



Tubular / Finned Tubular Duct Heaters



Certificate No. 013867



Applications

Heatrex High Temperature Tubular Duct Heaters are designed for installations requiring higher air temperature to accomplish drying, baking, preheating, annealing, dehumidification and similar applications.

Standard Features

- Rugged incoloy sheathed tubular elements
- Steel mounting flange
- Individually replaceable elements
- Heavy-duty support rods
- Prewired 48 amp maximum circuits
- NEMA I terminal housing
- Up to 600 volts

Optional Features

- Special dimensions and sheath materials
- Special wattage/voltages
- Thermowell or Thermocouple available for over temperature protection
- Custom terminations
- NEMA 4, 7 and 12 terminal housings available
- Gas-tight flange construction
- Built-in controls/custom control panels
- Air flow switch
- Fan interlock relay
- Adjustable bulb and capillary manual reset
- All stainless steel construction
- Insulation Box

Benefits

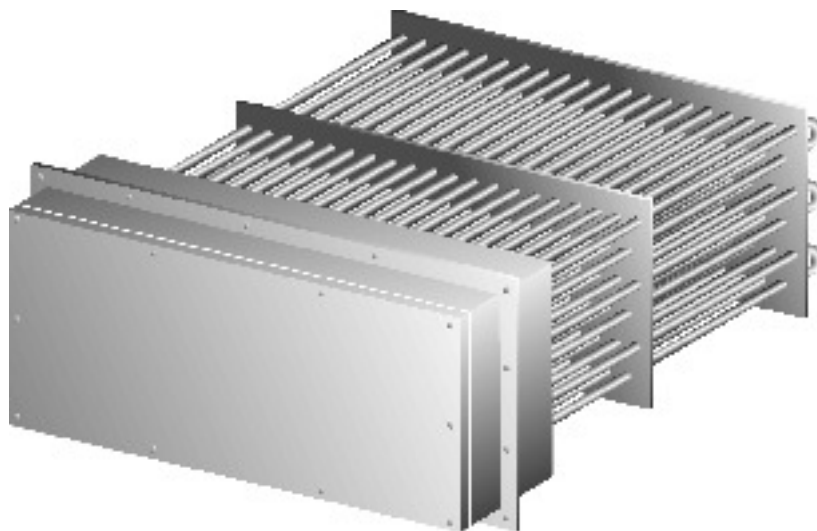
- Versatile - May be adapted to allow application at locations where air heating is most efficiently accomplished
- Easy installation
- Low maintenance
- Engineered for long life
- Provides clean heat

Installation

The units screw or bolt in place through the flange on the heater. When installed vertically through the top of the duct, the heaters are self supporting and sheet metal screws are all that is required to hold the unit in position, providing the duct is of a sufficiently heavy gauge metal. When installed horizontally, the installer will determine whether the duct wall has adequate strength to support the weight of the unit by the flange only. An internal frame may be necessary to support the unit in the duct. This frame can have tapped holes or captive nuts to receive mounting bolts.

Wiring

A fused power supply of required voltage and phase must be brought to the terminal box. The conductors must have a minimum ampacity of 125% of the maximum heater load. The power circuit normally is required to include a branch circuit overcurrent protective device, a disconnect and a secondary thermal cut-out with manual reset. The control circuit should include the temperature controller, the primary thermal cut-out and an interlock with the fan motor. The most reliable and economical method to do this is with a pressure air flow switch. It will open the control circuit and de-energize the heater when any circumstance prevents sufficient air flow through the heater. The air handler should run on a 10-15 second time delay after the heater is de-energized. This allows the elements to cool and prevents overheating the adjacent duct and terminal areas. All wiring must be in accordance with National Electric Code and applicable local codes in your area.



HEATREX TUBULAR DUCT HEATERS

1 Terminal

Standard low profile NEMA 1 enclosure terminal box made from heavy gauge steel. Other NEMA rated enclosures are available.

