

ECS Direct Fired Evaporative Cooling System

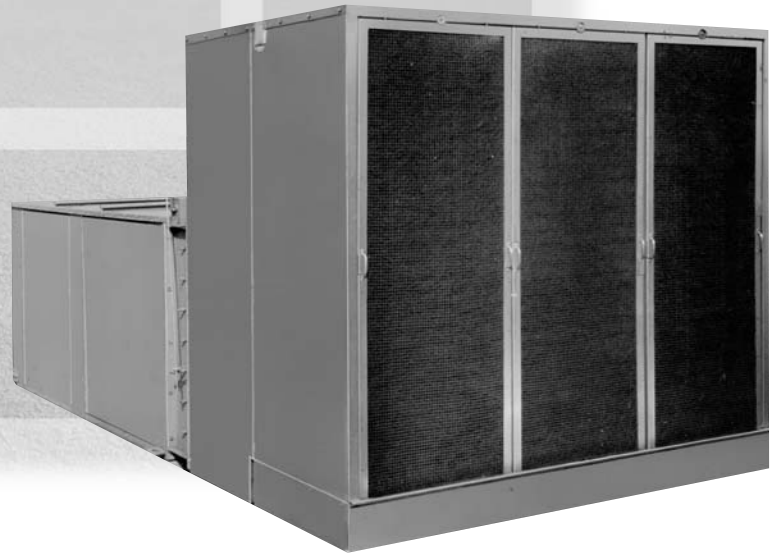
Technical Guide for:

Outdoor Mounted Units
To 100,000 CFM

Applied Air

Keeps You

Warm



Applied Air



• ECS Direct Fired
• Evaporative Cooling System
• Technical Guide



Applied Air

In the business of commercial and industrial operations, efficient and low-cost heating is essential. Applied Air keeps you warm for less.

Since 1975, Applied Air has been providing cost-effective, reliable gas heating solutions. Our proven Direct Fired Evaporative Cooling System adds cool, fresh and clean air to your work environment for greater comfort and productivity. With evaporative cooling modules you now have year-round performance.

This Technical Guide will help you choose an Applied Air Direct Fired Evaporative Cooling System to provide efficient, cost-effective make up air for your kitchen, warehouse, factory or process operation. The Guide covers:

- Technical Specifications — Configure the right system components (e.g., motors, drive, filter, options, etc.) to meet your needs.
- Installation Information — Plan details of on-site installation with dimensional information, unit weights and cabinet arrangement diagrams.

If you have questions, please contact Applied Air's Customer Service Department at 214-638-6010. We'll be glad to help.

Applied Air

Keeps You

Warm

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Evaporative Cooling



The Latest In Cooling Technology

In many types of industries where efficient, low cost make-up air is essential, Applied Air has been the word for experience, reliability and innovation. Now Applied Air adds the benefits of evaporative cooling to the already popular and versatile Model DFC make-up air unit.

Applied Air has the facilities, resources and people to assure Leadership and Quality in research and development, design and engineering, manufacturing and service. The Turbocell/ Turbospray series evaporative coolers reflect our high quality standards and our commitment to leadership.

Add to this the professional planning assistance provided by Applied Air. We work with architects, engineers, building owners and plant managers to help select the right equipment, analyze the best way to install it and back it up with service.

How The Evaporative Cooler Works

Whenever water is evaporated, heat is absorbed. Wet the back of your hand, then blow on it. The skin surface is immediately cooler. This demonstrates the basic principle of evaporative cooling.

The Turbocell works by drawing outside air through a uniquely designed cross-fluted media. Due to its internal geometry, a turbulent mist of air and water is created which optimizes heat transfer. An air washing effect is also created which removes most dust and dirt from the air stream before the air flows into the work area providing a clean, cool environment.

The Turbospray works by drawing outside air through a pre-cooling filter before it meets a virtual wall of water created by the water spray system. The air is cleaned and cooled using the natural way of evaporation. The air then passes through the primary cooling and eliminator filters where dust, dirt and entrained moisture are removed before the air flows into the work area providing a clean, cool environment.

Benefits Of Evaporative Cooling

Cooling without the cost of refrigeration and ozone destroying CFC refrigerants . . . Cooling nature's way, with water, eliminates the cost of expensive refrigeration systems and reduces operating and maintenance costs. Installation is simple and inexpensive.

Big Space or Small

You can cool a small area or a big plant. With capacities from 5,000 to 100,000 CFM you have the flexibility to put cool air right where you want it. Air changes can be planned for one every 30 seconds to one every five minutes (12 to 120 times per hour) - depending on climate conditions and operational requirements.

Comfort Anywhere

On a humid day in New Orleans the Turbocell can reduce the 93°F air to a relatively cool 70°-80°F. In drier Tucson, 104°F outside air can be brought down 30°F. The hotter and drier the air, the greater the reduction in temperature. That means maximum comfort when you need it most.

Ventilation

Fresh air ventilation is available anytime by just turning off the water spray system. The DFC blower continues to operate, pumping and back it up with service.

Why Evaporative Cooling is Comfortable

Lowers Temperature

The DFC pumps in cool air, lowering room temperature.

Lowers The Temperature You Feel

The rapid moving air produced by the DFC increases skin surface evaporation. This results in effective cooling, meaning people feel 3 to 5 degrees cooler than the temperature read from a thermometer.

Carries Away Radiated Heat

A constant flow of cool air removes heat from the work place, leaving the area more comfortable.

Fresh Air

The DFC provides fresh, revitalizing air, forcing stale air out.

Cleans Air

The Turbocell/Turbospray system cleans air by removing dust, dirt, pollen and foreign matter, creating a more refreshing environment.

Evaporative Cooling



Turbocell Features

A) Cooling Media

The media, with its unique cross-fluted design, not only offers a higher cooling efficiency (up to 90% in the 400 fpm range with Turbodek, or slightly higher with Fiberdek, but is also more durable. Its self-cleaning action extends the life span years beyond that of most conventional media. Optional Fiberdek is U.L. approved with a U.L. 900, Class 2 rating.

B) Optional Maxaire Prefilter

Keeps bugs out, reduces odor-producing algae by keeping out sunlight, and helps minimize the accumulation of dust, dirt and other airborne particles in the water tank.

C) Washer Cabinet and Water Pan

Construction of 304 Stainless Steel

D) Float Operated Valve

3/8"; Maintains water level in tank; Parts are corrosion-resistant and replaceable.

E) Bleed-off Valve

1/4"; Manually adjustable; Brass construction; Reduces mineral buildup; Helps prevent media clogging, thus extending media life.

F) Water Distribution Manifold

Heavy-duty PVC with metered orifices and removable end caps for easy cleaning.

G) Bottom Drain

Drain pan is cross broke to center with stainless steel nipple welded in place to allow complete drainage of water pan.

H) Water Regulator Valve

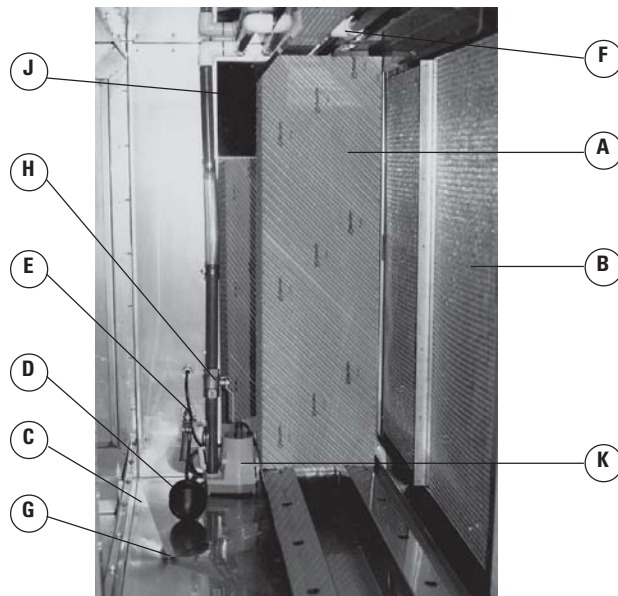
Brass construction; Water flow can be field set.

J) Access Panel

Full size side panel provides easy access to pump, float valve, water regulator valve and cooling media so it can be easily removed.

K) Pump

Submersible, centrifugal, U.L. listed, dielectric oil-filled motor, lubricated for life. Lightweight and compact with strainer to prevent clogging. Available for 115V, single-phase operation.



Evaporative Cooling

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Turbospray Features

Triple-Filter Action

Maxaire filters are durable, permanently fire retardant, and carry full U.L. approval, Class 2. They are latex coated, treated with an active bacteriostat, housed in 304 stainless steel frames, will not sag or wear thin, and are easily removable. Maxaire filters soften when wet and do not decay or rot out as aspen wood filters do. When the unit is off, the filters dry instead of remaining wet and promoting rust.

A) Eliminator Filter

Traps entrained moisture. Water is evaporated or returned to sump.

B) Primary Cooling Filter

Most of the cooling takes place here.

C) Pre-Cooling Filter

Keeps bugs, dust, dirt, and other airborne particles out of the water compartment. Reduces odor-producing algae by keeping out sunlight. Aids evaporative action.

D) Washer Cabinet

G-90 bright spangled galvanized steel, rigid construction, corrosion-resistant enamel finish.

E) Float Operated Valve

Maintains water level in tank. Brass construction; Parts are corrosion-resistant and replaceable.

F) Water Pan

304 Stainless Steel; Field replaceable.

G) Water Spray Regulator Valve

Brass construction; Water spray volume can be field set.

H) Bleed-Off Valve

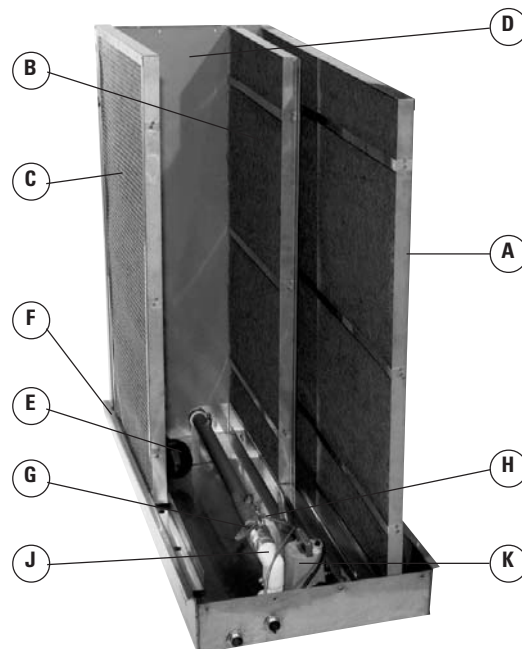
Reduces mineral build up; Helps prevent nozzle clogging.

J) Water Spray Manifold

Heavy-duty PVC, Brass 95° spray nozzles.

K) Pump

Submersible, centrifugal, U.L. listed, dielectric oil-filled motor, lubricated for life. Lightweight and compact with strainer to prevent clogging. Available for 115V, single-phase operation.



Selection Table

TurboCell Selection											
Unit Model	CFM Std. Air @70°	Washer(s) and Face Area	Air Press. Drop "W.C.	Unit Model	CFM Std. Air @70°	Washer(s) and Face Area	Air Press. Drop "W.C.				
DFC 109	1,600	WCD-70 FFA-13.30	0.16	DFC 215	9,000	WCD-130 FFA-20.00	0.32				
	1,800		0.17		9,500		0.34				
	2,000		0.17		10,000		0.36				
	2,250		0.18		10,500		0.38				
	2,500		0.18		11,000		0.41				
	2,750		0.19		12,000		0.45				
	3,000		0.20		13,000		0.50				
DFC 112	3,250		WCD-70 FFA-13.30	0.20	DFC 218	14,000	WCD-210 FFA-32.90	0.31			
	3,500			0.21		15,000		0.32			
	3,750			0.22		16,000		0.35			
	4,000			0.23		17,000		0.37			
	4,250			0.24		18,000		0.40			
DFC 115	4,500			WCD-70 FFA-13.30	0.25	DFC 220		19,000	WCD-300 FFA-49.50	0.44	
	5,000				0.28			20,000		0.46	
	5,500	0.30			21,000			0.49			
	6,000	0.32			22,000			0.32			
DFC 118	5,500	WCD-70 FFA-13.30			0.30	DFC 220		23,000		WCD-300 FFA-49.50	0.33
	7,000				0.38			24,000			0.35
	7,500				0.42			25,000			0.36
	8,000				0.45			26,000			0.38
	8,500				0.49			27,000			0.40
DFC 120	9,000		WCD-100 FFA-17.20		0.38	DFC 222	28,000	WCD-300 FFA-49.50			0.43
	9,500				0.41		29,000				0.45
	10,000				0.44		30,000				0.46
	10,500				0.46		31,000				0.48
	11,000				0.49		32,000				0.50
DFC 122	11,000			WCD-100 FFA-17.20	0.49	DFC 225	36,000		(2)WCD-210 FFA-65.80		0.41
	12,000				0.45		40,000				0.46
	13,000				0.50		44,000				0.32
	14,000				0.31		48,000				0.35
	15,000	0.32			52,000		0.38				
DFC 125	14,000	WCD-210 FFA-32.90			0.31	DFC 230	56,000		(2)WCD-300 FFA-99.00	0.43	
	15,000				0.32		60,000			0.46	
	16,000				0.35		64,000			0.50	
	18,000				0.41		70,000			0.34	
	20,000		0.45		75,000		0.36				
DFC 130	22,000		WCD-300 FFA-49.50		0.32	DFC 233	80,000	(3)WCD-300 FFA-148.50	0.39		
	24,000				0.35		85,000		0.43		
	26,000				0.38		90,000		0.46		
	28,000				0.43		95,000		0.49		
	30,000			0.46	100,000		0.53				

Selection Guide:

- 1) After selecting the DFC model from the current DFC catalog, match the DFC model and CFM to the corresponding TurboCell model and determine static pressure.
- 2) Add the TurboCell static pressure to the DFC to determine the correct motor horsepower.

NOTE: Other models can be packaged with evaporative coolers as well as the DFC. Please contact the factory.

Selection Table

Turbospray Selection							
Unit Model	CFM Std. Air @70°	Washer(s) and Face Area	Air Press. Drop "W.C.	Unit Model	CFM Std. Air @70°	Washer(s) and Face Area	Air Press. Drop "W.C.
DFC 109	1,600	WDM-550 FFA-14.10	0.18	DFC 215	9,000	WDM-1250 FFA-21.80	0.56
	1,800		0.19		9,500		0.61
	2,000		0.20		10,000		0.66
	2,250		0.21		10,500		0.71
	2,500		0.23		11,000		0.76
	2,750		0.24		12,000		0.88
	3,000		0.26		WDM-1550 FFA-34.00		DFC 218
3,250	0.28	14,000	0.56				
3,500	0.30	15,000	0.62				
3,750	0.32	16,000	0.68				
4,000	0.34	17,000	0.75				
4,250	0.37	18,000	0.82				
4,500	0.39	WDM-2050 FFA-46.10	DFC 220	19,000		0.56	
5,000	0.45			20,000	0.60		
5,500	0.52			21,000	0.65		
6,000	0.58			22,000	0.70		
DFC 115	5,500			0.52	23,000	0.75	
	7,000			0.74	24,000	0.80	
	7,500			0.58	25,000	0.47	
	8,000	0.64	26,000	0.50			
DFC 118	8,500	WDM-750 FFA-17.70	0.70	DFC 222	27,000	(2)WDM-1550 FFA-68.00	0.53
	9,000		0.77		28,000		0.56
	9,500		0.61		29,000		0.59
	10,000		0.66		30,000		0.62
DFC 120	10,500	WDM-1250 FFA-21.80	0.71	DFC 225	31,000	(2)WDM-2050 FFA-92.20	0.65
	10,500		0.76		32,000		0.68
	11,000		0.76		36,000		0.82
	12,000		0.88		40,000		0.60
	13,000		0.50		44,000		0.70
DFC 122	14,000	WDM-1550 FFA-34.00	0.56	DFC 230	48,000	(3)WDM-2050 FFA-138.30	0.80
	15,000		0.62		52,000		0.49
	14,000		0.56		56,000		0.54
	15,000		0.62		60,000		0.60
	16,000		0.68		64,000		0.66
DFC 125	18,000	WDM-2050 FFA-46.10	0.82	DFC 233	70,000	Contact Factory	0.76
	20,000		0.60		75,000		0.86
	22,000		0.70		80,000		CF
	24,000		0.80		85,000		CF
DFC 130	26,000	Contact Factory	CF	DFC 240	90,000	CF	
	28,000		CF		95,000	CF	
	30,000		CF		100,000	CF	

Selection Guide:

- 1) After selecting the DFC model from the current DFC catalog, match the DFC model and CFM to the corresponding Turbospray model and determine static pressure.
- 2) Add the Turbospray static pressure to the DFC to determine the correct motor horsepower.

NOTE: Other models can be packaged with evaporative coolers as well as the DFC. Please contact the factory.

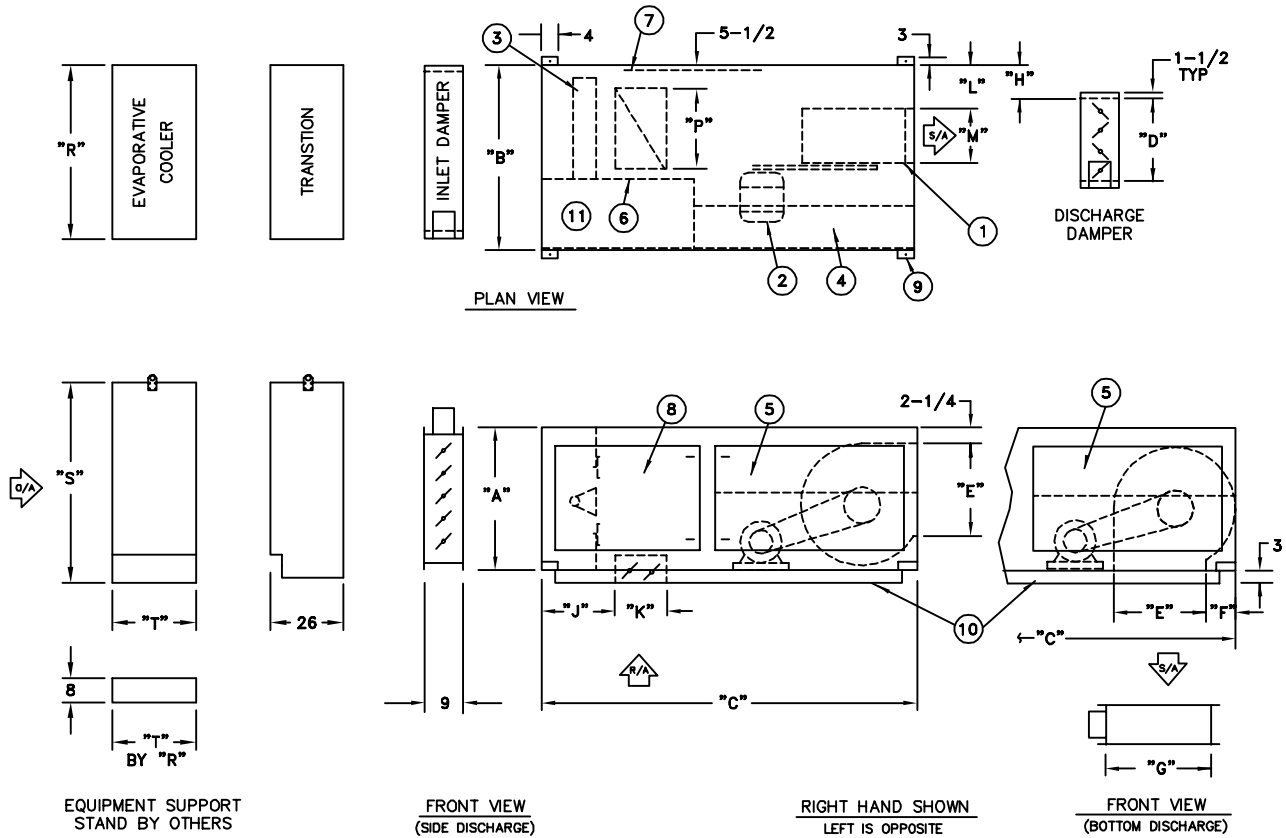
Dimensions

DFC-109 Through 118 to WCD-70

C000530

UNIT COMPONENTS

- | | | | |
|---------------------------|---------------------------------------|-------------------------------------|--------------------------|
| 1. Centrifugal supply fan | 4. Control cabinet | 7. Access door | 10. Unit base |
| 2. Fan motor | 5. Hinged control cabinet access door | 8. Access door (piping compartment) | 11. Manifold compartment |
| 3. Line burner | 6. Observation port | 9. Lifting lug | |



Model	Dimensions							
	A	B	C	D	E	F	G	H
DFC-109	36	52	77	17 ¹³ / ₁₆	10 ³ / ₈	15 ¹ / ₈	14 ⁷ / ₁₆	14 ⁷ / ₁₆
DFC-112	36	52	77	17 ¹³ / ₁₆	13 ⁹ / ₁₆	13 ⁹ / ₁₆	14 ⁷ / ₁₆	14 ⁷ / ₁₆
DFC-115	36	52	77	23 ¹⁵ / ₁₆	16	12 ³ / ₈	19 ⁷ / ₈	8 ⁵ / ₈
DFC-118	36	52	77	23 ¹⁵ / ₁₆	19	12 ³ / ₈	19 ⁷ / ₈	6 ¹⁵ / ₁₆
Model	Dimensions							
	J	K	L	M	P	R	S	T
DFC-109	19	14 ¹ / ₄	14 ¹ / ₂	11 ¹⁵ / ₁₆	27 ³ / ₄	50	50	30
DFC-112	19	14 ¹ / ₄	12 ¹ / ₂	15 ¹⁵ / ₁₆	27 ³ / ₄	50	50	30
DFC-115	19	14 ¹ / ₄	11 ¹ / ₈	18 ¹⁵ / ₁₆	27 ³ / ₄	50	50	30
DFC-118	19	14 ¹ / ₄	7 ⁷ / ₈	22 ¹ / ₁₆	27 ³ / ₄	50	50	30

NOTE: All dimensions in inches subject to manufacturing tolerances.

