AH Series with Heat Wheel, Heating Water Coil, Cooling Water Coil or Packaged Cooling, Supply & Exhaust Air

Series ECW Energy Conservation Wheel …..…………………………………..…..E-1

Quick Select (Units w/Heat Wheel, Heating/Cooling Water Coils, Supply and Exhaust Blower) ……………………………………………………………………...…E-6

Quick Select (Units w/Heat Wheel, Heating/Cooling Water Coils, Supply and Exhaust Blower. (Vertical))……………………...……………………………………...…E-7

Quick Select (Outdoor Air Handling Units w/Heat Wheel, HeatingWater Coils, Packaged DX Cooling, Supply and Exhaust Blower) …….……………………….………...…E-8

Units w/Heat Wheel, Heating/Cooling Water Coils, Supply and Exhaust Blower (2000~21000 cfm) ……………………………………………………………...…E-9

Units w/Heat Wheel, Heating/Cooling Water Coils, Supply and Exhaust Blower (Vertical, 2000~21000 cfm) …………………….…………………………………...…E-16

Outdoor Air Handling Units w/Heat Wheel, Heating Water Coils, Packaged DX Cooling, Supply and Exhaust Blower (2000~21000 cfm) …….…………………………....…E-23

Typical Specifications…………………………………………………...….…..E-33

Custom Units with Heat Wheel…..……………………………………...….…..E-39

SERIES ECW
Energy Conservation Wheel

Energy Efficient Ventilation

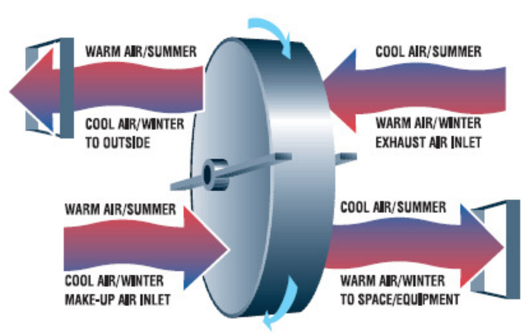
Energy Conservation Wheel (ECW) is a rotary counter flow air-to-air exchanger designed to provide maximum energy efficiency in ventilated systems where heated or cooled air is exhausted and outdoor air is introduced as makeup. In applications where ventilation is required, energy wheels are used to reduce the initial investment in HVAC equipment and minimize operating costs. Since HVAC equipment is typically the largest single source of energy consumption in residential and commercial buildings, ECW investments are economically justified on most new and retrofit HVAC systems with 15% or more outdoor air makeup. In new HVAC installations, ECWs also allow ventilated systems to be sized with smaller compressors, condensers, and other DX components, lowering the first cost of the HVAC package.

- Improves indoor air quality
- Reduces the ventilation energy penalty
- Transfers both latent and sensible energy
- Lowers operating costs
- Lowers first costs on new installations
- Both winter and summer energy savings

Improve Indoor Air Quality

Ventilation accomplishes several objectives:
- It purges the conditioned space of unwanted pollutants such as organic vapors, dust, radon, and etc.
- It purges the space of unwanted products of human activity such as tobacco smoke, carbon dioxide, bacteria, and germs.

Poor indoor air quality has been directly associated with the "sick building syndrome", a condition that can result in high illness rates, absenteeism, and productivity decreases. Consequently, design engineers are becoming increasingly aware of the need to design proper air quality into HVAC systems.
The ASHRAE Standard 62-1989 (Ventilation for Acceptable Indoor Air Quality), describes a recommended target ratio of makeup air to return air for a variety of application and building types. Building codes in the World are becoming increasingly more comprehensive in addressing ventilation requirement. Architects and engineers are, with increasing frequency, including greater amounts of fresh air makeup in their HVAC systems, and are doing so without a significant energy penalty by including exhaust air energy recovery.
The ECW Series is designed to provide for all season ventilation, providing acceptable IAQ year-round, normally without the expense of additional HVAC-direct expansion capacity and with minimal extra costs.



ECW Features and Benefits

ECWs are constructed of unique corrugated synthetic fibe-based media impregnated with a non-migrating water selective molecular sieve desiccant. The fiber and desiccant, intimately bound together in the process, form sheets with excellent heat and mass transfer properties which are corrugated and spirally wound into wheels. Unlike other media, the desiccant is uniformly and permanently dispersed throughout the matrix structure in contrast to being coated, bonded, or synthesized onto the matrix, and thus is not susceptible to delamination or erosion of the desiccant material.

- Homogenous media – not coated or bonded will not delaminate
- Synthetic wheel media is completely corrosion resistant
- Synthetic wheel media maximizes desiccant loading
- Unitary wheel construction maximizes face flatness
- Fluted geometry minimizes internal cross leakage
- Molecular sieve desiccant reduces cross contamination
- Wheel is completely water washable
- ECWs offered in 4" or 6" deep wheels for single unit air volumes of 500-45,000cfm
- Tough wheel face resists damage

ECW Cassettes

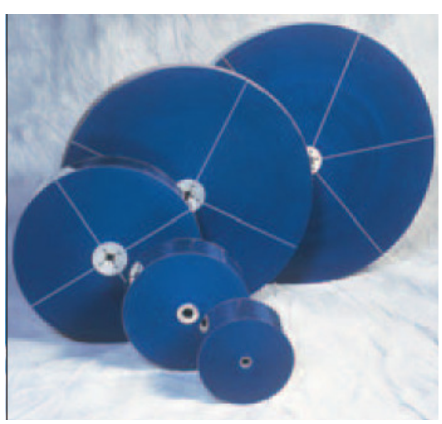
- Heavy duty galvanized steel construction with removable side panels
- No-maintenance bearings standard on small cassettes
- Flanged outboard bearings used on larger cassettes
- Full contact brush seals minimize leakage
- Adjustable purge section reduces cross contamination
- AC drive motor with Power Twist link belt

Performance Certification

ECWs are UL tested and are a UL recognized component for heat recovery ventilators and other HVAC equipment.
ECWs are ARI certified using the 84-1991 ASHARE standard (Method of Testing rotary Air-to-Air Heat Exchangers) and ARI Standard 1060 (Rating Air-to-Air Energy Recovery Equipment).

Frost Protection

During extremely cold winter time conditions, frost formation becomes a possibility in the exhaust air stream. Frost formation on the wheel will basically act to plug or reduce air flow but will not hurt the wheel itself.
In practice several types of frost prevention are employed: heating return air, heating outdoor air, variable speed control, and air bypass. It is generally recommended preheating outdoor air to keep exhaust air from freezing. Wheel speed control works to limit frost formation by reducing wheel performance to a level where the exhaust air temperature is kept above the dew point.



ECW Selection and Calculations

ECW Selection

The following example show the basic concepts for selecting ECWs for a balanced system (Air Ratio=1.0). For calculations using unbalanced Air Ratios (>1.0), please refer to the factory's software program or contact the factory for assistance.

I. Example:

Design parameters: outdoor: 4500 cfm, 95°F dry bulb, 75° wet bulb, 99 grains (0.0142$lb_{moisture}/lb_{dry\ air}$)

return: 4500 cfm, 75°F dry bulb, 62.5° wet bulb, 64 grains (0.00914$lb_{moisture}/lb_{dry\ air}$)

Air Ratio (A.R.): 1.0, balanced flow.

A selection can be made as follows:

Size Determination:
If unit size is a limitation in your package, first refer to the Engineering Detail Table at the back of the brochure to identify the appropriate cassette size for your application.

For the purpose of this example, let's assume that you choose an ECW544. At 4,500 cfm, from the plot featuring the model numbers, going down vertically along the line of constant face velocity yields resulting pressure drop (here: .96 inches of water). Since both supply and return flows are equal, refer to the plot immediately above the model number plot along the same face velocity vertical line to read directly the latent, total and sensible effectivenesses for the model wanted. In the present case:

latent effectiveness: 71.5%
total effectiveness: 73.5%
sensible effectiveness: 75.2%

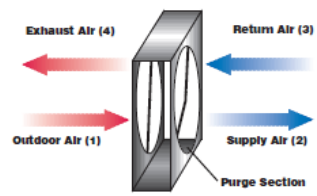
II. Exact Determination of Supply and Exhaust Air Conditions:

This section shows how a detailed picture of all incoming and outgoing flows can be derived from the examples above. The effectivenesses shown in our plots are accurately described by the following equations:

$$\varepsilon = \frac{\dot{m}_e}{\dot{m}_{min}} \frac{X_4 - X_3}{X_1 - X_3} \qquad \varepsilon = \frac{\dot{m}_s}{\dot{m}_{min}} \frac{X_1 - X_2}{X_1 - X_3}$$

Where:

ε = sensible, latent, or total heat effectiveness;
X = dry bulb temperature for sensible effectiveness, humidity ratio for latent effectiveness, total enthalpy for total effectiveness;
$\dot{m}_e$ = mass flow rate of the exhaust, mass of dry air per unit time;
$\dot{m}_s$ = mass flow rate of the supply, mass of dry air per unit time;
$\dot{m}_{min}$ = minimum value of either mass flow rate;



Going back to the above Example, we can calculate the supply air conditions. The dry bulb temperature is assessed by using the sensible effectiveness:

$$T_2 = \frac{\dot{m}_{min}}{\dot{m}_s} \varepsilon (T_3 - T_1) + T_1$$

$$= \frac{4500}{4500} 0.752\ (75 - 95) + 95$$

$$= 80.0$$

Similarly, the humidity of the supply air flow is calculated using the latent effectiveness:

The supply conditions are therefore completely defined as:

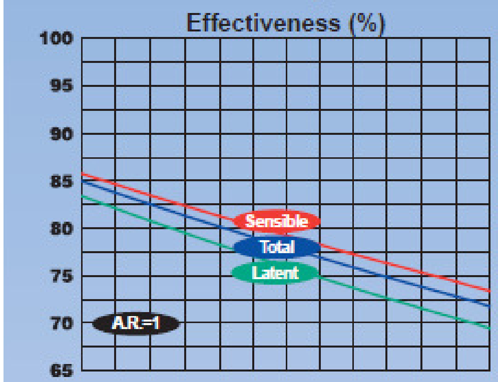
$$W_2 = \frac{\dot{m}_{min}}{\dot{m}_s} \varepsilon (W_3 - W_1) + W_1$$

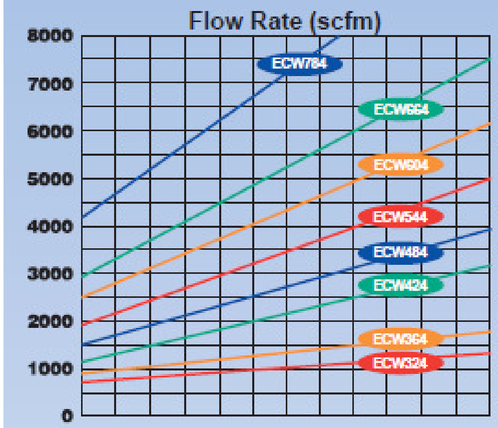
$$= \frac{4500}{4500} 0.715\ (64 - 99) + 99$$

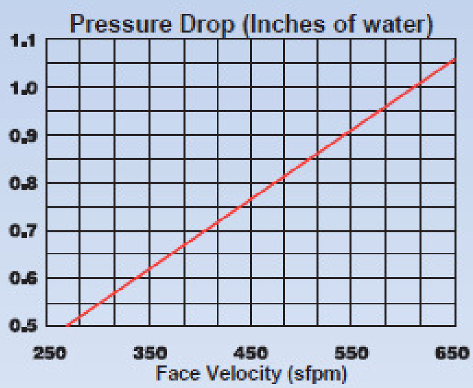
$$= 74.0$$

Dry bulb temperature: 80.0°F
Humidity: 74 grains of moisture per pound of dry air

4" Depth







LEAKAGE AND EXHAUST AIR TRANSFER

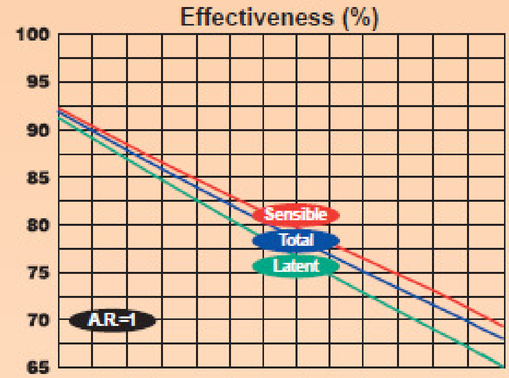
Exhaust Air Transfer Ratio (All Models)

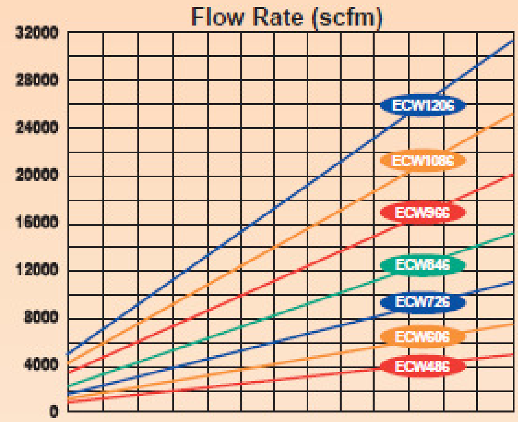
Pressure Differential	0.0"	0.5"	3.0"
EATR	4.0%	0.1%	0.0%

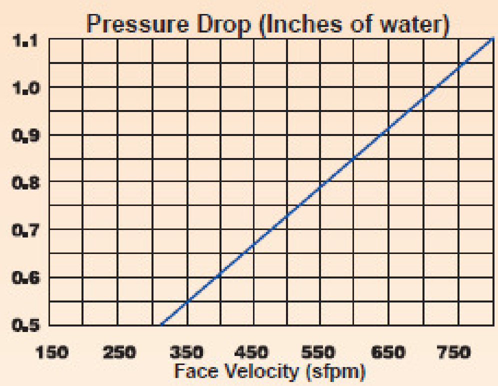
Leakage-Outdoor Air Correction Factor (OACF)

	0.0"	0.5"	3.0"
ECW 324	1.04	1.08	1.21
ECW 364	1.04	1.07	1.18
ECW 424	1.04	1.06	1.16
ECW 484	1.03	1.05	1.14
ECW 544	1.03	1.05	1.12
ECW 604	1.02	1.04	1.10
ECW 664	1.02	1.03	1.09
ECW 784	1.01	1.03	1.07

6" Depth







LEAKAGE AND EXHAUST AIR TRANSFER

Exhaust Air Transfer Ratio (All Models)

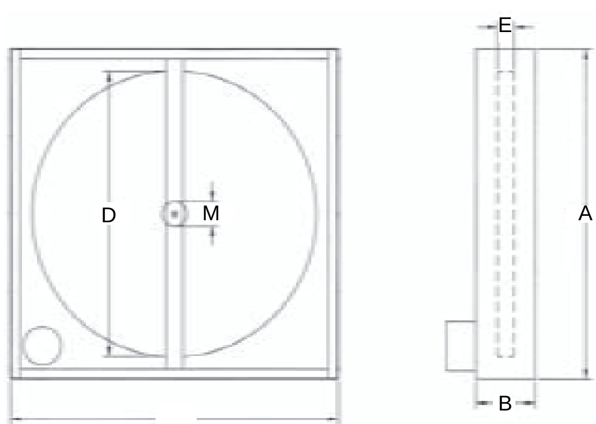
Pressure Differential	0.0"	0.5"	3.0"
EATR	4.0%	0.1%	0.0%

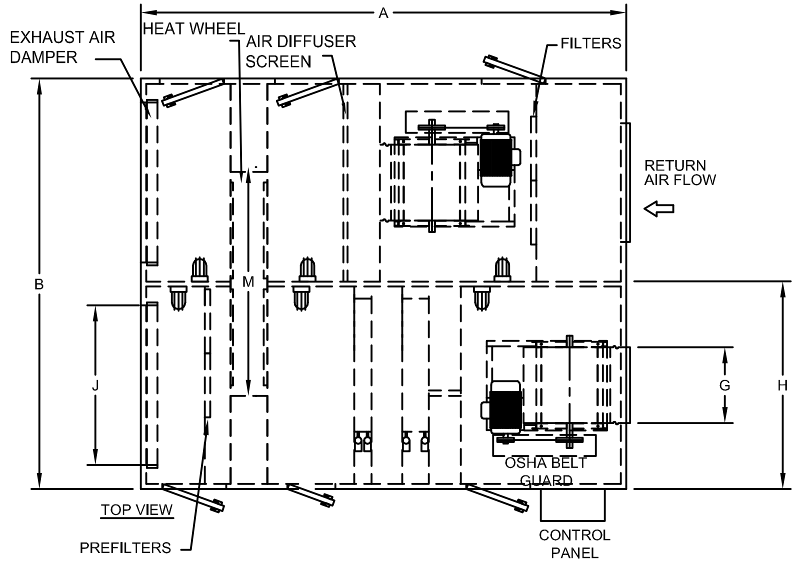
Leakage-Outdoor Air Correction Factor (OACF)

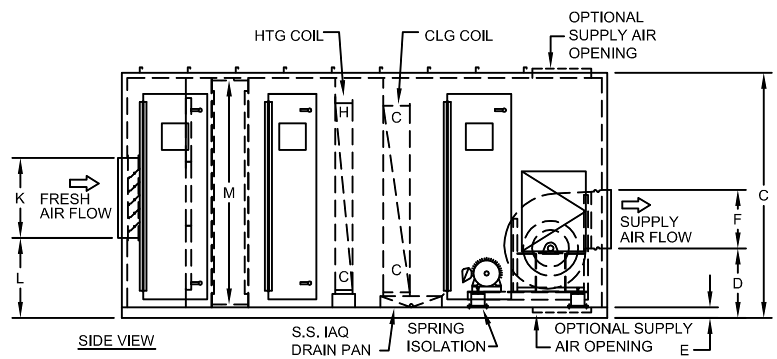
	0.0"	0.5"	3.0"
ECW 486	1.04	1.05	1.14
ECW 606	1.02	1.04	1.10
ECW 726	1.02	1.03	1.08
ECW 846	1.02	1.03	1.07
ECW 966	1.01	1.02	1.05
ECW 1086	1.00	1.01	1.04
ECW 1206	1.00	1.01	1.03

Engineering Detail

NTL Model No.	Flow Rate (scfm)	Wheel Diameter D (inches)	Wheel Depth E (inches)	Cassette Height/Width A (inches)	Cassette Depth B (inches)	Approx. Total Wt. (pounds)	Drive Motor (Hp)
ECW204	600	20	4	23	7	40	1 / 20
ECW244	900	24	4	27	7	70	1 / 20
ECW324	1500	32	4	39	7	160	1 / 2
ECW364	2000	36	4	42	7	190	1 / 2
ECW424	3000	42	4	48	7	200	1 / 2
ECW484	4000	48	4	54	8	270	1 / 2
ECW544	5000	54	4	60	8	320	3 / 4
ECW486	5000	48	6	54	10	310	1 / 2
ECW604	6000	60	4	66	8	440	3 / 4
ECW546	6000	54	6	60	10	350	3 / 4
ECW664	7500	66	4	72	9	540	1
ECW606	7500	60	6	66	10	540	3 / 4
ECW724	9500	72	4	78	9	670	1
ECW666	9500	66	6	72	11	630	1
ECW784	11000	78	4	84	9.5	720	1
ECW726	11000	72	6	78	11	700	1
ECW844	13000	84	4	90	9.5	810	1
ECW786	13000	78	6	84	12	880	1
ECW846	15000	84	6	90	12	1050	1
ECW906	17500	90	6	96	12	1130	1 1/2
ECW966	20000	96	6	102	12	1400	1 1/2
ECW1026	22500	102	6	108	12	1630	1 1/2
ECW1086	25000	108	6	116	15	2200	2
ECW1206	30000	120	6	129	15	2750	2
ECW1326	37500	132	6	140	15	3070	2
ECW13212	40000	132	12	140	21	3830	2
ECW14412	50000	144	12	153	21	4400	2







NOTES:
1. 1 1/2 INLET AND DISCHARGE DUCT FLANGES
2. SERVICE ACCESS PANELS MUST NOT BE
OBSTRUCTED RECOMMENDED CLEARANCE 24 INCHES.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