2 Elements

The tubular heaters used are of special design construction consisting of .430" diameter incoloy sheath for better corrosion resistance at high temperatures. All tubular heaters are replaceable. Individual elements are easily replaced in the field.

3 Support Frame

The heavy duty frame is composed of 1/4" thick steel mounting flange, steel support plate and four 1/2" diameter stainless steel support rods that make for a very sturdy frame to rigidly support the tubular heating elements.

4 Second Support Plate

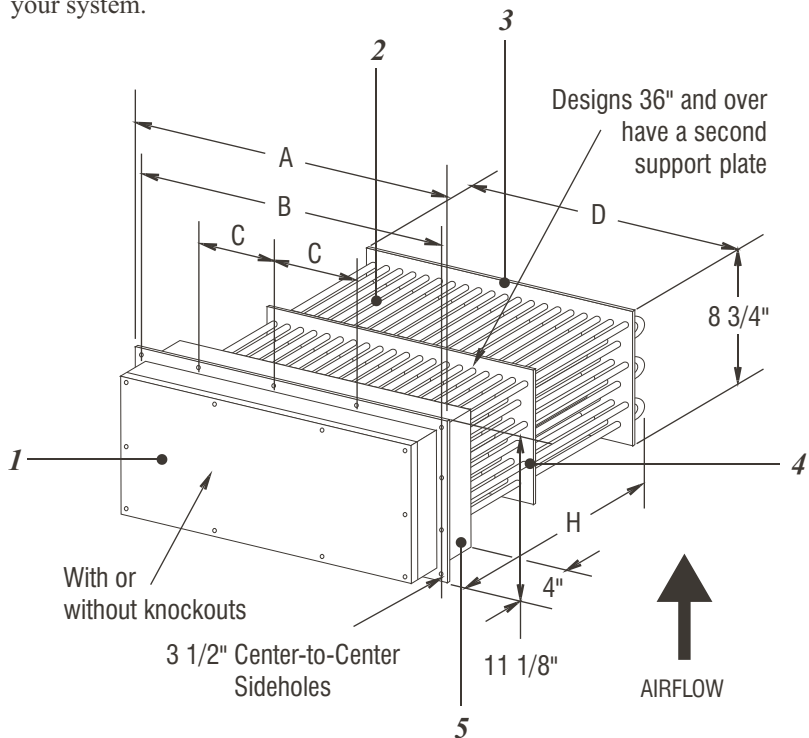
A second support plate is added in the center for units over 36" on the Immersion length.

5 Insulation (optional)

Four inches of special mineral insulation minimizes heat losses and keeps the electrical wiring at the terminal end cooler, when required.

Thermowell (optional)

Thermowell provides convenient access for accurate sheath temperature surveillance with a thermal cut-out device. The well's orifice is located in the terminal box. Thermal cut-out with type J or K thermocouple provides very responsive input to the adjustable cut-out control. An excellent safe-guard for your system.



Standard Design Sizes and Ratings - 23 Watts/Sq. In.

(400°F max @ 240 SFPM; 550°F max @ 540 SFPM; 650°F max @ 960 SFPM; 675°F max @ 1500 SFPM)

kW Rating	Number of Elements	Dimensions (in.)					HEATREX Catalog Number			
							240 Volts		480 Volts	
		A	B	C	D	H	Without Insulation Box	With Insulation Box	Without Insulation Box	With Insulation Box
6	6	5 5/8	5	2 1/2	2 3/4	20	545016	545121	545018	545122
12	12	7 5/8	7	3 1/2	4 3/4	20	545020	545123	545022	545124
18	18	9 5/8	9	3	6 3/4	20	545024	545125	545026	545126
24	24	11 5/8	11	2 3/4	8 3/4	20	545028	545127	545030	545128
30	30	13 5/8	13	3 1/4	10 3/4	20	545032	545129	545034	545130
36	36	15 5/8	15	3 3/4	12 3/4	20	545035	545131	545037	545132
42	42	17 5/8	17	4 1/4	14 3/4	20	545048	545133	545040	545134
48	48	19 5/8	19	4 3/4	16 3/4	20	545041	545135	545043	545136
54	54	21 5/8	21	5 1/4	18 3/4	20	545044	545137	545046	545138
60	60	23 5/8	23	5 3/4	20 3/4	20	545047	545139	545049	545140
75	60	23 5/8	23	5 3/4	20 3/4	25	545050	545141	545052	545142
100	60	23 5/8	23	5 3/4	20 3/4	32 1/2	545053	545143	545055	545144
125	60	23 5/8	23	5 3/4	20 3/4	41 1/2	545016	545116	545056	545145

