

# Slant/Fin® ENGINEERING DATA\*

## SPECIFICATIONS

Ratings are based on active (finned) length. Active length of "S" and "C" elements is 5¼" less than total length. Fin size of "S" and "C" elements is 4¼" x 4¼". Active length of "H" and "E" elements is 3" less than total length. See p. 26-27 for the specifications of individual "H" and "E" elements.

### Water Ratings And Flow Rates

The hot water ratings shown in this catalog are based on the following

Water velocity:	3 or more feet per second
Entering air temp:	65°
Steam temperature:	215°

Proceed as follows to determine output under conditions different than above:

Water velocity less than 3 feet per second: multiply the hot water ratings by the factors shown in Table 1.

**TABLE 1**

FACTORS FOR DETERMINING BTUH OUTPUTS AT WATER FLOW RATES OF LESS THAN 3 FEET PER SECOND. AHRI RECOMMENDS THAT A MINIMUM VELOCITY OF 0.25 ft/s BE USED IN SYSTEM DESIGN TO PREVENT A LAMINAR FLOW CONDITION.

Flow Rate Ft./Sec.	Factor	Flow Rate Ft./Sec.	Factor
3.0	1.00	1.5	.973
2.75	.996	1.25	.966
2.5	.992	1.0	.957
2.25	.988	.75	.946
2.0	.984	.5	.931
1.75	.979	.25	.905

### Steam Ratings

Steam ratings are expressed in BTU per hour per lineal foot of activelength, based on steam or 215° F, 1 PSI, (101.5° C) and 65° F (18.3° C) entering air.

### Recommended Installed Height

*(Does not apply to units with horizontal outlet)*

Ratings include the factor shown in Table 3 for the recommended installed height. If the unit is to be installed at a height other than that recommended, the rating must be adjusted as follows:

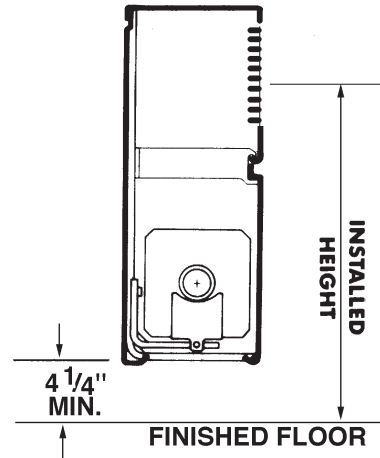
$$\left[ \frac{\text{Factor from Table 3 for actual installed height}}{\text{Factor from Table 3 for recommended installed height}} \right] \times \text{Rating shown on pages 5, 11, 13, 15, 21 \& 27}$$

Example for installed heights other than recommended (example based on Multi/Pak 95-10):

Given:

Installed height	36"	[1.00 ÷ 1.15] x 1500 = 1304 Btu/Hr./Ft.
Recommended height	14"	
Water Temperature	200°F	
Cover type	95-10	
Element	C-540	

† Use the values in Table 3 below for both the "RECOMMENDED HEIGHT" factors and for the "ACTUAL HEIGHT" factors.



The **installed height** for enclosures is defined as the distance from the finished floor to the center of the outlet. Recommended height is based on a minimum mounting height for all covers and enclosures of 4¼" from finished floor to bottom of front panel.

**TABLE 2**

Height †	Factor	Height †	Factor
36" or more	1.00	25"	1.08
34"	1.01	24"	1.09
32"	1.02	23"	1.10
30"	1.03	22"	1.11
29"	1.04	21"	1.12
28"	1.05	20"	1.13
27"	1.06	19"	1.14
26"	1.07	18" or less	1.15

### Dampers

Dampers are available as options on most enclosures, and are shown in diagrams wherever applicable. Ratings are for enclosures without dampers, or with dampers in fully open position.

### Water Content

Slant/Fin commercial radiation elements contain the following volume of water: ¾" copper tube.....0.023 gal./ft.  
Model C440, 1" copper tube.....0.040 gal./ft.  
Model C540, 1¼" copper tube.....0.063 gal./ft.  
Model S532, S540, 1¼" steel pipe.....0.077 gal./ft.  
Model S832, 2" steel pipe.....0.174 gal./ft.