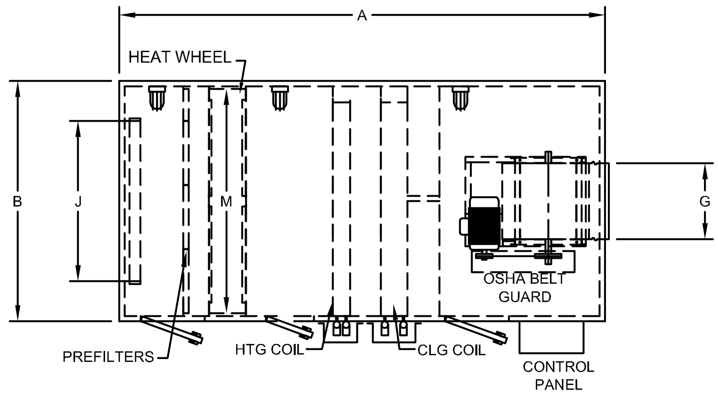
MODEL	CFM	A	B	C	D	E	F	G	H	K	L	M	HTG COIL QTY/SIZE	CLG COIL QTY/SIZE	F/A PREFILTER QTY/SIZEX2"	R/A FILTER QTY/SIZEX2"	CONTROL PANEL SIZE
AH–20–EW	2000	167	74	50	19–1/2	4	14	18	38	20	17	42	1–36x25	1–36x25	4–16x20	4–16x20	24x12
AH–60–EW	6000	174	106	74	22	4	16	22	54	25	24	66	1–32x55	1–32x55	6–20x20	6–20x20	24x24
AH–80–EW	8000	181	130	80	25	4	19	26	66	30	30	72	1–42x70	1–42x70	6–24x24	6–24x24	24x24
AH–120–EW	12000	182	154	92	26	4	22	28–1/2	78	30	30	84	1–44x80	1–44x80	6–24x24,2–24x12	6–24x24,2–24x12	24x30
AH–150–EW	15000	188	154	98	28	4	24	32	78	30	30	90	1–50x89	2–25.5x89	6–24x24,2–24x12	6–24x24,2–24x12	24x30
AH–180–EW	18000	202	154	104	32	4	29	38–1/2	78	40	36	96	1–60x90	2–29x90	12–20x24	12–20x24	24x30
AH–210–EW	21000	209	178	110	35	4	32	43	90	40	36	102	1–62x98	2–31x98	8–24x24,4–24x12	8–24x24,4–24x12	24x30

Rev	By	Revision Description	Date

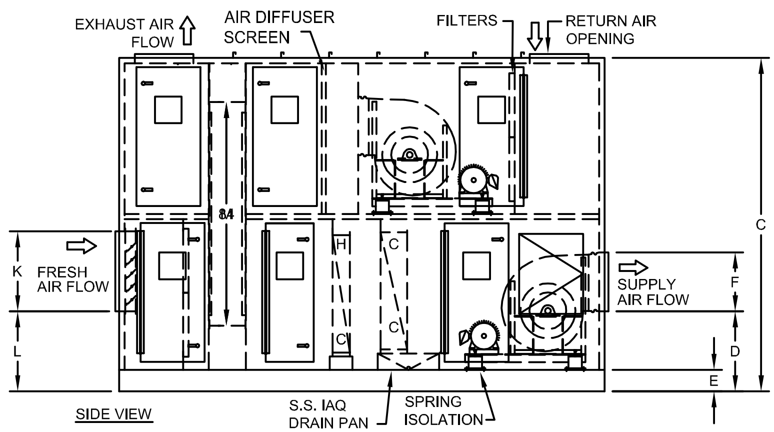
WESTERN
SALES

TITLE
CONVERTIBLE WET AIR HANDLING UNIT
w/ HEAT WHEEL, HEATING/COOLING WATER COILS
BLOWER w/ MOTOR (SUPPLY & EXHAUST)
MODEL: AH-EW

DRAWN BY	ISSUED BY	SCALE 1/6"=1'	DRW. NO.	
CHK. BY	DATE		JOB NO.	PAGE E-6



TOP VIEW (LOWER LEVEL)



SIDE VIEW

NOTES:
1. 1 1/2 INLET AND DISCHARGE DUCT FLANGES
2. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED RECOMMENDED CLEARANCE 24 INCHES.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES. FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

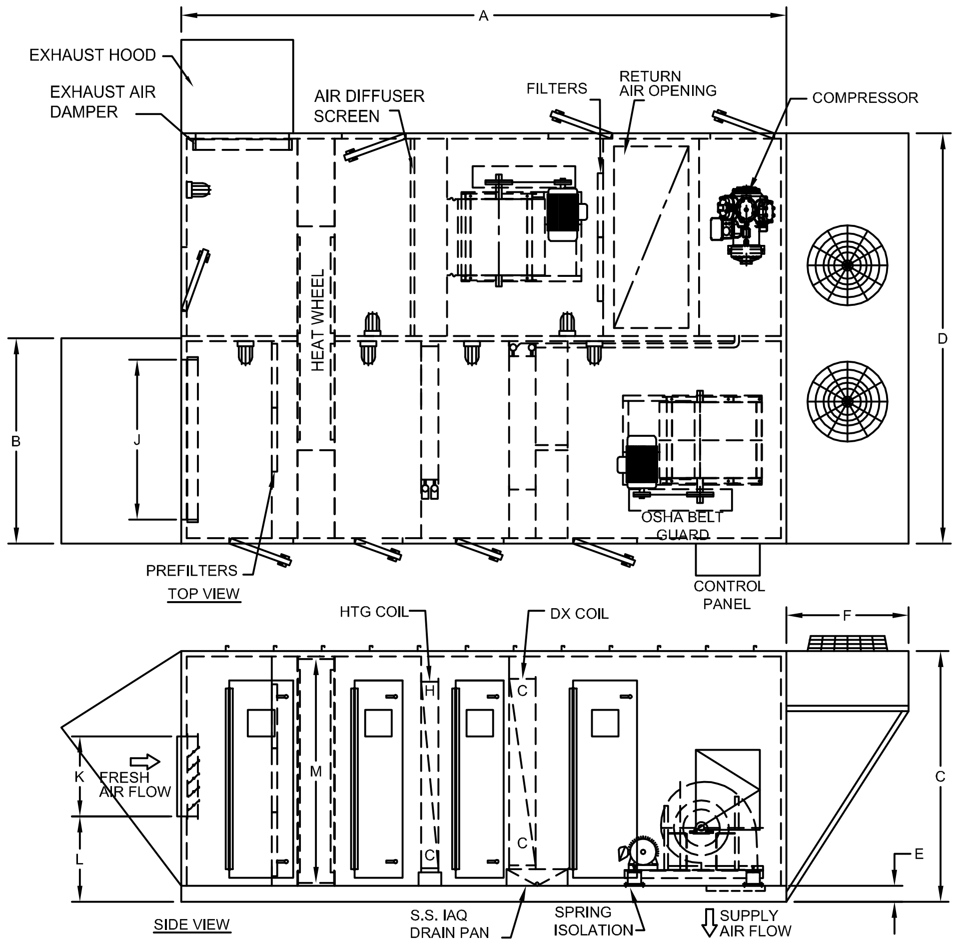
MODEL	CFM	A	B	C	D	E	F	G	K	L	M	HTG COIL QTY/SIZE	CLG COIL QTY/SIZE	F/A PREFILTER QTY/SIZEX2"	R/A FILTER QTY/SIZEX2"	CONTROL PANEL SIZE
AH-20-EW	2000	167	48	85	19-1/2	4	14	18	20	15	42	1-26x35	1-26x35	2-24x20,2-12x20	2-24x20,2-12x20	24x12
AH-60-EW	6000	174	72	106	24	6	16	22	25	24	66	1-32x55	1-32x55	6-20x20	6-20x20	24x24
AH-80-EW	8000	181	78	115	29	8	19	26	30	25	72	1-42x70	1-42x70	6-24x24	6-24x24	24x24
AH-120-EW	12000	182	90	125	30	8	22	28-1/2	30	30	84	1-44x80	1-44x80	6-24x24,2-24x12	6-24x24,2-24x12	24x30
AH-150-EW	15000	188	96	130	32	8	24	32	30	30	90	1-50x89	2-25.5x89	6-24x24,2-24x12	6-24x24,2-24x12	24x30
AH-180-EW	18000	202	102	150	36	8	29	38-1/2	40	30	96	1-60x90	2-29x90	12-20x24	12-20x24	24x30
AH-210-EW	21000	209	108	160	39	8	32	43	40	35	102	1-62x98	2-31x98	8-24x24,4-24x12	8-24x24,4-24x12	24x30

Rev	By	Revision Description	Date

WESTERN SALES

TITLE
CONVERTIBLE WET AIR HANDLING UNIT
w/ HEAT WHEEL, HEATING/COOLING WATER COILS
BLOWER w/ MOTOR (SUPPLY & EXHAUST)
MODEL: AH-EW (VERTICAL)

DRAWN BY	ISSUED BY	SCALE 1/6"=1'	DRW. NO.	
CHK. BY	DATE		JOB NO.	PAGE E-7



NOTES:

1. 1 1/2 INLET AND DISCHARGE DUCT FLANGES
2. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED RECOMMENDED CLEARANCE 24 INCHES.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES. FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

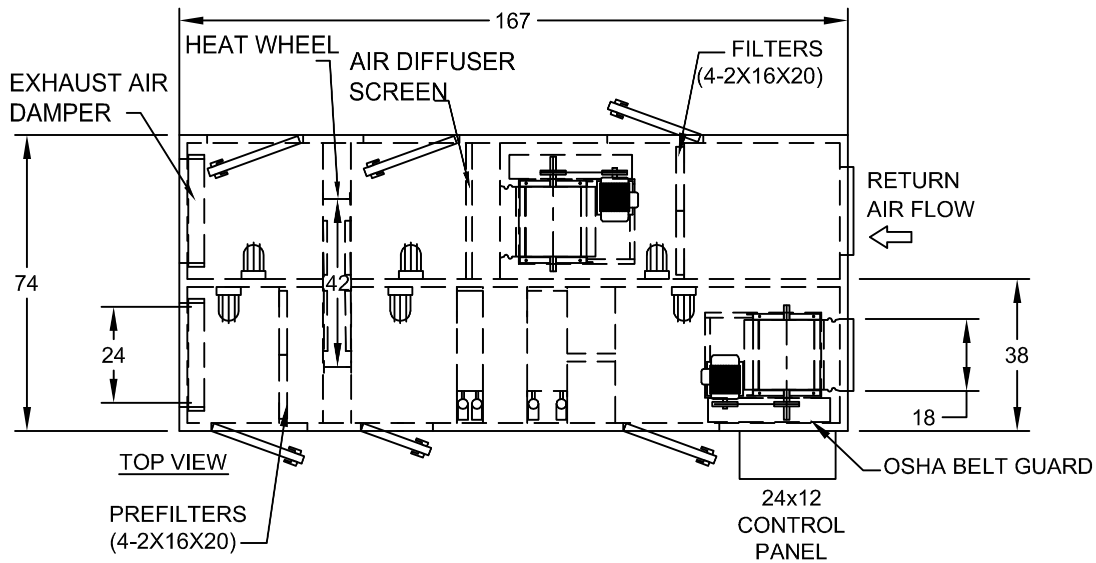
MODEL	CFM	A	B	C	D	E	F	J	K	L	M	HTG COIL QTY/SIZE	DX COIL QTY/SIZE	F/A PREFILTER QTY/SIZEX2"	R/A FILTER QTY/SIZEX2"	CONTROL PANEL SIZE
AH-20-EW-DX05	2000	183	37	50	74	4	30-5/8	24	20	17	42	1-36x25	1-36x25	4-16x20	4-16x20	24x12
AH-60-EW-DX10	6000	189	53	76	106	6	30-5/8	40	25	26	66	1-51x38	1-46x38	6-20x20	6-20x20	24x24
AH-80-EW-DX20	8000	206	65	82	130	6	45-7/8	42	30	22	72	1-64x45	1-64x45	6-24x24	6-24x24	24x24
AH-120-EW-DX30	12000	227	77	94	154	6	45-7/8	60	30	32	84	1-70x50	1-70x50	6-24x24,2-24x12	6-24x24,2-24x12	24x30
AH-150-EW-DX40	15000	231	77	100	154	6	60	60	30	32	90	1-70x63	2-35x59	6-24x24,2-24x12	6-24x24,2-24x12	24x30
AH-180-EW-DX45	18000	254	77	76	154	6	60	60	40	38	96	1-83x63	2-40.5x58	12-20x24	12-20x24	24x30
AH-210-EW-DX50	21000	269	89	76	178	6	60	72	40	38	102	1-85x75	2-41.5x70	8-24x24,4-24x12	8-24x24,4-24x12	24x30

Rev	By	Revision Description	Date

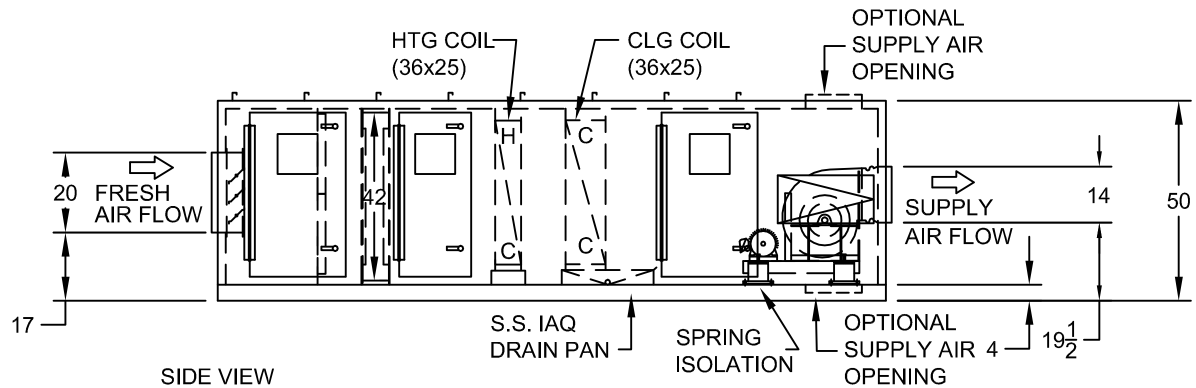
ICG WESTERN SALES

TITLE
OUTDOOR AIR HANDLING UNIT
w/ HEAT WHEEL, HEATING WATER COIL & PACKAGED COOLING, BLOWER c/w MOTOR (SUPPLY & EXHAUST), MODEL: AH-EW-DX

DRAWN BY	ISSUED BY	SCALE	DRW. NO.
		1/6"=1'	
CHK. BY	DATE	JOB NO.	PAGE
			E-8



TOP VIEW



SIDE VIEW

NOTES:

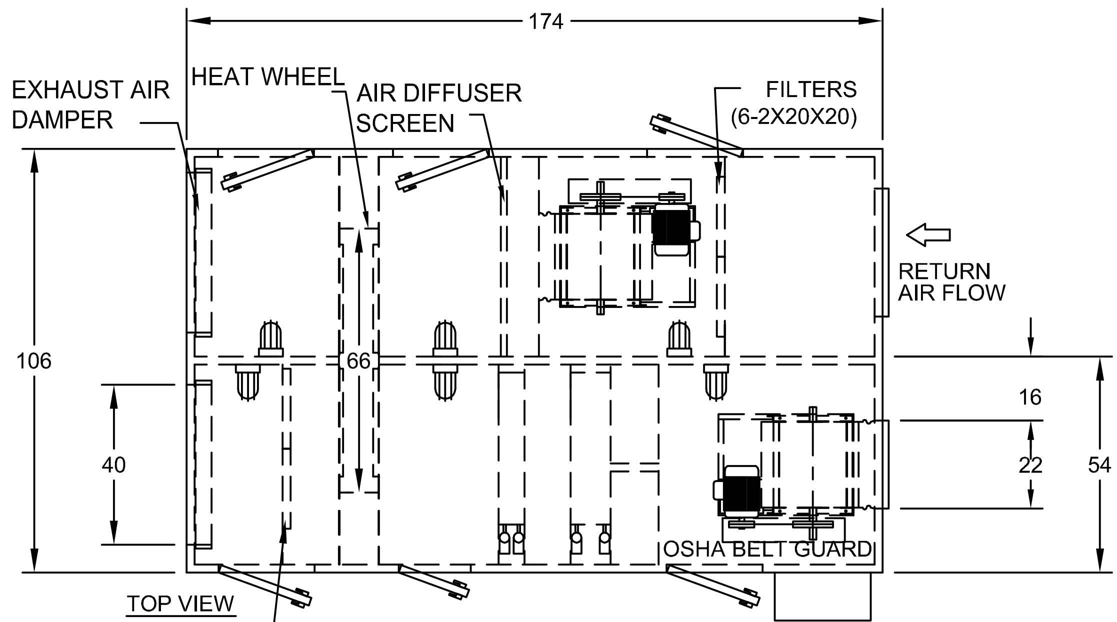
1. 1 1/2 INLET AND DISCHARGE DUCT FLANGES
2. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED RECOMMENDED CLEARANCE 24 INCHES.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES. FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

Rev	By	Revision Description	Date

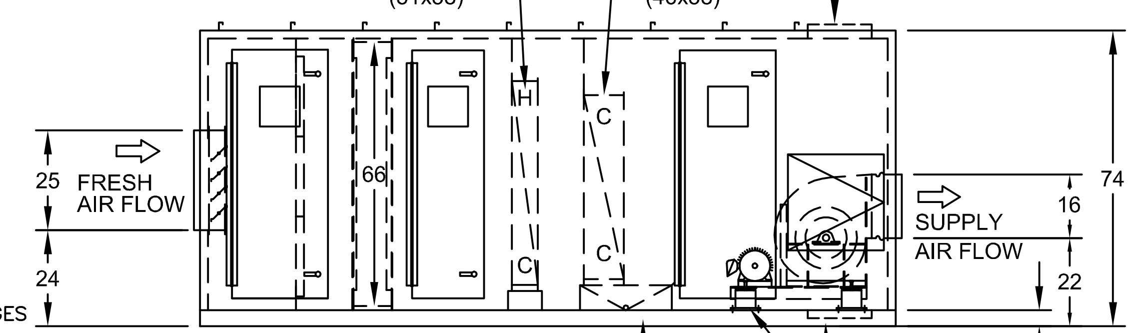
ICE WESTERN SALES

TITLE
2,000CFM CONVERTIBLE WET AIR HANDLING UNIT
W/ HEAT WHEEL, HEATING/COOLING WATER COILS
12" BI DWDI FAN c/w 2HP MOTOR (SUPPLY & EXHAUST)
MODEL: AH-20-EW

DRAWN BY	ISSUED BY	SCALE 1/4"=1'	DRW. NO.	
CHK. BY	DATE		JOB NO.	PAGE E-9



TOP VIEW



SIDE VIEW

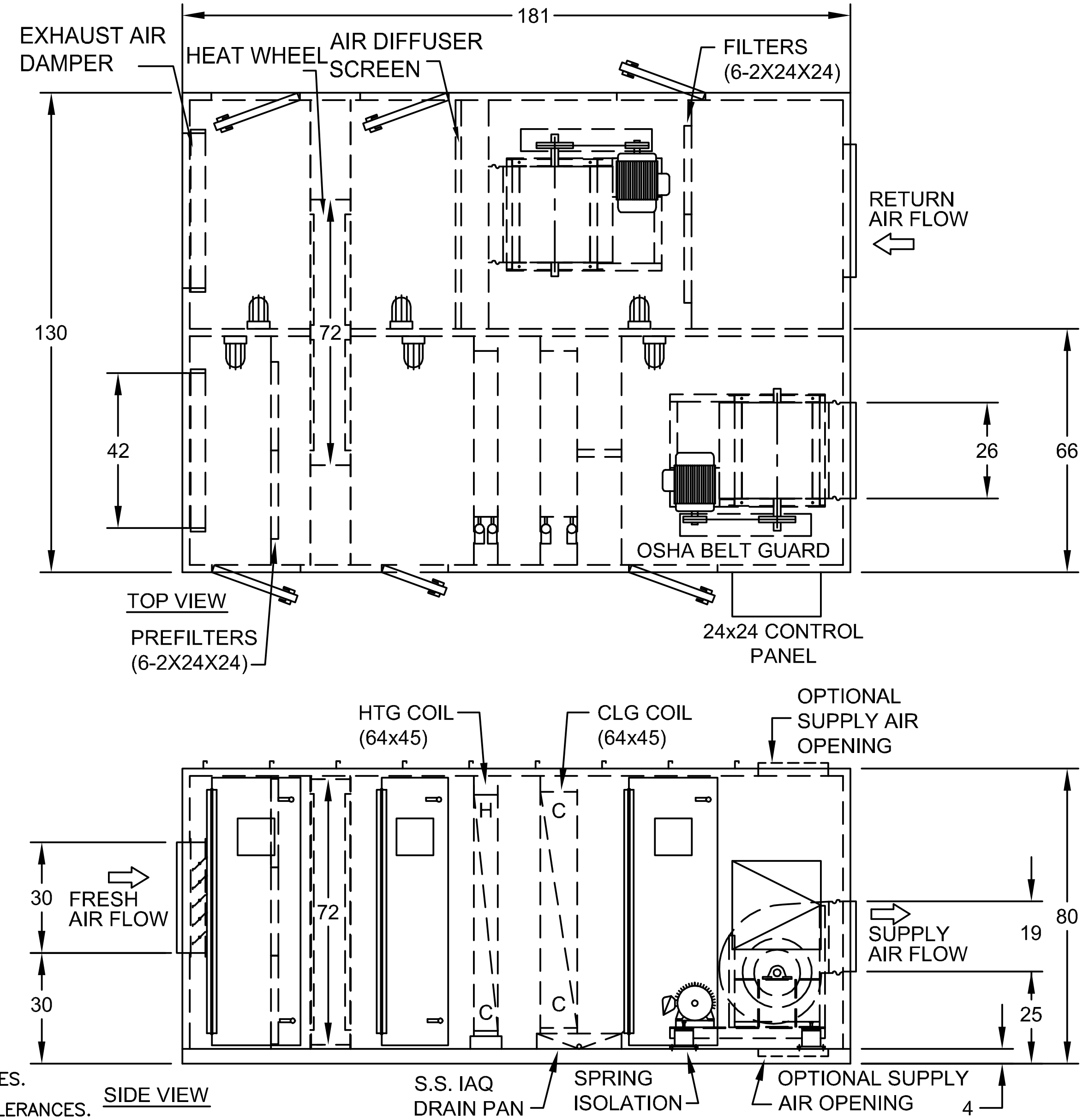
NOTES:

1. 1 1/2 INLET AND DISCHARGE DUCT FLANGES
2. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED RECOMMENDED CLEARANCE 24 INCHES.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES. FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

Rev	By	Revision Description	Date

ICE WESTERN SALES

TITLE 6,000CFM CONVERTIBLE WET AIR HANDLING UNIT w/ HEAT WHEEL, HEATING/COOLING WATER COILS 15" BI DWDI FAN c/w 5HP MOTOR (SUPPLY & EXHAUST) MODEL: AH-60-EW				
DRAWN BY	ISSUED BY	SCALE 1/4"=1'	DRW. NO.	
CHK. BY	DATE		JOB NO.	PAGE E-10



NOTES:

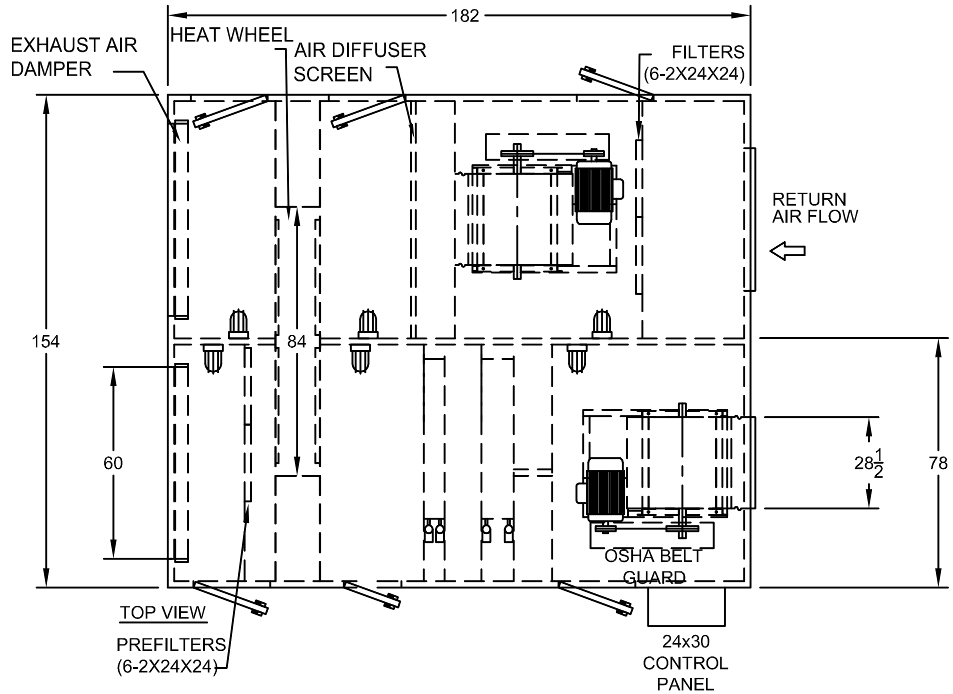
1. 1 1/2 INLET AND DISCHARGE DUCT FLANGES
2. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED RECOMMENDED CLEARANCE 24 INCHES.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES. FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

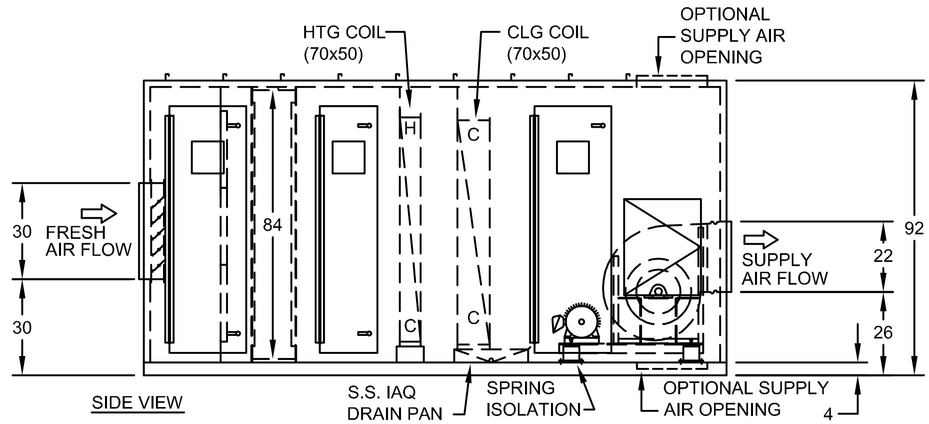
Rev	By	Revision Description	Date

ICE WESTERN SALES

TITLE
8,000CFM CONVERTIBLE WET AIR HANDLING UNIT
w/ HEAT WHEEL, HEATING/COOLING WATER COILS
18" BI DWDI FAN c/w 10HP MOTOR (SUPPLY & EXHAUST)
MODEL: AH-80-EW

DRAWN BY	ISSUED BY	SCALE	DRW. NO.	
		1/4"=1'		
CHK. BY	DATE		JOB NO.	PAGE E-11





NOTES:

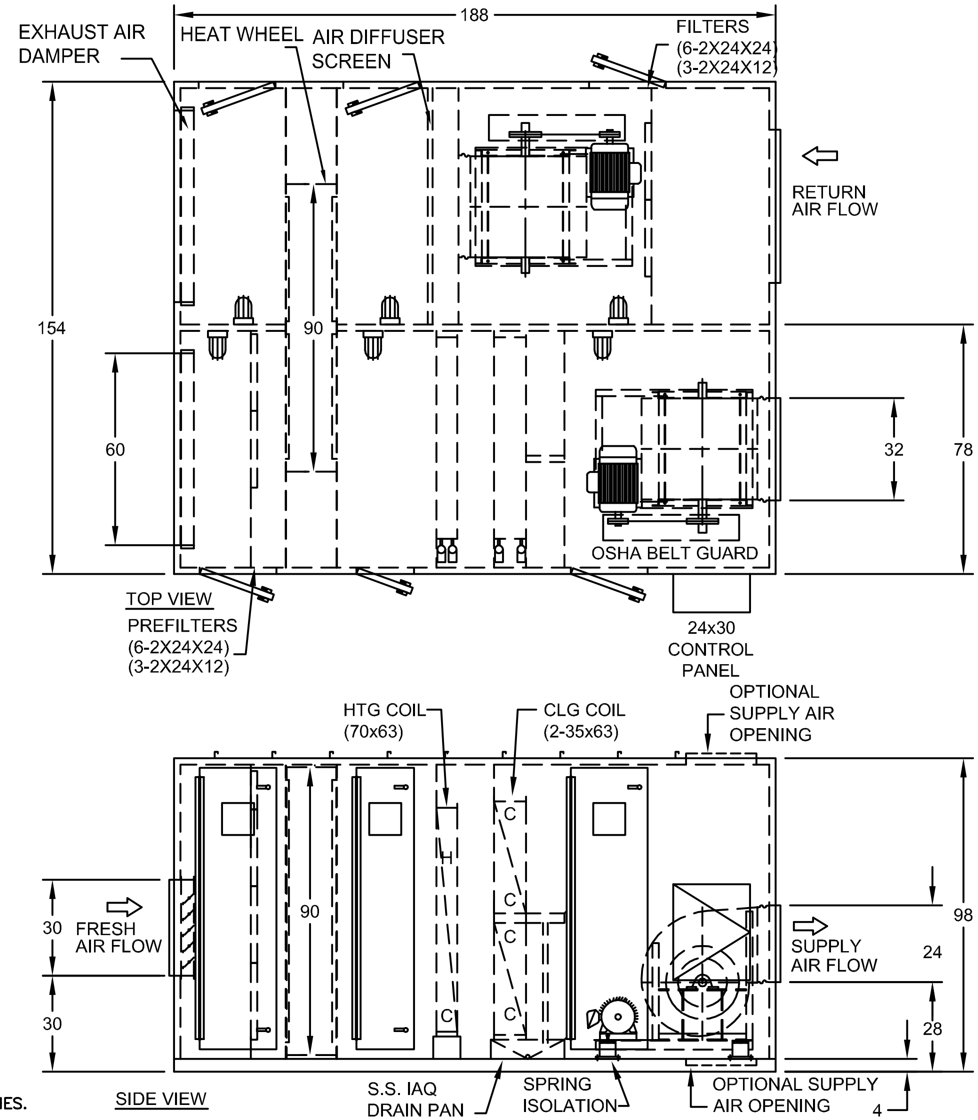
1. 1 1/2 INLET AND DISCHARGE DUCT FLANGES
2. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED RECOMMENDED CLEARANCE 24 INCHES.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES. FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

Rev	By	Revision Description	Date

ICG WESTERN SALES

TITLE
12,000CFM CONVERTIBLE WET AIR HANDLING UNIT
w/ HEAT WHEEL, HEATING/COOLING WATER COILS
20" BI DWDI FAN c/w 15HP MOTOR (SUPPLY & EXHAUST)
MODEL: AH-120-EW

DRAWN BY	ISSUED BY	SCALE 1/5"=1'	DRW. NO.	
CHK. BY	DATE		JOB NO.	PAGE E-12



NOTES:

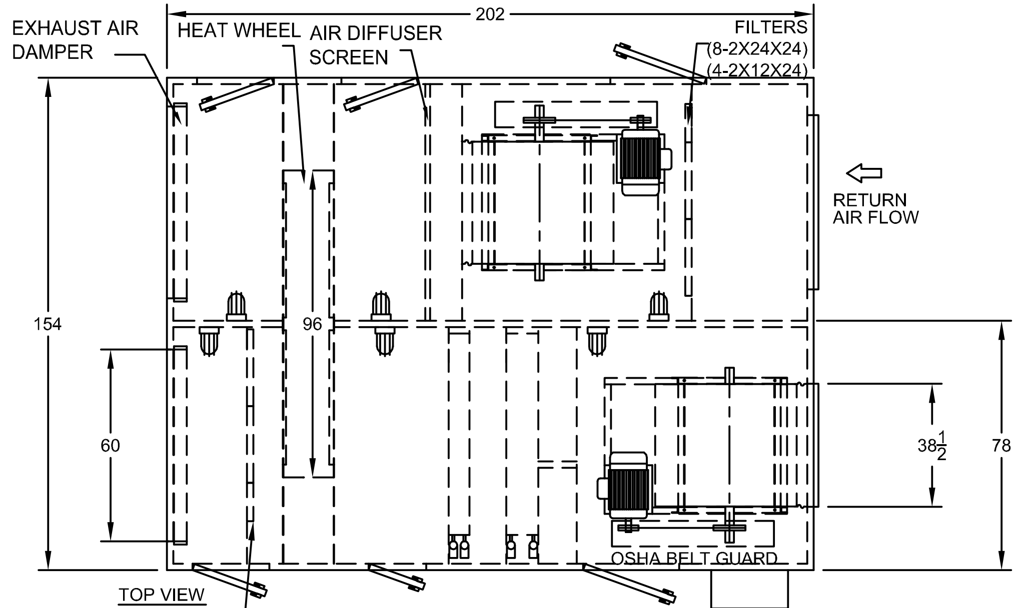
1. 1 1/2 INLET AND DISCHARGE DUCT FLANGES
2. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED RECOMMENDED CLEARANCE 24 INCHES.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES. FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

Rev	By	Revision Description	Date

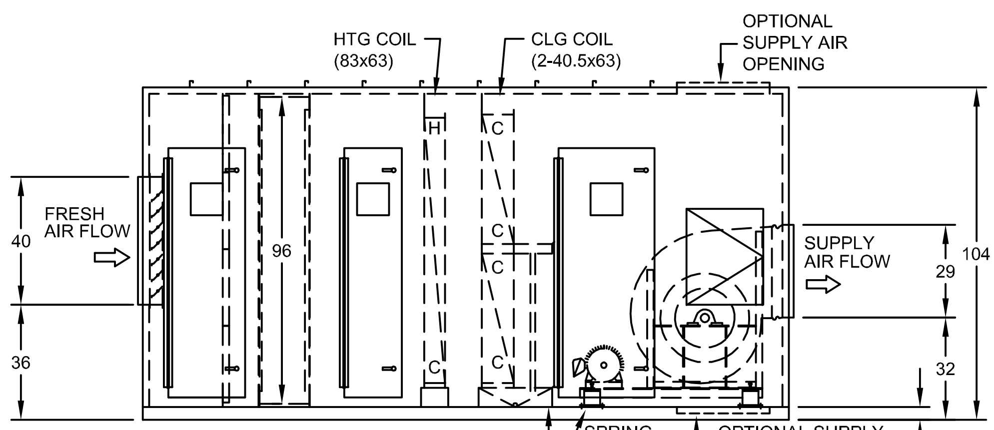
ICG WESTERN SALES

TITLE
15,000CFM CONVERTIBLE WET AIR HANDLING UNIT
w/ HEAT WHEEL, HEATING/COOLING WATER COILS
22" BI DWDI FAN c/w 20HP MOTOR (SUPPLY & EXHAUST)
MODEL: AH-150-EW

DRAWN BY	ISSUED BY	SCALE	DRW. NO.	
		1/5"=1'		
CHK. BY	DATE		JOB NO.	PAGE E-13



TOP VIEW



SIDE VIEW

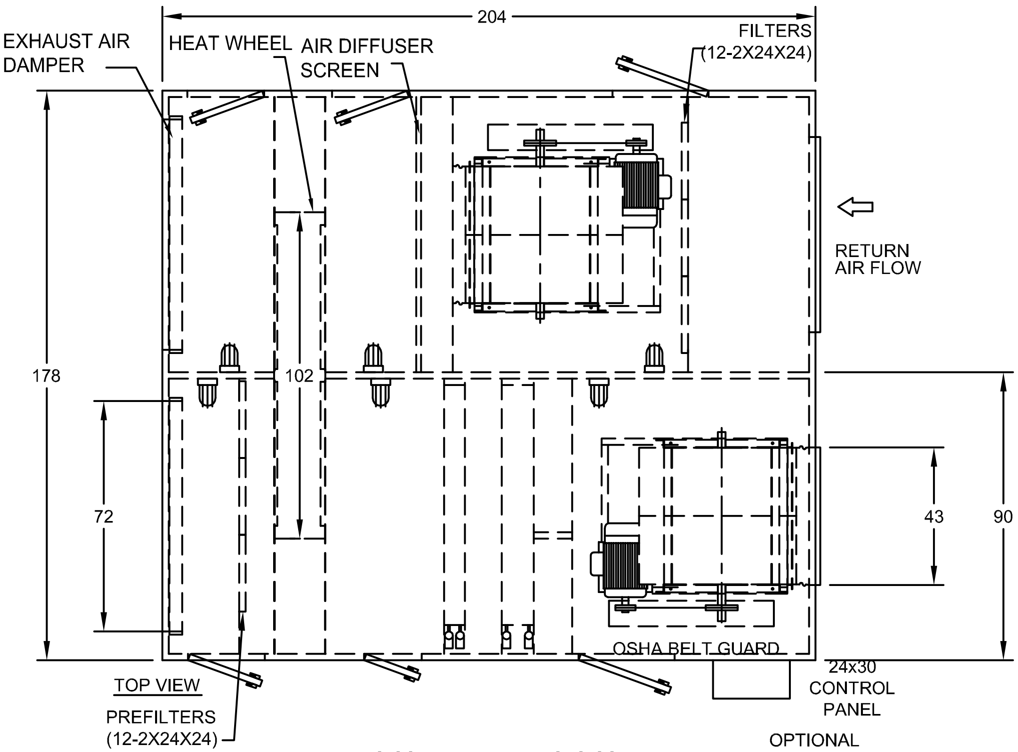
NOTES:

1. 1 1/2 INLET AND DISCHARGE DUCT FLANGES
2. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED RECOMMENDED CLEARANCE 24 INCHES.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES. FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

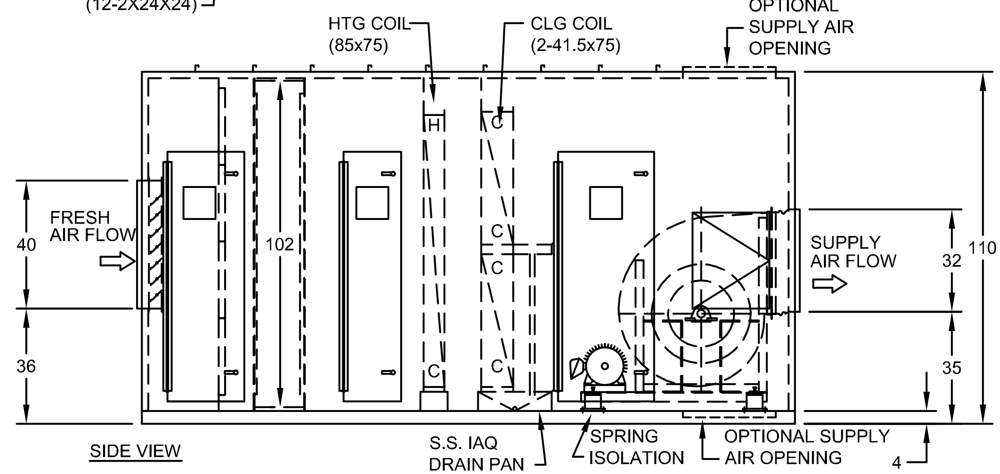
Rev	By	Revision Description	Date

ICG WESTERN SALES

TITLE 18,000CFM CONVERTIBLE WET AIR HANDLING UNIT w/ HEAT WHEEL, HEATING/COOLING WATER COILS 27" BI DWDI FAN c/w 20HP MOTOR (SUPPLY & EXHAUST) MODEL: AH-180-EW				
DRAWN BY	ISSUED BY	SCALE 1/5"=1'	DRW. NO.	
CHK. BY	DATE		JOB NO.	PAGE E-14



TOP VIEW



SIDE VIEW

NOTES:

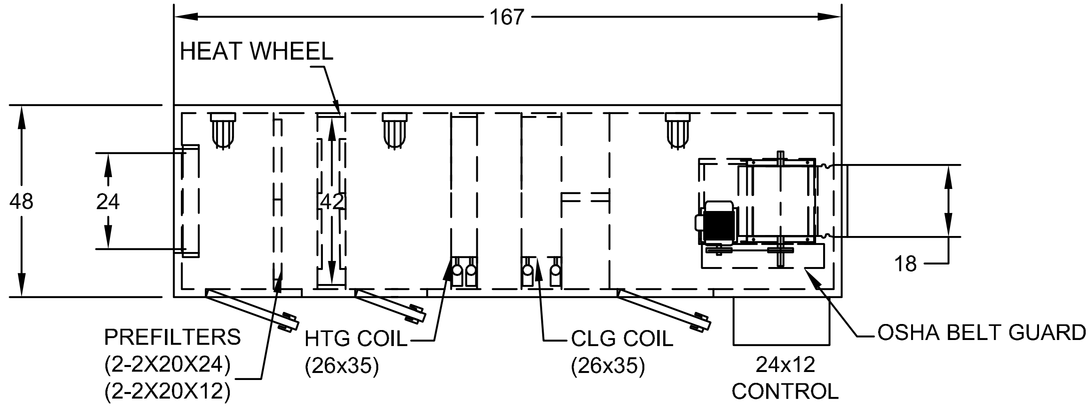
1. 1 1/2 INLET AND DISCHARGE DUCT FLANGES
2. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED RECOMMENDED CLEARANCE 24 INCHES.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES. FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