(Up to 300 kW - Consult Factory)

NOTE: Above catalog items are designed for three phase operations, single phase available consult factory.



Applications

Heatrex Finned Tubular Duct Heaters are engineered for lower temperature industrial process heating and recirculating ovens at temperatures of 600°F and below. Typical uses include comfort heating, shrink wrapping, drying rooms, low temperature process air, fruit and produce ripening rooms, low temperature forced air ovens, cryogenic exhaust gas heating and other air heating applications.

Standard Features

- .430 Diameter
- Copper clad steel tubular elements
- Edgewound furnace brazed fins
- Individually removable elements
- Prewired 48 amp maximum circuits

Optional Features

- Over-temperature protection
- Other ratings/sizes are available
- Explosion/moisture resistant terminal housing
- Hermetically sealed terminals for severely humid environments
- Solid state control panels/controls
- All stainless steel construction
- Insulation Box

Benefits

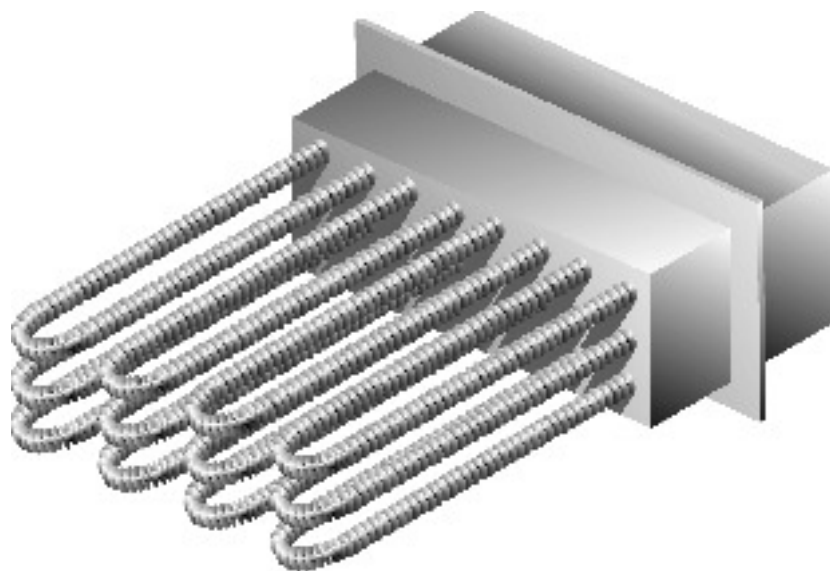
- Versatile - May be adapted to allow application at locations where air heating is most efficiently accomplished
- Easy installation
- Low maintenance
- Engineered for long life
- Provides uniform air temperatures

Installation

When possible, heaters should be installed in the bottom or on either side of the duct to limit heat transfer into the terminal enclosure. Air flow as shown. Two heaters can be mounted side by side, provided the watt density of the downstream heater has been selected based on the air inlet temperature to that heater. The duct area may be increased or decreased, based on the size of the heater, through the use of sheet metal transition inserts. The slope or angle of the transition cannot exceed 30°.

