

Air Duct Heaters - DFF, DIF, DFT & DIT

Application

Caloritech™ air duct heaters are for use in comfort heating applications. Typical applications include:

- Make-up air heating
- Air pre-heating
- Air handling equipment
- Fan coils
- Terminal reheating
- Multizone reheating
- Heat pump auxiliary systems
- Return air heating

DFF is a flanged duct heater with finned tubular heating elements.

DIF is an insert duct heater with finned tubular heating elements.

DFT is a flanged duct heater with Incoloy® (non-finned) tubular heating elements.

DIT is an insert duct heater with tubular heating elements.

Standard Features

- Primary linear cutout, 160°F (71°C) 277/600 VAC, 25/10 amp non-inductive
- Secondary linear cutout – Manual reset complete with back-up magnetic contactor on units under 300V, 30 kW and less, 225°F (107°C) 277/600 VAC, 25/10 amp non-inductive

Optional Auxiliary Duct Heater Controls

These controls are available as factory installed on the duct heater or as an Electrical & Electronic Manufacturing Association (EEMAC) rated:

- Wall thermostats:
 - T498AT6051A (1 stage),
 - T6052A (2 stage), T921A (0-135 Ω)
- Duct thermostats: T675A (1-stage), T678A (2-stage), T991A (0-135 Ω)
- Bulb holders
- Silent contactors
- SCR controllers
- Sail switch
- Differential pressure switch
- Main disconnect
- Pneumatic electric switches
- **“ON/OFF”** switch
- Magnetic contactors
- Step controllers (specify control panel for wall mount:
 - HRC fusing
 - Control transformers
 - Fan interlock relay
 - Pilot lights

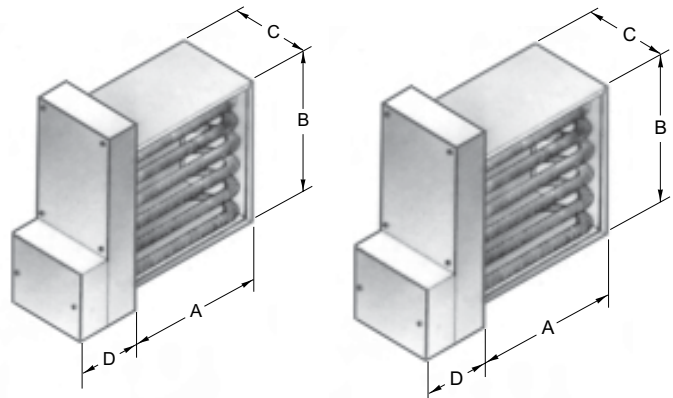


Figure 7

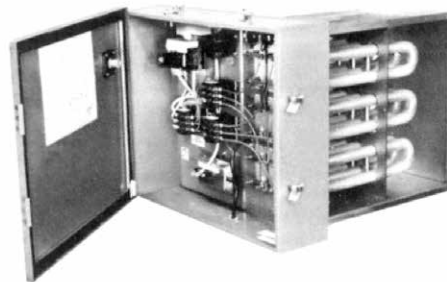


Figure 8

Element Types

The finned tubular element design is the most popular. It incorporates the highest wattage per cross sectional duct area thus making it more economical than the Incoloy® tubular design.

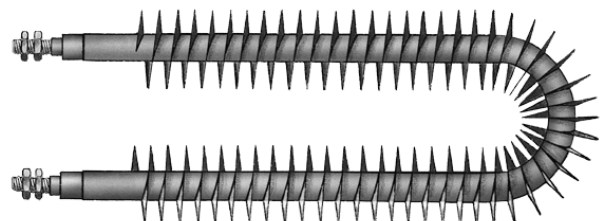


Figure 9 – Finned Tubular Element

Finned tubular elements are constructed using a steel tube with a corrugated steel fin wrapped around it and brazed together. This increases the heat transfer surface of the element resulting in a lower operating temperature than tubular designs.

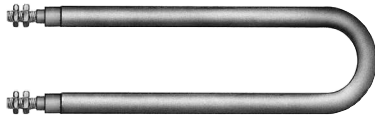


Figure 10 – Tubular Element

Incoloy® tubular elements are similarly constructed, but without the steel fin in order to increase the corrosion resistance. The Incoloy® design should be chosen where high humidity or slightly corrosive chemical contaminants are present in the air stream. These units are made and approved on special order only. Both element types are designed to provide many years of maintenance free service. Unlike open coil designs, duct heaters fitted with tubular elements are not subject to hazards of electrical shock which allows installation close to a register or grille.

Recommended Kilowatts

In order to select the proper kW for your application, use Figure 11 and Figure 12, page C10.