Rev	By	Revision Description	Date

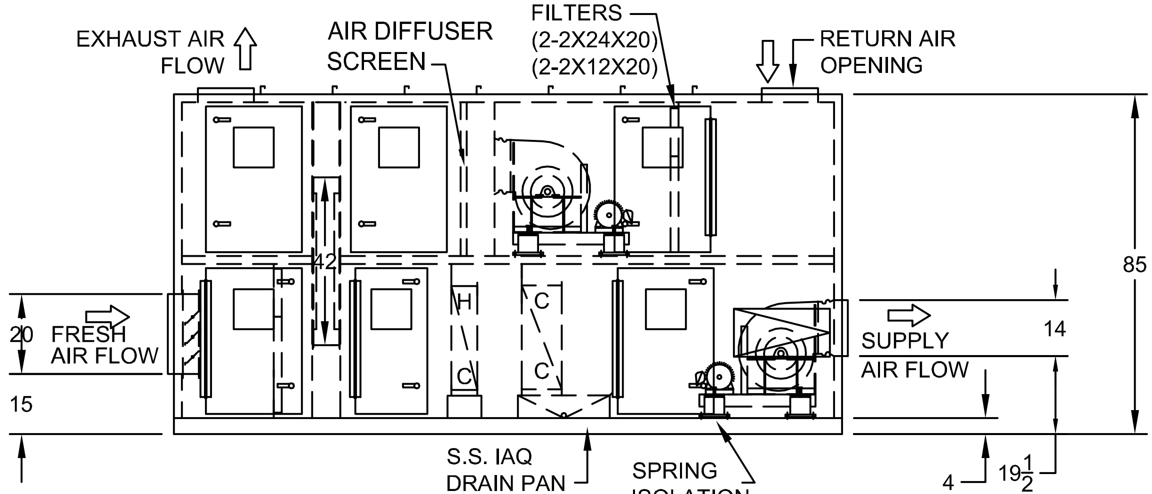
ICG WESTERN SALES

TITLE
21,000CFM CONVERTIBLE WET AIR HANDLING UNIT
w/ HEAT WHEEL, HEATING/COOLING WATER COILS
30" BI DWDI FAN c/w 30HP MOTOR (SUPPLY & EXHAUST)
MODEL: AH-210-EW

DRAWN BY	ISSUED BY	SCALE	DRW. NO.	
		1/5"=1'		
CHK. BY	DATE		JOB NO.	PAGE
				E-15



TOP VIEW LOWER LEVEL



SIDE VIEW

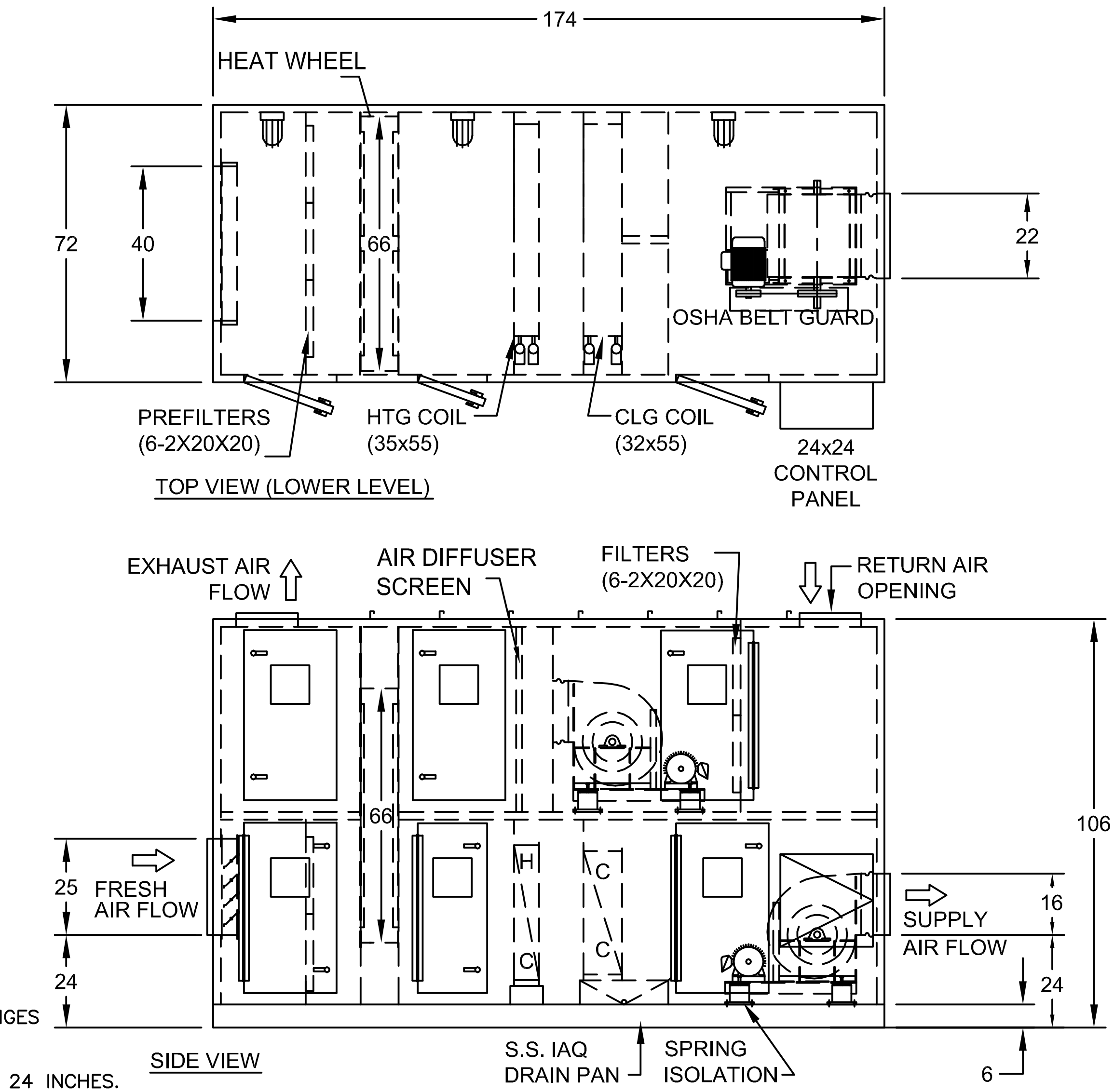
NOTES:

1. 1 1/2 INLET AND DISCHARGE DUCT FLANGES
2. SERVICE ACCESS PANELS MUST NOT BE
   OBSTRUCTED RECOMMENDED CLEARANCE 24 INCHES.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
   FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

Rev	By	Revision Description	Date

ICG WESTERN SALES

TITLE 2,000CFM CONVERTIBLE WET AIR HANDLING UNIT W/ HEAT WHEEL, HEATING/COOLING WATER COILS 12" BI DWDI FAN c/w 2HP MOTOR (SUPPLY & EXHAUST) MODEL: AH-20-EW (VERTICAL)				
DRAWN BY	ISSUED BY	SCALE 1/4"=1'	DRW. NO.	
CHK. BY	DATE		JOB NO.	PAGE E-16



NOTES:

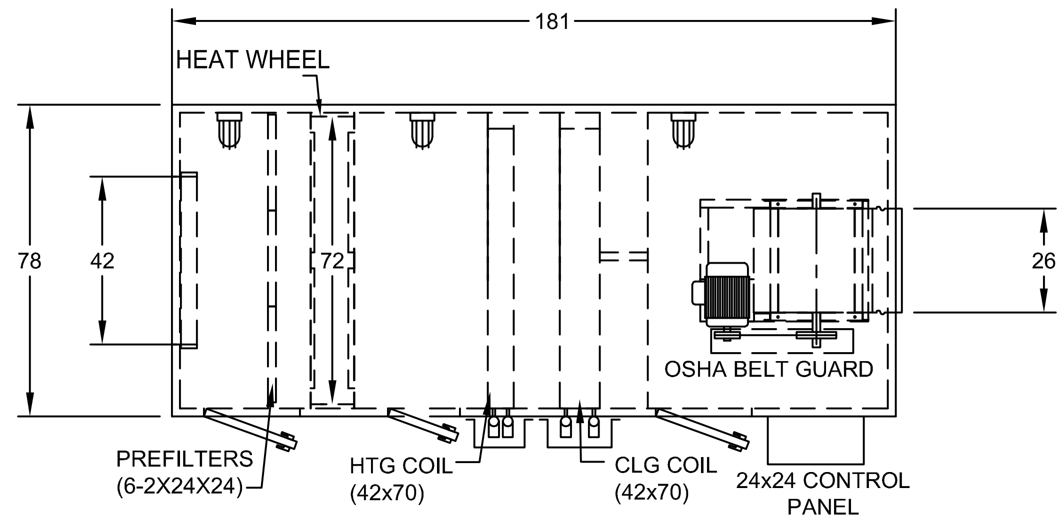
1. 1 1/2 INLET AND DISCHARGE DUCT FLANGES
2. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED RECOMMENDED CLEARANCE 24 INCHES.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES. FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

Rev	By	Revision Description	Date

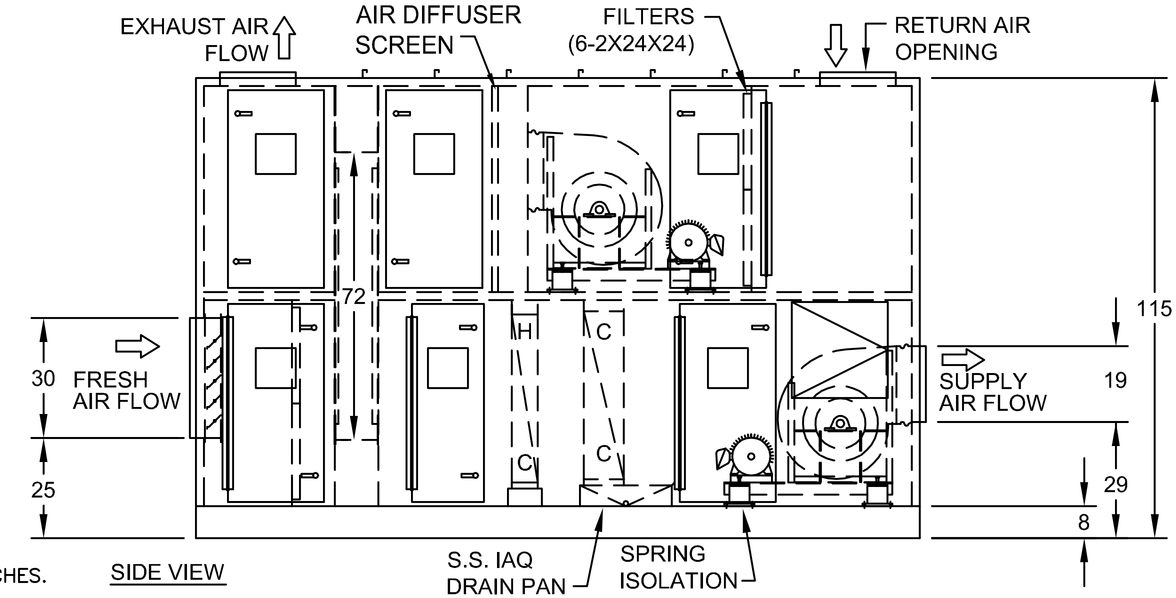
ICG WESTERN SALES

TITLE
6,000CFM CONVERTIBLE WET AIR HANDLING UNIT
w/ HEAT WHEEL, HEATING/COOLING WATER COILS
15" BI DWDI FAN c/w 5HP MOTOR (SUPPLY & EXHAUST)
MODEL: AH-60-EW (VERTICAL)

DRAWN BY	ISSUED BY	SCALE 1/4"=1'	DRW. NO.	
CHK. BY	DATE		JOB NO.	PAGE E-17



TOP VIEW (LOWER LEVEL)



SIDE VIEW

NOTES:

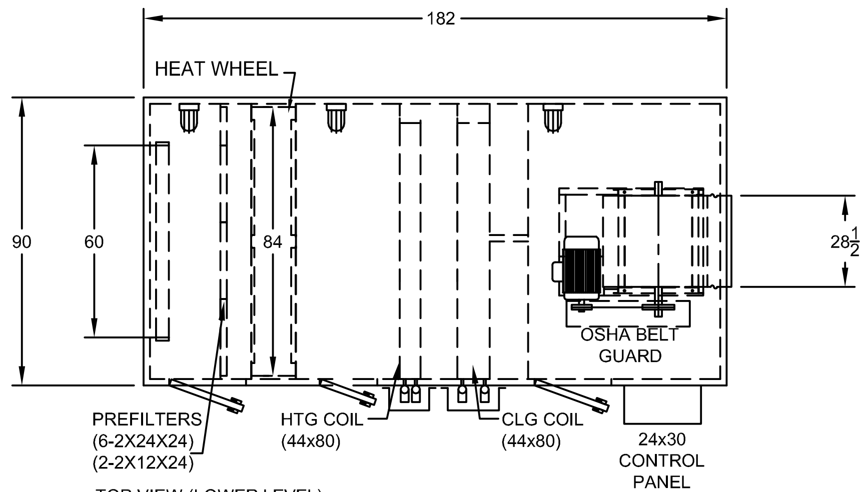
1. 1 1/2 INLET AND DISCHARGE DUCT FLANGES
2. SERVICE ACCESS PANELS MUST NOT BE
   OBSTRUCTED RECOMMENDED CLEARANCE 24 INCHES.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
   FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

Rev	By	Revision Description	Date

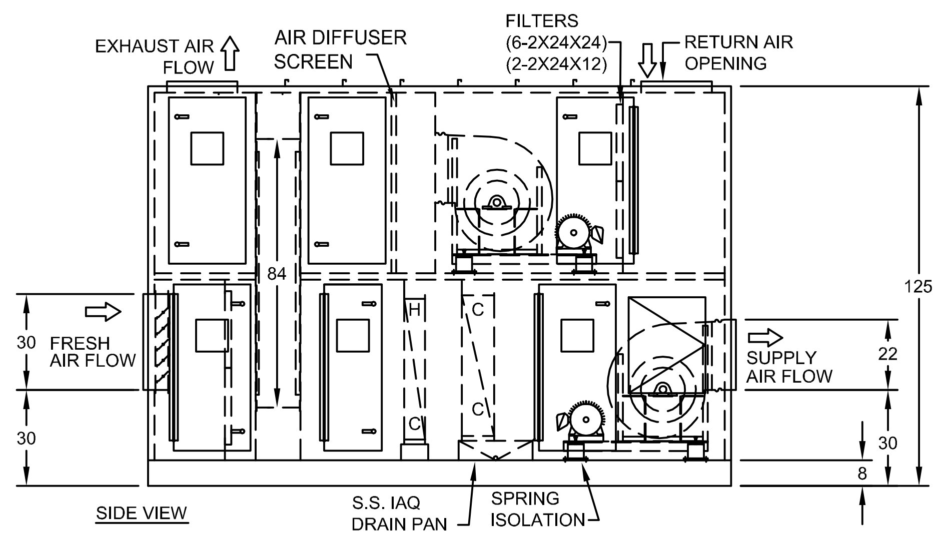
ICG WESTERN SALES

TITLE
8,000CFM CONVERTIBLE WET AIR HANDLING UNIT
w/ HEAT WHEEL, HEATING/COOLING WATER COILS
18" BI DWDI FAN c/w 10HP MOTOR (SUPPLY & EXHAUST)
MODEL: AH-80-EW (Vertical)

DRAWN BY	ISSUED BY	SCALE 1/4"=1'	DRW. NO.	
CHK. BY	DATE		JOB NO.	PAGE E-18



TOP VIEW (LOWER LEVEL)



SIDE VIEW

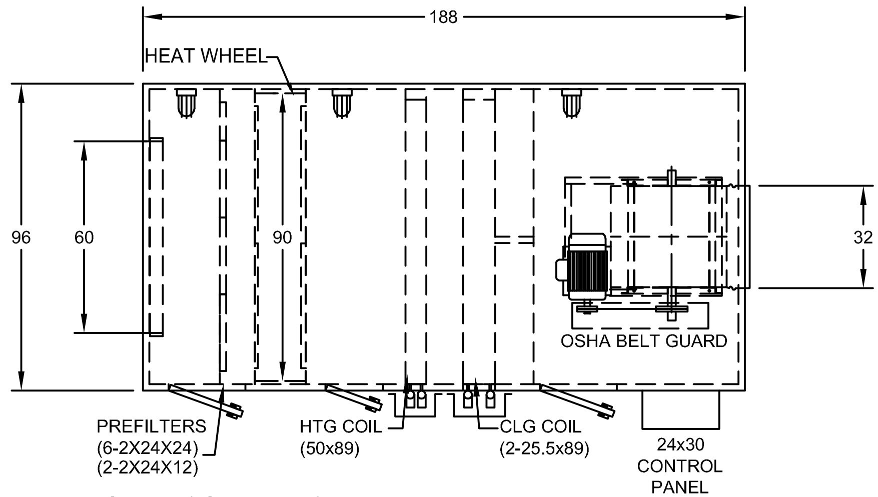
NOTES:

1. 1 1/2 INLET AND DISCHARGE DUCT FLANGES
2. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED RECOMMENDED CLEARANCE 24 INCHES.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES. FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

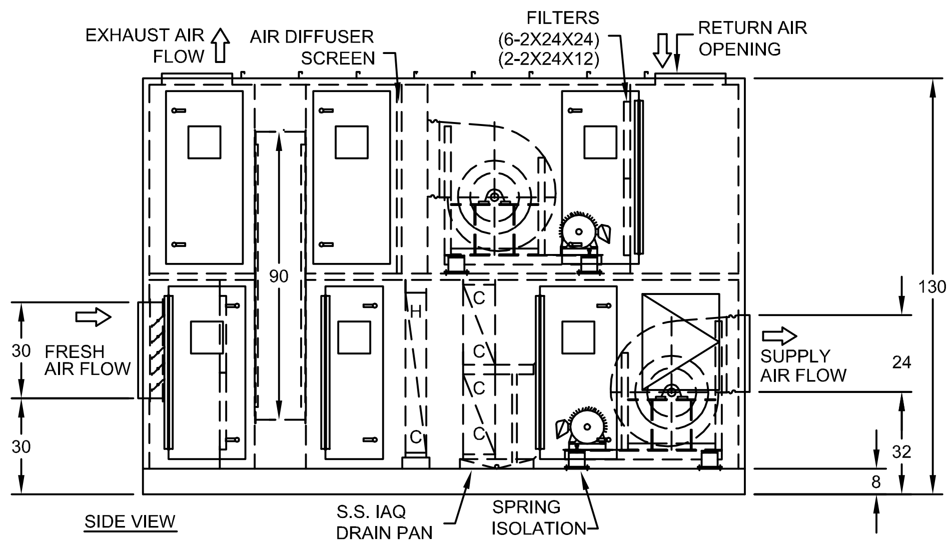
Rev	By	Revision Description	Date

ICE WESTERN SALES

TITLE 12,000CFM CONVERTIBLE WET AIR HANDLING UNIT w/ HEAT WHEEL, HEATING/COOLING WATER COILS 20" BI DWDI FAN c/w 15HP MOTOR (SUPPLY & EXHAUST) MODEL: AH-120-EW (VERTICAL)				
DRAWN BY	ISSUED BY	SCALE 1/5"=1'	DRW. NO.	
CHK. BY	DATE		JOB NO.	PAGE E-19



TOP VIEW (LOWER LEVEL)