Wiring

A fused power supply of required voltage and phase must be brought to the terminal box. The conductors must have a minimum ampacity of 125% of the maximum heater load. The power circuit normally is required to include a branch circuit overcurrent protective device, a disconnect and a secondary thermal cut-out with manual reset. The control circuit should include the temperature controller, the primary thermal cut-out and an interlock with the fan motor. The most reliable and economical method to do this is with a pressure air flow switch. It will open the control circuit and de-energize the heater when any circumstance prevents sufficient air flow through the heater. The air handler should run on a 10-15 second time delay after the heater is de-energized. This allows the elements to cool and prevents overheating the adjacent duct and terminal areas. All wiring must be in accordance with National Electric Code and applicable local codes in your area.



HEATREX FINNED TUBULAR DUCT HEATERS

1 Terminal

Standard low profile NEMA 1 enclosure terminal box made from heavy gauge steel. Other NEMA rated enclosures are available.

2 Elements

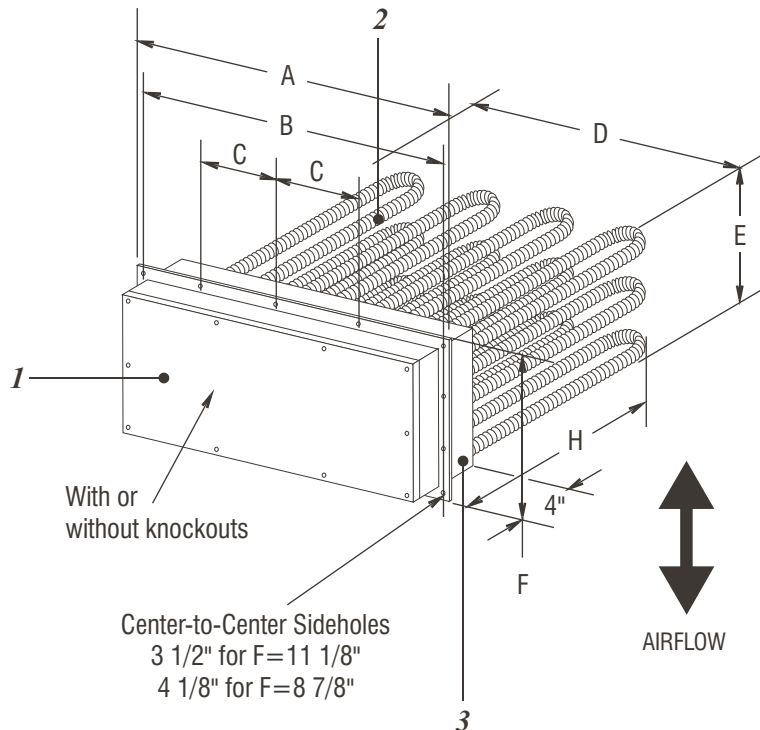
The tubular heaters used are of special design construction consisting of .430" diameter copper plated steel sheath with steel fin edgewound and brazed to the sheath. All tubular heaters are replaceable. Individual elements are easily replaced in the field.

3 Insulation (optional)

Four inches of special mineral insulation minimizes heat losses and keeps the electrical wiring at the terminal end cooler, when required.

Thermowell (optional)

Thermowell provides convenient access for accurate sheath temperature surveillance with a thermal cut-out device. The well's orifice is located in the terminal box. Thermal cut-out with type J or K thermocouple provides very responsive input to the adjustable cut-out control. An excellent safe-guard for your system.



Standard Design Sizes and Ratings - 40 Watts/Sq. In.

(325°F max @ 240 SFPM; 450°F max @ 540 SFPM; 500°F max @ 960 SFPM; 550°F max @ 1500 SFPM)