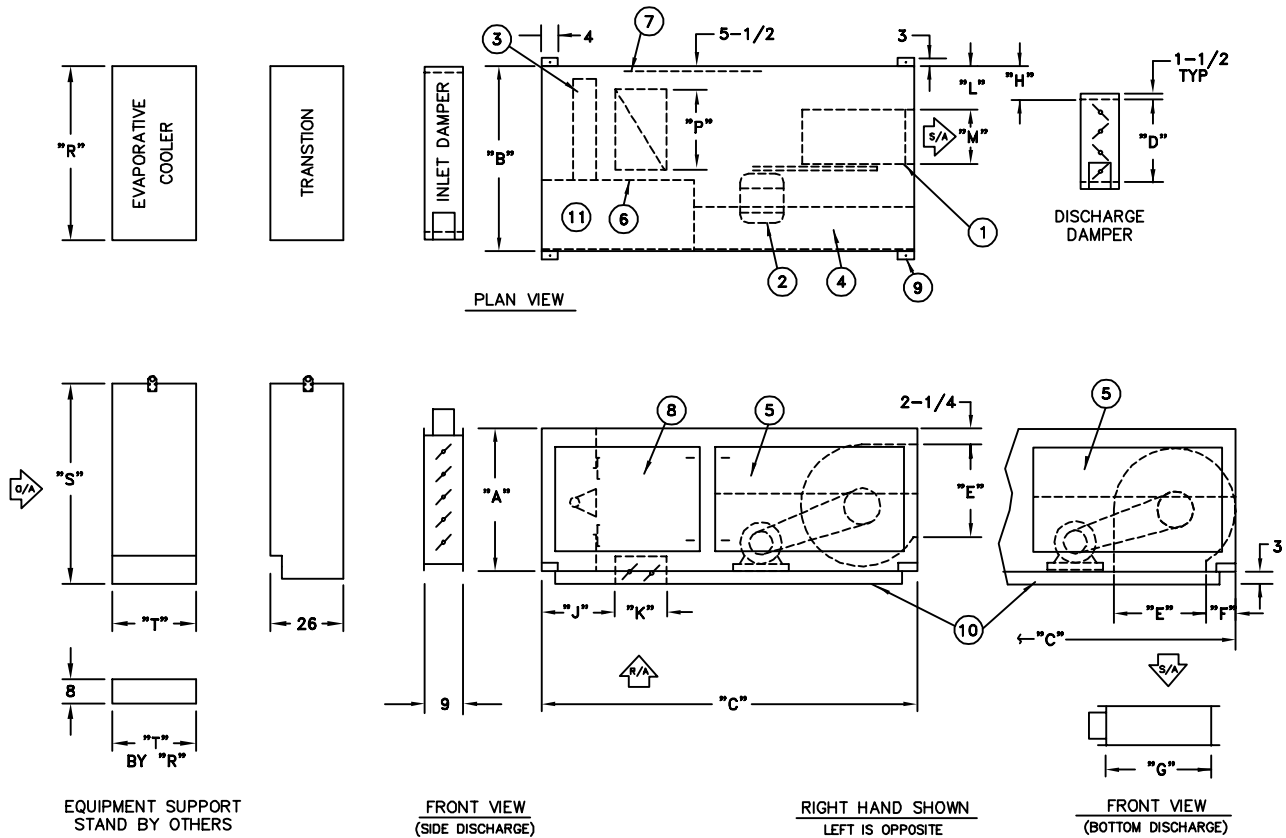
Dimensions

DFC-109 Through 118 to WDM-550

C000530

UNIT COMPONENTS

- | | | | |
|---------------------------|---------------------------------------|-------------------------------------|--------------------------|
| 1. Centrifugal supply fan | 4. Control cabinet | 7. Access door | 10. Unit base |
| 2. Fan motor | 5. Hinged control cabinet access door | 8. Access door (piping compartment) | 11. Manifold compartment |
| 3. Line burner | 6. Observation port | 9. Lifting lug | |



Model	Dimensions							
	A	B	C	D	E	F	G	H
DFC-109	36	52	77	17 ¹³ / ₁₆	10 ³ / ₈	15 ¹ / ₈	14 ⁷ / ₁₆	14 ⁷ / ₁₆
DFC-112	36	52	77	17 ¹³ / ₁₆	13 ⁹ / ₁₆	13 ⁹ / ₁₆	14 ⁷ / ₁₆	14 ⁷ / ₁₆
DFC-115	36	52	77	23 ¹⁵ / ₁₆	16	12 ³ / ₈	19 ⁷ / ₈	8 ⁵ / ₈
DFC-118	36	52	77	23 ¹⁵ / ₁₆	19	12 ³ / ₈	19 ⁷ / ₈	6 ¹⁵ / ₁₆
Model	Dimensions							
	J	K	L	M	P	R	S	T
DFC-109	19	14 ¹ / ₄	14 ¹ / ₂	11 ¹⁵ / ₁₆	27 ³ / ₄	50	50	22 ¹ / ₂
DFC-112	19	14 ¹ / ₄	12 ¹ / ₂	15 ¹⁵ / ₁₆	27 ³ / ₄	50	50	22 ¹ / ₂
DFC-115	19	14 ¹ / ₄	11 ¹ / ₈	18 ¹⁵ / ₁₆	27 ³ / ₄	50	50	22 ¹ / ₂
DFC-118	19	14 ¹ / ₄	7 ⁷ / ₈	22 ¹ / ₁₆	27 ³ / ₄	50	50	22 ¹ / ₂

NOTE: All dimensions in inches subject to manufacturing tolerances.

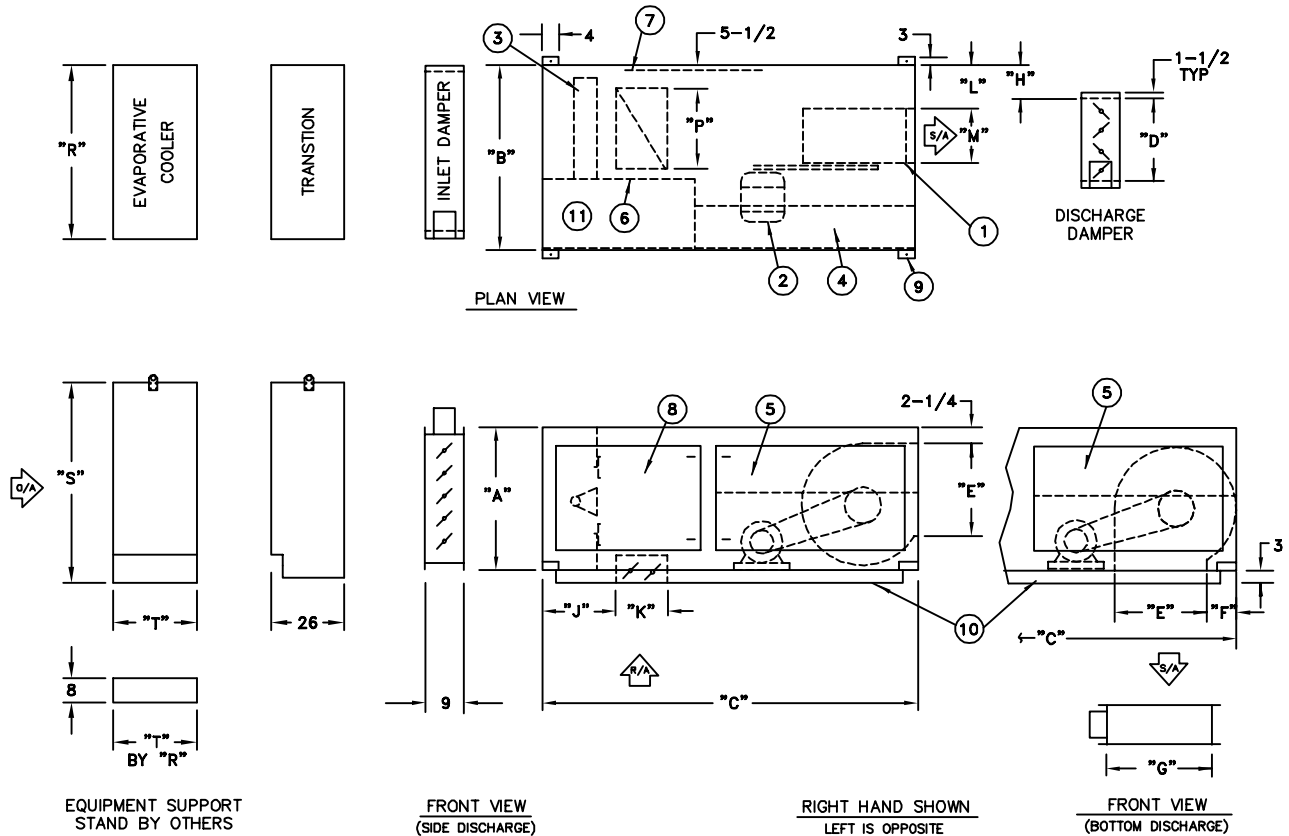
Dimensions

C000530

DFC-118 to WDM-750

UNIT COMPONENTS

- | | | | |
|---------------------------|---------------------------------------|-------------------------------------|--------------------------|
| 1. Centrifugal supply fan | 4. Control cabinet | 7. Access door | 10. Unit base |
| 2. Fan motor | 5. Hinged control cabinet access door | 8. Access door (piping compartment) | 11. Manifold compartment |
| 3. Line burner | 6. Observation port | 9. Lifting lug | |



Model	Dimensions							
	A	B	C	D	E	F	G	H
DFC-118	36	52	77	23 ¹⁵ / ₁₆	19	12 ³ / ₈	19 ⁷ / ₈	16 ¹⁵ / ₁₆
Model	Dimensions							
	J	K	L	M	P	R	S	T
DFC-118	19	14 ¹ / ₄	7 ⁷ / ₈	22 ¹ / ₁₆	27 ³ / ₄	56	56	22 ¹ / ₂

NOTE: All dimensions in inches subject to manufacturing tolerances.

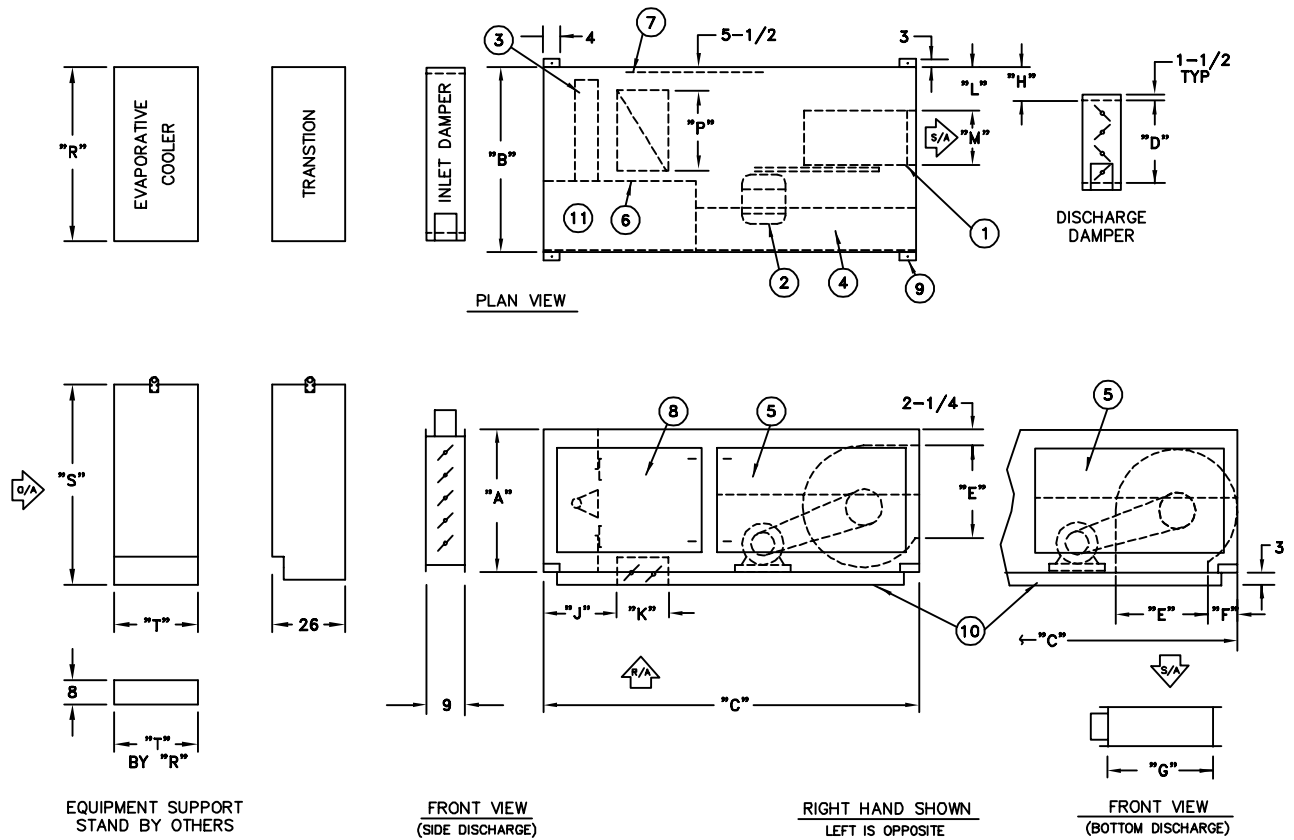
Dimensions

DFC-122 to WCD-130

C000530

UNIT COMPONENTS

- | | | | |
|---------------------------|---------------------------------------|-------------------------------------|--------------------------|
| 1. Centrifugal supply fan | 4. Control cabinet | 7. Access door | 10. Unit base |
| 2. Fan motor | 5. Hinged control cabinet access door | 8. Access door (piping compartment) | 11. Manifold compartment |
| 3. Line burner | 6. Observation port | 9. Lifting lug | |



Model	Dimensions							
	A	B	C	D	E	F	G	H
DFC-122	48	78	96	29 ¹ / ₂	27 ³ / ₈	13 ³ / ₁₆	28 ¹ / ₄	11 ¹³ / ₃₂
Model	Dimensions							
	J	K	L	M	P	R	S	T
DFC-122	19	14 ¹ / ₄	12 ³ / ₈	27 ⁹ / ₁₆	48	60	62	30

NOTE: All dimensions in inches subject to manufacturing tolerances.

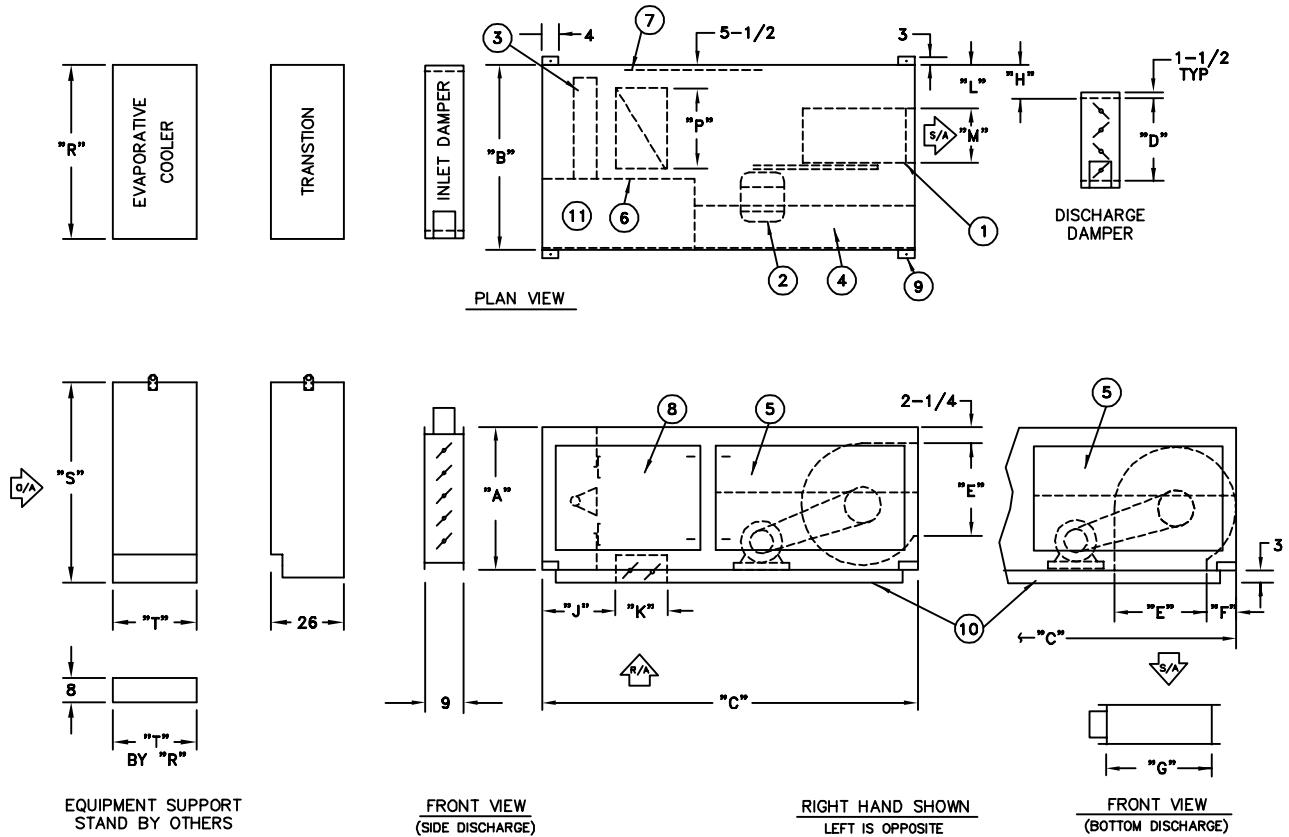
Dimensions

DFC-122 Through 125 to WCD-210

C000530

UNIT COMPONENTS

- | | | | |
|---------------------------|---------------------------------------|-------------------------------------|--------------------------|
| 1. Centrifugal supply fan | 4. Control cabinet | 7. Access door | 10. Unit base |
| 2. Fan motor | 5. Hinged control cabinet access door | 8. Access door (piping compartment) | 11. Manifold compartment |
| 3. Line burner | 6. Observation port | 9. Lifting lug | |



Model	Dimensions							
	A	B	C	D	E	F	G	H
DFC-122	48	78	96	29 ¹ / ₂	27 ³ / ₈	13 ³ / ₁₆	28 ¹ / ₄	11 ¹³ / ₃₂
DFC-125	60	91	96	38 ⁷ / ₈	31 ³ / ₈	17 ⁹ / ₁₆	37 ³ / ₄	11 ¹¹ / ₁₆
Model	Dimensions							
	J	K	L	M	P	R	S	T
DFC-122	19	14 ¹ / ₄	12 ³ / ₈	27 ⁹ / ₁₆	48	75	75	30
DFC-125	12 ⁵ / ₁₆	20 ¹ / ₄	15 ³ / ₈	31 ¹ / ₂	49	75	75	30

NOTE: All dimensions in inches subject to manufacturing tolerances.

