

## UNIT HEATER SIZING GUIDE

### INSTRUCTIONS

#### Design Temperature Differentials (Degrees F)

##### Wall & Ceiling

Inside Temp. - Record the inside temperature that will be maintained in the building.

Outside Temp. - Record the outside temperature for the area in which the building will be located; see Table 2.

Design Temp. Diff.- Calculate the difference between these two temperatures.

##### Floor

Inside Temp. - Record the inside temperature that will be maintained in the building.

Outside Temp. - Record the ground temperature based on the winter design temperature of the area in which building will be located; see Table 3.

Design Temp. Diff.- Calculate the difference between these two temperatures.

#### Building Dimensions (ft):

Record the length (ft), width (ft) and height (ft) of the building and calculate the volume (cubic ft) of the building.

#### Construction "U" Values (Table 1):

Based on Table 1 list the "U" values for the walls, roof, floor, windows and doors of the building.

For additional types of construction material not listed in Table 1 please refer to the ASHRAE Handbook of Fundamentals for a more extensive list.

#### Calculations:

Record the number of doors in the building and their respective height (ft) and width (ft).

Record the number of windows in the building, along with their respective height (ft) and width (ft).

#### Infiltration:

Record the number of air changes per hour from Table 4 based on the building type.

Calculate the heat loss based on infiltration by multiplying the volume of the building by the Design Temperature Difference of the walls and ceilings by the number of air changes per hour.

#### Subtotal

Add the heat loss (BTU/HR) from each section of the building: doors, windows, walls, floors roof, and from infiltration. Once a subtotal is calculated add 10% of this value to the subtotal for a factor of safety to determine the Total Heat Loss for the building (BTU/HR). This Total Heat Loss for the building will be the total heat output required by the ADP Unit Heater(s). Please refer to Page 5 of the Sizing Guide to determine which heater(s) is right for this application.

# UNIT HEATERSIZING GUIDE

All calculations are based on information received from the customer. (bold boxes)

Job Owner or Builder: \_\_\_\_\_  
 Distributor: \_\_\_\_\_

City & State: \_\_\_\_\_  
 Building Use: \_\_\_\_\_

## Design Temperature Differentials (Degrees F)

### Wall & Ceiling:

Inside Temp:   
 Outside Temp (table 2): -   
 Design Temp Diff. =

### Floor:

Inside Temp:   
 Ground Temp (table 3):   
 Design Temp Diff. =

## Building Dimensions (ft.):

Length  Width  Height

Volume (cu. ft.) \_\_\_\_\_

## Construction "U" Values (table 1):

Walls  Roof  Floor  Windows  Doors

## Calculations:

Doors:	Square Ft.	"U" Factor	Design T.D.	BTU/HR
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Infiltration:  $\frac{\text{Volume} \times \text{TD} \times \text{Air Changes (table 4)}}{\text{Subtotal}} =$

**Subtotal** =

**Safety Factor:** Add 10% for possible high winds, morning warm ups, periods of higher than average infiltration, etc. =