kW Rating	Number of Elements	Dimensions (in.)							HEATREX Catalog Number			
									240 Volts		480 Volts	
		A	B	C	D	E	F	H	Without Insulation Box	With Insulation Box	Without Insulation Box	With Insulation Box
4.5	3	7 7/8	6 5/8	3 5/16	5	6 1/2	8 7/8	19 1/2	545188	545189	545290	545291
9	6	11 7/8	10 5/8	5 5/16	9	6 1/2	8 7/8	19 1/2	545190	545191	545292	545293
13.5	9	15 7/8	14 5/8	4 7/8	13	6 1/2	8 7/8	19 1/2	545192	545193	545294	545295
18	12	19 7/8	18 5/8	4 5/8	17	6 1/2	8 7/8	19 1/2	545194	545195	545296	545297
22.5	15	23 7/8	22 5/8	4 1/2	21	6 1/2	8 7/8	19 1/2	545196	545197	545298	545299
27	18	27 7/8	26 5/8	4 7/16	25	6 1/2	8 7/8	19 1/2	545198	545199	545300	545301
36	24	27 7/8	26 5/8	4 7/16	25	8 3/4	11 1/8	19 1/2	545200	545201	545302	545303
6	3	7 7/8	6 5/8	3 5/16	5	6 1/2	8 7/8	24 1/8	545202	545203	545304	545305
12	6	11 7/8	10 5/8	5 5/16	9	6 1/2	8 7/8	24 1/8	545204	545205	545306	545307
18	9	15 7/8	14 5/8	4 7/8	13	6 1/2	8 7/8	24 1/8	545206	545207	545308	545309
24	12	19 7/8	18 5/8	4 5/8	17	6 1/2	8 7/8	24 1/8	545208	545209	545310	545311
30	15	23 7/8	22 5/8	4 1/2	21	6 1/2	8 7/8	24 1/8	545210	545211	545312	545313
36	18	27 7/8	26 5/8	4 7/16	25	6 1/2	8 7/8	24 1/8	545212	545213	545314	545315
48	24	27 7/8	26 5/8	4 7/16	25	8 3/4	11 1/8	24 1/8	545214	545215	545316	545317
45	15	23 7/8	22 5/8	4 1/2	21	6 1/2	8 7/8	32 1/2	545216	545217	545318	545319
54	18	27 7/8	26 5/8	4 7/16	25	6 1/2	8 7/8	32 1/2	545218	545219	545320	545321
72	24	27 7/8	26 5/8	4 7/16	25	8 3/4	11 1/8	32 1/2	545220	545221	545322	545323

(Up to 300 kW - Consult Factory)

NOTE: Above catalog items are designed for three phase operations, single phase available consult factory.

Standard Design Sizes and Ratings - 54 Watts/Sq. In.

(300°F max @ 540 SFPM; 375°F max @ 960 SFPM; 450°F max @ 1500 SFPM)

kW Rating	Number of Elements	Dimensions (in.)							HEATREX Catalog Number			
									240 Volts		480 Volts	
		A	B	C	D	E	F	H	Without Insulation Box	With Insulation Box	Without Insulation Box	With Insulation Box
6	3	7 7/8	6 5/8	3 5/16	5	6 1/2	8 7/8	19 1/2	545222	545223	545324	545325
12	6	11 7/8	10 5/8	5 5/16	9	6 1/2	8 7/8	19 1/2	545224	545225	545326	545327
18	9	15 7/8	14 5/8	4 7/8	13	6 1/2	8 7/8	19 1/2	545226	545227	545328	545329
24	12	19 7/8	18 5/8	4 5/8	17	6 1/2	8 7/8	19 1/2	545228	545229	545330	545331
30	15	23 7/8	22 5/8	4 1/2	21	6 1/2	8 7/8	19 1/2	545230	545231	545332	545333
36	18	27 7/8	26 5/8	4 7/16	25	6 1/2	8 7/8	19 1/2	545232	545233	545334	545335
48	24	27 7/8	26 5/8	4 7/16	25	8 3/4	11 1/8	19 1/2	545234	545235	545336	545337
8.1	3	7 7/8	6 5/8	3 5/16	5	6 1/2	8 7/8	24 1/8	545236	545237	545338	545339
16.2	6	11 7/8	10 5/8	5 5/16	9	6 1/2	8 7/8	24 1/8	545238	545239	545340	545341
24.3	9	15 7/8	14 5/8	4 7/8	13	6 1/2	8 7/8	24 1/8	545240	545241	545342	545343
32.4	12	19 7/8	18 5/8	4 5/8	17	6 1/2	8 7/8	24 1/8	545242	545243	545344	545345
40.5	15	23 7/8	22 5/8	4 1/2	21	6 1/2	8 7/8	24 1/8	545244	545245	545346	545347
48.6	18	27 7/8	26 5/8	4 7/16	25	6 1/2	8 7/8	24 1/8	545246	545247	545348	545349
64.8	24	27 7/8	26 5/8	4 7/16	25	8 3/4	11 1/8	24 1/8	545248	545249	545350	545351
60	15	23 7/8	22 5/8	4 1/2	21	6 1/2	8 7/8	32 1/2	545250	545251	545352	545353
72	18	27 7/8	26 5/8	4 7/16	25	6 1/2	8 7/8	32 1/2	545252	545253	545354	545355
96	24	27 7/8	26 5/8	4 7/16	25	8 3/4	11 1/8	32 1/2	545254	545255	545356	545357