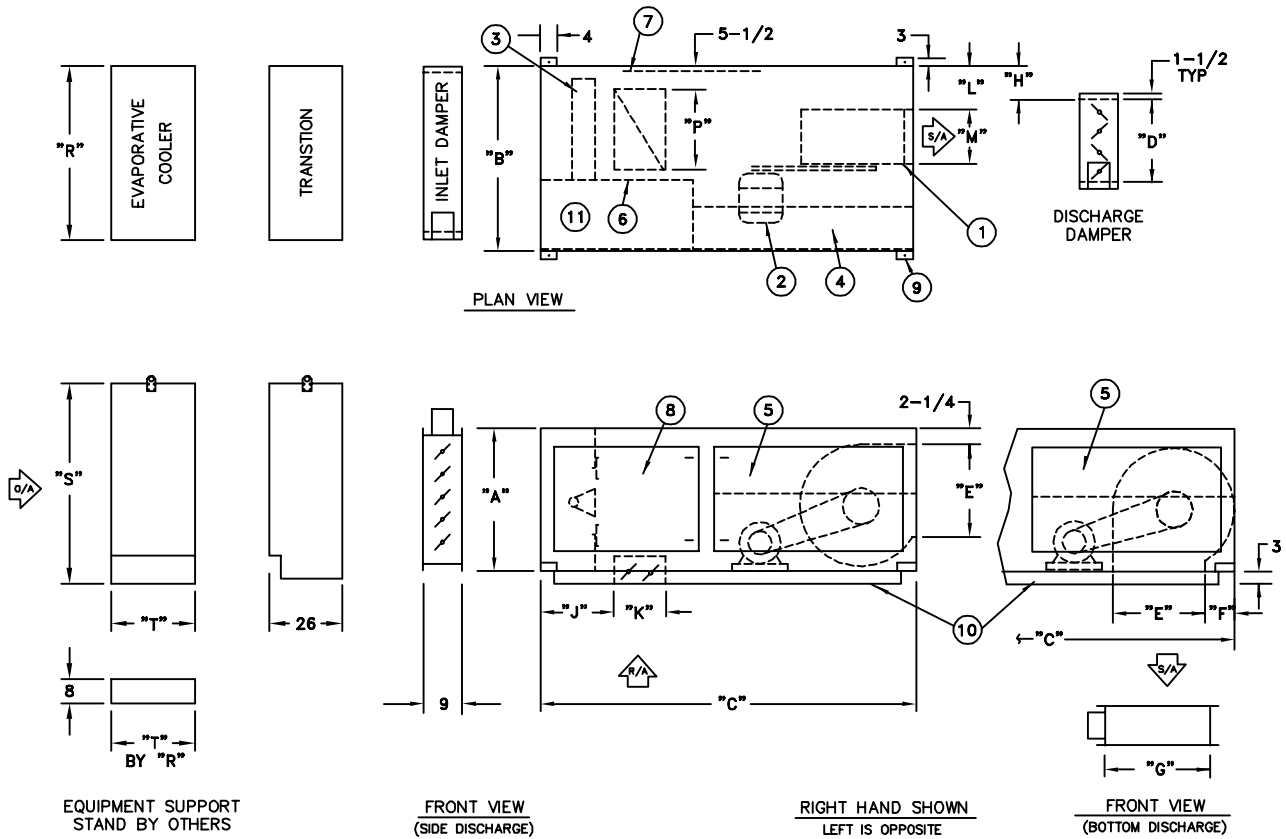
Dimensions

DFC-130 to WCD-300

C000530

UNIT COMPONENTS

- | | | | |
|---------------------------|---------------------------------------|-------------------------------------|--------------------------|
| 1. Centrifugal supply fan | 4. Control cabinet | 7. Access door | 10. Unit base |
| 2. Fan motor | 5. Hinged control cabinet access door | 8. Access door (piping compartment) | 11. Manifold compartment |
| 3. Line burner | 6. Observation port | 9. Lifting lug | |



Model	Dimensions							
	A	B	C	D	E	F	G	H
DFC-130	60	91	96	38 ⁷ / ₈	36 ⁷ / ₈	17 ⁹ / ₁₆	37 ³ / ₄	14 ⁷ / ₁₆
Model	Dimensions							
	J	K	L	M	P	R	S	T
DFC-130	12 ⁵ / ₁₆	20 ¹ / ₄	15 ³ / ₈	37	49	96	86	30

NOTE: All dimensions in inches subject to manufacturing tolerances.

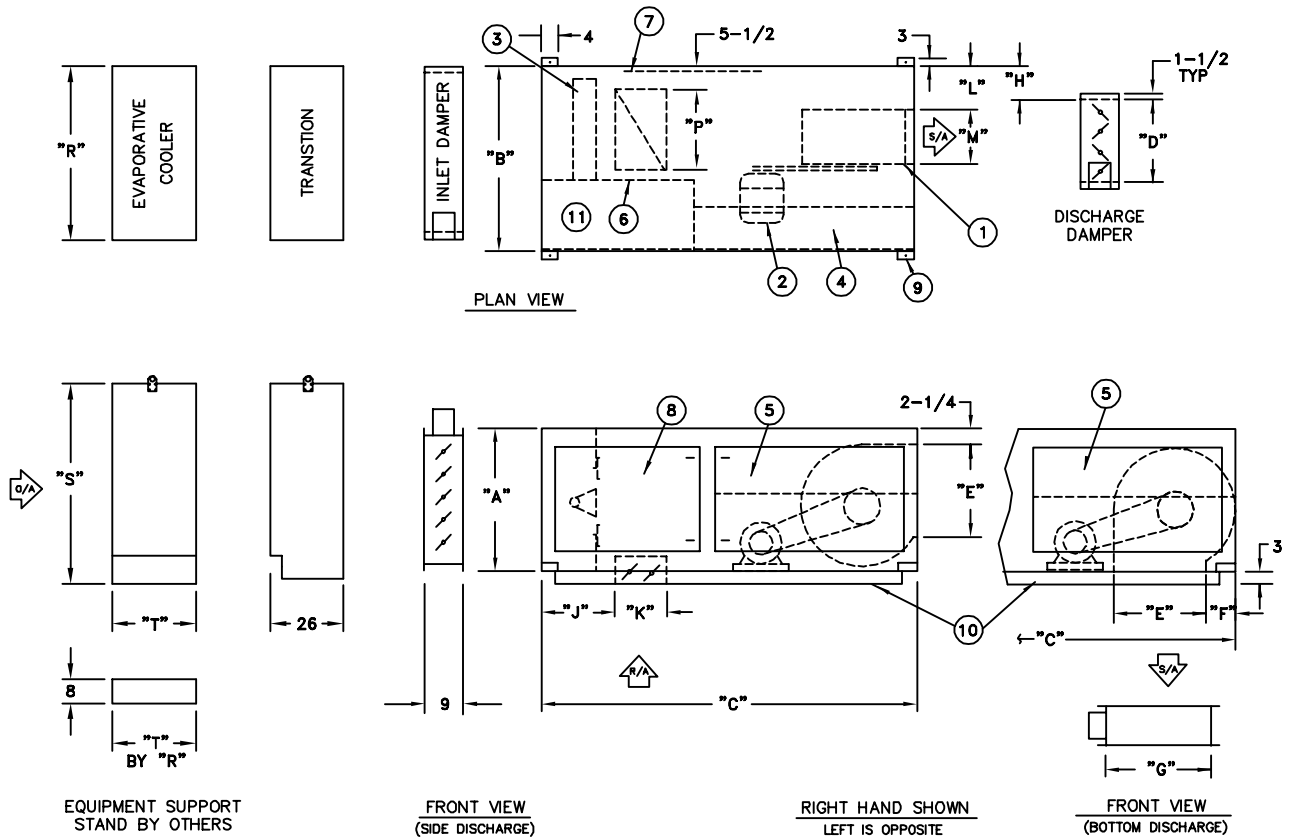
Dimensions

DFC-120 to WDM-750

C000530

UNIT COMPONENTS

- | | | | |
|---------------------------|---------------------------------------|-------------------------------------|--------------------------|
| 1. Centrifugal supply fan | 4. Control cabinet | 7. Access door | 10. Unit base |
| 2. Fan motor | 5. Hinged control cabinet access door | 8. Access door (piping compartment) | 11. Manifold compartment |
| 3. Line burner | 6. Observation port | 9. Lifting lug | |



Model	Dimensions							
	A	B	C	D	E	F	G	H
DFC-120	48	78	96	29 ¹ / ₂	24 ⁷ / ₈	13 ³ / ₁₆	28 ¹ / ₄	10 ⁵ / ₃₂
Model	Dimensions							
	J	K	L	M	P	R	S	T
DFC-120	19	14 ¹ / ₄	12 ³ / ₈	25 ¹ / ₁₆	48	56	56	22 ¹ / ₂

NOTE: All dimensions in inches subject to manufacturing tolerances.

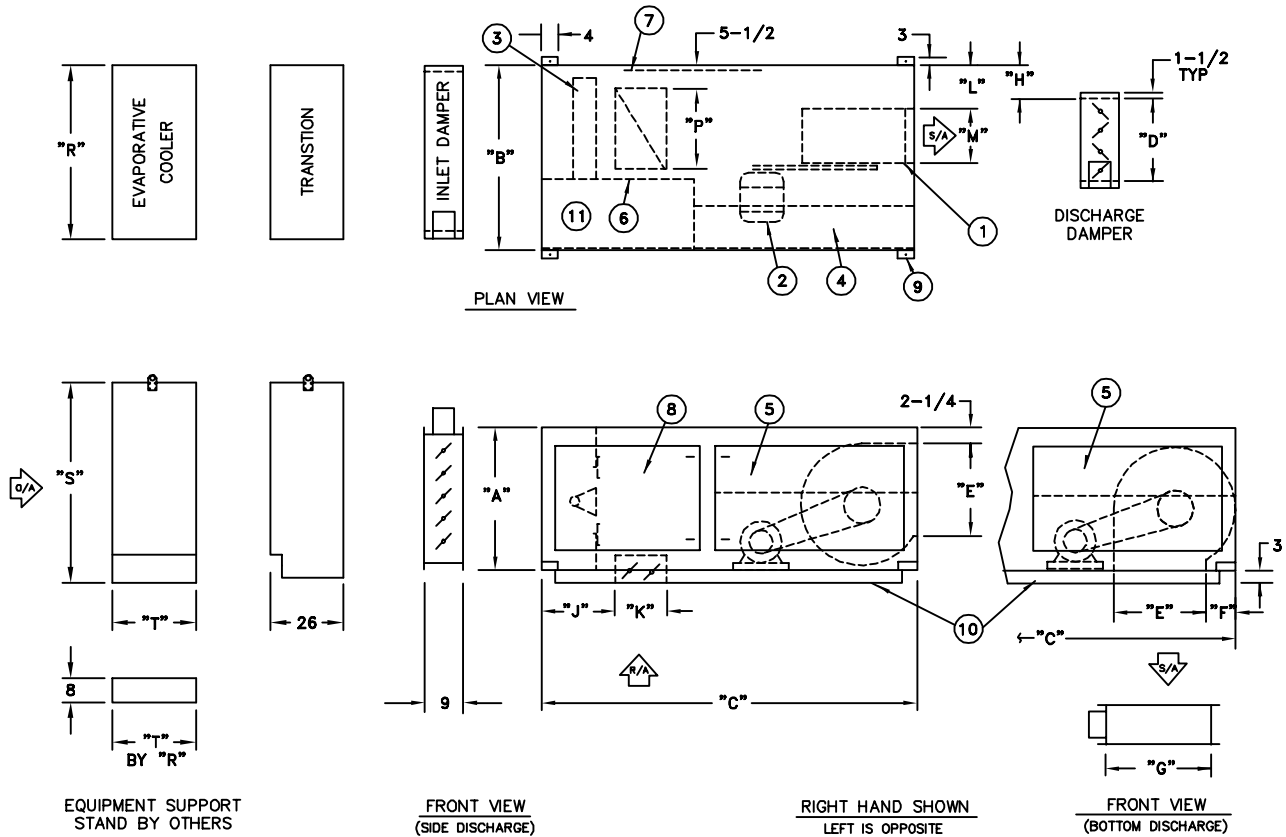
Dimensions

DFC-120 Through 122 to WDM-1250

C000530

UNIT COMPONENTS

- | | | | |
|---------------------------|---------------------------------------|-------------------------------------|--------------------------|
| 1. Centrifugal supply fan | 4. Control cabinet | 7. Access door | 10. Unit base |
| 2. Fan motor | 5. Hinged control cabinet access door | 8. Access door (piping compartment) | 11. Manifold compartment |
| 3. Line burner | 6. Observation port | 9. Lifting lug | |



Model	Dimensions							
	A	B	C	D	E	F	G	H
DFC-120	48	78	96	29 ¹ / ₂	24 ⁷ / ₈	13 ³ / ₁₆	28 ¹ / ₄	10 ⁵ / ₃₂
DFC-122	48	78	96	29 ¹ / ₂	27 ³ / ₈	13 ³ / ₁₆	28 ¹ / ₄	11 ¹³ / ₃₂
Model	Dimensions							
	J	K	L	M	P	R	S	T
DFC-120	19	14 ¹ / ₄	12 ³ / ₈	25 ¹ / ₁₆	48	60	62	22 ¹ / ₂
DFC-122	19	14 ¹ / ₄	12 ³ / ₈	27 ⁹ / ₁₆	48	60	62	22 ¹ / ₂

NOTE: All dimensions in inches subject to manufacturing tolerances.

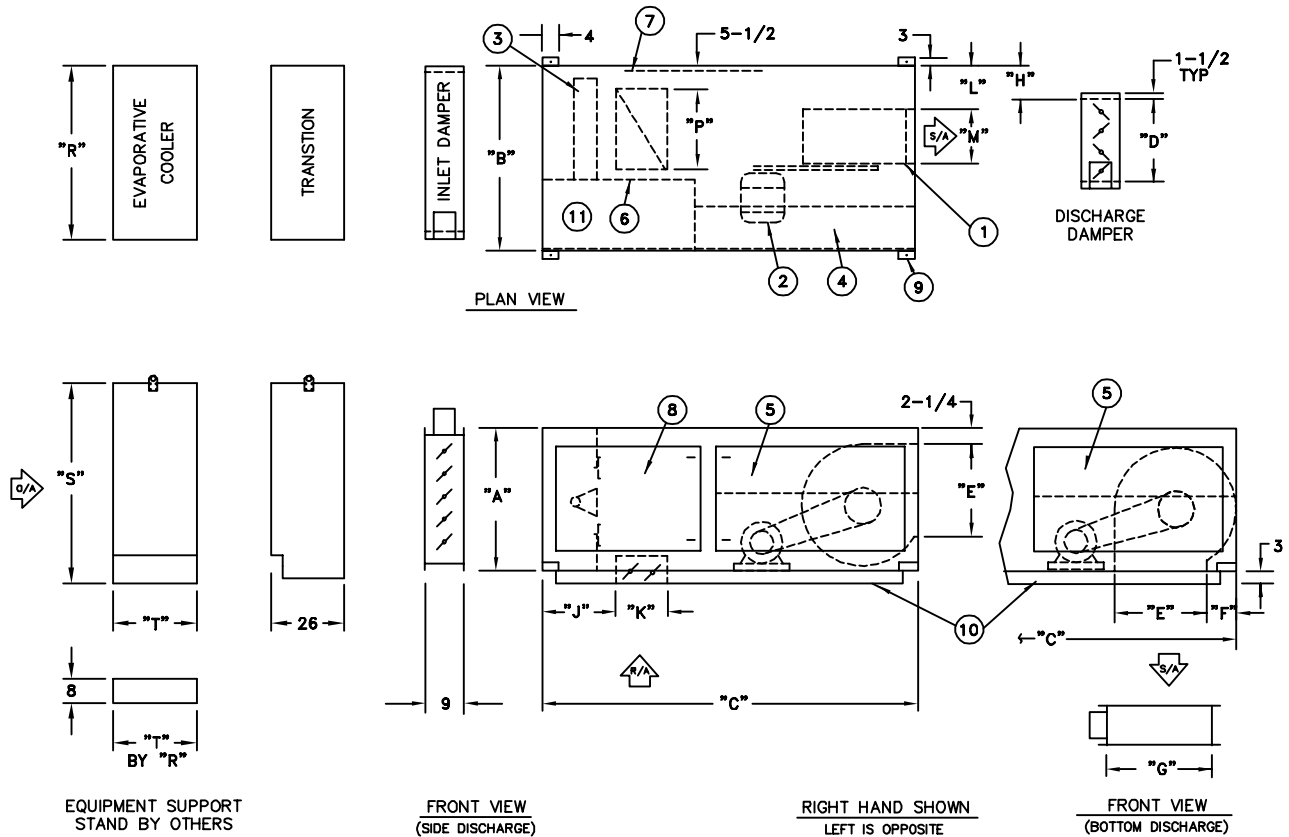
Dimensions

DFC-122 Through 125 to WDM-1550

C000530

UNIT COMPONENTS

- | | | | |
|---------------------------|---------------------------------------|-------------------------------------|--------------------------|
| 1. Centrifugal supply fan | 4. Control cabinet | 7. Access door | 10. Unit base |
| 2. Fan motor | 5. Hinged control cabinet access door | 8. Access door (piping compartment) | 11. Manifold compartment |
| 3. Line burner | 6. Observation port | 9. Lifting lug | |



Model	Dimensions							
	A	B	C	D	E	F	G	H
DFC-122	48	78	96	29 ¹ / ₂	27 ³ / ₈	13 ³ / ₁₆	28 ¹ / ₄	11 ¹³ / ₃₂
DFC-125	60	91	96	38 ⁷ / ₈	31 ³ / ₈	17 ⁹ / ₁₆	37 ³ / ₄	11 ¹¹ / ₁₆
Model	Dimensions							
	J	K	L	M	P	R	S	T
DFC-122	19	14 ¹ / ₄	12 ³ / ₈	27 ⁹ / ₁₆	48	75	75	22 ¹ / ₂
DFC-125	12 ⁵ / ₁₆	20 ¹ / ₄	15 ³ / ₈	31 ¹ / ₂	49	75	75	22 ¹ / ₂

NOTE: All dimensions in inches subject to manufacturing tolerances.