SIDE VIEW

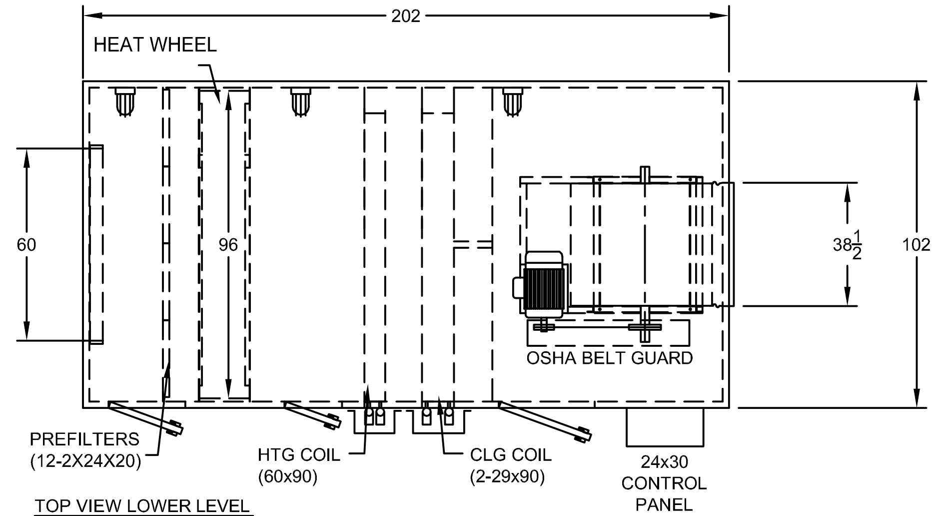
NOTES:

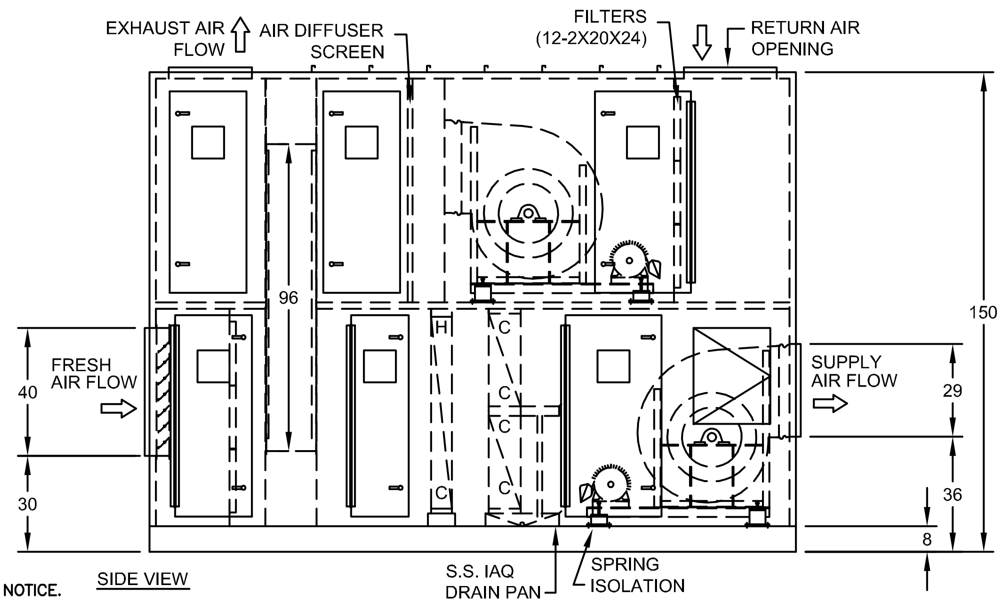
1. 1 1/2 INLET AND DISCHARGE DUCT FLANGES
2. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED RECOMMENDED CLEARANCE 24 INCHES.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES. FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

Rev	By	Revision Description	Date

WESTERN SALES

TITLE 15,000CFM CONVERTIBLE WET AIR HANDLING UNIT w/ HEAT WHEEL, HEATING/COOLING WATER COILS 22" BI DWDI FAN c/w 20HP MOTOR (SUPPLY & EXHAUST) MODEL: AH-150-EW (VERTICAL)			
DRAWN BY	ISSUED BY	SCALE 1/5"=1'	DRW. NO.
CHK. BY	DATE	JOB NO.	PAGE E-20



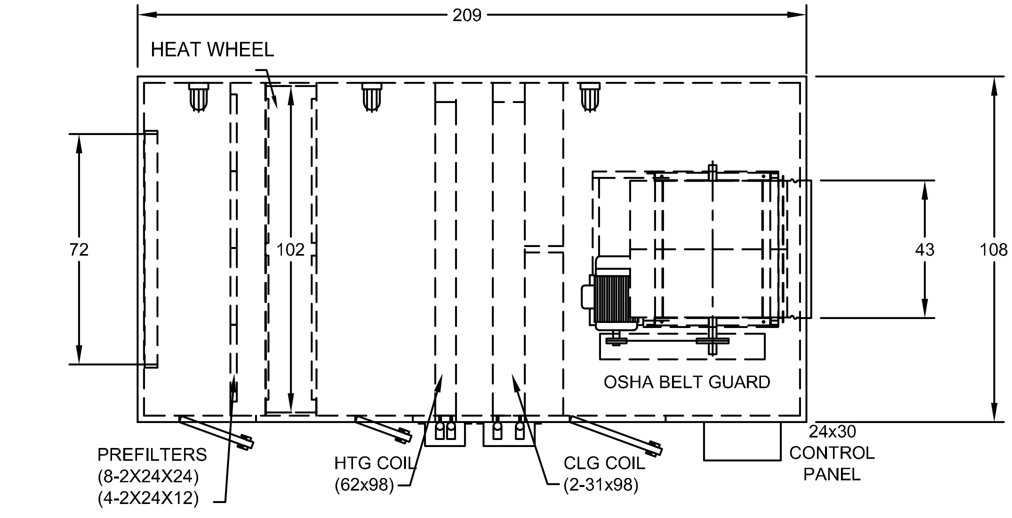


NOTES:
1. 1 1/2 INLET AND DISCHARGE DUCT FLANGES
2. SERVICE ACCESS PANELS MUST NOT BE
OBSTRUCTED RECOMMENDED CLEARANCE 24 INCHES.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

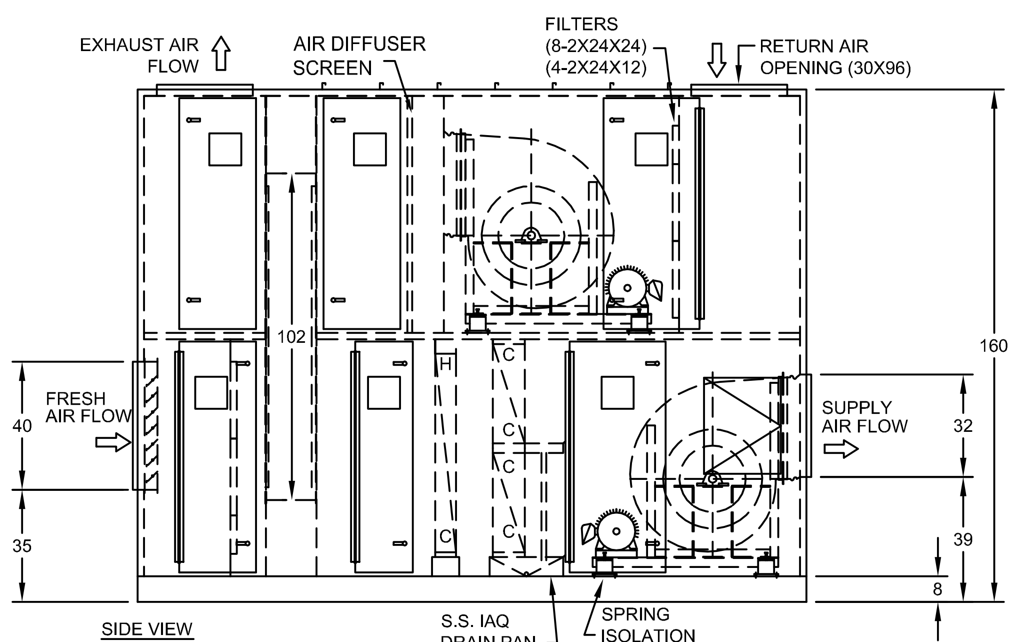
Rev	By	Revision Description	Date

WESTERN SALES

TITLE 18,000CFM CONVERTIBLE WET AIR HANDLING UNIT w/ HEAT WHEEL, HEATING/COOLING WATER COILS 27" BI DWDI FAN c/w 20HP MOTOR (SUPPLY & EXHAUST) MODEL: AH-180-EW (VERTICAL)				
DRAWN BY	ISSUED BY	SCALE 1/5"=1'	DRW. NO.	
CHK. BY	DATE		JOB NO.	PAGE E-21



TOP VIEW (LOWER LEVEL)



SIDE VIEW

NOTES:

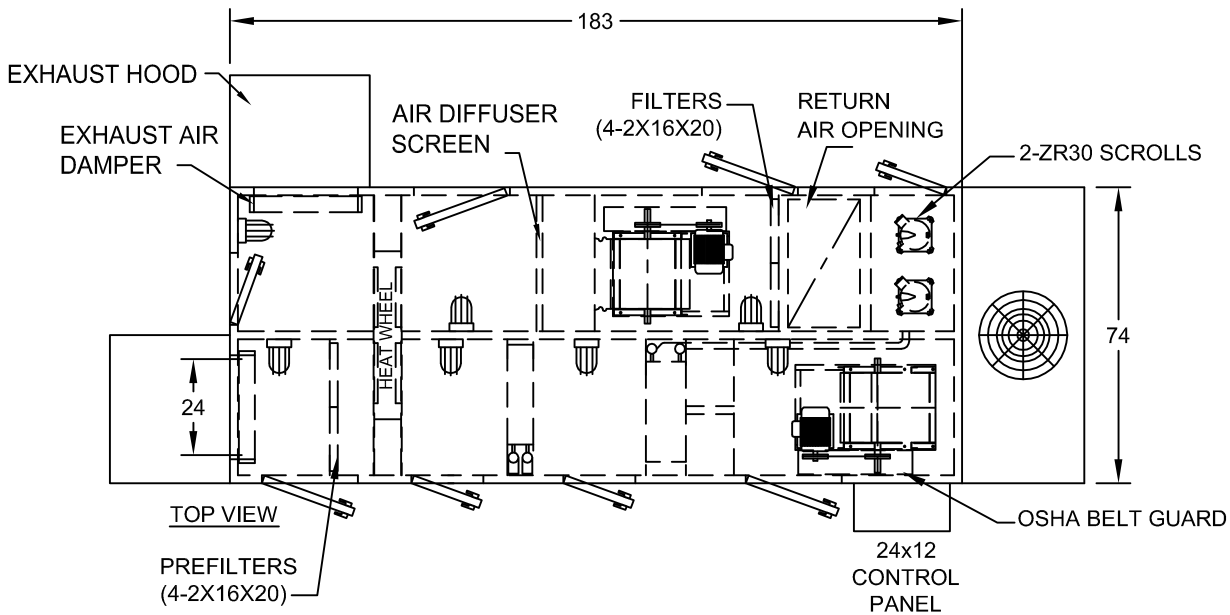
1. 1 1/2 INLET AND DISCHARGE DUCT FLANGES
2. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED RECOMMENDED CLEARANCE 24 INCHES.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES. FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

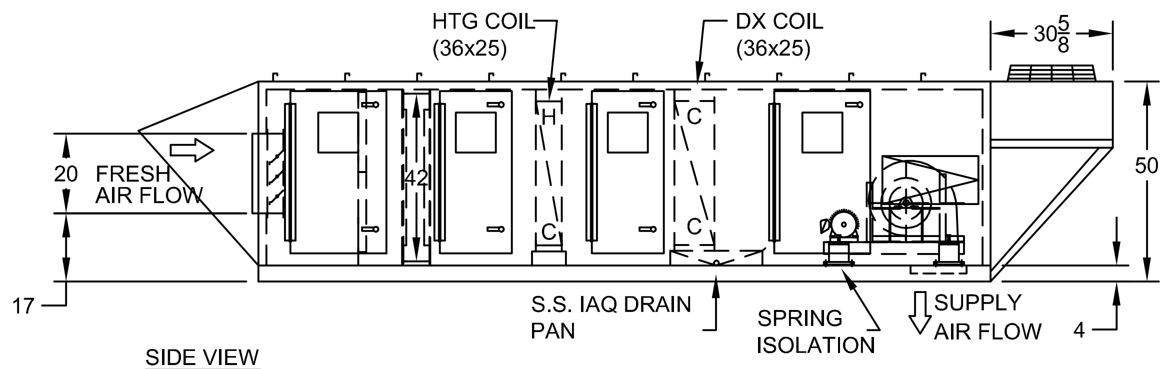
Rev	By	Revision Description	Date

ICE WESTERN SALES

TITLE
21,000CFM CONVERTIBLE WET AIR HANDLING UNIT
w/ HEAT WHEEL, HEATING/COOLING WATER COILS
30" BI DWDI FAN c/w 30HP MOTOR (SUPPLY & EXHAUST)
MODEL: AH-210-EW (VERTICAL)

DRAWN BY	ISSUED BY	SCALE 1/5"=1'	DRW. NO.	
CHK. BY	DATE		JOB NO.	PAGE E-22





NOTES:

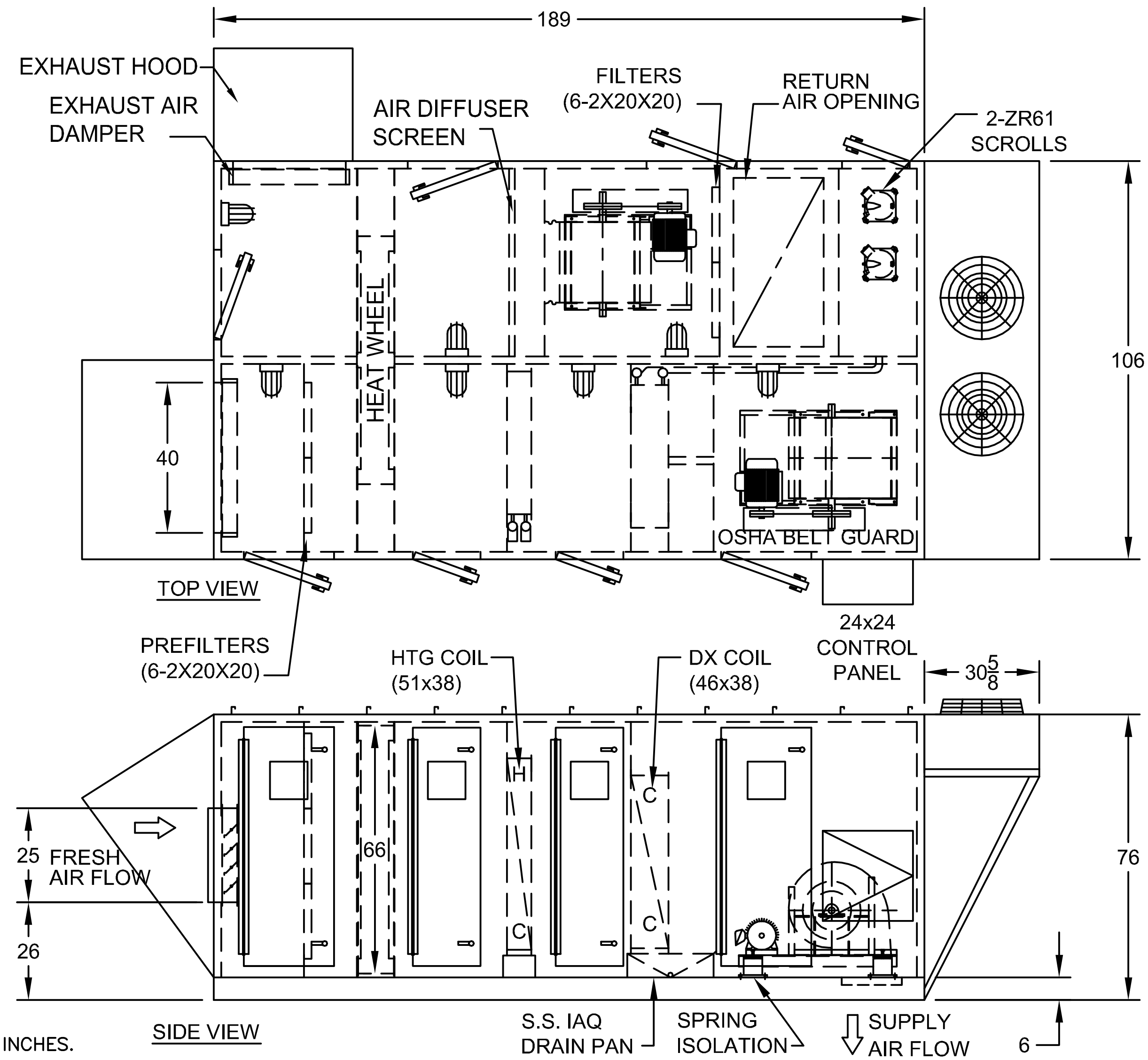
1. 1 1/2 INLET AND DISCHARGE DUCT FLANGES
2. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED RECOMMENDED CLEARANCE 24 INCHES.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES. FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

Rev	By	Revision Description	Date

ICE WESTERN SALES

TITLE
2,000CFM ROOFTOP AIR HANDLING UNIT
w/HEAT WHEEL,HEATING WATER COIL&PACKAGED COOLING
12" BI DWDI FAN c/w 2HP MOTOR (SUPPLY & EXHAUST)
MODEL: AH-20-EW-DX05

DRAWN BY	ISSUED BY	SCALE 1/4"=1'	DRW. NO.	
CHK. BY	DATE		JOB NO.	PAGE E-23



NOTES:

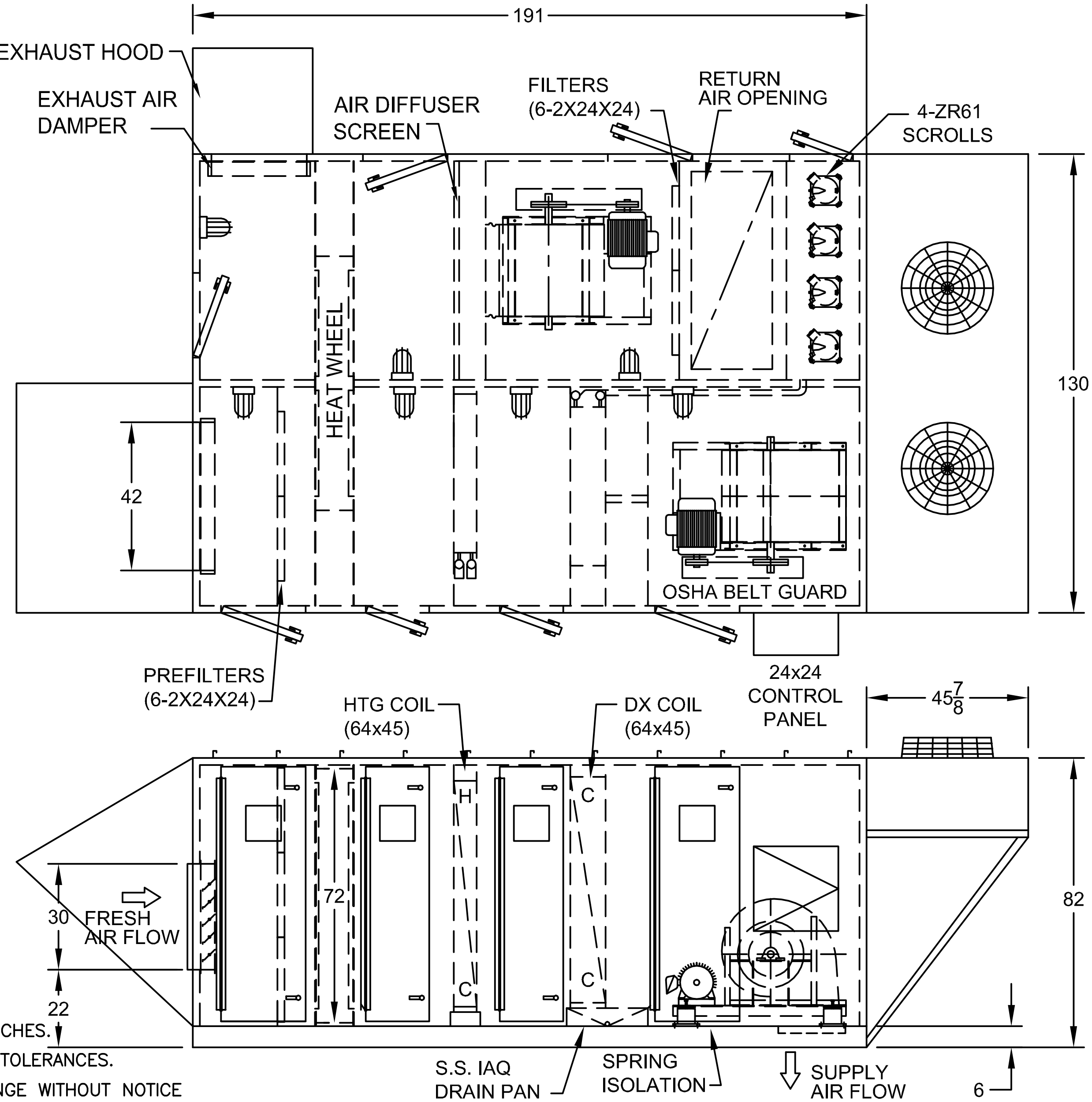
1. 1 1/2 INLET AND DISCHARGE DUCT FLANGES
2. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED RECOMMENDED CLEARANCE 24 INCHES.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES. FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