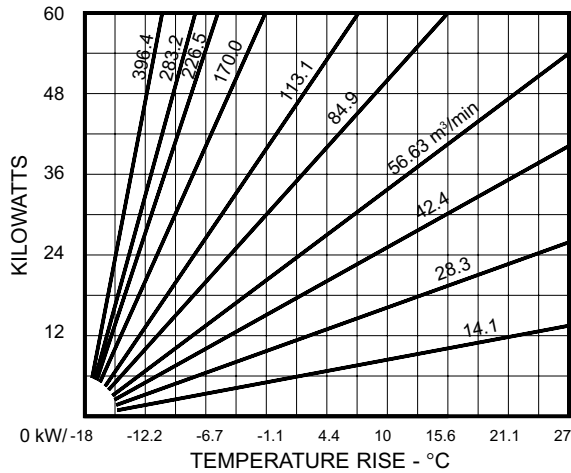


Figure 11 – Recommended Kilowatts

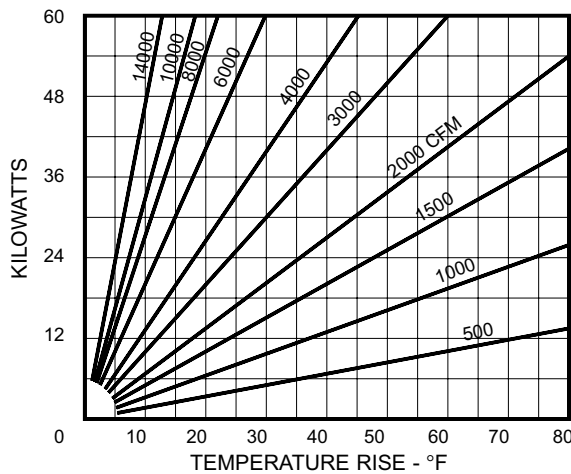


Figure 12 – Recommended Kilowatts

Wiring and Auxiliary Controls

Caloritech™ electric duct heaters are available for supply voltages up to 600V, 3 phase. Multi-staging to provide increments of temperature rise can be incorporated where dimensional space and element spacing allows. Special electrical features are available providing simple or sophisticated temperature control to suit individual requirements. See Optional Auxiliary Duct Heater Controls, page C9.

Construction

Two basic heater frame constructions are available, flange type or insert type (see Figure 13 and Figure 14, page C10).

All frames are fabricated from 16-gauge satin coat steel. Specially constructed stainless steel frames are also available.

A unique modular construction using stock frame components is employed using vertical and horizontal dimensional increments of two inches, ensuring rapid delivery.

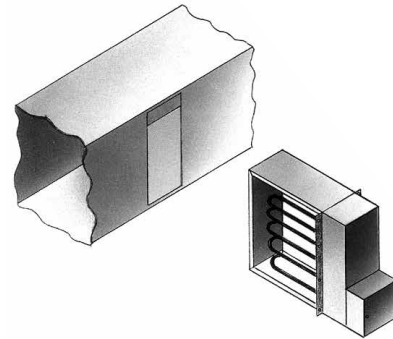


Figure 13 – Insert Type

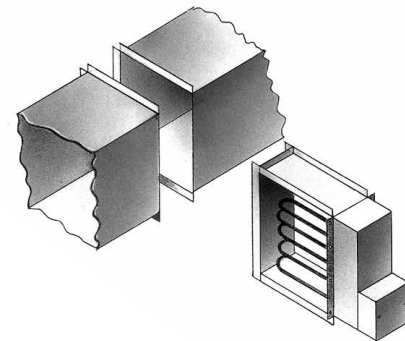


Figure 14 – Flange Type

Standard Dimensions

Insert type duct heaters are slightly undersized to permit installation in ducts having the A and B dimensions listed in Table 7, page C11.



Selection and Installation

Finned tubular duct heaters are approved for horizontal duct installation where the maximum inlet air temperature does not exceed 77°F (25°C) and the maximum rating does not exceed 120 kW. Multiple heaters can be installed in tandem (series provided that the inlet temperature to any heater section one heater) is not more than 77°F (25°C) and the air velocity is not less than the requirements of Figure 15, page C11. Check factory if you require assistance.