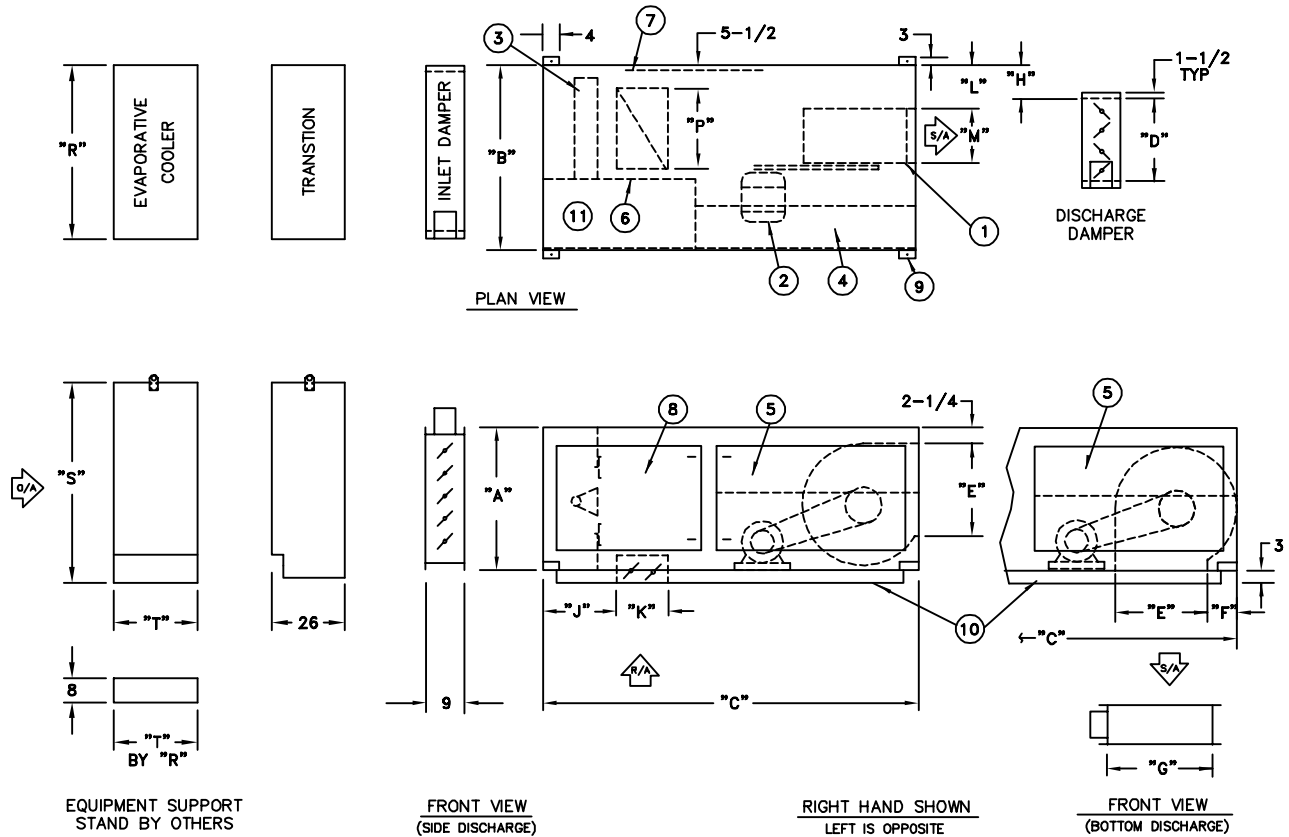
Dimensions

DFC-125 Through 130 to WDM-2050

C000530

UNIT COMPONENTS

- | | | | |
|---------------------------|---------------------------------------|-------------------------------------|--------------------------|
| 1. Centrifugal supply fan | 4. Control cabinet | 7. Access door | 10. Unit base |
| 2. Fan motor | 5. Hinged control cabinet access door | 8. Access door (piping compartment) | 11. Manifold compartment |
| 3. Line burner | 6. Observation port | 9. Lifting lug | |



Model	Dimensions							
	A	B	C	D	E	F	G	H
DFC-125	60	91	96	38 ⁷ / ₈	31 ³ / ₈	17 ⁹ / ₁₆	37 ³ / ₄	11 ¹¹ / ₁₆
DFC-130	60	91	96	38 ⁷ / ₈	36 ⁷ / ₈	17 ⁹ / ₁₆	37 ³ / ₄	14 ⁷ / ₁₆
Model	Dimensions							
	J	K	L	M	P	R	S	T
DFC-125	12 ⁵ / ₁₆	20 ¹ / ₄	15 ³ / ₈	31 ¹ / ₂	49	88	88	22 ¹ / ₂
DFC-130	12 ⁵ / ₁₆	20 ¹ / ₄	15 ³ / ₈	37	49	88	88	22 ¹ / ₂

NOTE: All dimensions in inches subject to manufacturing tolerances.

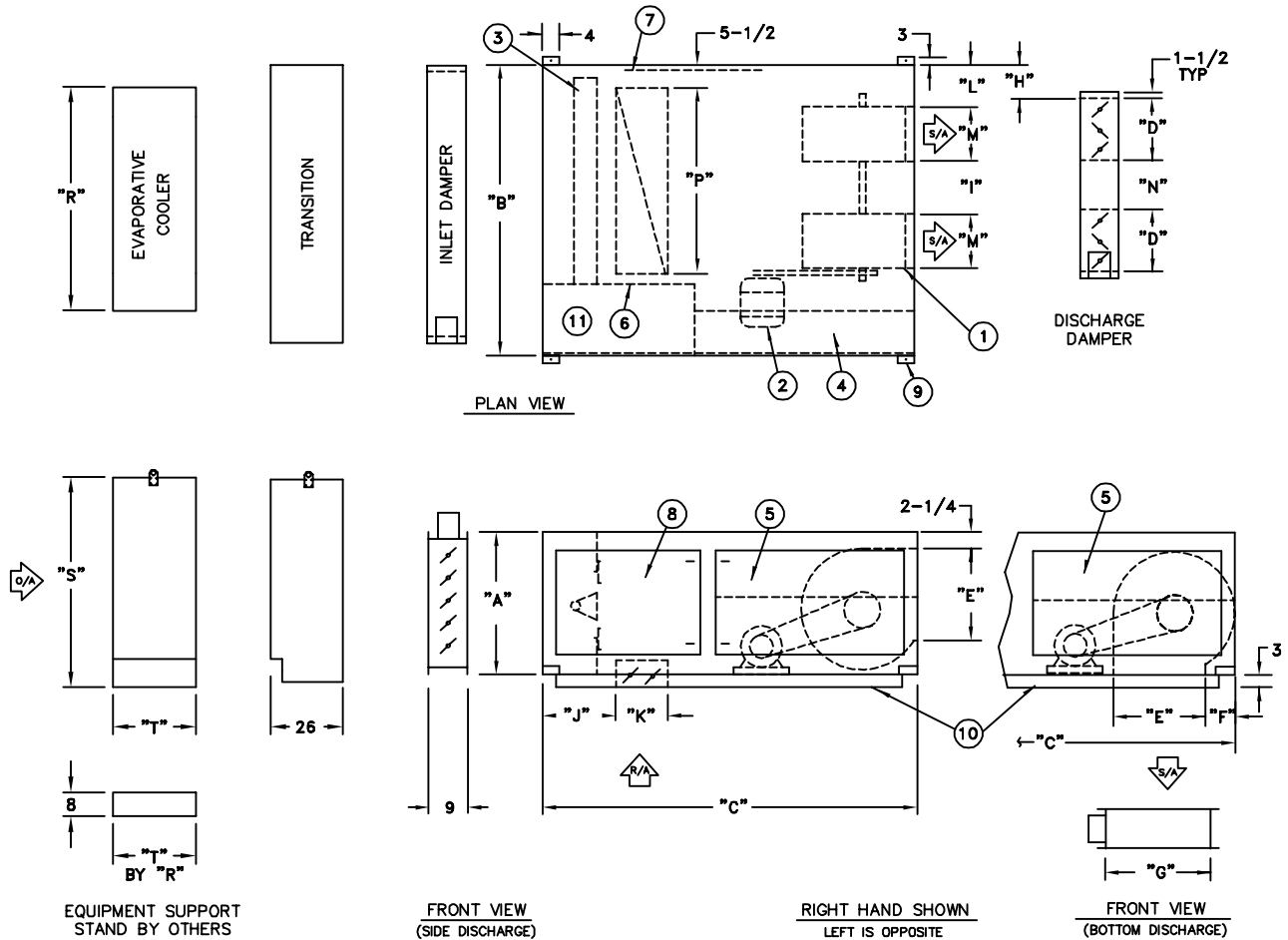
Dimensions

DFC-215 Through 218 to WCD-130

C000531

UNIT COMPONENTS

- | | | | |
|---------------------------|---------------------------------------|-------------------------------------|--------------------------|
| 1. Centrifugal supply fan | 4. Control cabinet | 7. Access door | 10. Unit base |
| 2. Fan motor | 5. Hinged control cabinet access door | 8. Access door (piping compartment) | 11. Manifold compartment |
| 3. Line burner | 6. Observation port | 9. Lifting lug | |



Model	Dimensions								
	A	B	C	D	E	F	G	H	I
DFC-215	36	94	77	23 ¹⁵ / ₁₆	16	12 ³ / ₈	19 ⁷ / ₈	5 ³ / ₈	22 ¹ / ₄
DFC-218	36	94	77	23 ¹⁵ / ₁₆	19	12 ³ / ₈	19 ⁷ / ₈	6 ¹⁵ / ₁₆	16
Model	Dimensions								
	J	K	L	M	N	P	R	S	T
DFC-215	19	14 ¹ / ₄	7 ⁷ / ₈	18 ¹⁵ / ₁₆	14	65 ³ / ₄	60	62	30
DFC-218	19	14 ¹ / ₄	7 ⁷ / ₈	22 ¹ / ₁₆	14	65 ³ / ₄	60	62	30

NOTE: All dimensions in inches subject to manufacturing tolerances.

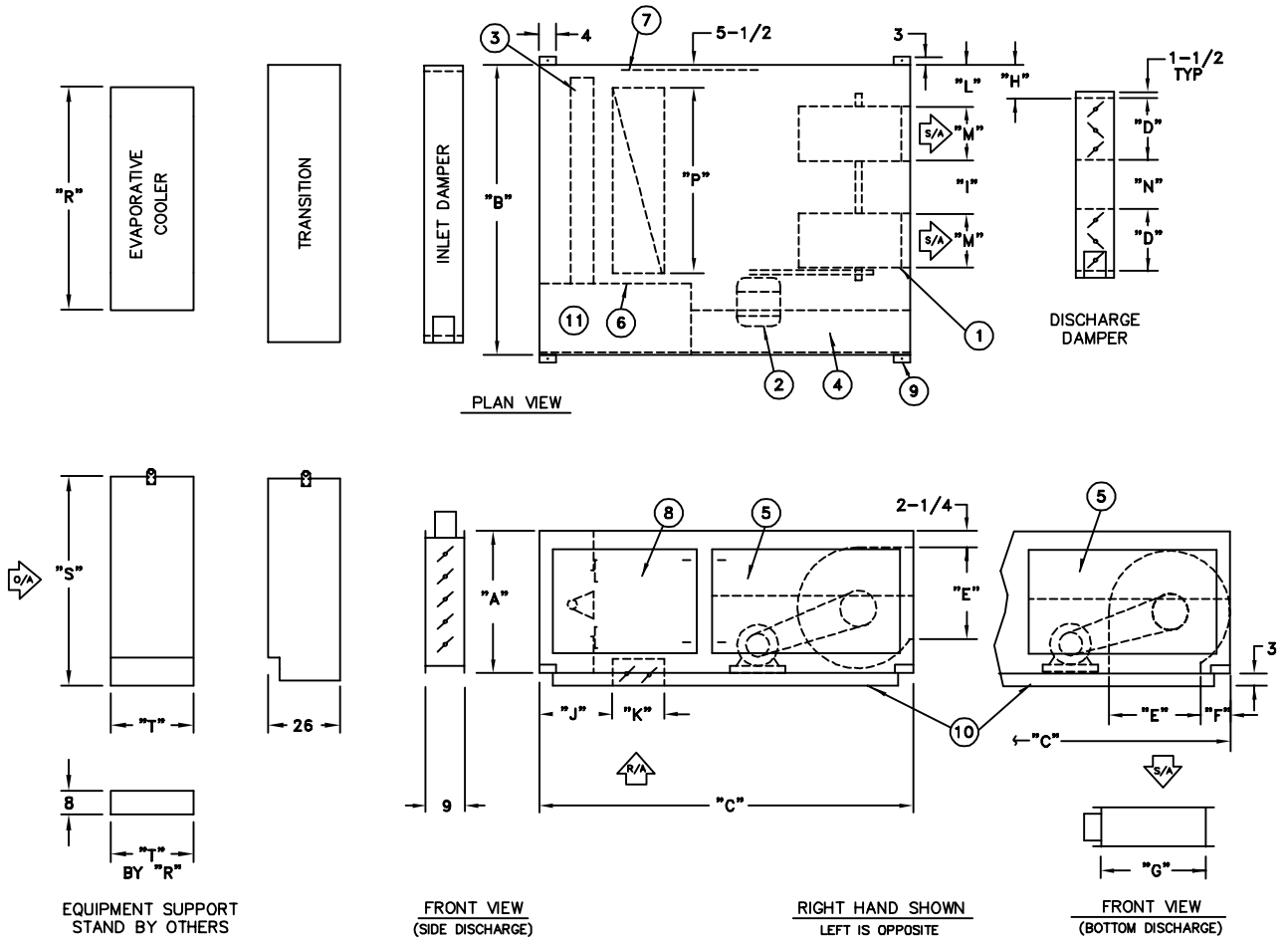
Dimensions

DFC-218 Through 220 to WCD-210

C000531

UNIT COMPONENTS

- | | | | |
|---------------------------|---------------------------------------|-------------------------------------|--------------------------|
| 1. Centrifugal supply fan | 4. Control cabinet | 7. Access door | 10. Unit base |
| 2. Fan motor | 5. Hinged control cabinet access door | 8. Access door (piping compartment) | 11. Manifold compartment |
| 3. Line burner | 6. Observation port | 9. Lifting lug | |



Model	Dimensions								
	A	B	C	D	E	F	G	H	I
DFC-218	36	94	77	23 ¹⁵ / ₁₆	19	12 ³ / ₈	19 ⁷ / ₈	6 ¹⁵ / ₁₆	16
DFC-220	48	130	96	29 ⁷ / ₁₆	24 ⁷ / ₈	13 ³ / ₁₆	28 ¹ / ₄	10 ³ / ₁₆	29 ⁵ / ₈
Model	Dimensions								
	J	K	L	M	N	P	R	S	T
DFC-218	19	14 ¹ / ₄	7 ⁷ / ₈	22 ¹ / ₁₆	14	65 ³ / ₄	75	75	30
DFC-220	19	14 ¹ / ₄	12 ³ / ₈	25 ¹ / ₁₆	22 ⁵ / ₈	87 ³ / ₈	75	75	30

NOTE: All dimensions in inches subject to manufacturing tolerances.

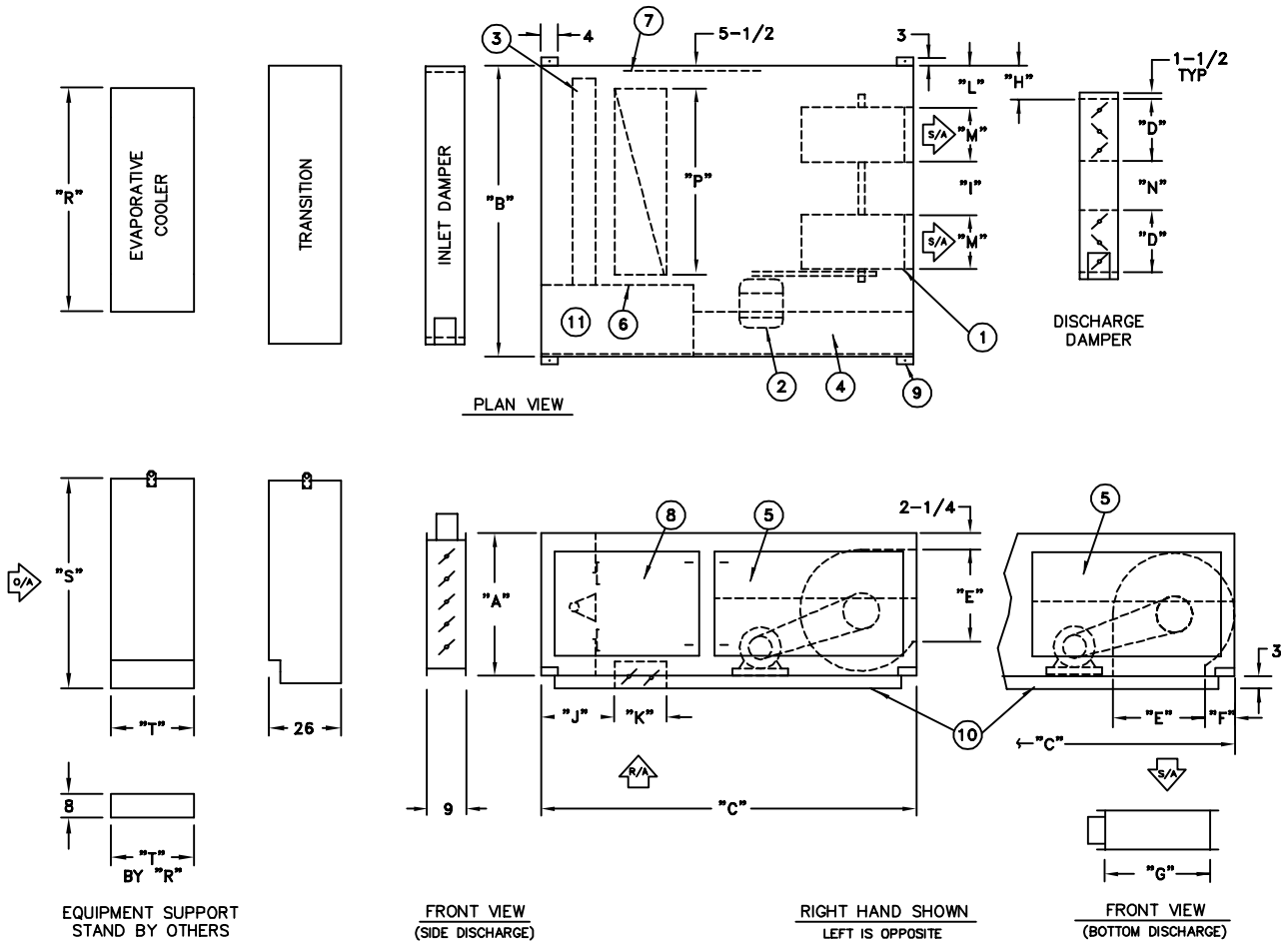
Dimensions

DFC-220 Through 225 to WCD-300

C000531

UNIT COMPONENTS

- | | | | |
|---------------------------|---------------------------------------|-------------------------------------|--------------------------|
| 1. Centrifugal supply fan | 4. Control cabinet | 7. Access door | 10. Unit base |
| 2. Fan motor | 5. Hinged control cabinet access door | 8. Access door (piping compartment) | 11. Manifold compartment |
| 3. Line burner | 6. Observation port | 9. Lifting lug | |



Model	Dimensions								
	A	B	C	D	E	F	G	H	I
DFC-220	48	130	96	29 ⁷ / ₁₆	24 ⁷ / ₈	13 ³ / ₁₆	28 ¹ / ₄	10 ³ / ₁₆	29 ⁵ / ₈
DFC-222	48	130	96	29 ⁷ / ₁₆	27 ³ / ₈	13 ³ / ₁₆	28 ¹ / ₄	11 ⁷ / ₁₆	24 ⁵ / ₈
DFC-225	60	154	96	38 ⁷ / ₈	31 ³ / ₈	17 ⁹ / ₁₆	37 ³ / ₄	11 ¹¹ / ₁₆	37 ⁵ / ₈
Model	Dimensions								
	J	K	L	M	N	P	R	S	T
DFC-220	19	14 ¹ / ₄	12 ³ / ₈	25 ¹ / ₁₆	22 ⁵ / ₈	87 ³ / ₈	96	86	30
DFC-222	19	14 ¹ / ₄	12 ³ / ₈	27 ⁹ / ₁₆	22 ⁵ / ₈	87 ³ / ₈	96	86	30
DFC-225	12 ⁵ / ₁₆	20 ¹ / ₄	15 ³ / ₈	31 ¹ / ₂	24 ⁵ / ₈	111 ³ / ₈	96	86	30

NOTE: All dimensions in inches subject to manufacturing tolerances.