### NOTE:

All ratings have been determined in the Slant/Fin Environmental Laboratory in conformance with accepted industry practice concerning testing and rating procedures for finned tube (commercial) radiation. Fin-tube must be installed in accordance with installation diagrams on Form CP-10 and 90-40 to obtain the ratings indicated. Use of material or installation methods other than those specified by Slant/Fin may result in a change in the ratings.

\* Engineering data pertains to all products in this publication except Multi/Pak 80 and H and E Series bare elements.

# SPECIFICATIONS – CONTINUED

**TABLE 3**

CORRECTION FACTORS FOR WATER TEMPERATURES† AND AIR TEMPERATURES OTHER THAN STANDARD

AVG. WATER TEMP. °F	ENTERING AIR TEMPERATURE																
	45	50	55	60	65	70	75	80	85	90	95	100	110	120	130	140	150
90	.19	.16	.13	.12	.11	.06											
100	.25	.22	.19	.17	.15	.11	.08	.06									
110	.31	.28	.25	.22	.20	.16	.13	.11	.08	.06							
120	.38	.34	.31	.28	.26	.22	.19	.16	.13	.11	.08	.06					
130	.45	.42	.38	.35	.33	.28	.25	.22	.19	.16	.13	.11	.06				
140	.53	.49	.45	.42	.40	.34	.31	.28	.25	.21	.19	.16	.11	.06			
150	.61	.57	.53	.49	.45	.42	.38	.34	.31	.28	.24	.21	.16	.11	.06		
155	.65	.61	.57	.53	.49	.45	.42	.38	.34	.31	.29	.25	.19	.14	.09		
160	.69	.65	.61	.57	.53	.49	.45	.42	.38	.34	.31	.28	.21	.16	.11	.06	
165	.73	.69	.65	.61	.57	.53	.49	.45	.42	.38	.34	.31	.25	.19	.14	.09	
170	.78	.73	.69	.65	.61	.57	.53	.49	.45	.42	.38	.34	.28	.21	.16	.11	.06
175	.82	.78	.73	.69	.65	.61	.57	.53	.49	.45	.42	.38	.31	.25	.19	.14	.09
180	.86	.82	.78	.73	.69	.65	.61	.57	.53	.49	.45	.42	.34	.28	.21	.16	.11
185	.91	.86	.82	.78	.73	.69	.65	.61	.57	.53	.49	.45	.38	.31	.25	.19	.14
190	.95	.91	.86	.82	.78	.73	.69	.65	.61	.57	.53	.49	.42	.34	.28	.21	.16
195	1.00	.95	.91	.86	.82	.78	.73	.69	.65	.61	.57	.53	.45	.38	.31	.25	.19
200	1.05	1.00	.95	.91	.86	.82	.78	.73	.69	.65	.61	.57	.49	.42	.34	.28	.21
205	1.09	1.05	1.00	.95	.91	.86	.82	.78	.73	.69	.65	.61	.53	.45	.38	.31	.25
210	1.14	1.09	1.05	1.00	.95	.91	.86	.82	.78	.73	.69	.65	.57	.49	.42	.34	.28
215 (Standard Temp.)	1.20	1.14	1.09	1.05	1.00	.95	.91	.86	.82	.78	.73	.69	.61	.53	.45	.38	.31
220	1.25	1.20	1.14	1.09	1.05	1.00	.95	.91	.86	.82	.78	.73	.65	.57	.49	.42	.34
225	1.32	1.25	1.20	1.14	1.09	1.05	1.00	.95	.91	.86	.82	.78	.69	.61	.53	.45	.38
230	1.39	1.32	1.25	1.20	1.14	1.09	1.05	1.00	.95	.91	.86	.82	.73	.65	.57	.49	.42
235	1.41	1.39	1.32	1.25	1.20	1.14	1.09	1.05	1.00	.95	.91	.86	.78	.69	.61	.53	.45
240	1.44	1.41	1.39	1.32	1.25	1.20	1.14	1.09	1.05	1.00	.95	.91	.82	.73	.65	.57	.49

† Also applies to equivalent saturated steam temperatures.

Entering air temperature other than 65°F: multiply the catalog steam rating by the factors shown in Table 2.

Water temperature other than 215°F: multiply the catalog steam rating by the factors shown in Table 2.

**NOTE:**

All ratings have been determined in the Slant/Fin Environmental Laboratory in conformance with accepted industry practice concerning testing and rating procedures for finned tube (commercial) radiation. Fin-tube must be installed in accordance with installation diagrams on Form CP-10 and 90-40 to obtain the ratings indicated. Use of material or installation methods other than those specified by Slant/Fin may result in a change in the ratings.