**Total BTU/H** =

Number of Heaters  Total BTU/H per heater =

Table 1

COMMON BUILDING MATERIALS	U"	COMMON BUILDING MATERIALS	"U"
<b>Walls:</b>		<b>Flat Roofs:</b>	
Poured concrete, 80#/cu.ft.		Corrugated Metal (un-insulated) .....	1.50
8-inch.....	0.25	w/1-inch bolt or blanket .....	0.23
12-inch.....	0.18	w/1 1/2-inch bolt or blanket .....	0.16
Concrete Block, hollow cinder aggregate		w/3-inch bolt or blanket .....	0.08
8-inch.....	0.39	Flat Metal	
12-inch.....	0.36	w/3/8-inch built-up roofing .....	0.90
Concrete Block, hollow gravel aggregate		w/1-inch blanket insulation under deck ....	0.21
8-inch.....	0.52	w/2-inch blanket insulation under deck ....	0.12
12-inch.....	0.47	Wood-1"	
Concrete Block, w/4-inch facebrick		(un-insulated) w/3/8-inch built-up roofing .	0.48
8-inch Cinder .....	0.33	w/1-inch blanket insulation .....	0.17
8-inch Gravel .....	0.41	Wood-2"	
Metal		(un-insulated) w/3/8-inch built-up roofing .	0.32
(un-insulated) .....	1.17	w/1-inch blanket insulation .....	0.15
w/1-inch blanket insulation .....	0.22	<b>Pitched Roofs:</b>	
w/3-inch blanket insulation .....	0.08	Corrugated Metal (un-insulated) .....	1.50
Frame		w/1-inch bolt or blanket .....	0.23
2x4 w/ 1/2" asphalt sheathing and wood		w/1 1/2-inch bolt or blanket .....	0.16
siding, 1/2" sheetrock		w/3-inch bolt or blanket .....	0.08
(un-insulated) .....	0.23	Framed Roof (un-insulated) .....	0.48
w/3-inch insulation .....	0.08	w/R-11 (3 1/2") Fiberglas .....	0.09
<b>Windows:</b>		w/R-19 (6") Fiberglas .....	0.05
Vertical, single-glass .....	1.13	w/1" Polystyrene .....	0.14
Vertical, double-glass .....	0.69	<b>Floors:</b>	
Horizontal, single-glass (sky light) .....	1.40	4-inch concrete .....	0.65
<b>Doors:</b>		6-inch concrete .....	0.43
Metal-single sheet .....	1.20	8-inch concrete .....	0.33
Wood, 1-inch .....	0.64	10-inch concrete .....	0.26
Wood, 2-inch .....	0.43		

Note: For additional types of construction, refer to the ASHRAE Handbook of Fundamentals.