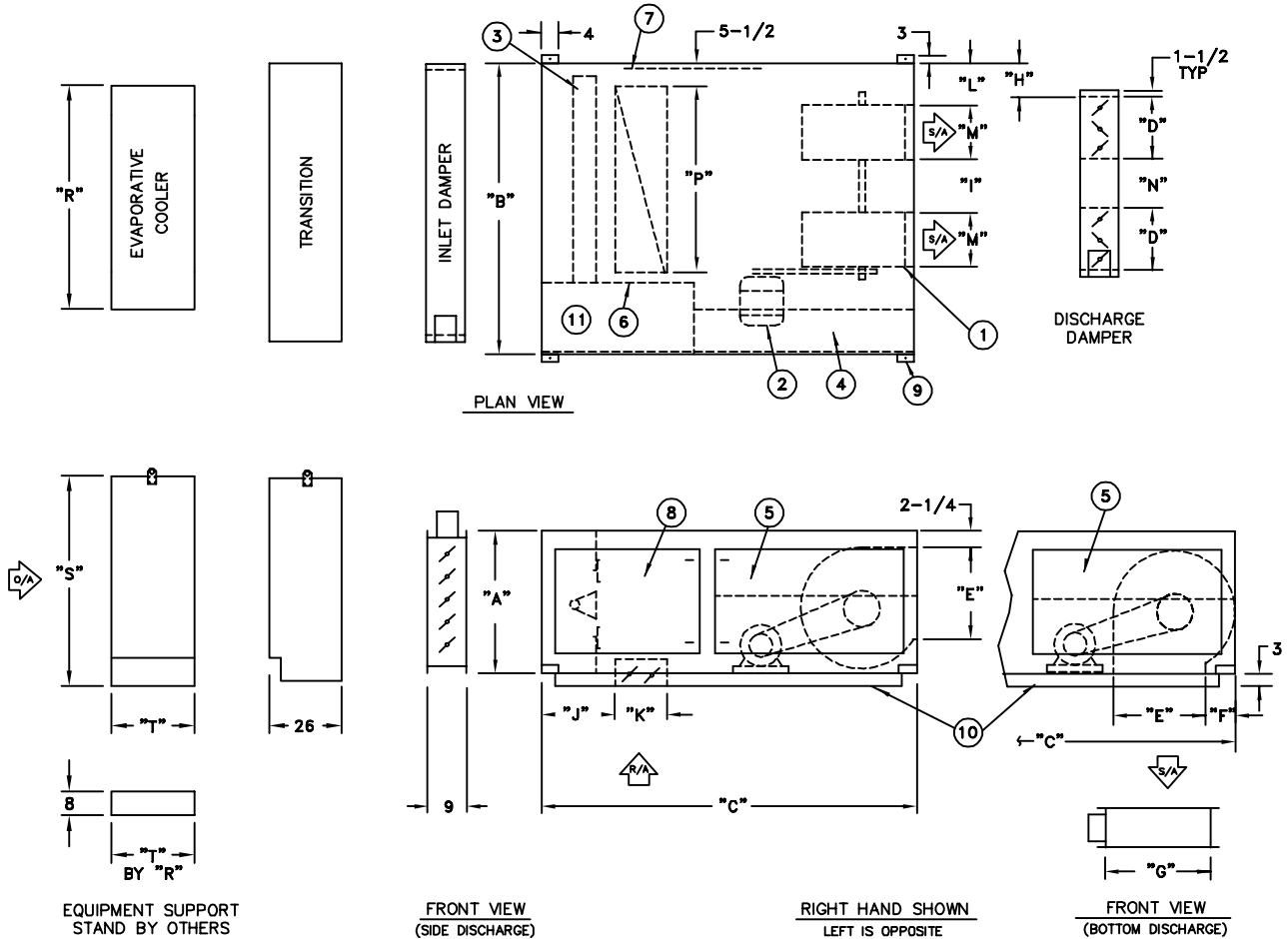
Dimensions

DFC-215 to WDM-1250

C000531

UNIT COMPONENTS

- | | | | |
|---------------------------|---------------------------------------|-------------------------------------|--------------------------|
| 1. Centrifugal supply fan | 4. Control cabinet | 7. Access door | 10. Unit base |
| 2. Fan motor | 5. Hinged control cabinet access door | 8. Access door (piping compartment) | 11. Manifold compartment |
| 3. Line burner | 6. Observation port | 9. Lifting lug | |



Model	Dimensions								
	A	B	C	D	E	F	G	H	I
DFC-215	36	94	77	23 ¹⁵ / ₁₆	16	12 ³ / ₈	19 ⁷ / ₈	5 ³ / ₈	22 ¹ / ₄
Model	Dimensions								
	J	K	L	M	N	P	R	S	T
DFC-215	19	14 ¹ / ₄	7 ⁷ / ₈	18 ¹⁵ / ₁₆	14	65 ³ / ₄	60	62	22 ¹ / ₂

NOTE: All dimensions in inches subject to manufacturing tolerances.

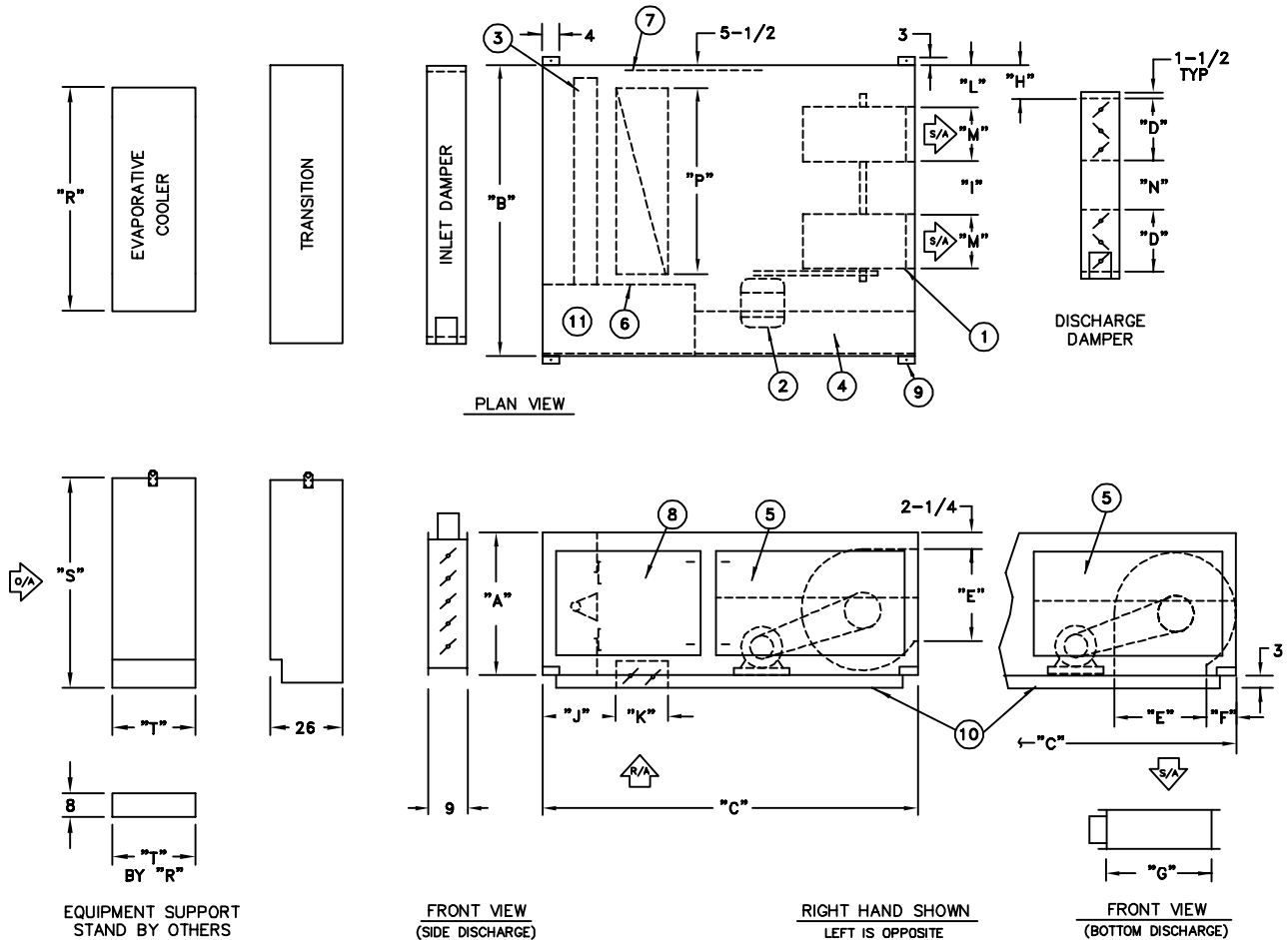
Dimensions

DFC-218 Through 220 to WDM-1550

C000531

UNIT COMPONENTS

- | | | | |
|---------------------------|---------------------------------------|-------------------------------------|--------------------------|
| 1. Centrifugal supply fan | 4. Control cabinet | 7. Access door | 10. Unit base |
| 2. Fan motor | 5. Hinged control cabinet access door | 8. Access door (piping compartment) | 11. Manifold compartment |
| 3. Line burner | 6. Observation port | 9. Lifting lug | |



Model	Dimensions								
	A	B	C	D	E	F	G	H	I
DFC-218	36	94	77	23 ¹⁵ / ₁₆	19	12 ³ / ₈	19 ⁷ / ₈	6 ¹⁵ / ₁₆	16
DFC-220	48	130	96	29 ⁷ / ₁₆	24 ⁷ / ₈	13 ³ / ₁₆	28 ¹ / ₄	10 ³ / ₁₆	29 ⁵ / ₈
Model	Dimensions								
	J	K	L	M	N	P	R	S	T
DFC-218	19	14 ¹ / ₄	7 ⁷ / ₈	22 ¹ / ₁₆	14	65 ³ / ₄	75	75	22 ¹ / ₂
DFC-220	19	14 ¹ / ₄	12 ³ / ₈	25 ¹ / ₁₆	22 ⁵ / ₈	87 ³ / ₈	75	75	22 ¹ / ₂

NOTE: All dimensions in inches subject to manufacturing tolerances.

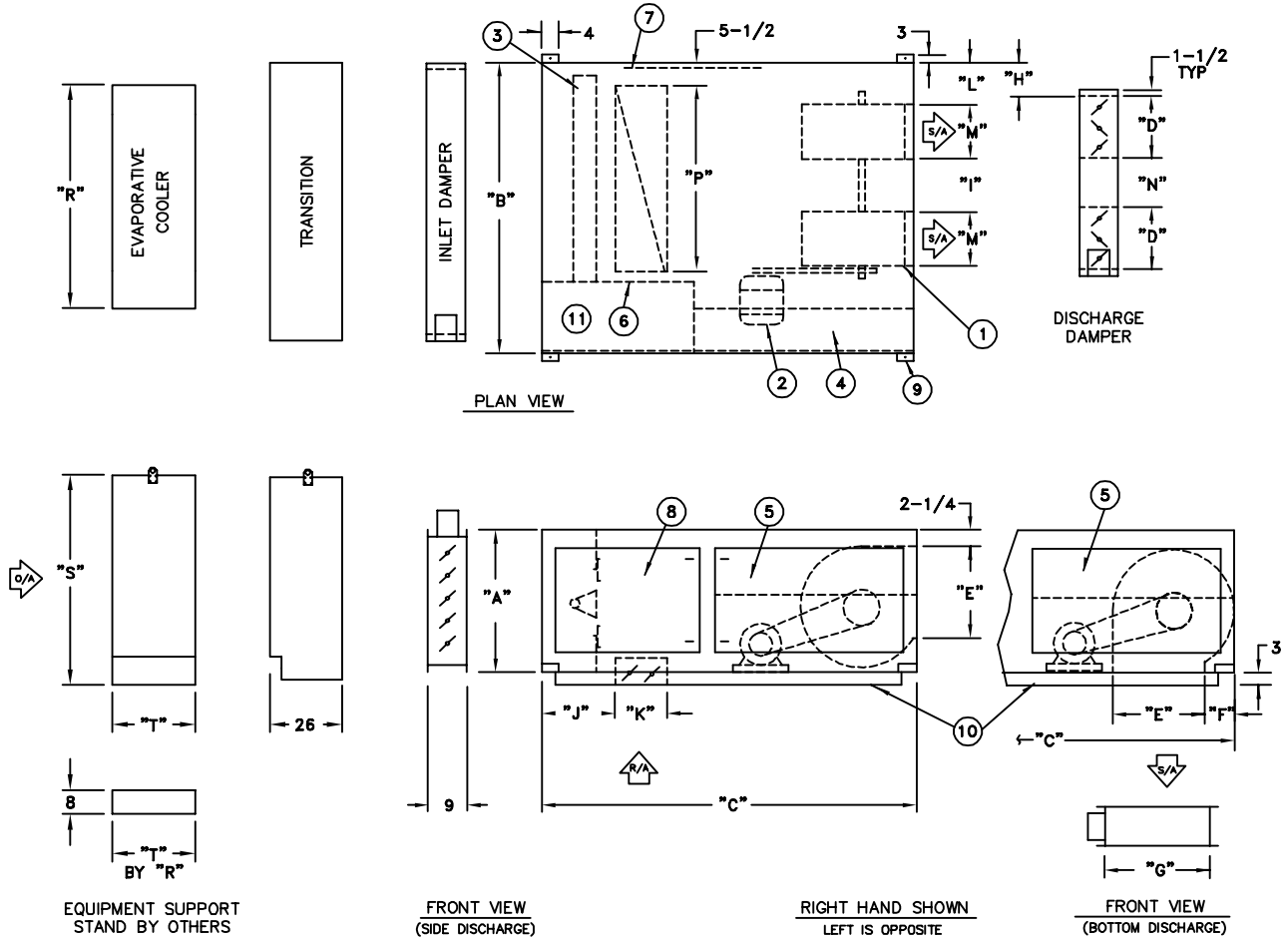
Dimensions

DFC-220 to WDM-2050

C000531

UNIT COMPONENTS

- | | | | |
|---------------------------|---------------------------------------|-------------------------------------|--------------------------|
| 1. Centrifugal supply fan | 4. Control cabinet | 7. Access door | 10. Unit base |
| 2. Fan motor | 5. Hinged control cabinet access door | 8. Access door (piping compartment) | 11. Manifold compartment |
| 3. Line burner | 6. Observation port | 9. Lifting lug | |



Model	Dimensions								
	A	B	C	D	E	F	G	H	I
DFC-220	48	130	96	29 ⁷ / ₁₆	24 ⁷ / ₈	13 ³ / ₁₆	28 ¹ / ₄	10 ³ / ₁₆	29 ⁵ / ₈
Model	Dimensions								
	J	K	L	M	N	P	R	S	T
DFC-220	19	14 ¹ / ₄	12 ³ / ₈	25 ¹ / ₁₆	22 ⁵ / ₈	87 ³ / ₈	88	88	22 ¹ / ₂

NOTE: All dimensions in inches subject to manufacturing tolerances.

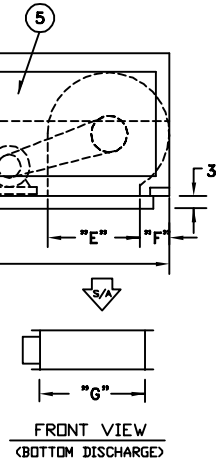
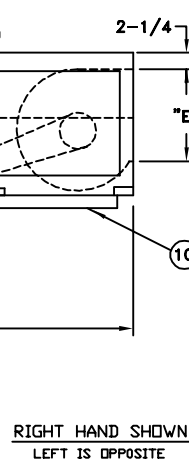
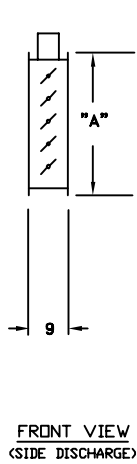
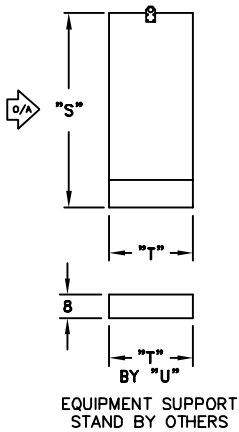
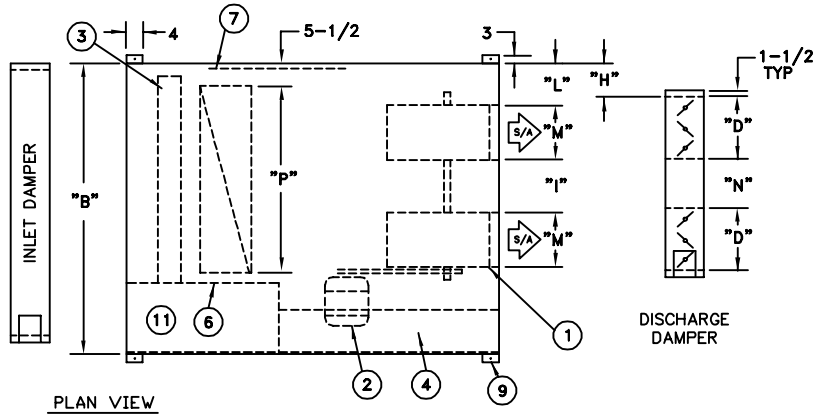
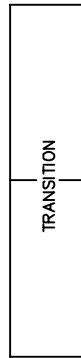
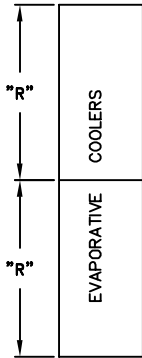
Dimensions

DFC-225 to 2) WCD-210

C000532

UNIT COMPONENTS

- | | | | |
|---------------------------|---------------------------------------|-------------------------------------|--------------------------|
| 1. Centrifugal supply fan | 4. Control cabinet | 7. Access door | 10. Unit base |
| 2. Fan motor | 5. Hinged control cabinet access door | 8. Access door (piping compartment) | 11. Manifold compartment |
| 3. Line burner | 6. Observation port | 9. Lifting lug | |



Model	Dimensions								
	A	B	C	D	E	F	G	H	I
DFC-225	60	154	96	38 ⁷ / ₈	31 ³ / ₈	17 ⁹ / ₁₆	37 ³ / ₄	11 ¹¹ / ₁₆	37 ⁵ / ₈
Model	Dimensions								
	J	K	L	M	N	P	R	S	T
DFC-225	12 ⁵ / ₁₆	20 ¹ / ₄	15 ³ / ₈	31 ¹ / ₂	24 ⁵ / ₈	111 ³ / ₈	75	75	30

NOTE: All dimensions in inches subject to manufacturing tolerances.