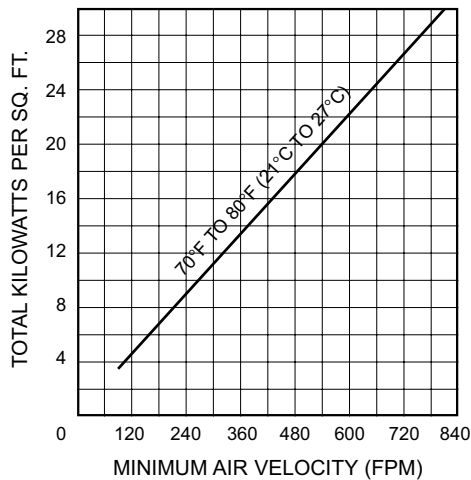


Figure 15 – Air Velocity Requirements

See Table 7, page C11 for typical duct heater sizes and kW ratings based on an air flow velocity of 500 ft/min or higher.

If the flow velocity is less than 500 ft/min, the typical maximum kW ratings in the table must be derated using .

Multiply the kW ratings shown in Table 7, page C11 by the appropriate derating factor from Figure 16, page C11.

Table 7, page C11 lists some of the more common heater sizes with maximum kilowatt ratings for each size. Stock modular frames allow quick delivery for other sizes in increments of 2" (51 mm).

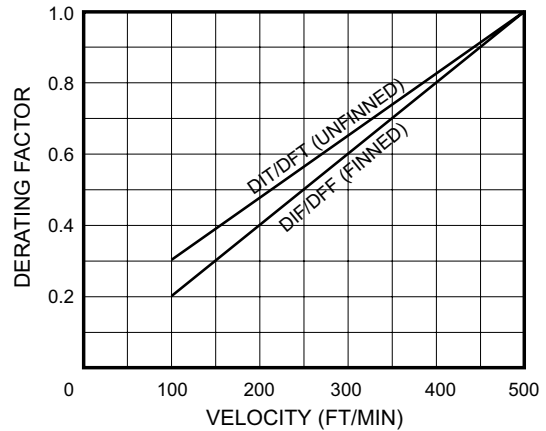


Figure 16 – Derating Factors

Table 7 – Maximum Single Heater kW Rating for Typical Duct Heater Sizes

Dimensions A x B		DIF/DFE		DIT/DFT	
in	mm	Max. kW	Max No. of Elements	Max. kW	Max No. of Elements
6 x 6	152 x 152	2.5	3	1.5	6
8 x 6	203 x 152	3.0	3	3.0	6
10 x 6	254 x 152	4.0	3	2.5	6
10 x 8	254 x 203	5.5	4	3.5	8
12 x 6	305 x 152	5.0	3	3.5	6
12 x 8	305 x 203	6.5	4	4.5	8
12 x 10	305 x 254	8.0	5	5.5	10
14 x 8	356 x 203	7.5	4	5.5	8
14 x 10	356 x 254	9.5	5	6.5	10
14 x 12	356 x 305	11.5	6	8.0	12
16 x 10	406 x 254	11.0	5	7.5	10
16 x 12	406 x 305	13.0	6	9.0	12
16 x 14	406 x 356	15.5	7	10.5	14
18 x 12	457 x 305	15.0	6	10.5	12
18 x 14	457 x 356	17.5	7	12.0	14
18 x 16	457 x 406	20.0	8	14.0	16
20 x 14	508 x 356	19.0	7	13.5	14
20 x 16	508 x 406	22.0	8	15.5	16
20 x 18	508 x 457	25.0	9	17.5	18
22 x 16	559 x 406	24.0	8	17.0	16
22 x 18	559 x 457	27.5	9	19.0	18
22 x 20	559 x 508	30.5	10	21.0	20
24 x 18	610 x 457	30.0	9	21.0	18
24 x 20	610 x 508	33.0	10	23.0	20
24 x 22	610 x 559	36.5	11	25.5	22
26 x 20	660 x 508	36.0	10	25.0	20
26 x 22	660 x 559	39.5	11	27.5	22
26 x 24	660 x 610	43.0	12	30.0	24
28 x 22	711 x 559	42.5	11	29.5	22
28 x 24	711 x 610	46.5	12	32.5	24
28 x 26	711 x 660	50.5	13	35.0	26
30 x 24	762 x 610	50.0	12	35.0	24
30 x 26	762 x 660	54.0	13	37.5	26
30 x 28	762 x 711	58.0	14	40.5	28
30 x 30	762 x 762	62.5	15	43.5	30

Types DFF and DIF duct heaters are designed and approved for comfort heating applications. The unit must be installed in a horizontal duct with the terminal housing at the side or bottom. Tandem mounting (more than one heater in series) is permitted within certain limitations. See previous discussion. Units listed in Table 9, page C12 are representative only. It is reasonably safe to specify any similar unit using this table as a guideline, and we will build to your specifications.