**Table 2**

**Winter Design Temperatures**

STATE	CITY	TEMP F	STATE	CITY	TEMP F	STATE	CITY	TEMP F	STATE	CITY	TEMP F
Alabama	Birmingham	21	Illinois (cont)	Moline	-4	Nebraska	Grand Island	-3	Penn. (cont)	Scranton	5
	Huntsville	16		Peoria	-4		Lincoln	-2		Williamsport	7
	Mobile	29		Rockford	-4		Norfolk	-4	Rhode Island	Newport	9
	Montgomery	25		Springfield	2		North Platte	-4		Providence	9
Alaska	Anchorage	-18	Indiana	Evansville	9		Omaha	-3	S. Carolina	Charleston	27
	Fairbanks	-47		Fort Wayne	1		Scottsbluff	-3		Columbia	24
	Juneau	1		Indianapolis	2	Nevada	Elko	-2		Florence	25
	Nome	-27		South Bend	1		Ely	-4		Greenville	22
Arizona	Flagstaff	4	Iowa	Burlington	-3		Las Vegas	28	S. Dakota	Huron	-14
	Pheonix	34		Des Moines	-5		Reno	10		Rapid City	-7
	Tucson	32		Dubuque	-7		Winnemucca	3		Sioux Falls	-11
	Winslow	10		Sioux City	-7	N. Hamp.	Concord	-3	Tennessee	Bristol	14
	Yuma	39		Waterloo	-10		Portsmouth	2		Chattanooga	18
Arkansas	Fort Smith	17	Kansas	Dodge City	5	N. Jersey	Atlantic City	13		Knoxville	19
	Little Rock	20		Goodland	0		Newark	14		Memphis	18
	Texarkana	23		Topeka	4		Trenton	14		Nashville	14
California	Bakersfield	32		Wichita	7	N. Mexico	Albuquerque	16	Texas	Abilene	20
	Burbank	39	Kentucky	Covington	6		Raton	1		Amarillo	11
	Fresno	30		Lexington	8		Roswell	18		Austin	28
	Long Beach	43		Louisville	10		Silver City	10		Brownsville	39
	Los Angeles	40	Louisiana	Alexandria	27	New York	Albany	-1		Corpus Christi	35
	Oakland	36		Baton Rouge	29		Binghamton	1		Dallas	22
	Sacramento	32		Lake Charles	31		Buffalo	6		El Paso	24
	San Diego	44		New Orleans	33		New York	15		Fort Worth	22
	San Francisco	38		Shreveport	25		Rochester	5		Galveston	36
	Santa Maria	33	Maine	Bangor	-6		Schenectady	1		Houston	32
Colorado	Alamosa	-16		Caribou	-13		Syracuse	2		Laredo	36
	Colo. Springs	2		Portland	-1	N. Carolina	Asheville	14		Lubbock	15
	Denver	1	Maryland	Baltimore	13		Charlotte	22		Midland	21
	Grand Junction	7		Frederich	12		Greensboro	18		Port Authur	31
	Pueblo	0	Mass.	Boston	9		Raleigh	20		San Angelo	22
Conn.	Bridgeport	9		Pittsfield	-3		Wilmington	26		San Antonio	30
	Hartford	7		Worcester	4		Winston-Salem	20		Victoria	32
	New Haven	7	Michigan	Alpena	-6	N. Dakota	Bismarck	-19		Waco	26
Delaware	Wilmington	14		Detroit	6		Devils Lake	-21		Wichita Falls	18
D.C.	Washington	17		Escanaba	-7		Fargo	-18	Utah	Ogden	5
Florida	Daytona Beach	35		Flint	1		Williston	-21		Provo	6
	Fort Myers	44		Grand Rapids	5	Ohio	Akron	6		Salt Lake City	8
	Jacksonville	32		Lansing	1		Cincinnati	6	Vermont	Burlington	-7
	Key West	57		Marquette	-8		Cleveland	5		Rutland	-8
	Lakeland	41		Muskegon	6		Columbus	5	Virginia	Lynchburg	16
	Miami	47		Saginaw	4		Dayton	4		Norfolk	22
	Orlando	38		Sault Ste. Marie	-8		Mansfield	5		Richmond	17
	Pensacola	29	Minn.	Duluth	-16		Sandusky	6		Roanoke	16
	Tallahassee	30		Minneapolis	-12		Toledo	1	Washington	Olympia	22
	Tampa	40		Rochester	-12		Youngstown	4		Seattle	26
	W. Palm Beach	45	Miss.	Jackson	25	Oklahoma	Norman	13		Spokane	2
Georgia	Athens	22		Meridan	23		Oklahoma City	13		Tacoma	24
	Atlanta	22		Vicksburg	26		Tulsa	13		Walla Walla	7
	Augusta	23	Missouri	Columbia	4	Oregon	Astoria	29		Yakima	5
	Columbus	24		Kansas City	6		Eugene	22	W. Virginia	Charleston	11
	Macon	25		St. Joseph	2		Medford	23		Elkins	6
	Rome	22		St. Louis	6		Pendleton	5		Huntington	10
	Savannah	27		Springfield	9		Portland	23		Parkersburg	11
Hawaii	Honolulu	63	Montana	Billings	-10		Roseburg	23	Wisconsin	Green Bay	-9
	Hilo	62		Glasgow	-18		Salem	23		La Crosse	-9
Idaho	Boise	10		Great Falls	-15	Penn.	Allentown	9		Madison	-7
	Lewiston	6		Havre	-11		Erie	9		Milwaukee	-4
	Pocatello	-1		Helena	-16		Harrisburg	11	Wyoming	Casper	-5
Illinois	Aurora	-1		Kalispell	-7		Philadelphia	14		Cheyenne	-1
	Champaign	2		Miles City	-15		Pittsburgh	5		Lander	-11
	Chicago	-4		Missoula	-6		Reading	13		Sheridan	-8

**Table 3**

Winter Design Temp.	Use Ground Temp.
Above +15F	Disregard Floor Load
0 to +15F	+60F
-20 to 0F	+50F
-40 to -20F	+40F

**Table 4**

Building Types	Air Changes
Residential type building, good insulation, vapor barrier, little or no door openings.	.75 - 1
Warehouse, average insulation, little or no door openings	1 - 1.5
Commercial garage (auto care center) average insulation, many door openings.	1.5 - 2.5
Warehouse, poor insulation, many door openings	2 - 2.5
Warehouse, poor insulation, doors left open sometimes.	2.5 - 4

**NOTE:** These figures are to be used as guidelines only. It is up to the job estimator to accurately determine the number of air changes per hour the structure will experience.

If the space contains ventilating equipment, determine the total CFM exhausted. Use this figure in the following formula.

$$BTUH = (CFM \text{ exhausted} \times T.D.) / 55$$

If this Btuh is greater than the amount under infiltration, use this amount.