Rev	By	Revision Description	Date

ICE WESTERN SALES

TITLE
6,000CFM ROOFTOP AIR HANDLING UNIT
w/HEAT WHEEL,HEATING WATER COIL&PACKAGED COOLING
15" BI DWDI FAN c/w 5HP MOTOR (SUPPLY & EXHAUST)
MODEL: AH-60-EW-DX10

DRAWN BY	ISSUED BY	SCALE 1/4"=1'	DRW. NO.	
CHK. BY	DATE		JOB NO.	PAGE E-24



NOTES:

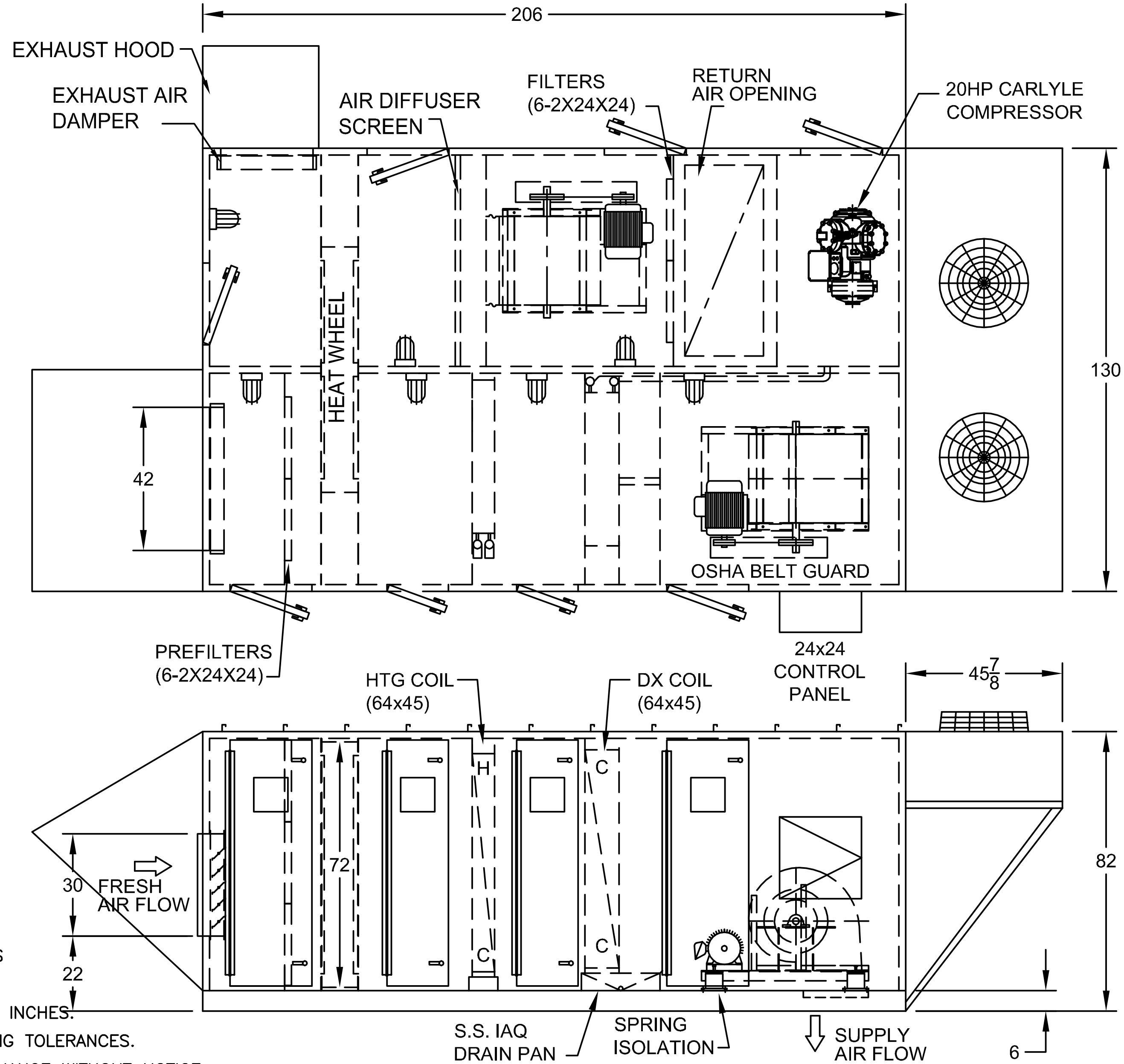
1. 1 1/2 INLET AND DISCHARGE DUCT FLANGES
2. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED RECOMMENDED CLEARANCE 24 INCHES.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES. FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE

Rev	By	Revision Description	Date

ICG WESTERN SALES

TITLE
8,000CFM ROOFTOP AIR HANDLING UNIT
w/HEAT WHEEL, HEATING WATER COIL & PACKAGED COOLING
18" BI DWDI FAN c/w 10HP MOTOR (SUPPLY & EXHAUST)
MODEL: AH-80-EW-DX20

DRAWN BY	ISSUED BY	SCALE 1/4"=1'	DRW. NO.	
CHK. BY	DATE		JOB NO.	PAGE E-25



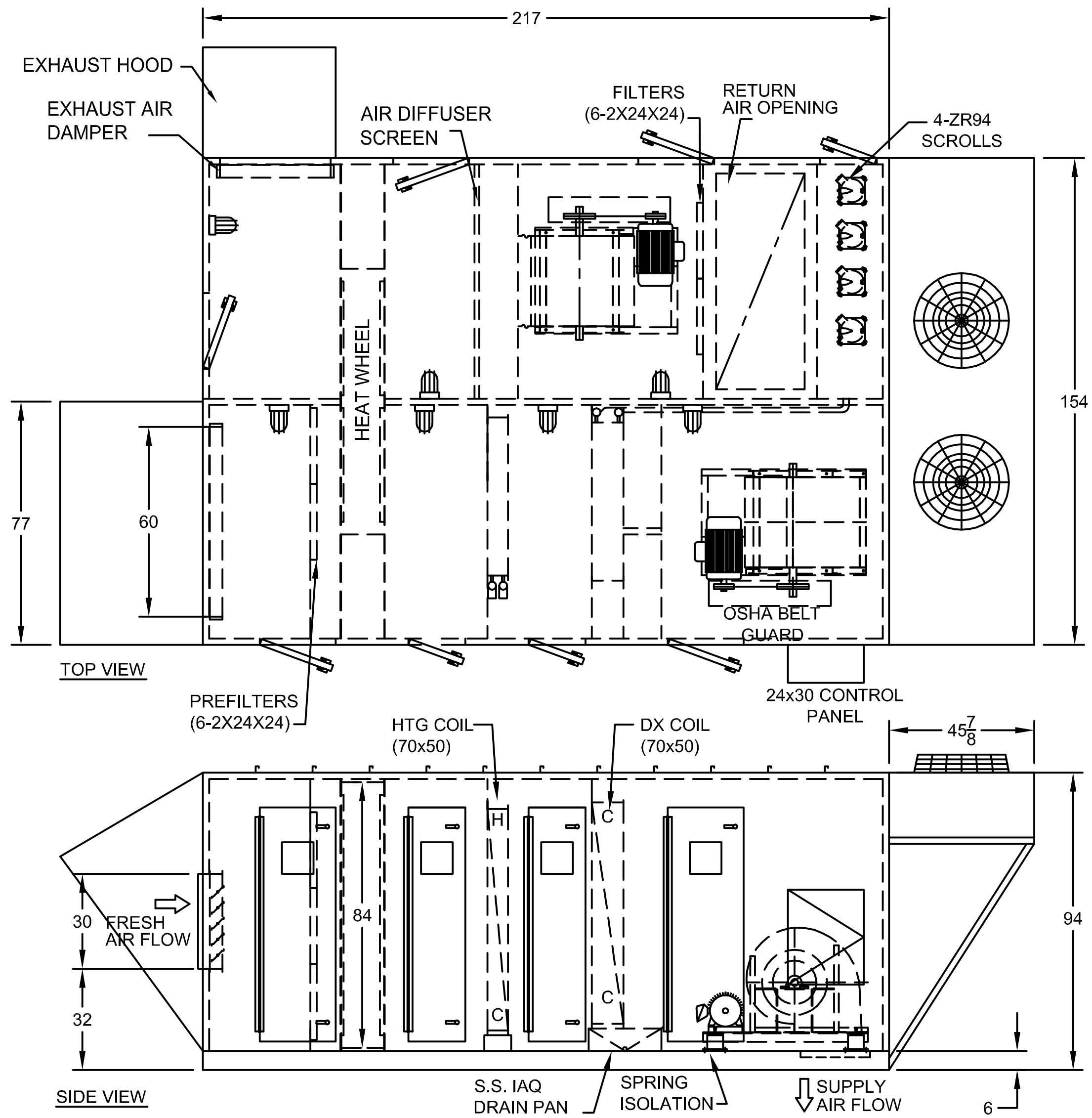
NOTES:

1. 1 1/2 INLET AND DISCHARGE DUCT FLANGES
2. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED RECOMMENDED CLEARANCE 24 INCHES.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES. FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

Rev	By	Revision Description	Date

ICE WESTERN SALES

TITLE 8,000CFM ROOFTOP AIR HANDLING UNIT w/HEAT WHEEL,HEATING WATER COIL&PACKAGED COOLING 18" BI DWDI FAN c/w 10HP MOTOR (SUPPLY & EXHAUST) MODEL: AH-80-EW-DX20				
DRAWN BY	ISSUED BY	SCALE 1/4"=1'	DRW. NO.	
CHK. BY	DATE		JOB NO.	PAGE E-26



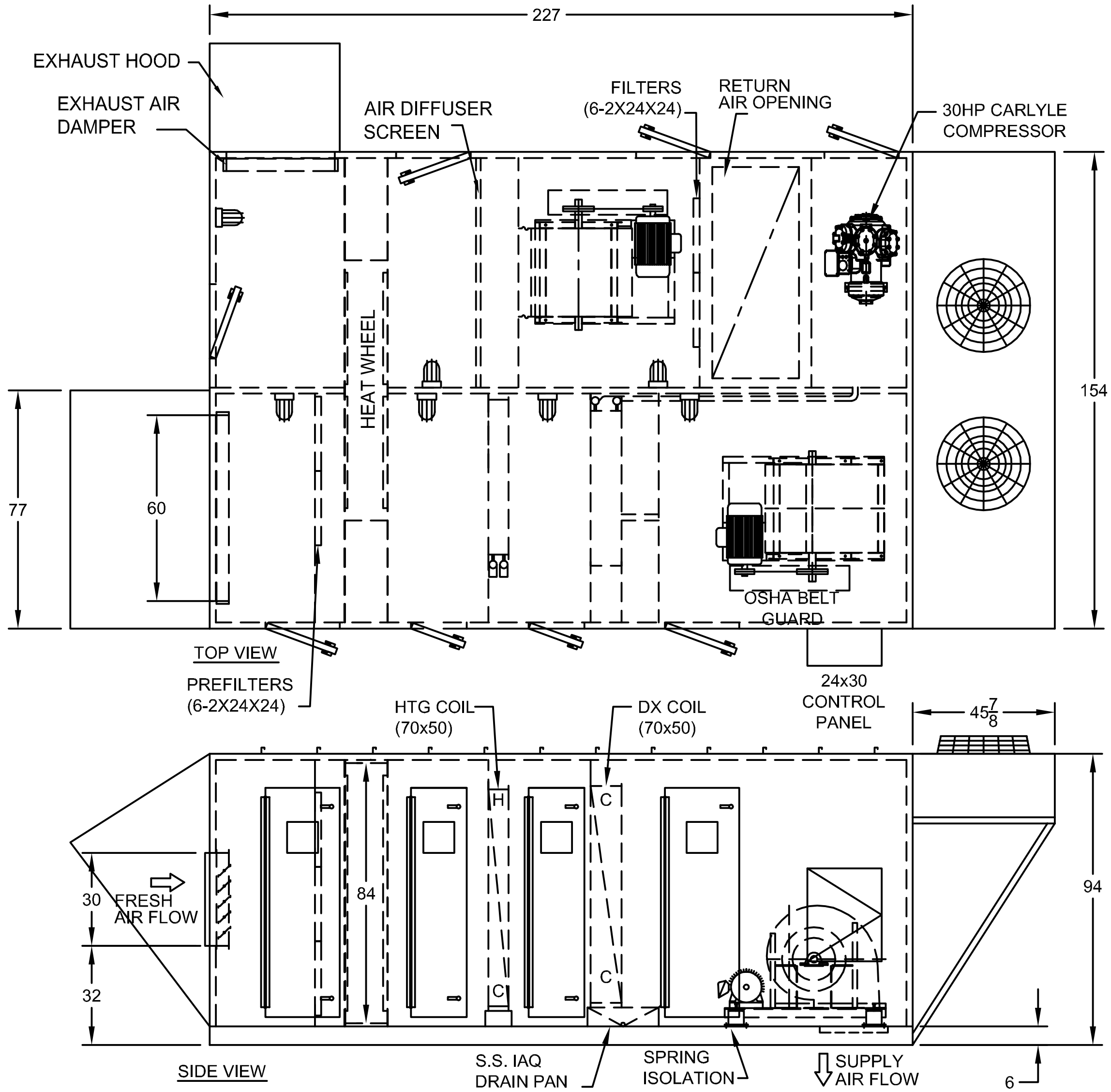
NOTES:

1. 1 1/2 INLET AND DISCHARGE DUCT FLANGES
2. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED RECOMMENDED CLEARANCE 24 INCHES.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES. FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

Rev	By	Revision Description	Date

ICE WESTERN SALES

TITLE 12,000CFM OUTDOOR AIR HANDLING UNIT w/ WHEEL PIPE,HEATING WATER COIL& PACKAGED COOLING 20" BI DWDI FAN c/w 15HP MOTOR (SUPPLY & EXHAUST) MODEL: AH-120-EW-DX30				
DRAWN BY	ISSUED BY	SCALE 1/5"=1'	DRW. NO.	
CHK. BY	DATE		JOB NO.	PAGE E-27



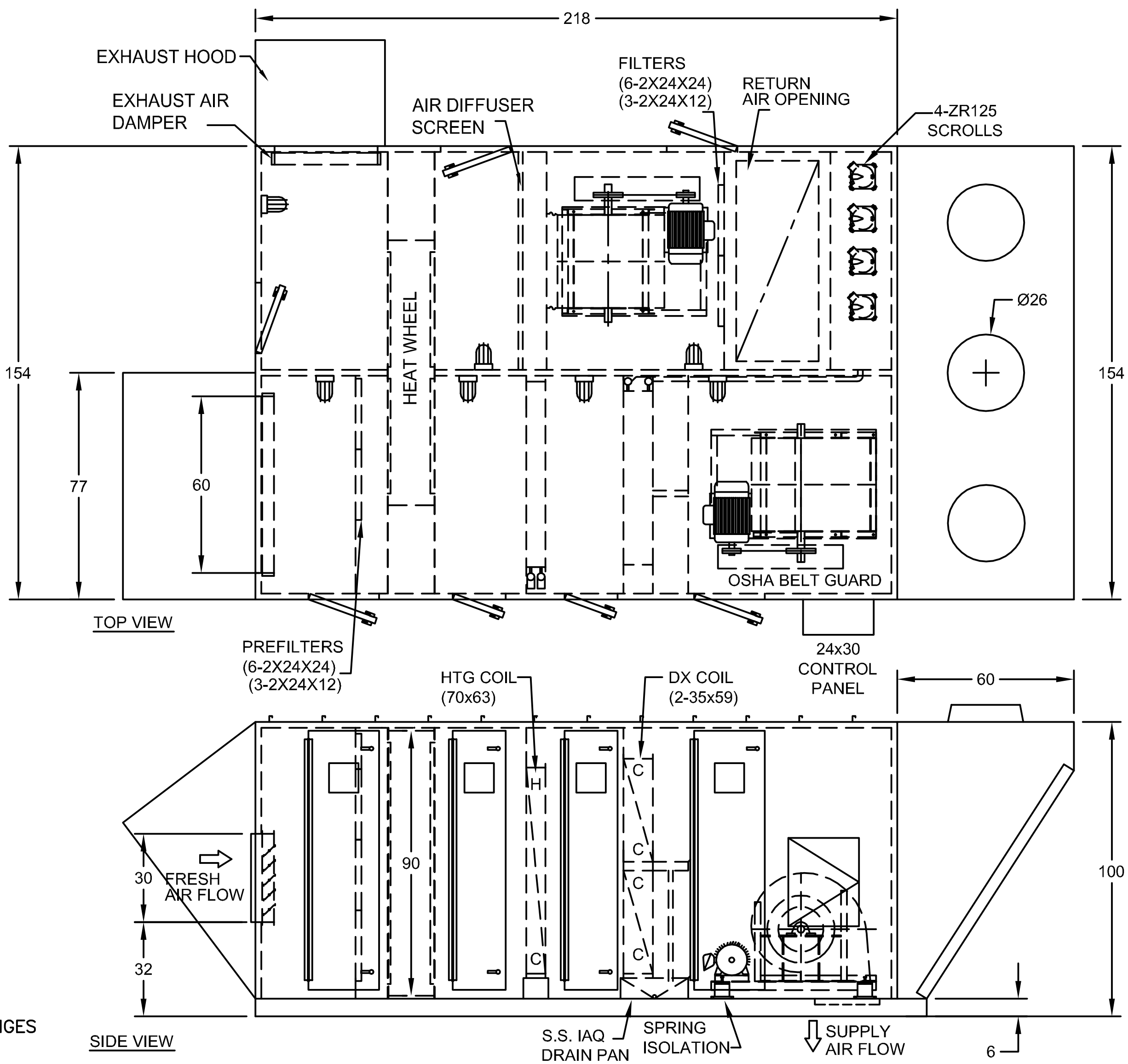
NOTES:

1. 1 1/2 INLET AND DISCHARGE DUCT FLANGES
2. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED RECOMMENDED CLEARANCE 24 INCHES.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES. FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

Rev	By	Revision Description	Date

ICG WESTERN SALES

TITLE 12,000CFM OUTDOOR AIR HANDLING UNIT w/ HEAT WHEEL, HEATING WATER COIL & PACKAGED COOLING 20" BI DWDI FAN c/w 15HP MOTOR (SUPPLY & EXHAUST) MODEL: AH-120-EW-DX30				
DRAWN BY	ISSUED BY	SCALE 1/5"=1'	DRW. NO.	
CHK. BY	DATE		JOB NO.	PAGE E-28



NOTES:

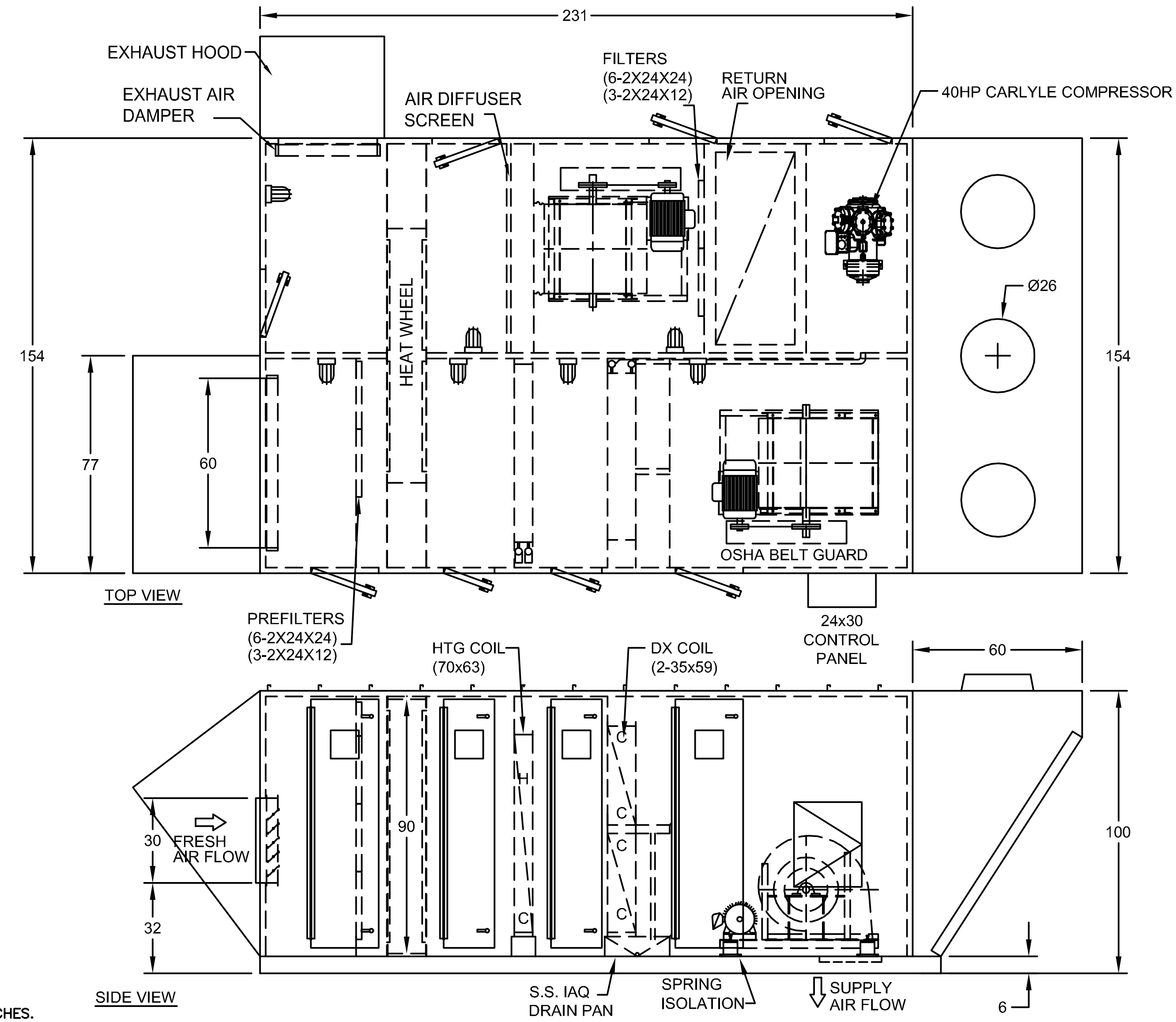
1. 1 1/2 INLET AND DISCHARGE DUCT FLANGES
2. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED RECOMMENDED CLEARANCE 24 INCHES.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES. FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

Rev	By	Revision Description	Date

ICG WESTERN SALES

TITLE
15,000CFM OUTDOOR AIR HANDLING UNIT
w/ HEAT WHEEL, HEATING COIL & PACKAGED COOLING
22" BI DWDI FAN c/w 20HP MOTOR (SUPPLY & EXHAUST)
MODEL: AH-150-EW-DX40

DRAWN BY	ISSUED BY	SCALE	DRW. NO.	
		1/5"=1'		
CHK. BY	DATE		JOB NO.	PAGE
				E-29



NOTES:

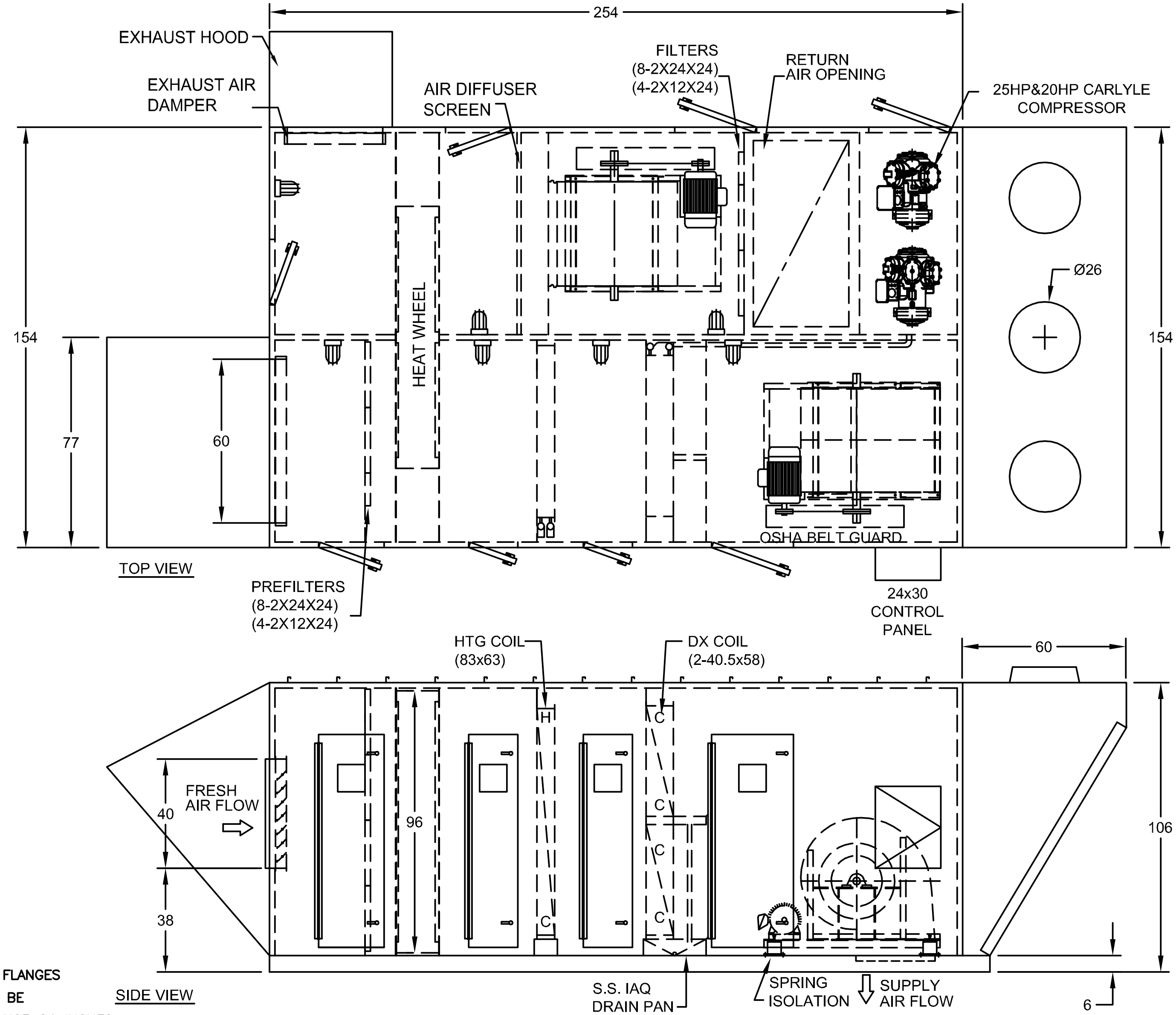
1. 1 1/2 INLET AND DISCHARGE DUCT FLANGES
2. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED RECOMMENDED CLEARANCE 24 INCHES.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES. FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE

Rev	By	Revision Description	Date

ICG WESTERN SALES

TITLE
15,000CFM OUTDOOR AIR HANDLING UNIT
w/ HEAT WHEEL, HEATING COIL & PACKAGED COOLING
22" BI DWDI FAN c/w 20HP MOTOR (SUPPLY & EXHAUST)
MODEL: AH-150-EW-DX40

DRAWN BY	ISSUED BY	SCALE 1/5"=1'	DRW. NO.	
CHK. BY	DATE		JOB NO.	PAGE E-30



NOTES:

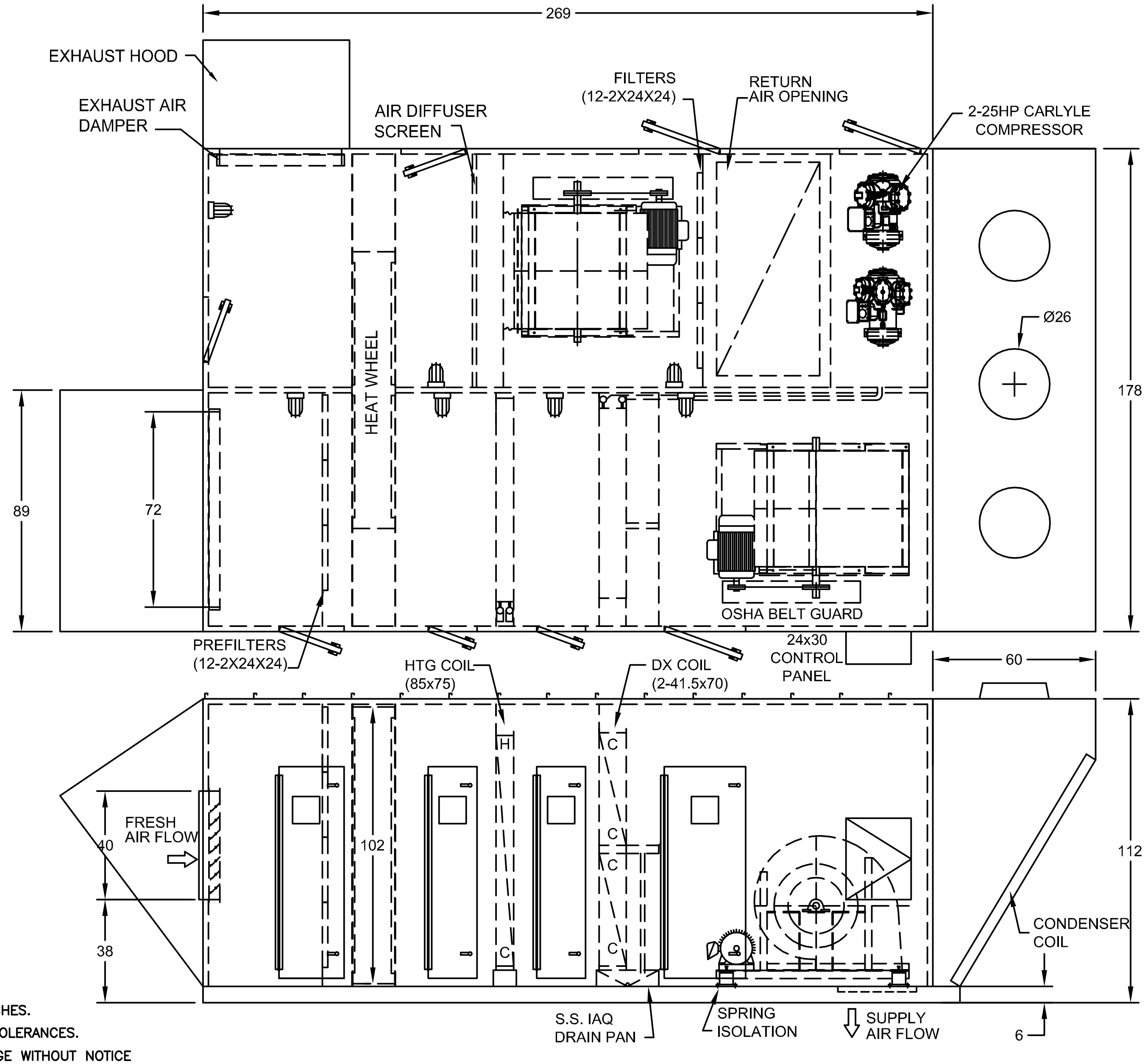
1. 1 1/2 INLET AND DISCHARGE DUCT FLANGES
2. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED RECOMMENDED CLEARANCE 24 INCHES.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES. FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE.

Rev	By	Revision Description	Date

ICG WESTERN SALES

TITLE
18,000CFM OUTDOOR AIR HANDLING UNIT
w/WHEEL PIPE, HEATING WATER COIL & PACKAGED COOLING
27" BI DWDI FAN c/w 20HP MOTOR (SUPPLY & EXHAUST)
MODEL: AH-180-EW-DX45

DRAWN BY	ISSUED BY	SCALE	DRW. NO.	
		1/5"=1'		
CHK. BY	DATE		JOB NO.	PAGE E-31



NOTES:
1. 1 1/2 INLET AND DISCHARGE DUCT FLANGES
2. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED RECOMMENDED CLEARANCE 24 INCHES.
3. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES. FOR REFERENCE USE ONLY, SUBJECT TO CHANGE WITHOUT NOTICE

Rev	By	Revision Description	Date

ICE WESTERN SALES

TITLE 21,000CFM OUTDOOR AIR HANDLING UNIT w/ HEAT WHEEL, HEATING WATER COIL & PACKAGED COOLING, 30" BI DWDI FAN c/w 30HP MOTOR (SUPPLY & EXHAUST) MODEL: AH-210-EW-DX50				
DRAWN BY	ISSUED BY	SCALE 1/5"=1'	DRW. NO.	
CHK. BY	DATE		JOB NO.	PAGE E-32

AH SERIES w/ HEAT WHEEL, HEATING WATER COIL, COOLING WATER COIL OR PACKAGED COOLING, SUPPLY & EXHAUST AIR BLOWER TYPICAL SPECIFICATIONS

CASING

The unit exterior casing shall be heavy gauge G90 rated bonderized steel. Unit roof shall feature standing seam construction. The entire unit casing shall be insulated with 1-in. thick 1.5-lb. (2-in. thick 1.5-lb.) fiberglass insulation with hard neoprene backing in a sandwich wall fashion (22-gauge solid liner). The unit exterior shall be finished with industrial enamel (catalyzed epoxy) paint. An integral welded iron channel frame shall support the unit casing. The structural iron frame shall be sandblasted, primed and finished with industrial enamel (catalyzed epoxy) paint.

BLOWER/MOTOR SECTION

The fan section and motor assembly shall be constructed in accordance with the requirements of the Air Moving and Conditioning Association (AMCA). The assembly shall be designed to house the fan(s), bearings, motor, and v-belts, which shall be selected for at least 50% above the rated motor capacity. The fan(s) and motor shall be mounted on a welded unitary base made of angle iron frame. The frame shall be sandblasted, primed and finished with industrial enamel (catalyzed epoxy) paint. The unitary base shall be provided with seismic spring vibration isolation. The blower section shall have a hinged access door with Ventlock handles to allow easy maintenance of filters and belts. The NEMA T-Frame motor shall be mounted on an adjustable base located within the fan section. The blower wheel shall be statically and dynamically balanced, and mounted on a turned, ground and polished shaft with rigid bearing supports. The shaft shall be designed with a maximum operating speed not exceeding 75% of the first critical speed. The bearings shall be split taper lock ball bearing type L20 minimum life of 100,000 hours (L10 200 kHr).

Fan performance shall be based on tests conducted in accordance with AMCA Standard Test Code for Air moving Devices. (All fans shall have sharply rising pressure characteristic extending throughout the operating range and continuing to rise well beyond the efficiency peak to assure quiet and stable operation under all conditions. Horsepower characteristics shall be truly non-overloading and shall reach a peak in the normal selection area.) Fan manufacturer shall provide sound power ratings in the eight octave bands, which shall be based on AMCA Standard 300-67, test, setup number one. Sound power ratings shall be referenced 10-12 watts. A factory dynamic balance shall be made on all fans after their assembly. An IRD or PMC analyzer shall be used to measure velocity, and the final reading shall not exceed 0.1 inches per second. The exact level of vibration shall be recorded on the fan as proof of the final dynamic balance at the factory.

COOLING CONTROLS

Cooling control shall be achieved via a Honeywell T775 multi-stage sequencer. The sequencer shall be controlled with an analog signal provided by the discharge air thermostat. As the discharge air thermostat requires cooling the signal shall increase, thereby turning on the stages at specific set points. The set points shall be set with appropriate offset and differential to ensure accurate discharge temperature is maintained. The stages are to be sequenced without turning on and off of compressors to minimize unnecessary wear on the compressors. Upon sensing a call for cooling from the space, the compressors shall provide full cooling until the space sensor is satisfied, upon which time the cooling shall revert to discharge air control. A low discharge temperature set point with a large differential shall be set to prevent the compressor from cycling on and off. The compressor will remain on low setting until cooling is disabled manually or the ambient temperature falls below the minimum set point.

ELECTRICAL CONTROL EQUIPMENT

Electrical assembly and components shall be in strict accordance with the latest provisions and requirements of the National Electric Code. Control cabinet shall be designed and constructed to ETL specifications. A safety disconnect switch shall be mounted on the unit. The controls shall be located in a weatherproof cabinet. Provisions for service padlocking shall be provided. The following items shall be located within the cabinet: fuses, starters, control relays, timing and holding relays, resistors and numbered terminal strips. All components shall be labeled and cross-referenced to control and field wiring diagrams. The control circuit shall be 24V, single phase. Wiring shall be neatly run in "PANDUIT" wiring duct. Low and/or line voltage thermostats shall be furnished shipped loose for installation by others. Unit shall be equipped with automatic low limit freeze protection with bypass timer.

DAMPERS & FILTER SECTION

The dampers are to be galvanized steel (aluminum airfoil low leak) type (with seals). The dampers shall be equipped with 2-position (modulating) actuators. The filters shall be 2" pleated throwaway type with minimum of 85% arrestance and 30% efficiency. Filter access shall be through a latched and gasketed access doors located on both sides of the unit. (Final filters shall be 4 or 12 inch high efficiency cartridge filters.)

REMOTE CONTROL PANELS

Remote NEMA 1(12) locking control panel shall be equipped with summer/off/winter switch and blower on, burner on, flame failure and loaded filter lights. (A remote adjustment potentiometer shall control damper positioning.) (An LCD display shall provide system temperature and set points.)

FLUID COILS

Fluid coils are intended for use with water, glycol, or other appropriate heat transfer fluids. Coils are to be designed to maximize performance under specified conditions with minimal air-side pressure drop.
All water coils designed with 1/2” or 5/8” tubes are to be ARI performance certified and shall bear the ARI symbol.
Tubes and return bends shall be constructed from seamless UNS C12200 copper conforming to ASTM B224 and ASTM E527. Properties shall be O50 light annealed with a maximum grain size of 0.040 mm.
Tubes are to mechanically expanded into fins (secondary surface) for maximum heat transfer. Materials are to be 3/8” diameter x (0.014, 0.022) wall thickness, 1/2” diameter x (0.016, 0.025) wall thickness, or 5/8” diameter x (0.020, 0.025, 0.035, 0.049) wall thickness.
Secondary surface (fins) shall be of the plate-fin design using aluminum or copper, with die-formed collars. Fin design to be flat, waffle, or sine-wave in a staggered tube pattern to meet performance requirements.

Collars will hold fin spacing at specified density, and cover the entire tube surface. Aluminum properties are to be Alloy 1100 per ASTM B209, with O (soft) temper; copper is to be Alloy 11000 per ASTM B152-06 with soft (anneal) temper. Fins are to be free of oils and oxidation.
Headers are to be constructed of seamless UNS C12200, Type L (drawn) copper material sized to match specified connection size. Type K (drawn) copper headers and Schedule 40 steel headers shall be offered as optional materials.
Die-formed copper end caps are brazed on the inside of the headers, unless spun-closed (for sizes up to 1-3/8"). 1/4" vents and drains are to be provided for all fluid coils.
Connection material shall be copper, or Schedule 40 steel or red brass pipe. The type of connection is to be sweat type, MPT or FPT, grooved, or flanged as required.
Coil casing material shall be of G90 galvanized steel, 16 gauge minimum. Heavier material, stainless steel, copper, or aluminum casing are to be provided as required.
Intermediate tube supports are to be provided on all coils 48" and longer fin length. Coil casing on top and bottom of coils are to have double-flange construction, allowing for vertical stacking of coils.
All coils are to be brazed with minimum 5% silver content (BCup-3) filler material to insure joint integrity. Low-fuming, flux-coated bronze braze-weld material is to be used for ferrous to non-ferrous joints.
Coils shall be tested at 550 psig using dry nitrogen, submerged under water. Dual-operator verification shall determine that all coils are leak-free.
Fluid coils shall be designed to withstand 300ºF maximum operating fluid temperature, and 250 psig maximum operating pressure.