Standard Features

- Primary linear cutout, 160°F (71°C) 277/600 VAC, 25/10 amp non-inductive
- Secondary linear cutout - Manual reset complete with back-up magnetic contactor on units under 300V, 30 kW and less, 225°F (107°C) 277/600 VAC, 25/10 amp non-inductive

Optional Features

See Optional Auxiliary Duct Heater Controls, page C9.

Table 8 – Type DFF

DIM.	in	mm
C	6.5	163
D	7.0	178
E	2.0	51

To Order Specify

- Quantity
- kW
- Catalog number
- Minimum CFM
- Voltage
- Duct dimensions
- Phase
- Optional features

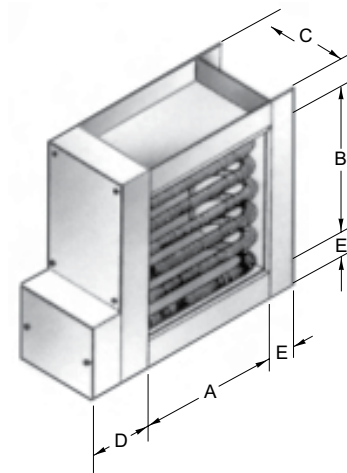


Figure 17 – Type DFF

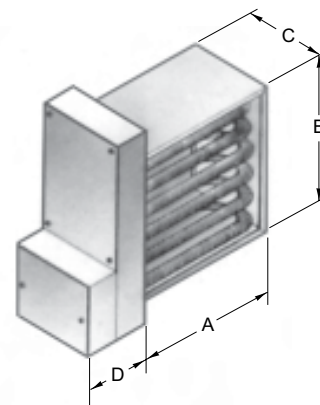


Figure 18 – Type DIF

Table 9 – Types DFF/DIF Duct Heaters With Finned Element

kW	Standard Voltages					Dimensions				Min. Air Flow		No. of Elements	Catalog No.		Approx. Weight		
	120V		280V, 240V		480V, 600V		A		B		CFM		m³/min.	Flange Type	Insert Type	lbs	kg
	1Ø	1Ø	3Ø	1Ø	3Ø	in	mm	in	mm								
1	✓	✓	-	-	-	6	152	6	152	152	1.4	2	DFF06x06-01	DIF06x06-01	15	7	
2.5	✓	✓	-	-	-	6	152	6	152	150	4.2	3	DFF06x06-02.5	DIF06x06-02.5	15	7	
7.5	-	✓	-	✓	✓	14	356	8	203	390	11.0	4	DFF14x08-07.5	DIF14x08-07.5	20	9	
10	-	✓	-	✓	✓	14	356	12	305	500	14.1	6	DFF14x12-10	DIF14x12-10	25	11	
12.5	-	✓	-	✓	✓	16	406	12	305	625	17.7	6	DFF16x12-12.5	DIF16x12-12.5	30	14	
15	-	✓	-	✓	✓	18	457	12	305	750	21.2	6	DFF18x12-15	DIF18x12-15	30	14	
17.5	-	✓	-	✓	✓	18	457	14	356	875	24.8	6	DFF18x14-17.5	DIF18x14-17.5	35	16	
20	-	✓	-	✓	✓	18	457	16	406	1000	28.3	6	DFF18x16-20	DIF18x16-20	35	16	
25	-	-	✓	✓	✓	20	508	18	457	1250	35.4	9	DFF20x18-25	DIF20x18-25	50	23	
30	-	-	✓	✓	✓	24	610	18	457	1500	42.4	9	DFF24x18-30	DIF24x18-30	55	25	
35	-	-	✓	✓	✓	24	610	2	559	1650	46.7	9	DFF24x22-35	DIF24x22-35	60	27	
40	-	-	✓	✓	✓	26	660	24	610	2050	58.0	12	DFF26x24-40	DIF26x24-40	70	32	
45	-	-	✓	✓	✓	28	711	24	610	2200	62.2	12	DFF26x24-45	DIF26x24-45	75	34	
50	-	-	✓	✓	✓	28	711	26	660	2500	70.7	12	DFF28x26-50	DIF28x26-50	80	36	
60	-	-	✓	✓	✓	30	762	30	813	3000	84.9	15	DFF30x30-60	DIF30x30-60	95	43	
80	-	-	✓	✓	✓	36	914	32	813	4000	113.1	15	DFF36x32-80	DIF36x32-80	105	48	
100	-	-	✓	✓	✓	42	1067	36	914	5250	148.5	18	DFF42x36-100	DIF42x36-100	130	59	
120	-	-	✓	✓	✓	48	1219	36	914	6000	170.0	18	DFF48x36-120	DIF48x36-120	150	68	

Note: Incoloy® tubular duct heaters, types DFT and DIT, are available on special order only.

Caloritech™