip.

E. The microprocessor shall have a built-in time schedule. The schedule shall be programmable from the unit keypad interface. The schedule shall be maintained in nonvolatile memory to insure that it is not lost during a power failure. There shall be one start/stop per day and a separate holiday schedule. The controller shall accept up to sixteen holidays each with up to a 5-day duration. Each unit shall also have the ability to accept a time schedule via BAS network communications.

F. If the unit is to be programmed with a night setback or setup function, an optional space sensor shall be provided. Space sensors shall be available to support field selectable features. Sensor options shall include Zone sensor with tenant override switch, or Zone sensor with tenent override switch and heating/cooling set point adjustment.

2.25 Sorbent Ventilation

A. Indoor air quality performance shall be in compliance with ASHRAE 62.1-2016 and relevant addenda via the Indoor Air Quality Procedure (IAQP).

B. Air Cleaning Solution and Mechanism shall be fully compliant with ASHRAE Standard for Gas Phase Filtration: ASHRAE Standard 145.2 – 2011.

C. Air Cleaning Solution shall be certified as zero-byproduct emitting by 3rd Party Certified Lab. Zero-byproduct certification letter required to be submitted to Engineer of Record and equipment Owner and/or Operator.

D. Mechanism for air cleaning shall be capture and release; air cleaning solution alternates shall not alter the chemistry or composition of airborne gaseous substances. Alternate air-manipulative or catalytic type cleaners shall not be approved (i.e. plasma cleaners, ionizers, etc.).

E. Solution shall not emit Ozone and/or Reactive Oxygen Species (ROS) of any kind; processes and mechanisms that emit ozone/ROS or have the potential to emit ozone or ROS are not acceptable.

F. Solution shall have the capability to be automatically regenerated (self-cleaned) in-situ; replacement of cleaning mechanism or sorbent media shall not be required more than once per year.

G. Gas-phase cleaning efficiencies must meet the following minimums for single-pass air cleaning of the following contaminants of concern:1, Carbon Dioxide to have a measured standard challenge concentration of 1000 ppb, with a cartride efficiency of 57%.2. Formaldehyde to have a measured standard challenge concentration of 121 ppb, with a cartride efficiency of 55%.

H. Cartridge Bank: The cartridge bank shall house twelve (12) quantity cartridges that contain the sorbents used to capture molecular level contaminants (CO2, formaldehyde, VOCs, ozone, etc. as defined by ASHRAE Standard 62.1-2016) during the sorption (cleaning) process and then released during the regeneration (airflow purge or exhaust) process.

I. Heater: An integrated heater shall raise the internal temperature of the unit to initiate the release of captured contaminants by molecular thermal excitation. The heater shall be controlled using a PID controller loop to maintain the internal temperature. Temperature control shall be an on-board software-based function. Controller shall contain 3-modes of safety protection with respect to heater control that are mechanical in nature to ensure safe operation:1. An airflow switch that ensures the heater is disabled when there is insufficient airflow inside the unit.2. A resettable thermal switch shall disconnect the heater when the temperature exceeds a preset limit and will only allow the heater to operate once a safe temperature has been reached.3. A one-time blow fuse shall permanently disconnect the heater in the event the two primary safety functions fail to work.

J. Fans: Integrated DC brushless motor driven fans shall control airflow through the unit during the adsorption and regeneration cycles. The fans are controlled using pulse width modulation for variable speed and are safety listed. The fan motors shall contain on-board locked rotor protection to prevent damage to the unit in the event of motor failure or the fan becomes blocked or locked in position.

K. Inlets & Outlets: The module shall include airflow damper inlets and airflow damper outlets controlled and modulated by mechanical actuator assemblies.

L. Internal Damper: An internal shunt damper shall be used during the regeneration cycle to enable the system to reach and maintain optimal temperature using airflow recirculation and mixing. The internal damper shall be controlled by an actuator allowing for analog position control to actively modulate the amount of recirculation during the regeneration.

M. Control Board: The electronic enclosure shall contain both the power supply and main controller board. The power supply converts the incoming AC power to all voltages required to operate all aspects of the unit including actuators, heater, fans, and sensors. The controller contains the systems software, all controls/ relays/sensor interfaces, and all wireless and wired communication modules.

N. Insulation: All internal surfaces of the unit shall be covered in heat-reflective insulation material for improved efficiency and soundproofing. All outdoor-rated and weatherized equipment modules shall contain between-the-wall pressed insulation to maintain thermal efficiency.

O. Outdoor-rated equipment modules shall have galvanized steel double-walled construction with 1000-hr salt spray rated power-coated paint. Indoor-based equipment modules are excluded from this specification.

P. Power Requirements: The unit shall be designed to work with single-phase AC power and should accommodate a range of line voltages and frequencies. Rated incoming line-voltage shall be 208-277V/ single phase at 60/50 Hz frequencies.

Q. Airflow: Module airflow performance shall be based on no more than 0.2” w.g. of external static pressure. Maximum airflow shall not exceed 1000 CFM of cleaning capacity with a design nominal airflow of 800 CFM per single unit. Regeneration Cycle design maximum airflow shall not exceed 500 CFM of exhaust capacity with a design nominal airflow of 300 CFM per single unit.

2.26 Warranty

A. The manufacturer shall provide 12 month parts only warranty. Defective parts will be repaired or replaced during the warranty period at no charge. The warranty period shall commence at start up, or 6 months after shipment, which ever occurs first.

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