TECH TIP #20

HOW CAN I SIZE A UNIT HEATER?

Copy these two pages for individual load calculations on jobs. Contact Federal for help.

Sterling Commercial / Industrial Heat Loss

This quick heat loss method will allow you to select a heating system for most applications in warehouses and factories. This form is for estimates only. For more accurate selection refer to the ASHRAE Handbooks.

1. Determine the inside temperature to be maintained and subtract the winter low temperature.
NOTE: Negative numbers should be added to inside temperature figures.

_____ (inside temp.) - _____ (winter low temp.) = _____ **design temp. (Δt)**

2. Figure the volume of the room in cubic feet and multiply by the number of air changes per hour. (Usually 1 to 2). Then divide by 55.

_____ (Volume in cu. ft.) x _____ (Air Changes) x _____ (design temp. (Δt)) ÷ 55 = _____ **infiltration heat loss**

3. Calculate the square feet of wall area and multiply by the proper "U" factor from the Building Material Chart.

_____ (sq. ft. of wall) x _____ ("U" factor) x _____ (Δt) = _____ **wall heat loss**

4. Calculate the square feet of window area and multiply by the proper "U" factor from the Building Material Chart.

_____ (sq. ft. of windows) x _____ ("U" factor) x _____ (Δt) = _____ **window heat loss**

5. Calculate the square feet of door area and multiply by the proper "U" factor from the Building Material Chart.

_____ (sq. ft. of doors) x _____ ("U" factor) x _____ (Δt) = _____ **door heat loss**

6. Calculate the square feet of ceiling area and multiply by the proper "U" factor from the Building Material Chart.

_____ (sq. ft. of ceiling) x _____ ("U" factor) x _____ (Δt) = _____ **ceiling heat loss**

7. Add all heat loss figures. (2,3,4,5 & 6)

_____ **total BTUH output**

8. Divide by .80 for BTUH input required.

_____ (total BTUH output) ÷ .80 (steady state efficiency) = _____ **BTUH input required**

Building Material	"U" Factor
WALLS	
Poured concrete 80#/cu. ft.	
8-inch	0.25
12-inch	0.18
Concrete Block, hollow cinder aggregate	
8-inch	0.39
12-inch	0.36
Gravel aggregate	
8-inch	0.52
12-inch	0.47
Concrete Block, w/4-inch facebrick	
Gravel, 8-inch	0.41
Cinder, 8-inch	0.33
Metal	
(un-insulated)	1.17
w/1-inch blanket insulation	0.22
w/3-inch blanket insulation	0.08
ROOFING	
Corrugated Metal (un-insulated)	1.50
w/1-inch bolt or blanket	0.23
w/1½-inch bolt or blanket	0.16
w/3-inch bolt or blanket	0.08
Flat Metal	
w/⅜-inch built-up roofing	0.90
w/1-inch blanket insulation under deck	0.21
w/2-inch blanket insulation under deck	0.12
Wood/ 1" /	
(un-insulated) w/ ⅜-inch built-up roofing	0.48
w/1-inch blanket insulation	0.17
Wood/ 2" /	
(un-insulated) w/⅜-inch built-up roofing	0.32
w/1-inch blanket insulation	0.15
Concrete slab/ 2" /	
(un-insulated) w/⅜-inch built-up roofing	0.30
w/1-inch insulation board	0.16
Concrete slab/ 3" /	
(un-insulated) w/⅜-inch built-up roofing	0.23
w/1-inch insulation board	0.14
Gypsum slab/ 2" /	
(un-insulated) w/½-inch gypsum board	0.36
w/1-inch insulation board	0.20
Gypsum slab/ 3" /	
(Un-insulated) w/½-inch gypsum board	0.30
w/1-inch insulation board	0.18
WINDOWS	
Vertical, single-glass	1.13
Vertical, double-glass, 3/16 - inch air space	0.69
Horizontal, single-glass (sky light)	1.40
DOORS	
Metal — single sheet	1.20
Wood, 1-inch	0.64
2-inch	0.43

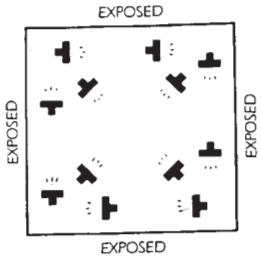
TECH TIP #20 (Cont.)

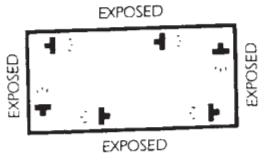
Choosing the Mounting Height

Unit heaters should be mounted no lower than 8 feet above the floor. Units smaller than 100,000 btuh should be mounted no higher than 12'. For larger units mounted higher than 15', downturn nozzles should be considered.

Approximate Throw of Standard Propeller Unit Heaters

mounting height	Size Unit - BTU Input x 1000													
	30	45	60	75	100	125	150	175	200	225	250	300	350	400
8'	33	33	33	40	60	65	70	75	80	85	90	105	110	120
10'	28	28	28	35	54	56	60	64	68	72	78	90	95	100
12'					44	46	49	57	61	65	68	80	84	90
15'							45	49	52	56	60	70	74	80
20'									46	50	54	63	66	70





Positioning Unit Heaters

Using several smaller units rather than a few large large units creates more even heating. Position heaters to set up a directional air flow and insure that the entire room gets heat. Concentrate discharge air along cold exposed walls.

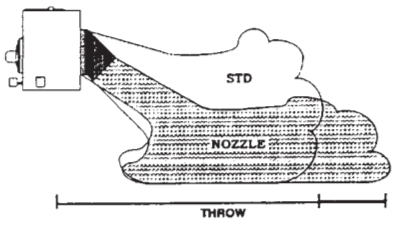
Unit heaters throw should be overlapped by 20% to insure even heating. Consider barriers, like shelves, boxes machinery or fixtures, which interrupt air flow. Avoid direct air discharge on occupants.

$$\frac{\text{ft. of perimeter wall}}{\text{throw of selected units}} \times 1.2 = \text{number of units required}$$

Using Downturn Nozzles

When using the above throw chart consider mounting height and the resulting air throw of the unit. The drawing shows the effect of using a downturn nozzle to extend throw. Nozzles overcome some of the problem with high mounting requirements and recover some heated air that has risen to the ceiling. As a rule of thumb 30° nozzles extend unit heater throw 5%, 45° nozzles add 10%, and 60° nozzles add 20%.

Our 90° nozzles can direct air down from heights up to 30'. Typically they help block entry of cold air at large doors. For unusually high mounting positions push warm air to the floor, using a 2 stage thermostat to first run 'fan only' then bring on the burner as the second stage.



The wye splitter sends warm air in two directions. It can overcome obstructions such as rows of shelving or machines, directing heat to two areas. Using the wye a single Beacon/Morris unit heater can provide cover from two bay doors.

Using Blower Units

Blower unit heaters must be used anywhere ducts are connected to a unit heater. Beacon/Morris blower unit heaters can provide static pressures up to .2" WC. Blower units also offer sound reductions of 5 to 15% over comparable prop units.

Unit heaters should never be installed within corrosive or flammable atmospheres. Areas that contain halogenated hydrocarbons, such as chlorine, shorten heater life and void your warranty. These spaces may be heated by ducting warm air from a unit heater located in a safe, non-contaminated, adjacent area.