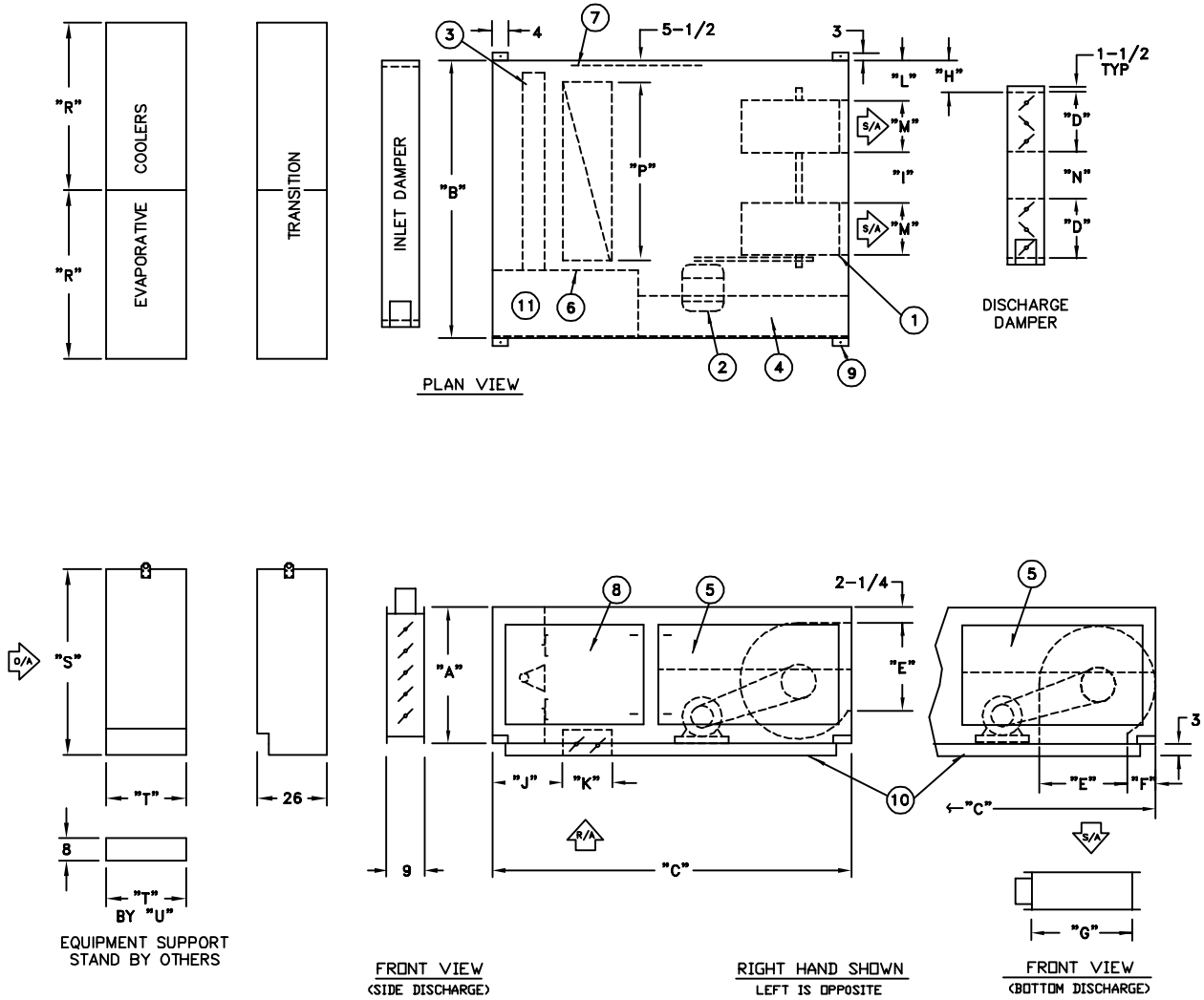
Dimensions

DFC-225 Through 230 to 2) WCD-300

C000532

UNIT COMPONENTS

- | | | | |
|---------------------------|---------------------------------------|-------------------------------------|--------------------------|
| 1. Centrifugal supply fan | 4. Control cabinet | 7. Access door | 10. Unit base |
| 2. Fan motor | 5. Hinged control cabinet access door | 8. Access door (piping compartment) | 11. Manifold compartment |
| 3. Line burner | 6. Observation port | 9. Lifting lug | |



Model	Dimensions								
	A	B	C	D	E	F	G	H	I
DFC-225	60	154	96	38 ⁷ / ₈	31 ³ / ₈	17 ⁹ / ₁₆	37 ³ / ₄	11 ¹¹ / ₁₆	37 ⁵ / ₈
DFC-230	60	154	96	38 ⁷ / ₈	36 ⁷ / ₈	17 ⁹ / ₁₆	37 ³ / ₄	14 ⁷ / ₁₆	26 ⁵ / ₈
Model	Dimensions								
	J	K	L	M	N	P	R	S	T
DFC-225	12 ⁵ / ₁₆	20 ¹ / ₄	15 ³ / ₈	31 ¹ / ₂	24 ⁵ / ₈	111 ³ / ₈	96	86	30
DFC-230	12 ⁵ / ₁₆	20 ¹ / ₄	15 ³ / ₈	37	24 ⁵ / ₈	111 ³ / ₈	96	86	30

NOTE: All dimensions in inches subject to manufacturing tolerances.

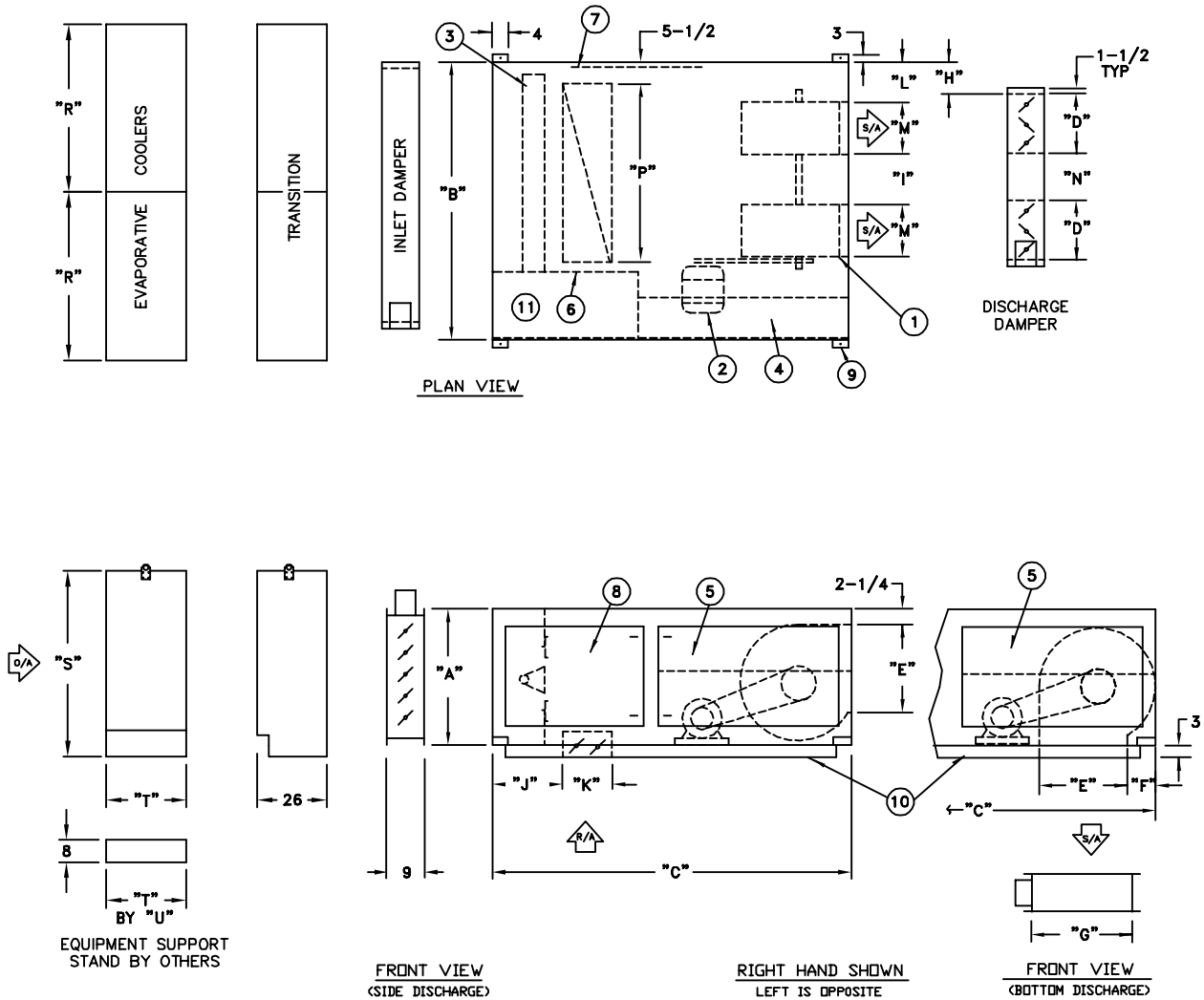
Dimensions

DFC-222 Through 225 to 2) WDM-1550

C000532

UNIT COMPONENTS

- | | | | |
|---------------------------|---------------------------------------|-------------------------------------|--------------------------|
| 1. Centrifugal supply fan | 4. Control cabinet | 7. Access door | 10. Unit base |
| 2. Fan motor | 5. Hinged control cabinet access door | 8. Access door (piping compartment) | 11. Manifold compartment |
| 3. Line burner | 6. Observation port | 9. Lifting lug | |



Model	Dimensions								
	A	B	C	D	E	F	G	H	I
DFC-222	48	130	96	29 ⁷ / ₁₆	27 ³ / ₈	13 ³ / ₁₆	28 ¹ / ₄	11 ⁷ / ₁₆	24 ⁵ / ₈
DFC-225	60	154	96	38 ⁷ / ₈	31 ³ / ₈	17 ⁹ / ₁₆	37 ³ / ₄	11 ¹¹ / ₁₆	37 ⁵ / ₈
Model	Dimensions								
	J	K	L	M	N	P	R	S	T
DFC-222	19	14 ¹ / ₄	12 ³ / ₈	27 ⁹ / ₁₆	22 ⁵ / ₈	87 ³ / ₈	75	75	22 ¹ / ₂
DFC-225	12 ⁵ / ₁₆	20 ¹ / ₄	15 ³ / ₈	31 ¹ / ₂	24 ⁵ / ₈	111 ³ / ₈	75	75	22 ¹ / ₂

NOTE: All dimensions in inches subject to manufacturing tolerances.

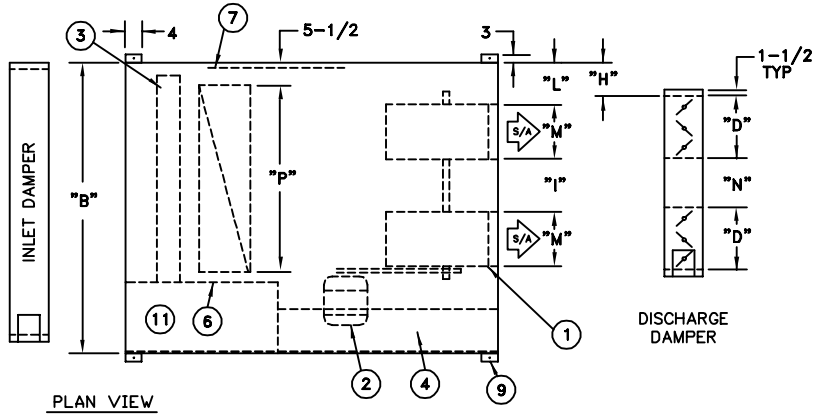
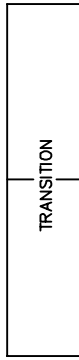
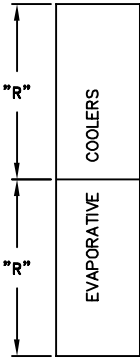
Dimensions

DFC-225 Through 230 to 2) WDM-2050

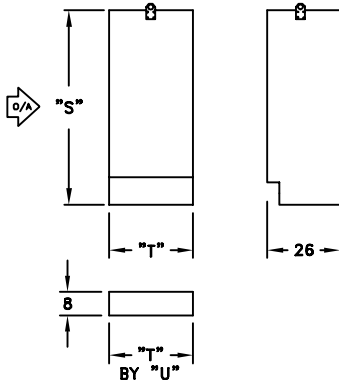
C000532

UNIT COMPONENTS

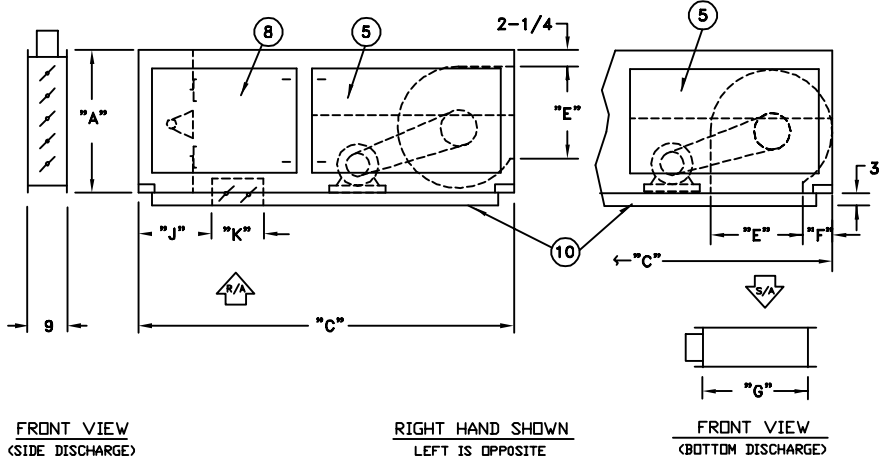
- 1. Centrifugal supply fan
- 2. Fan motor
- 3. Line burner
- 4. Control cabinet
- 5. Hinged control cabinet access door
- 6. Observation port
- 7. Access door
- 8. Access door (piping compartment)
- 9. Lifting lug
- 10. Unit base
- 11. Manifold compartment



PLAN VIEW



EQUIPMENT SUPPORT
STAND BY OTHERS



FRONT VIEW
(SIDE DISCHARGE)

RIGHT HAND SHOWN
LEFT IS OPPOSITE

FRONT VIEW
(BOTTOM DISCHARGE)

Model	Dimensions								
	A	B	C	D	E	F	G	H	I
DFC-225	60	154	96	38 ⁷ / ₈	31 ³ / ₈	17 ⁹ / ₁₆	37 ³ / ₄	11 ¹¹ / ₁₆	37 ⁵ / ₈
DFC-230	60	154	96	38 ⁷ / ₈	36 ⁷ / ₈	17 ⁹ / ₁₆	37 ³ / ₄	14 ⁷ / ₁₆	26 ⁵ / ₈
Model	Dimensions								
	J	K	L	M	N	P	R	S	T
DFC-225	12 ⁵ / ₁₆	20 ¹ / ₄	15 ³ / ₈	31 ¹ / ₂	24 ⁵ / ₈	111 ³ / ₈	88	88	22 ¹ / ₂
DFC-230	12 ⁵ / ₁₆	20 ¹ / ₄	15 ³ / ₈	37	24 ⁵ / ₈	111 ³ / ₈	88	88	22 ¹ / ₂

NOTE: All dimensions in inches subject to manufacturing tolerances.

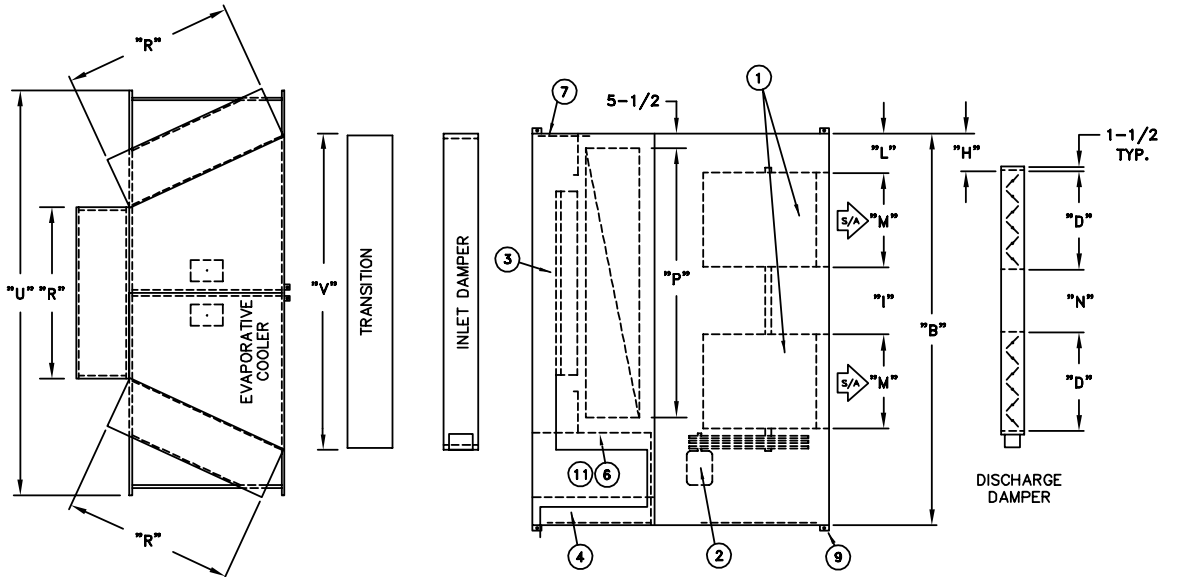
Dimensions

DFC-233 Through 240 to 3) WCD-300

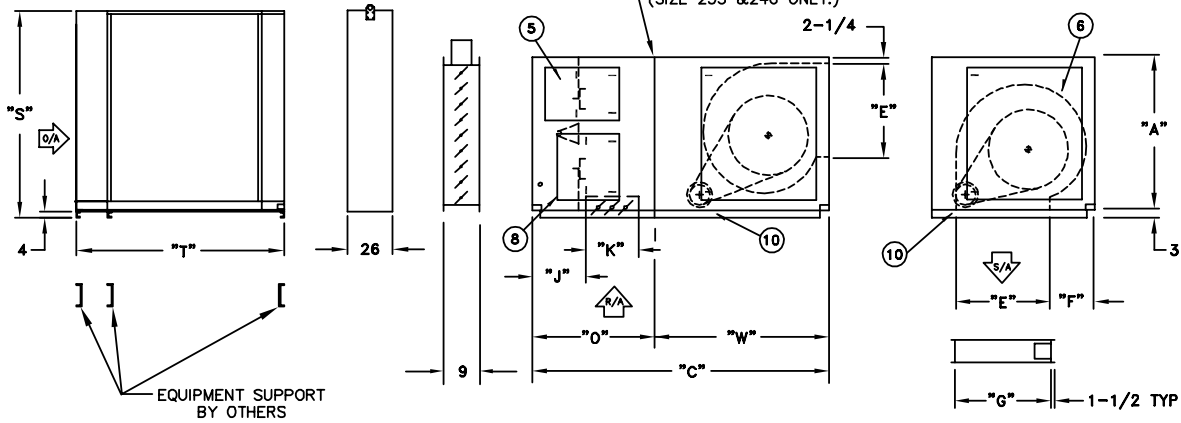
C000533

UNIT COMPONENTS

- | | | | |
|---------------------------|---------------------------------------|-------------------------------------|--------------------------|
| 1. Centrifugal supply fan | 4. Control cabinet | 7. Access door | 10. Unit base |
| 2. Fan motor | 5. Hinged control cabinet access door | 8. Access door (piping compartment) | 11. Manifold compartment |
| 3. Line burner | 6. Observation port | 9. Lifting lug | |



PLAN VIEW



FRONT VIEW
(SIDE DISCHARGE)

RIGHT HAND SHOWN
LEFT IS OPPOSITE

FRONT VIEW
(BOTTOM DISCHARGE)

Model	Dimensions										
	A	B	C	D	E	F	G	H	I	J	K
233	68	175	117	41 ³ / ₄	43 ³ / ₁₆	19 ⁷ / ₁₆	44	16 ¹ / ₁₆	36	20	20 ¹ / ₄
240	79 ¹ / ₄	210	131	55 ³ / ₄	41	33	42	19 ¹ / ₁₆	39 ⁷ / ₈	20	20 ¹ / ₄
Model	Dimensions										
	L	M	N	O	P	R	S	T	U	V	W
233	17	39 ⁷ / ₈	34 ¹ / ₈	45	130	96	90	123 ⁵ / ₈	197 ⁵ / ₈	139 ¹ / ₄	72
240	20	53 ⁷ / ₈	38	45	166	96	90	117 ³ / ₄	228 ⁷ / ₈	174 ¹ / ₈	86

NOTE: All dimensions in inches subject to manufacturing tolerances.