EVAPORATOR COILS

Evaporator coils are intended for use with a wide range of applications and refrigerant types. Coils are to be designed to maximize performance under specified conditions with minimal air-side pressure drop.
Coils shall be UL recognized as Refrigerant Containing Component. Coils to be used with refrigerant R-410A shall have undergone cycle testing, and shall be safety listed with 750 psig rating.
Tubes and return bends shall be constructed from seamless UNS C12200 copper conforming to ASTM B224 and ASTM E527. Properties shall be O50 light annealed with a maximum grain size of 0.040 mm.
Tubes are to mechanically expanded into fins (secondary surface) for maximum heat transfer. Materials are to be 3/8" diameter x (0.014, 0.022) wall thickness, 1/2" diameter x (0.016, 0.025) wall thickness, or 5/8" diameter x (0.020, 0.025, 0.035, 0.049) wall thickness.
Secondary surface (fins) shall be of the plate-fin design using aluminum or copper, with die-formed collars. Fin design to be flat, waffle, or sine-wave in a staggered tube pattern to meet performance requirements.
Collars will hold fin spacing at specified density, and cover the entire tube surface. Aluminum properties are to be Alloy 1100 per ASTM B209, with O (soft) temper; copper is to be Alloy 11000 per ASTM B152-06 with soft (anneal) temper. Fins are to be free of oils and oxidation.
Headers are to be constructed of seamless UNS C12200, Type L (drawn) copper material sized to match specified connection size. Type K (drawn) copper headers shall be offered as optional material.
Die-formed copper end caps are brazed on the inside of the headers, unless spun-closed (for sized up to 1-3/8").
Evaporator coils shall be designed with brass liquid distributors (as required), and copper sweat suction connections. Distributors shall be capped using soft-solder for ease of cap removal; suction connections shall be capped.

Coil casing material shall be of G90 galvanized steel, 16 gauge minimum. Heavier material, stainless steel, copper, or aluminum casing are to be provided as required.
Intermediate tube supports are to be provided on all coils 48” and longer fin length. Coil casing on top and bottom of coils are to have double-flange construction, allowing for vertical stacking of coils.
All coils are to be brazed with minimum 5% silver content (BCup-3) filler material to insure joint integrity.
Coils shall be tested at 550 psig using dry nitrogen, submerged under water. Dual-operator verification shall determine that all coils are leak-free.
Coils shall be shipped with nitrogen charge to verify leak-free integrity, and to prevent moisture migration into coil.
Coils shall be certified to withstand 750 psig working pressure.

CONDENSER COILS

Condenser coils are intended for use with a wide range of applications and refrigerant types. Coils are to be designed to maximize performance under specified conditions with minimal air-side pressure drop.
Coils shall be UL recognized as Refrigerant Containing Component. Coils to be used with refrigerant R-410A shall have undergone cycle testing, and shall be safety listed with 750 psig rating.
Tubes and return bends shall be constructed from seamless UNS C12200 copper conforming to ASTM B224 and ASTM E527. Properties shall be O50 light annealed with a maximum grain size of 0.040 mm.
Tubes are to mechanically expanded into fins (secondary surface) for maximum heat transfer. Materials are to be 3/8” diameter x (0.014, 0.022) wall thickness, 1/2” diameter x (0.016, 0.025) wall thickness, or 5/8” diameter x (0.020, 0.025, 0.035, 0.049) wall thickness.
Internally enhanced rifled or cross-hatched tubes can be offered as an option.
Secondary surface (fins) shall be of the plate-fin design using aluminum or copper, with die-formed collars. Fin design to be flat, waffle, or sine-wave in a staggered tube pattern to meet performance requirements.
Collars will hold fin spacing at specified density, and cover the entire tube surface. Aluminum properties are to be Alloy 1100 per ASTM B209, with O (soft) temper; copper is to be Alloy 11000 per ASTM B152-06 with soft (anneal) temper. Fins are to be free of oils and oxidation.
Headers are to be constructed of seamless UNS C12200, Type L (drawn) copper material sized to match specified connection size. Type K (drawn) copper headers shall be offered as optional material.
Die-formed copper end caps are brazed on the inside of the headers, unless spun-closed (for sized up to 1-3/8”).
Condenser coils shall be designed with copper sweat connections, and shall be shipped with caps on connections.
Coil casing material shall be of G90 galvanized steel, 16 gauge minimum. Heavier material, stainless steel, copper, or aluminum casing are to be provided as required.
Coils designed for hot-gas applications shall have oversized tube sheet holes for hot gas feeds to allow for free expansion and contraction of tubes during operation.
Intermediate tube supports are to be provided on all coils 48” and longer fin length. Coil casing on top and bottom of coils are to have double-flange construction, allowing for vertical stacking of coils.
All coils are to be brazed with minimum 5% silver content (BCup-3) filler material to insure joint integrity.
Coils shall be tested at 550 psig using dry nitrogen, submerged under water. Dual-operator verification shall determine that all coils are leak-free.

Coils shall be shipped with nitrogen charge to verify leak-free integrity, and to prevent moisture migration into coil.
Coils shall be certified to withstand 750 psig working pressure.

REFRIGERATION COMPRESSORS

Compressors shall be either hermetic or semi-hermetic type.

A) Semi-Hermetic- Semi-hermetic reciprocating compressors shall be provided on systems with total cooling capacity of 25 Tons and larger. Up to 40 tons a single compressor will be used and multiple semi-hermetic compressors over 40 Tons. Compressors shall be completely factory assembled, piped, insulated, internally wired and tested. Units shall be shipped in one piece and come fully charged with refrigerant and filled with compressor oil. Units shall be rated in accordance with ARI standards. The refrigerant system shall be leak tested, evacuated and refrigerant charged at the factory. Compressors shall be suction gas cooled and come with integral spring vibration isolators, oil level sight glass, discharge mufflers, vibrasorbers, automatic reversible oil pump, oil filter screen. Oil charging valve, crankcase heater which de-energizes during compressor operation, liquid line service valves. Unit shall also have the following safety control features:
   - Low pressure cutout
   - High pressure cutout, manual reset
   - Adjustable low ambient lockout
   - Liquid line solenoids incorporating pump down system
   - Anticycling time device (to prevent excessive cycling and premature wear on compressor and contactors) and phase and brownout protection.
   - Oil failure control

   Provide cylinder suction pressure unloaders for capacity control, with minimum steps required to provide coil frost protection, based on refrigerant circuit suction temperatures. Provide filter dryers, sight glasses and compressor service valves for each individual compressor. Provide hot gas bypass for each compressor. Compressor staging to be provided by a Honeywell T775 Series standalone controller mounted in the unit.

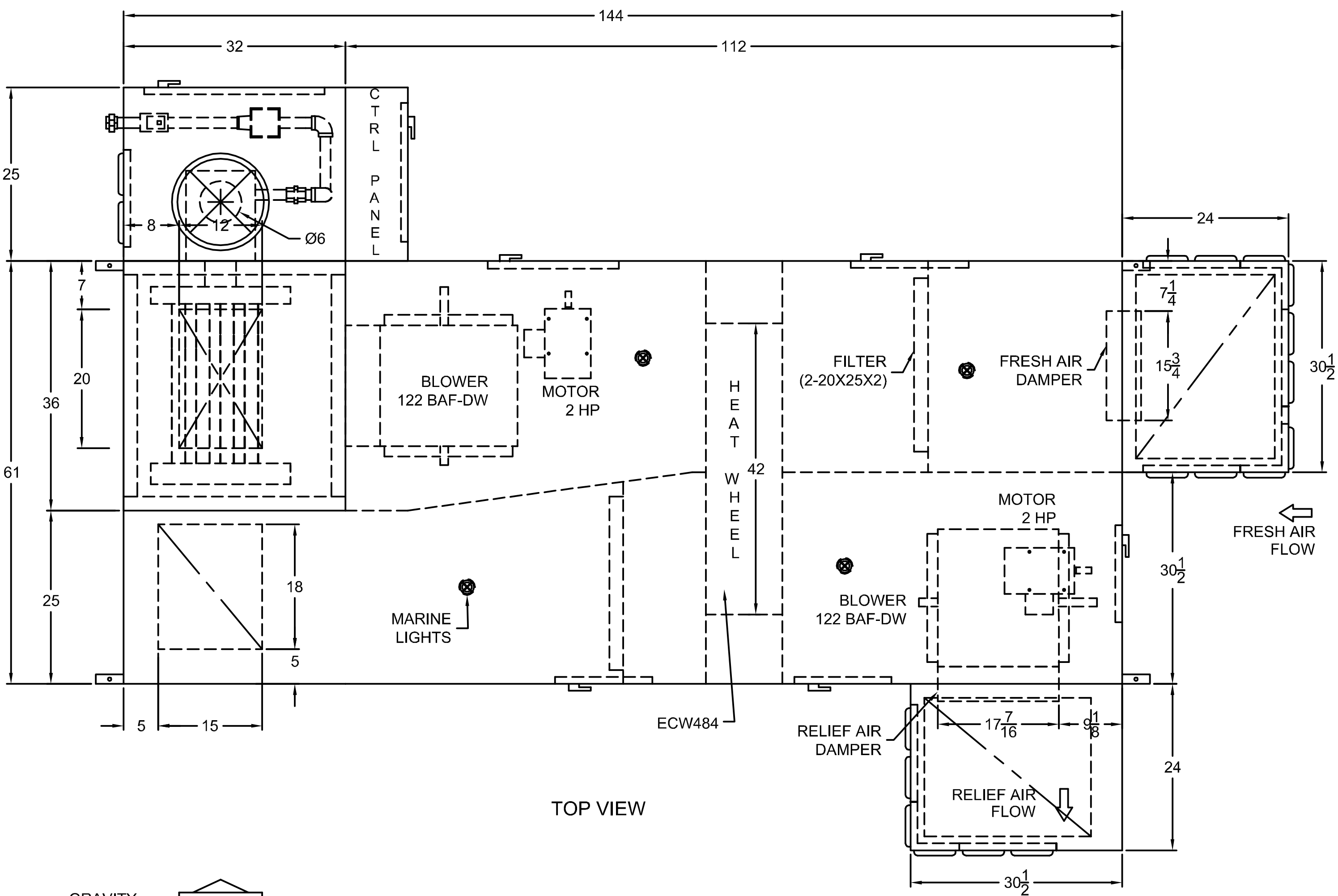
B) Hermetic compressors- Compressors shall be set on resilient neoprene mounts and complete with line voltage break internal overload protection, internal pressure relief valve and crankcase heater. Each unit shall have a minimum of two compressors. Whereby a unit utilizing two compressors the first stage compressor must be a digital scroll operating with a Emerson EC3 series stand-alone superheat controller with a built in synchronization control for the digital scroll. Unit will provide a turndown on cooling. Multiple refrigeration circuits shall be separate from each other. Refrigeration circuits shall be complete with liquid line filter-driers, and service ports fitted with Schraeder fittings. Units shall incorporate load compensated thermal expansion valves with external equalizers (electronic expansion valves on digital systems) and combination sight glass moisture indicators. System charge will be designed for 10 degrees Fahrenheit. Each system shall be factory run and adjusted prior to shipment. Controls shall include:
   - Compressor motor contactors
   - Overload protection control

- Cooling relays
- Ambient compressor lockout
- Dual pressure controls
- Anti-cycle timers
- Hot gas bypass on lead compressor to maintain adequate suction pressure in the event of low loads
(only when digital scrolls are not being used)

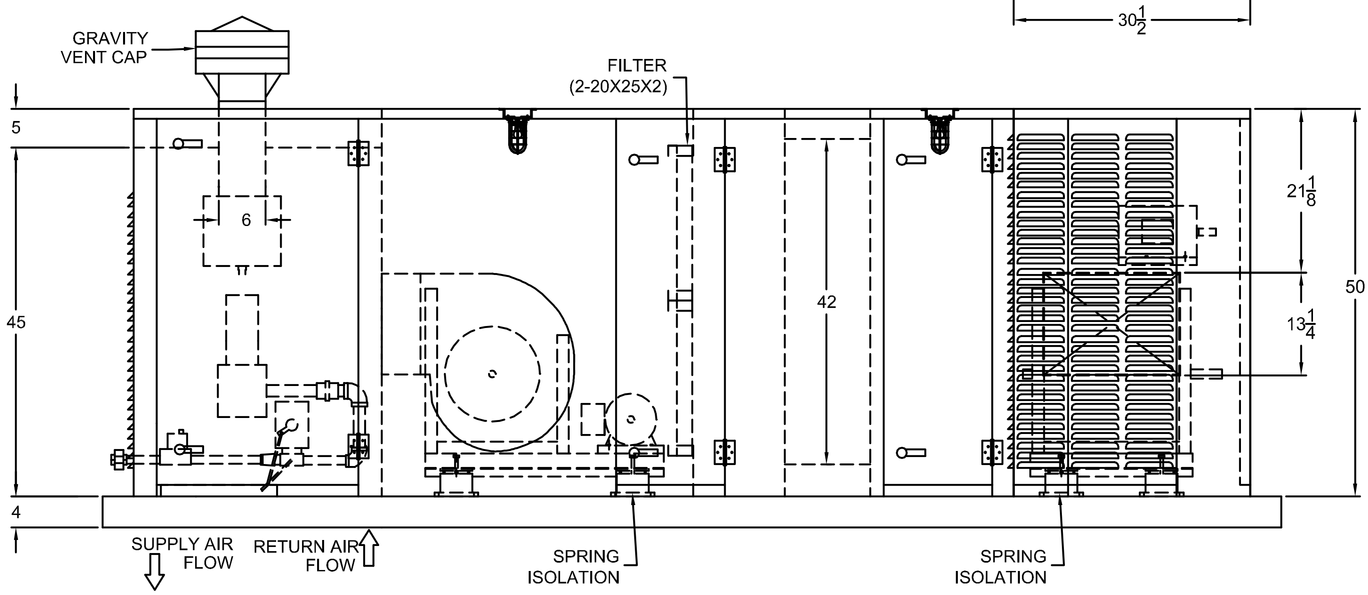
Packaged units shall operate down to 50 degrees Fahrenheit as standard. Minus 40 refrigeration systems are available as an option. Compressors shall be located on the side of the unit in a service enclosure complete with hinged access doors.

HEAT WHEEL

The energy recovery enthalpy wheel shall be ARI certified and carry the official ARI certification stamp. The wheel shall be constructed of corrugated synthetic fibrous media, with a desiccant intimately bound and uniformly and permanently dispersed throughout the matrix structure of the media. Rotors with desiccants coated, bonded, or synthesized onto the media are not acceptable due to the delamination or erosion of the desiccant material. Media shall be synthetic to provide corrosion resistance and resistance against attacks from laboratory chemicals present in pharmaceutical, hospital, etc. environments as well as attack from external outdoor air conditions. Coated aluminum is not acceptable. Face flatness of the wheel shall be maximized (+/- 0.032 in) in order to minimize wear on inner seal surfaces and to minimize cross leakage. Rotor shall be constructed of alternating layers of flat and corrugated media. Wheel construction shall be fluted or formed honeycomb geometry so as to eliminate internal wheel bypass. Wheel layers that can be separated or spread apart by airflow are unacceptable due to the possibility of channeling and performance degradation. The media shall be in accordance with NFPA or UL guidelines. The minimum acceptable performance shall be as specified in the drawing/submittals. The desiccant material shall be a 4A molecular sieve to minimize cross contamination. Silica gel and other pore size desiccants are not acceptable due to the possibility of cross contamination introduced by desiccant adsorption. The wheel frames shall consist of evenly spaced galvanized steel spokes, galvanized steel outer band and rigid center hub. The wheel shall allow for post fabrication wheel alignment. The wheel seals shall be a neoprene bulb seals or equivalent. Seals should be easily adjustable. Cassettes shall be fabricated of heavy duty reinforced galvanized steel. Cassettes shall have a built in adjustable purge section minimizing cross contamination of supply air. Bearings shall be inboard, zero maintenance, permanently sealed roller bearings, or alternatively, external flanged bearings. Drive systems shall consist of fractional horsepower AC drive motors with multi-link drive belts.



TOP VIEW



SIDE VIEW

NOTE:

1. 1 1/2 INLET AND DISCHARGE FLANGES.
2. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED.
   RECOMMENDED CLEARANCE 24 INCHES

DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.

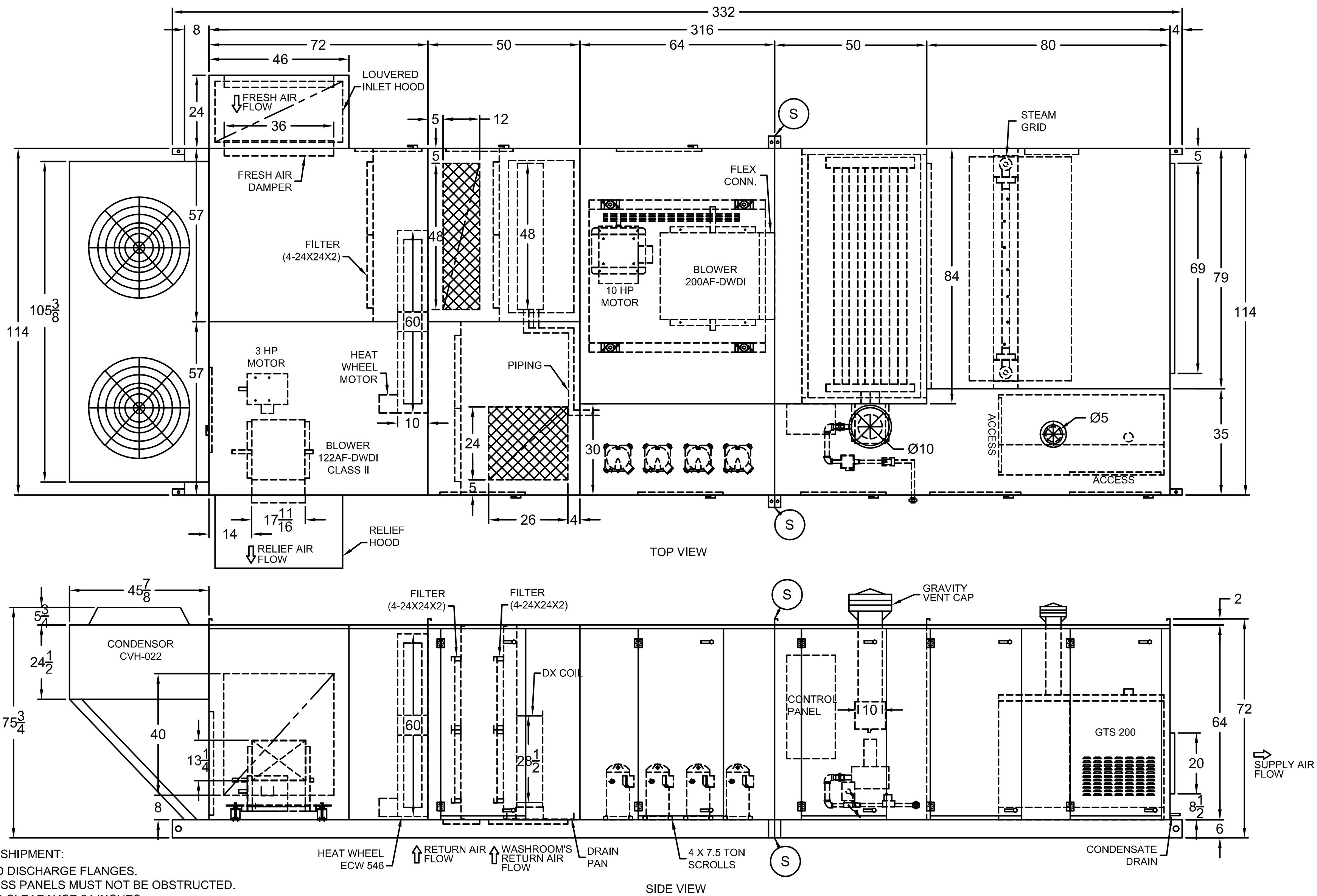
ICE WESTERN
HTDM SERIES

Rev	By	Revision Description	Date

TITLE

HTDM 200/ECW 364 HORIZ. CONFIG. GRAVITY VENTED OUTDOOR UNIT c/w FLAT FILTER, HEAT WHEEL, EXHAUST FAN AND LOUVERED INLET

DRAWN BY	ISSUED BY	SCALE	DRW. NO.	
JR		1:23	60-26201	
CHK. BY	DATE		JOB NO.	PAGE
				E-39



NOTE:

(S) SPLIT FOR SHIPMENT:

1. 1 1/2 INLET AND DISCHARGE FLANGES.
2. SERVICE ACCESS PANELS MUST NOT BE OBSTRUCTED.
   RECOMMENDED CLEARANCE 24 INCHES.

DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.

Rev	By	Revision Description	Date

WESTERN
HTDM SERIES

TITLE				
HTDM 1000 HORIZ. CONFIG. GRAVITY VENTED OUTDOOR UNIT c/w FLAT FILTER, HEAT WHEEL, DX COIL, CONDENSING UNIT, AND LOUVERED INLET				
DRAWN BY JR	ISSUED BY	SCALE 1:46	DRW. NO. 60-27497	
CHK. BY	DATE		JOB NO.	PAGE E-40