(Up to 300 kW - Consult Factory)

NOTE: Above catalog items are designed for three phase operations, single phase available consult factory.

Standard Design Sizes and Ratings - 64 Watts/Sq. In.

(200°F max @ 540 SFPM; 275°F max @ 960 SFPM; 350°F max @ 1500 SFPM)

kW Rating	Number of Elements	Dimensions (in.)							HEATREX Catalog Number			
									240 Volts		480 Volts	
		A	B	C	D	E	F	H	Without Insulation Box	With Insulation Box	Without Insulation Box	With Insulation Box
7.2	3	7 7/8	6 5/8	3 5/16	5	6 1/2	8 7/8	19 1/2	545256	545257	545358	545359
14.4	6	11 7/8	10 5/8	5 5/16	9	6 1/2	8 7/8	19 1/2	545258	545259	545360	545361
21.6	9	15 7/8	14 5/8	4 7/8	13	6 1/2	8 7/8	19 1/2	545260	545261	545362	545363
28.8	12	19 7/8	18 5/8	4 5/8	17	6 1/2	8 7/8	19 1/2	545262	545263	545364	545365
36	15	23 7/8	22 5/8	4 1/2	21	6 1/2	8 7/8	19 1/2	545264	545265	545366	545367
43.2	18	27 7/8	26 5/8	4 7/16	25	6 1/2	8 7/8	19 1/2	545266	545267	545368	545369
57.6	24	27 7/8	26 5/8	4 7/16	25	8 3/4	11 1/8	19 1/2	545268	545269	545370	545371
9.6	3	7 7/8	6 5/8	3 5/16	5	6 1/2	8 7/8	24 1/8	545270	545271	545372	545373
19.2	6	11 7/8	10 5/8	5 5/16	9	6 1/2	8 7/8	24 1/8	545272	545273	545374	545375
28.8	9	15 7/8	14 5/8	4 7/8	13	6 1/2	8 7/8	24 1/8	545274	545275	545376	545377
38.4	12	19 7/8	18 5/8	4 5/8	17	6 1/2	8 7/8	24 1/8	545276	545277	545378	545379
48	15	23 7/8	22 5/8	4 1/2	21	6 1/2	8 7/8	24 1/8	545278	545279	545380	545381
57.6	18	27 7/8	26 5/8	4 7/16	25	6 1/2	8 7/8	24 1/8	545280	545281	545382	545383
76.8	24	27 7/8	26 5/8	4 7/16	25	8 3/4	11 1/8	24 1/8	545282	545283	545384	545385
72	15	23 7/8	22 5/8	4 1/2	21	6 1/2	8 7/8	32 1/2	545284	545285	545386	545387
86.4	18	27 7/8	26 5/8	4 7/16	25	6 1/2	8 7/8	32 1/2	545286	545287	545388	545389
115.2	24	27 7/8	26 5/8	4 7/16	25	8 3/4	11 1/8	32 1/2	545288	545289	545390	545391

(Up to 300 kW - Consult Factory)

NOTE: Above catalog items are designed for three phase operations, single phase available consult factory.