\* Engineering data pertains to all products in this publication except Multi/Pak 80 and H and E Series bare elements.

## Handy Formulas for Water BTUH

$$\text{BTUH} = \text{GPM} \times 500 \times \Delta T^{\circ}\text{F}$$

$$\text{GPM} = \frac{(\text{BTUH} \div 500)}{\Delta T^{\circ}\text{F}}$$

$$\Delta T^{\circ}\text{F} = \frac{(\text{BTUH} \div 500)}{\text{GPM}}$$

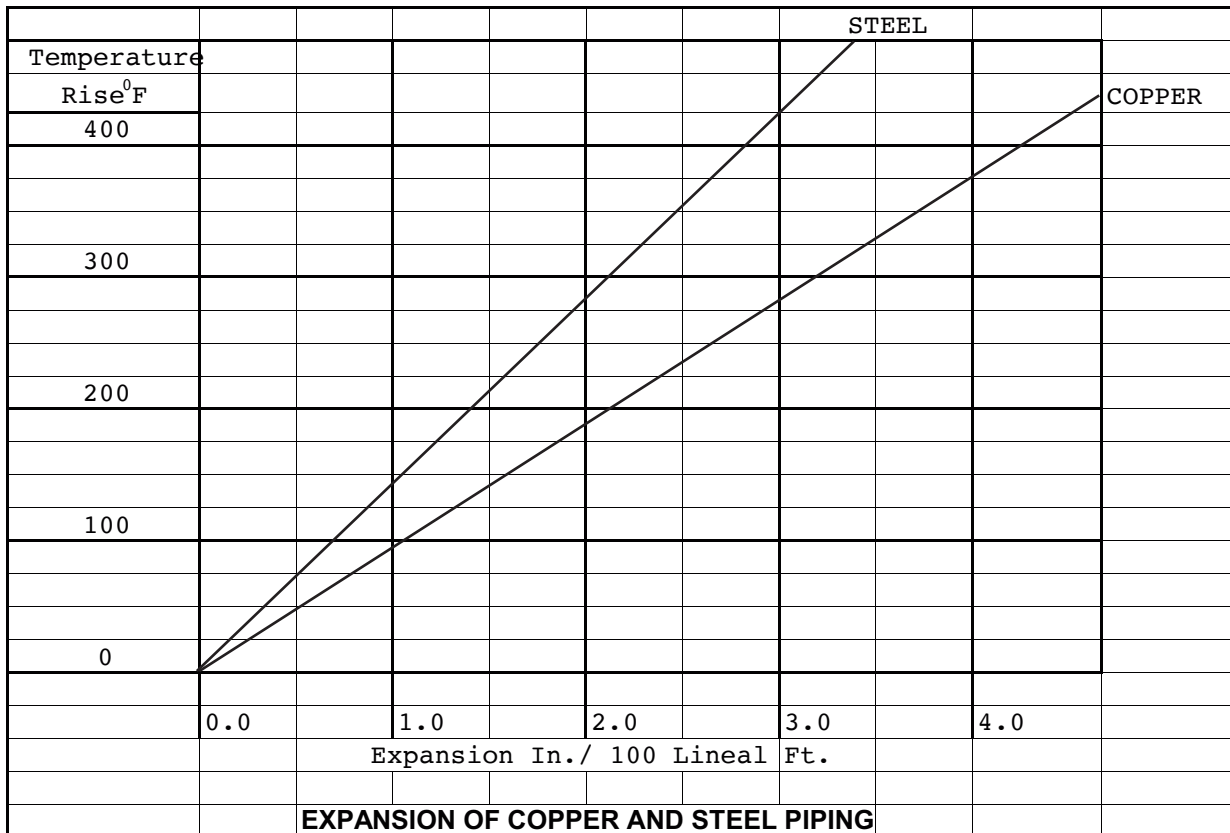
$$\text{BTU} = \text{GPM} \times 500 \times \text{Temp. Drop for Water } ^{\circ}\text{F}$$