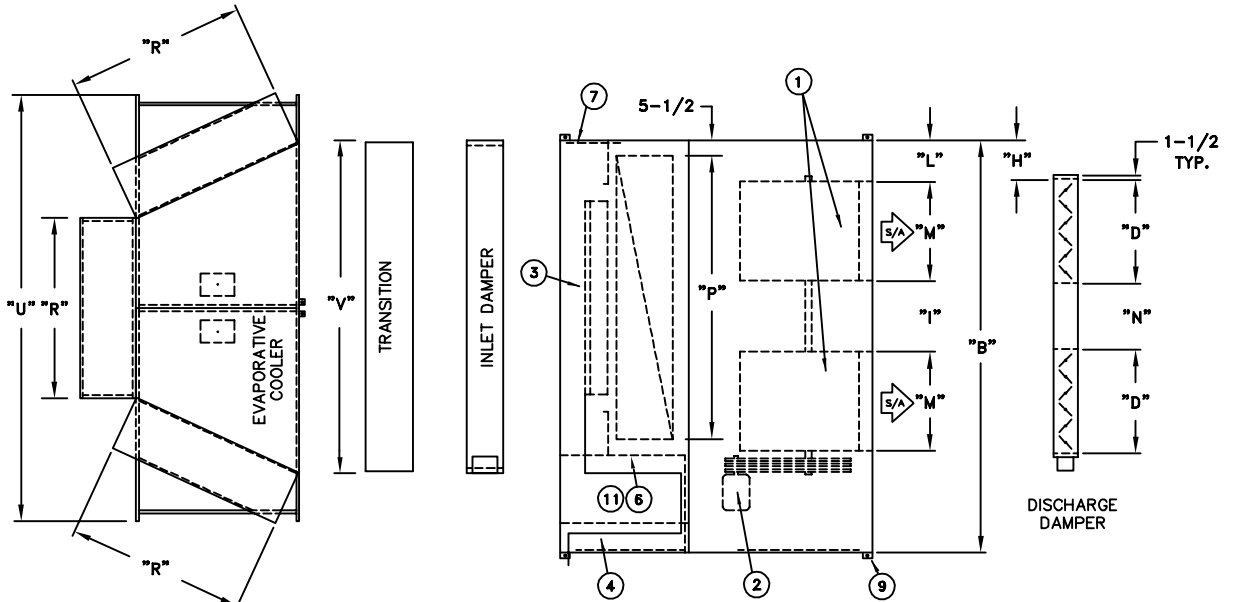
Dimensions

DFC-230 Through 233 to 3) WDM-2050

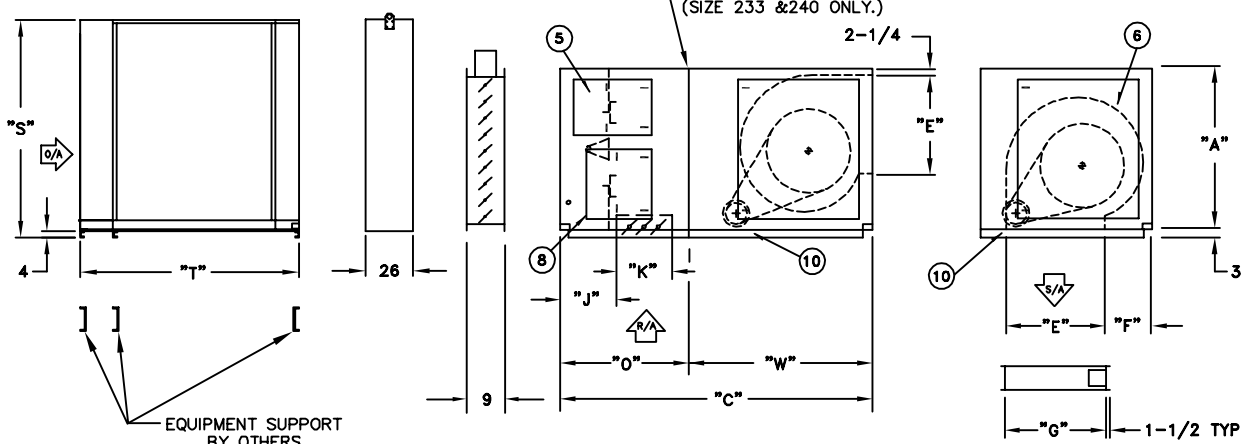
C000533

UNIT COMPONENTS

- | | | | |
|---------------------------|---------------------------------------|-------------------------------------|--------------------------|
| 1. Centrifugal supply fan | 4. Control cabinet | 7. Access door | 10. Unit base |
| 2. Fan motor | 5. Hinged control cabinet access door | 8. Access door (piping compartment) | 11. Manifold compartment |
| 3. Line burner | 6. Observation port | 9. Lifting lug | |



PLAN VIEW



FRONT VIEW
(SIDE DISCHARGE)

RIGHT HAND SHOWN
LEFT IS OPPOSITE

FRONT VIEW
(BOTTOM DISCHARGE)

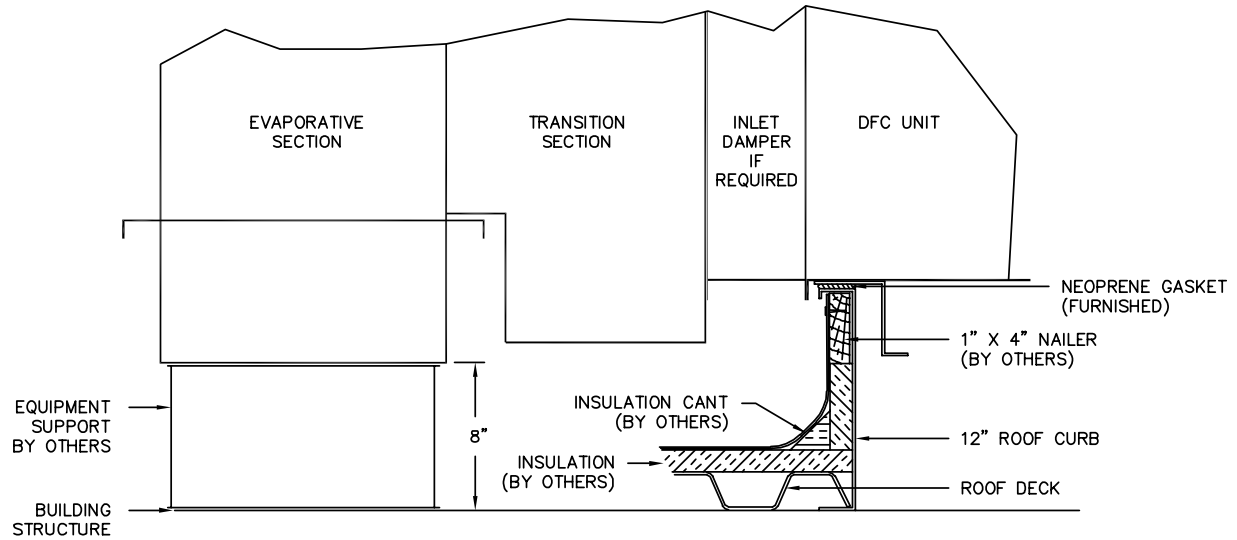
Model	Dimensions										
	A	B	C	D	E	F	G	H	I	J	K
230	60	154	96	38 ⁷ / ₈	36 ⁷ / ₈	17 ⁹ / ₁₆	37 ³ / ₄	14 ⁷ / ₁₆	26 ⁵ / ₈	12 ⁵ / ₁₆	20 ¹ / ₄
233	68	175	117	41 ³ / ₄	43 ³ / ₁₆	19 ⁷ / ₁₆	44	16 ¹ / ₁₆	36	20	20 ¹ / ₄
Model	Dimensions										
	L	M	N	O	P	R	S	T	U	V	W
230	15 ³ / ₈	37	24 ⁵ / ₈	—	111 ³ / ₈	88	92	109 ¹ / ₄	162 ⁷ / ₈	118 ¹ / ₂	—
233	17	39 ⁷ / ₈	34 ¹ / ₈	45	130	88	92	106 ⁷ / ₈	181 ¹ / ₈	138	72

NOTE: All dimensions in inches subject to manufacturing tolerances.

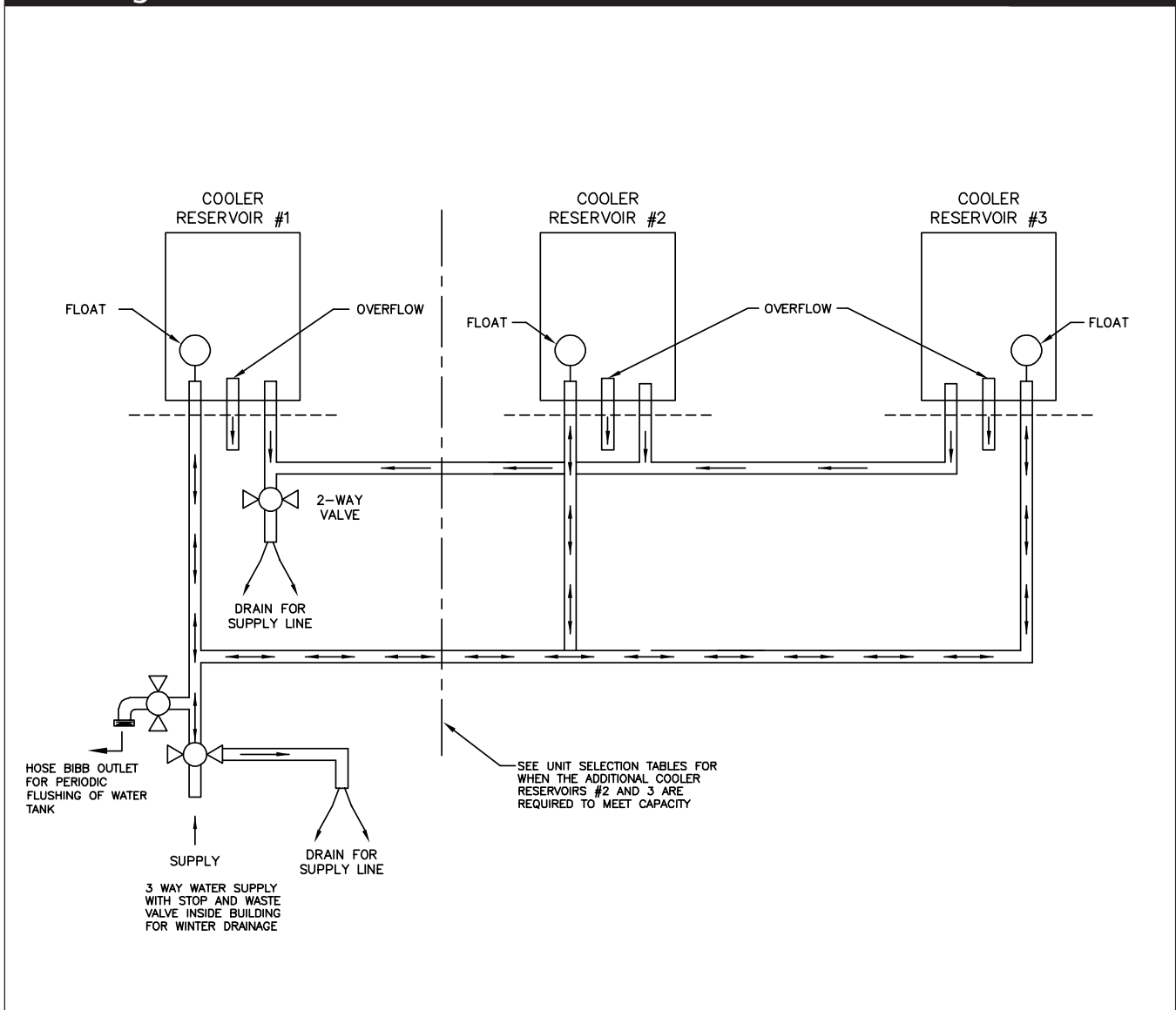
Dimensions

Typical Roof Support Detail

C000534



WCD and WDM modules are not curb mountable. If the DFC is to be curb mounted, an equipment support stand or rails must be provided by others. See above drawing for details.



Supply

Each unit requires a 3/8" IPS water supply line to each float valve assembly. Units with two float valve assemblies may be supplied from a 1/2" IPS water supply line. Units with three float valve assemblies may be supplied from a 3/4" IPS water supply line.

Maintenance

It is recommended that the supply piping system include one hose bib outlet, conveniently located on the roof, to facilitate periodic flushing of the water tanks.

Freeze Protection

The main water supply line should include a stop-and-waste valve inside the building for winter draining.

Drain

Each unit is equipped with a 1" drain connection. A 1" gate valve may be attached directly to the unit. Drain piping of waste water must meet local codes. In some cases, it is convenient to carry the 1" drain line down into the building with the valve located at an accessible point to facilitate frequent tank draining.

Weights and Model Designation

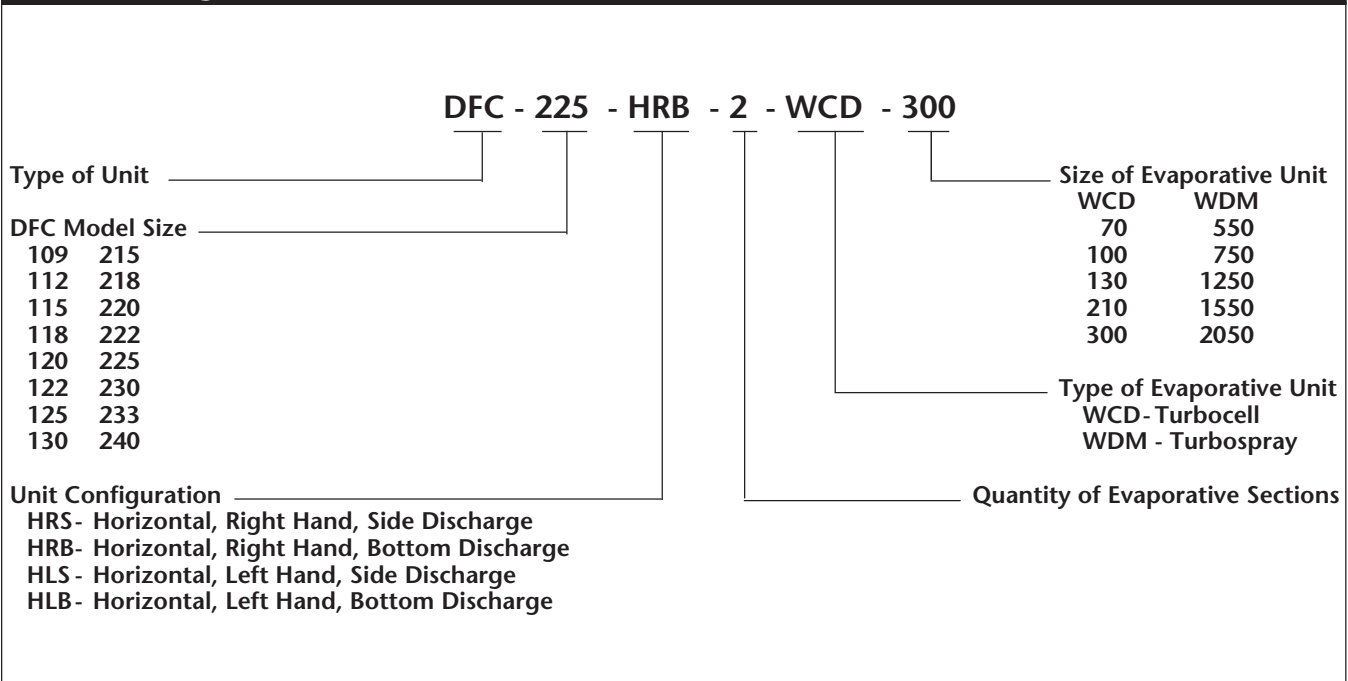
Approximate weights

Turbocell Series								
	WCD-70	WCD-100	WCD-130	WCD-210	WCD-300	(2) WCD-210	(2) WCD-300	(3) WCD-300
NET WT.	194	218	240	351	559	702	1118	1677
OPERATING WT.	593	695	759	1016	1597	2032	3194	4791
TRANSITION WT.	150	170	240	290	320	570	630	880

Approximate weights

Turbospray Series								
	WDM-550	WDM-750	WDM-1250	WDM-1550	WDM-2050	(2) WDM-1550	(2) WDM-2050	(3) WDM-2050
NET WT.	162	176	189	346	489	692	978	1467
OPERATING WT.	314	346	372	574	757	1148	1514	2271
TRANSITION WT.	150	170	240	290	330	570	640	850

Model Designation



Formulas For Estimating

Definitions

Dry Bulb Temperature:

Atmospheric temperature as measured by a standard thermometer.

Wet Bulb Temperature:

Temperature recorded by thermometer with wet sock over bulb in moving air stream. A measuring instrument which has a thermometer in this arrangement is a sling psychrometer. The wet bulb temperature is the lowest temperature to which air can be cooled by evaporation.

Abbreviations

A	= Filter area, sq. ft.	FPM	= Feet per minute	OWB	= Outdoor wet bulb temp.
Em	= Blower motor voltage	GPH	= Gallons per hour	PF	= Power factor
Ep	= Pump voltage	Im	= Blower motor amperage	SE	= Saturating effectiveness
FF	= Phase factor (1 for 1 Ph., 1.73 for 3 Ph.)	Ip	= Pump amperage	TCFM	= CFM rating of evaporative air unit
		ODB	= Outdoor dry bulb temp.		

Formulas

Desired	Formula	Example
Leaving Air Temp.	$ODB - SE (ODB - OWB)$	$95 - [.87 \times (95 - 66)] = 70^{\circ}\text{F}(1)$
Exhaust Fan Rating (2) (positive room pressure)	0.9 (TCFM)	$0.9 (6000) = 5400 \text{ CFM}$
Exhaust Fan Rating (negative room pressure)	1.1 (TCFM)	$1.1 (6000) = 6600 \text{ CFM}$
relief Opening (3)	$\text{CFM}/250$	$6000/250 = 24 \text{ sq. ft.}$
Water Evaporation	$(\text{CFM}/1000) \times (ODB - OWB)/10$	$(6000/1000) \times (95 - 65)/10 = 18 \text{ GPH}$
Daily Operating Cost	$\frac{(I_p \times E_p) + (I_m \times E_m \times FF)}{1000} \times PF \times (\text{HRS./DAY}) \times (\$/\text{KW-HR})$	$\frac{(5 \times 115) + (2.5 \times 460 \times 1.73)}{1000} \times 0.7 \times 8 \times \$0.07 = \$1.01$

NOTES:

- 1) The 87% efficiency used in the example is the Turbocell minimum efficiency as determined by factory tests. The Turbospray efficiency is 70%. With proper maintenance, the high efficiencies remain constant throughout the life of the unit.
- 2) Air removal is an important factor in maintaining comfort in an evaporative cooling system. Air removal will prevent an uncomfortable build-up of humidity while keeping the air in circulation. An exhaust fan is highly recommended. In areas such as restaurant kitchens or hotel laundry rooms where odors should remain in the room when doors are opened, the exhaust fan should be sized approximately 110% of the make-up air rating. This will create a negative room pressure, thus causing the air movement to be into the room rather than out when the doors are opened. In other cases, such as a coin operated laundry, where it is desirable to greet customers with a cool breeze upon opening the door, the exhaust fan should be sized approximately 90% of the make-up air unit. This will create a positive room pressure, which will cause the air movement to be out of the room when doors are opened. This will also help prevent outside air from entering.
- 3) When an exhaust fan is not used, the formula will determine the free area that must be provided from open windows, doors, etc.