SELECTING THE PROPER DUCT HEATER

There are many factors to consider to ensure the proper heater for your specific application. Some of them are contained in the following list:

- Medium to be heated
- Flow rate
- Inlet/Outlet temperature
- Duct size
- Wattage required
- Supply voltage available
- Desired electrical controls, NEMA rating and number of electrical circuits
- Insulation requirement
- Material of construction
- Possible corrosive agents in the medium

One the most important considerations when choosing a duct heater is the watt density. Watt density is expressed in watts per square inch (wpsi) of surface area of the element sheath. If the watt density you select for the application is too high, then premature failure is likely. Should you specify a watt density that is unusually low, then the heater may be larger than necessary.

After you have looked at as many facts as are available to you, please call Heatrex, Inc. Sales Engineering staff to work out the details and to be provided a detailed custom quote to satisfy your application needs.

The following charts are designed to give you a general idea of maximum watt densities at specific airflows to achieve a desired outlet temperature. It assumes 70° F ambient inlet temperature.

Tubular Duct Heater

Recommended maximum watt densities for the included air velocities and outlet temperatures

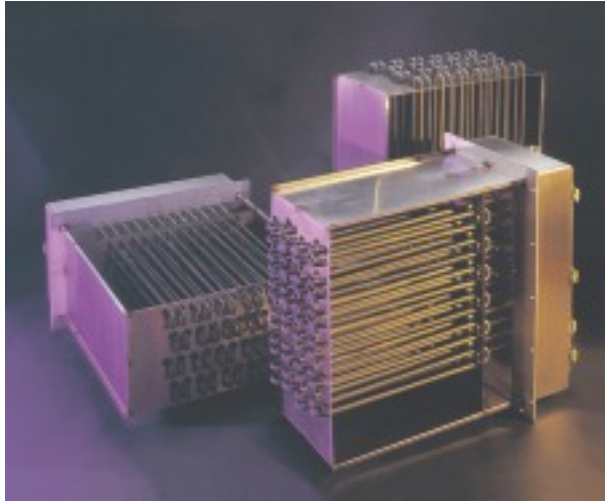
Minimum velocity in standard feet per minute	400° F	500° F	600° F	700° F	800° F	900° F	1000° F
240	23	21	19	17	12	9	5
540	26	23	21	18	14	10	8
960	30	27	23	21	16	12	10
1500	32	28	25	23	17	12	10
2160	33	29	25	23	17	12	10

Finned Tubular Duct Heater

Recommended maximum watt densities for the included air velocities and outlet temperatures

Minimum velocity in standard feet per minute	200° F	250° F	300° F	350° F	400° F	450° F	500° F	550° F	600° F
240	60	57	55	53	50	45	40	35	30
540	65	65	60	60	55	45	40	35	30
960	65	65	65	65	60	55	50	40	35
1500	65	65	65	65	65	60	55	45	40
2000	65	65	65	65	65	60	55	45	40

Tubular Duct Heaters



Finned Tubular Duct Heaters



Duct Heater Controls

Heatrex Tubular and Finned Tubular Duct Heaters provide the user with an extremely efficient heat source which is readily adaptable to the control requirements which suit his process. When combined with properly selected controls, these heaters function with accuracy and economy of operation.

SELECTION: The selection of controls or a control system for a specific application or process should be based on the careful consideration of a number of factors including:

- Heater selection of proper size and type
- Acceptable range of temperature above and below desired set point
- Medium use for heat transfer
- Fluctuations of temperature due to variables in the process
- Over temperature protection requirements
- Operator requirements such as readability, control monitoring, etc.

Heatrex application engineering personnel are available to assist in the evaluation of your control requirements.



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Printed in the U.S.A.

041295DH