## SPECIFICATIONS – CONTINUED

TUBE/PIPE WATER CAPACITIES AND QUANTITIES CIRCULATED AT VELOCITY OF 3* FEET PER SECOND			
Tube/Pipe Size	Gals. Per Linear Ft.	Gals./Min. @ 3'/Sec. Vel.*	Lbs./Hr. @ 3'/Sec. Vel.*
3/4" Copper Tube	0.023	4.14	2,070
1" Copper Tube	0.040	7.20	3,600
1-1/4" Copper Tube	0.063	11.34	5,670
1-1/4" NPT Steel Pipe	0.077	13.86	6,930
2" NPT Steel Pipe	0.174	31.32	15,660

\*3'/Sec. Velocity is Basis for Hot Water Rating Factors.

$$\text{Water Velocity Ft./Sec.} = \frac{\text{Lbs. per Hour}}{(\text{Gals. per Ft.})(3600)(8.3)}$$



## ELEMENT APPLICATION FOR STEAM

### Maximum Runs. Lineal Feet of Fin-Pipe:

The following table indicates maximum normal runs of fin-pipe for steam systems. These runs in lineal feet are based on conservative velocities and the rapid removal of condensate. Pressure drops in column headings are per hundred equivalent feet of pipe.

Type	Size	Square Ft. per Linear Ft. @ 1 psi	One Pipe	Two Pipe			
				Low Pressure		30 psi 8 oz.	150 psi 16 oz.
				1 oz.	2 oz.		
Maximum Length of Individual Run in Lineal Feet							
S540	1-1/4" ips	6.30	10	18	25	52	90
S832	2" ips	5.70	30	60	85	190	300
C540	1-1/4" cop.	7.50	8	16	22	45	—
H5X	1-1/4" cop.	4.70	8	16	22	45	—
H6X	1-1/4" ips	4.10	10	18	25	52	—

\* Made of schedule 40 seamed pipe

### STEAM CAPACITIES OF PIPING (Low Pressure, 1psig) "Square Feet, EDR"

Pipe Size	Horizontal Supply and Return Mains				Two-Pipe			One-Pipe	
		1 oz.	2 oz.	3 oz.	Risers		Undripped Runouts	Supply Risers	Runouts & Valves
1"	Supply	56	79	111	Upfeed	56	34	45	28
	Wet Return	700	1000	1400	Return	450			
	Dry Return	320	412	460					
1-1/4"	Supply	122	173	245	Upfeed	122	75	98	62
	Wet Return	1200	1700	2400	Return	990			
	Dry Return	670	868	962					
1-1/2"	Supply	190	269	380	Upfeed	190	108	152	93
	Wet Return	1900	2700	3800	Return	1500			
	Dry Return	1060	1360	1510					
2"	Supply	386	546	771	Upfeed	386	195	288	169
	Wet Return	4000	5600	8000	Return	3000			
	Dry Return	2300	2960	3300					
2-1/2"	Supply	635	898	1270	Upfeed	635	395	464	260
	Wet Return	6700	9400	13,400	Return	—			
	Dry Return	3800	4900	5450					
3"	Supply	1160	1650	2330	Upfeed	1130	700	800	475
	Wet Return	10,700	15,000	21,400	Return	—			
	Dry Return	7000	9000	10,000					
3-1/2"	Supply	1740	2460	3470	Upfeed	1550	1150	1140	745
	Wet Return	16,000	22,000	32,000	Return	—			
	Dry Return	10,000	12,900	14,300					
4"	Supply	2460	3480	4910	Upfeed	2040	1700	1520	1110
	Wet Return	22,000	31,000	44,000	Return	—			
	Dry Return	15,000	19,000	21,500					
5"	Supply	4550	6430	9090	Adapted from the ASHRAE Guide.				
6"	Supply	7460	10,550	14,900					
For downfeed supply risers, use "Supply" figures above.									

Pressure drop columns are in ounces per 100 feet, equivalent length of run. Equivalent length of run can be approximated as double the actual length of pipe.

Total pressure drop for the entire system should not exceed one-half the normal boiler-gauge pressure. Supply and return mains must be sized for a uniform pressure drop for each system.

To convert to pounds, divide above figure by 4.  
To convert to Btu's, multiply above figures by 240.

Pipe capacities are based on a normal pitch of 1/4" in 10 feet for two-pipe steam, and 1/2" pitch in 10 feet for one-pipe steam. If pitch is increased to 2" in 10", the runout capacities above may be increased by 20%.

The maximum lengths of fin-pipe listed above may also be increased by 20% if 2" pitch is used.