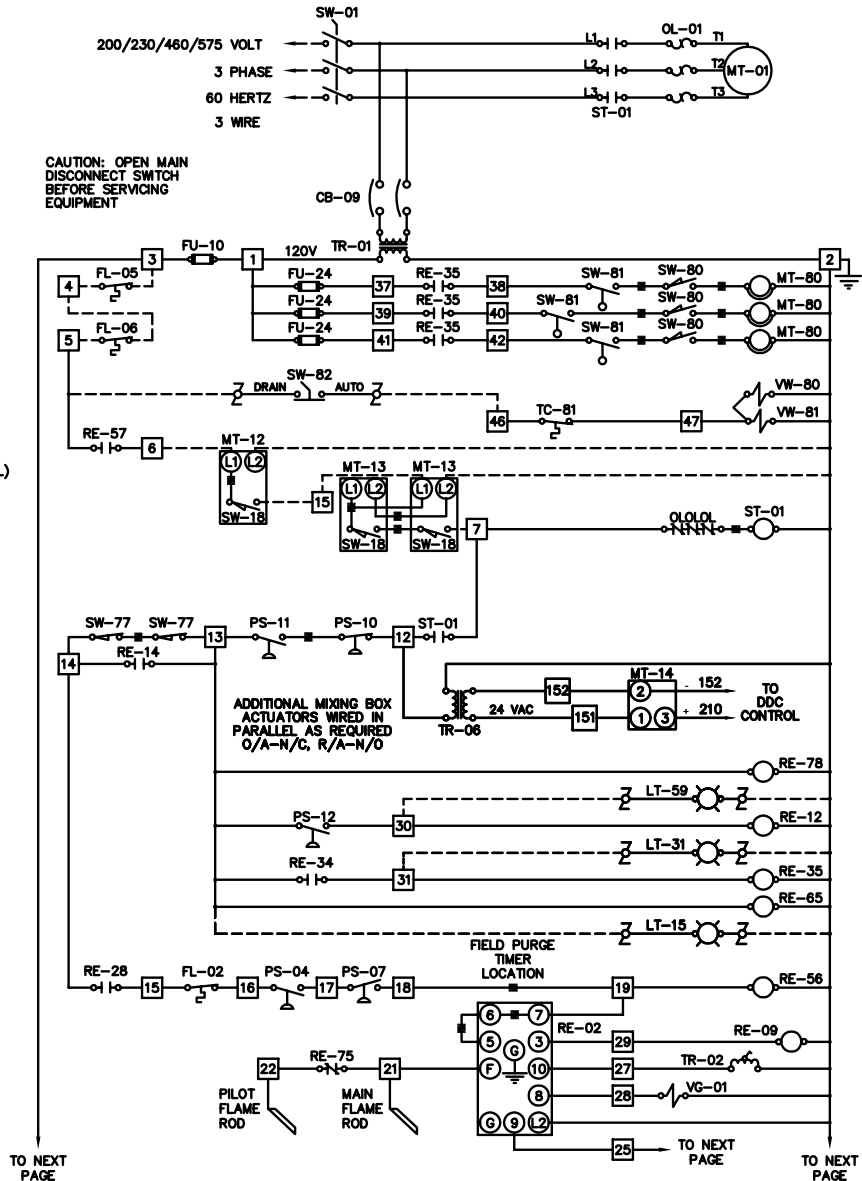
Wiring Diagram

ECS Evaporative Cooling System

C000631

COMPONENT IDENTIFICATION

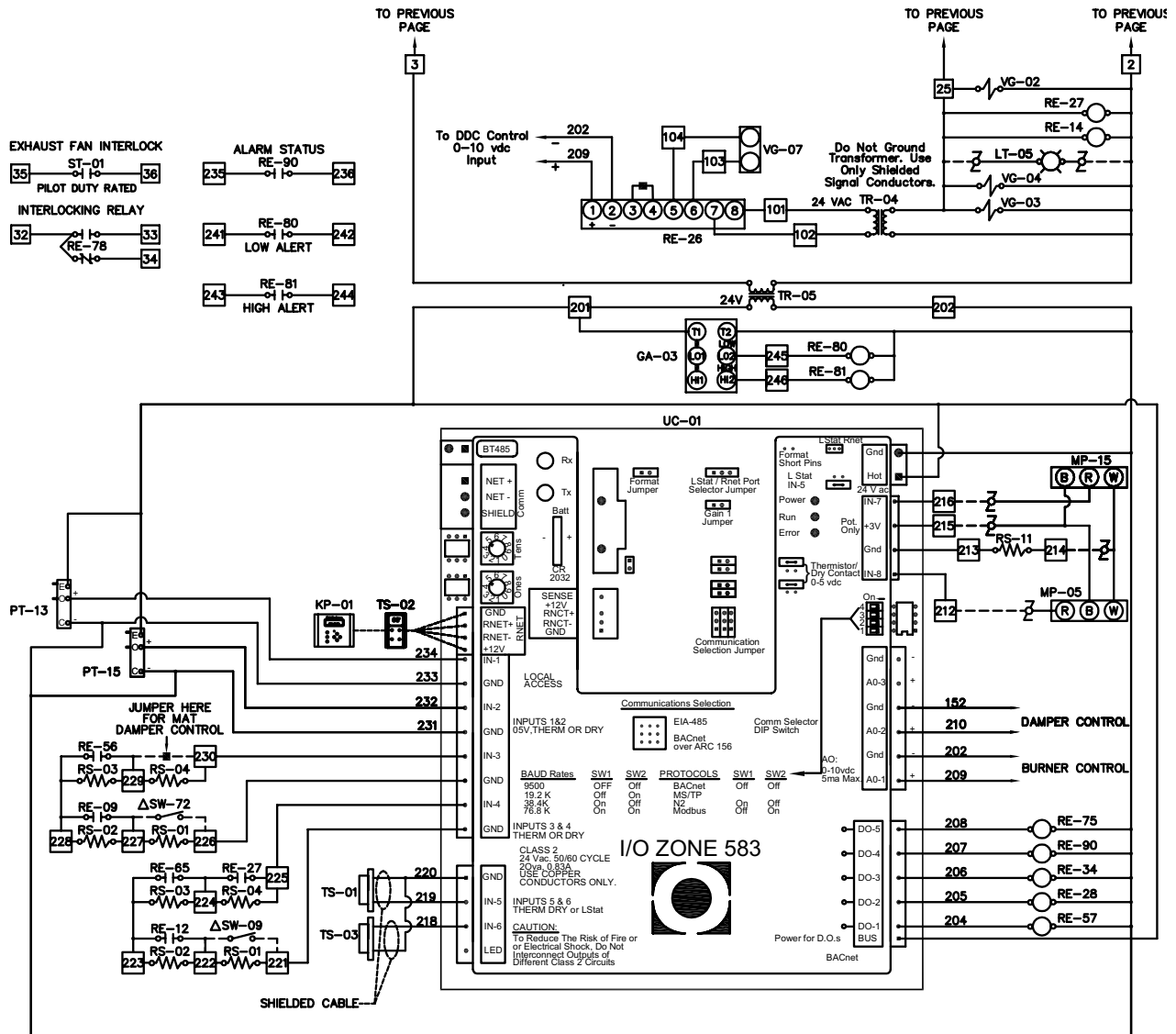
- CB-09 CONTROL CIRCUIT TRANSFORMER BREAKER
- FL-02 HIGH TEMPERATURE LIMIT SWITCH
- FL-05 SUPPLY AIR FIRESTAT (OPTIONAL)
- FL-06 RETURN AIR FIRESTAT (OPTIONAL)
- FU-10 CONTROL CIRCUIT FUSE
- FU-24 EVAP PUMP MOTOR FUSE
- GA-03 COMBINATION CO & NO2 DETECTOR (OPTIONAL)
- KP-01 KEYPAD /DISPLAY MODULE (OPTIONAL)
- LT-05 BURNER ON LIGHT (REMOTE)
- LT-15 FAN ON LIGHT (REMOTE)
- LT-31 COOLING ON LIGHT (REMOTE)
- LT-59 CLOGGED FILTER LIGHT (REMOTE)
- MP-05 DAMPER CONTROL POTENTIOMETER (OPTIONAL)
- MP-15 UNIT ENABLE POTENTIOMETER
- MT-01 MAIN SUPPLY FAN MOTOR
- MT-12 DISCHARGE DAMPER MOTOR (OPTIONAL)
- MT-13 INLET DAMPER MOTOR (OPTIONAL)
- MT-14 MIXING BOX DAMPER MOTOR (OPTIONAL)
- MT-80 EVAP PUMP MOTOR
- OL-01 MAIN FAN MOTOR OVERLOAD
- PS-04 LOW GAS PRESSURE SWITCH (OPTIONAL)
- PS-07 HIGH GAS PRESSURE SWITCH (OPTIONAL)
- PS-10 HIGH VELOCITY SWITCH
- PS-11 LOW VELOCITY SWITCH
- PS-12 CLOGGED FILTER SWITCH (OPTIONAL)
- PT-13 BUILDING PRESSURE TRANSDUCER (OPTIONAL)
- PT-15 FLOW STATION PRESSURE TRANSDUCER (OPTIONAL)
- RE-02 FLAME SAFEGUARD RELAY
- RE-09 FLAME FAILURE RELAY
- RE-12 CLOGGED FILTER RELAY (OPTIONAL)
- RE-14 HOLDING RELAY (OPTIONAL)
- RE-26 ELECTRONIC RELAY
- RE-27 BURNER STATUS RELAY
- RE-28 BURNER ENABLE RELAY
- RE-34 COOLING ENABLE RELAY
- RE-35 COOLING INTERLOCK RELAY
- RE-56 SAFETY CIRCUIT STATUS RELAY
- RE-57 UNIT ENABLE RELAY
- RE-65 FAN STATUS RELAY
- RE-75 FLAME SUPERVISION SWITCHING RELAY
- RE-78 INTERLOCKING RELAY (OPTIONAL)
- RE-80 LOW ALERT RELAY (OPTIONAL)
- RE-81 HIGH ALERT RELAY (OPTIONAL)
- RE-90 ALARM STATUS RELAY
- RS-01 RESISTOR 1K OHM
- RS-02 RESISTOR 2K OHM
- RS-03 RESISTOR 4.02K OHM
- RS-04 RESISTOR 8.06K OHM
- RS-11 RESISTOR 10 OHM
- ST-01 MAIN SUPPLY FAN MOTOR STARTER
- SW-01 MAIN DISCONNECT SWITCH (OPTIONAL)
- SW-09 AUXILIARY UNIT ENABLE (BY OTHERS)
- SW-18 DAMPER MOTOR END SWITCH (OPTIONAL)
- SW-72 100 PERCENT OUTSIDE AIR SWITCH (BY OTHERS)
- SW-77 PROOF OF VALVE CLOSURE SWITCH (OPTIONAL)
- SW-80 PUMP MOTOR DISCONNECT SWITCH
- SW-81 WATER LEVEL CUTOFF SWITCH
- SW-82 AUTO - DRAIN SWITCH (OPTIONAL)
- TC-81 EVAP FREEZE STAT (OPTIONAL)
- TR-01 CONTROL CIRCUIT TRANSFORMER
- TR-02 IGNITION TRANSFORMER
- TR-04 MODULATING VALVE TRANSFORMER
- TR-05 LOW VOLTAGE TRANSFORMER
- TR-06 DAMPER MOTOR TRANSFORMER (OPTIONAL)
- TS-01 OUTSIDE AIR TEMPERATURE SENSOR
- TS-02 SPACE TEMPERATURE SENSOR (OPTIONAL)
- TS-03 DISCHARGE AIR TEMPERATURE SENSOR
- UC-01 UNIT CONTROL MODULE
- VG-01 PILOT GAS VALVE
- VG-02 MAIN GAS VALVE
- VG-03 AUXILIARY GAS VALVE
- VG-04 NORMALLY OPEN VENT VALVE (OPTIONAL)
- VG-07 MODULATING GAS VALVE
- VW-80 DRAIN VALVE (OPTIONAL)
- VW-81 3 WAY FILL VALVE (OPTIONAL)



Wiring Diagram

ECS Evaporative Cooling System

C000631



Guide Specifications



Applied Air

Turbocell

- 1.0 The evaporative cooling unit shall be weatherproof and self-contained. It consists of component parts as listed in the following paragraphs.
Units shall be the Turbocell as sold by Applied Air located in Dallas, Texas, or approved equal.
- 2.0 **Cooling Compartment**
- 2.1 Cooling compartment shall contain the Turbocell Water System, float valve, overflow and drain connections. Cooling compartment to be built separate from the burner/blower compartment, and no water is to flow into the burner/blower compartment at any time. Cabinet of the cooling compartment to be fabricated from 304 stainless steel with hat channel stiffeners for tank support. Cooling media shall be easily removable from the air entering side. A service panel shall permit easy access to pump, float and water regulating valve.
- 2.2 Cooling media to be Turbodek - 12" deep fluted cellulose, high efficiency evaporative media, impregnated with insoluble anti-rot chemical. Maximum air velocity through cooling media shall not exceed 700 FPM.
- 2.3 Turbocell Water System shall produce a fine spray action which uniformly saturates the 12" deep Turbodek media. Turbocell system to include a submersible pump with U.L. listed, hermetically sealed, dielectric oil-filled motor and Buna-N seal. Horsepower rating of pump shall not be less than 1/4 hp. Pump to be centrifugal type with strainer to prevent the intake of solid matter. Pump assembly shall discharge into a distribution manifold fabricated from heavy-duty PVC pipe with metered orifices. A water regulator valve shall be installed in the distribution manifold and will permit field adjustment of water flow over media. A manual pet-cock metering valve shall be installed in the distribution manifold allowing continuous bleed-off, thus minimizing the build-up of minerals and salts. The Turbocell Water System assembly shall be available for single phase, 115 or 230 volt operation. Blower shall be capable of operating with water system off, permitting unit to function as a ventilator.
- 2.4 A brass float valve shall maintain a constant water level in the Turbocell tank.
- 2.5 Cooling unit to have a minimum saturating effectiveness of 87 percent when the outside air dry bulb temperature is greater than 90°F. Saturating effectiveness is defined as:

$$SE = \frac{T_1 - T_2}{T_1 - T_3} \times 100$$

where: T_1 = outside air, dry bulb temperature, °F
 T_2 = leaving air, dry bulb temperature, °F
 T_3 = outside air, wet bulb temperature, °F

MEDIA SPECIFICATIONS		
CONDITION	TURBODEK	FIBERDEK
maximum water temp.	130°F	165°F
maximum air temp.	300°F	300°F
ph range	6-9	
dry weight	2.4 lb/ft ³	4.5 lb/ft ³
wet weight	5.6 lb/ft ³	9.0 lb/ft ³
operating weight	8.0 lb/ft ³	11.4 lb/ft ³
water flow rate (gpm/sq. ft.)	1.5	1.5

3.0 Transition Section

- 3.1 The transition section shall be fabricated from heavy gauge G90 bright spangled galvanized steel. The casing shall be weatherproof and be built separate from the evaporative section. The transition section shall match the evaporative section with the burner/blower section without the need for field modifications. The transition shall incorporate a sloped interior to direct the airflow from the evaporative section to the burner/blower section.

Turbocell is a broad name used to describe our Turbodek and Fiberdek evaporative pads. Turbodek is made from a special cellulose paper, impregnated with insoluble anti-rot salts and rigidifying saturants. Fiberdek is made from large glass fibers bound together by inorganic, noncrystalline fillers and is UL approved with a UL900, Class 2 rating up to 12" depth.

The unique cross fluted design of the pads induces a highly turbulent mixing of air and water for optimum heat and moisture transfer. The internal geometry of the pad ... a "built-in-angle" ... continually directs the water to the air entry side. This results in:

1. Much higher cooling efficiency - up to 90% in the 400-500 FPM velocity range in a typical 12" depth of Turbodek ... or slightly higher with Fiberdek
2. Much higher face velocity - because of the "built-in-angle", the maximum air velocity without water carryover is approximately 700 FPM for Turbodek. This compares to approximately 200 FPM for conventional pads!
3. Self-cleaning design - Turbodek pads are unaffected by atmospheric dust or sand. When the recirculating water is turned on, especially without air flow, the water flushes the surface areas, with the greatest concentration at the entering side where debris normally accumulates. This also serves as protection against mineral buildup.

Guide Specifications



Applied Air

Turbospray

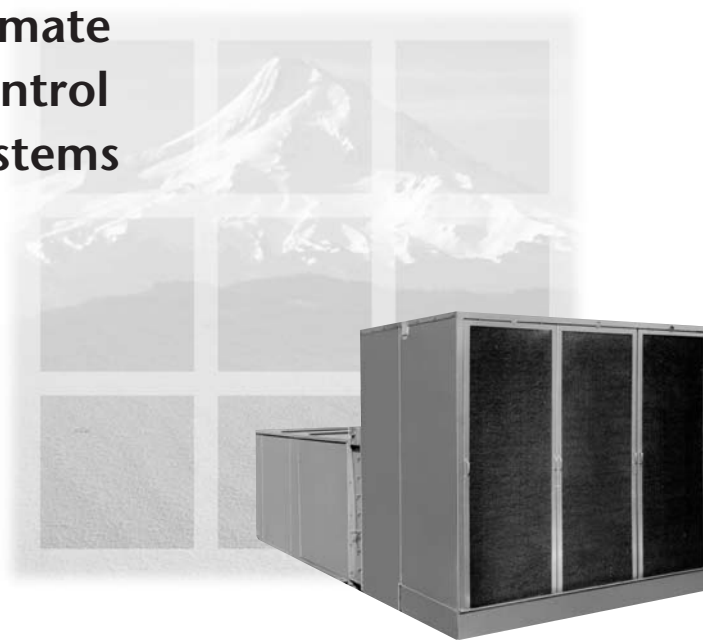
- 1.0 General - The evaporative cooling unit shall be weatherproof, self-contained and consist of component parts as listed in the following paragraphs.
Units shall be the Turbospray as sold by Applied Air located in Dallas, Texas, or approved equal.
- 2.0 Washer Compartment
- 2.1 Washer compartment shall contain the Turbospray Water System, a pre-cooling filter, primary cooling filter, eliminator filter, float valve, overflow and drain connections. Washer compartment to be built separate from the burner/blower section, and no water is to flow into the burner/blower compartment at any time. Cabinet of washer compartment to be fabricated from G90 bright spangled galvanized steel, and will be rigidly constructed. Water pan base of washer compartment to be 304 stainless steel and be field replaceable. All filters are to be easily removed from the unit without the use of tools.
- 2.2 Filter media to be Maxaire or equal. Filter material to be durable, permanently fire retardant and carry full U.L. approval Class 2. Filters shall be latex coated and treated with an active bacteriostat.
- 2.3 Pre-cooling filter shall be mounted in double section, 304 stainless steel frame. Both faces of filter media to be held in frame by a 1/2" mesh galvanized screen. Filter frame to have a lift-out handle for easy removal. Stainless steel spring retainer clips shall secure frame in position and be mounted on cabinet of unit.
- 2.4 Primary cooling filter shall be mounted in a single section, 304 stainless steel frame. Discharge face of filter to be held in position with a 1/2" mesh galvanized screen. Maximum air velocity through primary cooling filter shall not exceed 550 FPM.
- 2.5 Eliminator filter shall be mounted in a single section, 304 stainless steel frame. Primary cooling filter and eliminator filter are to be interchangeable. No entrained water is to be drawn through the eliminator filter, and water trapped by the eliminator is to be evaporated or returned to the sump.
- 2.6 Turbospray Water System shall produce a high velocity spray which continuously wets the surface of the primary cooling filter. Turbospray System to include a submersible pump with U.L. listed, hermetically sealed, dielectric oil-filled motor and Buna-N seal. Horsepower rating of pump shall be no less than 1/6 hp. Pump motors rated at 1/4 hp and above shall have internal overload. Pump to be centrifugal type with suction strainer to prevent the intake of solid matter. Pump assembly shall discharge into a distribution manifold fabricated from heavy-duty, PVC pipe with solid brass, 95° spray nozzles. A water spray regulator valve shall be installed in the distribution manifold and will permit field adjustment of the water spray. Turbospray Water System assembly shall be available for single phase, 115 or 230 volt operation. Blower shall be capable of operating with water spray system off, permitting unit to function as a ventilator.
- 2.7 A brass float valve shall maintain a constant water level in the Turbospray tank.
- 2.8 Cooling unit to have a minimum saturating effectiveness of 70 percent when the outside air dry bulb is greater than 90°F. Saturating effectiveness is defined as:
- $$SE = \frac{T_1 - T_2}{T_1 - T_3} \times 100$$
- where: T_1 = outside air, dry bulb temperature, °F
 T_2 = leaving air, dry bulb temperature, °F
 T_3 = outside air, wet bulb temperature, °F
- 3.0 Transition Section
- 3.1 The transition section shall be fabricated from heavy gauge G90 bright spangled galvanized steel. The casing shall be weatherproof and be built separate from the evaporative section. The transition section shall match the evaporative section with the burner/blower section without the need for field modifications. The transition shall incorporate a sloped interior to direct the airflow from the evaporative section to the burner/blower section.

The Turbospray cooling filter uses Maxaire filter media. The Maxaire filter media is 1" thick for the best cooling efficiency at the lowest cost. Filter media is mounted in a 304 stainless steel frame with 1/2" mesh galvanized screen on the discharge side of the filter. Filter media is also secured to the screen with stainless steel clips to prevent sagging when the media is wet. The three (3) sets of Maxaire filter media generally eliminate the need for a V-bank filter section during heating season.



Applied Air

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Systems**



Applied Air

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