## FSA SERIES HEATERS

### TECHNICAL DATA

MODEL NUMBER: FSA (N,P)-	<b>30</b>	<b>45</b>	<b>60</b>	<b>75</b>
TOTAL INPUT, BTUH	30,000	45,000	60,000	75,000
TOTAL OUTPUT, BTUH*	24,300	36,500	48,000	60,000
AIR VOLUME, CFM	536	750	830	950
TEMPERATURE RISE, DEGREES F	42	45	55	60
AIR THROW AT 8 FT MOUNTING HEIGHT, FEET	25	25	40	40
RECOMMENDED MOUNTING HEIGHT, FEET	10	10	12	12
FAN DATA	NUMBER OF FANS	1	1	1
	DIAMETER	10	10	14
SHIP WEIGHT, POUNDS	NUMBER OF BLADES	4	4	3
		60	63	87
FAN MOTOR DATA	HORSEPOWER	1/20	1/20	1/10
	AMPS @ 115 V / 1 PH. / 80 Hz	1.7	1.7	4.1
	RPM	1,650	1,650	1,050
FLUE SIZE, INCHES**	3	3	4	4
GAS CONNECTION, INCHES	1/2	1/2	1/2	1/2

## FOA SEPARATED COMBUSTION HEATERS

### TECHNICAL DATA

MODEL NUMBER: FSA (N,P)-	<b>45</b>	<b>60</b>	<b>75</b>	<b>100</b>	<b>125</b>	<b>150</b>	<b>200</b>	<b>250</b>	<b>300</b>
TOTAL INPUT, BTUH	45,000	60,000	75,000	100,000	125,000	150,000	200,000	250,000	300,000
TOTAL OUTPUT, BTUH (NAT. GAS)*	36,200	48,300	59,200	81,000	101,500	120,000	164,000	194,400	240,000
AIR VOLUME, CFM	750	830	950	2,435	2,435	2,955	2,955	5,215	5,215
TEMPERATURE RISE, DEGREES F	45	54	60	31	39	38	51	35	43
RECOMMENDED MOUNTING HEIGHT, FEET	16	20	20	20	20	20	20	30	30
FAN DATA	NUMBER OF FANS	1	1	1	1	1	1	2	2
	DIAMETER, INCHES	10	14	14	16	16	18	16	16
SHIP WEIGHT, POUNDS	NUMBER OF BLADES	5	3	3	4	4	4	4	4
		84	100	104	188	204	261	266	307
FAN MOTOR DATA	HORSEPOWER	1/20	1/10	1/10	1/8	1/8	1/8	1/8	1/8
	AMPS @ 115 V / 1 PH. / 80 Hz	1.7	4.1	4.1	2.7	2.7	2.7	2.7	2.7
	RPM	1,650	1,050	1,050	1,075	1,075	1,075	1,075	1,075
FLUE SIZE, INCHES**	3	4	4	5	5	5	5	5	6
GAS CONNECTION NPT, INCHES	1/2	1/2	1/2	1/2	1/2	1/2	1/2	3/4	3/4

## SEP SERIES HEATERS

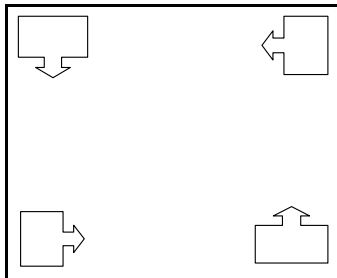
### TECHNICAL DATA

MODEL NUMBER: SEP- (N, P)	<b>100 (A,S)</b>	<b>115 (A,S)</b>	<b>145 (A,S)</b>	<b>175 (A,S)</b>	<b>200 (A, S)</b>	<b>230 (A, S)</b>	<b>250 (A, S)</b>	<b>300 (A,S)</b>	<b>345 (A,S)</b>	<b>400 (A,S)</b>
TOTAL INPUT, BTUH	100,000	115,000	145,000	172,500	195,000	230,000	250,000	300,000	345,000	390,000
TOTAL OUTPUT, BTUH*	80,500	92,000	116,000	138,000	156,000	184,000	201,250	241,500	276,000	312,000
AIR VOLUME, CFM	1,900	1,900	1,900	2,200	2,200	4,400	4,400	4,400	4,400	4,400
AIR THROW AT 8 FT. MTNG. HEIGHT, FEET	60	60	60	65	65	80	80	80	80	80
RECOMMENDED MOUNTING HEIGHT, FEET	16	16	20	20	20	30	30	30	30	30
FAN DIAMETER, INCHES	16	16	16	16	16	16	16	16	16	16
NUMBER OF FANS	1	1	1	1	1	2	2	2	2	2
SHIP WEIGHT, POUNDS	140	140	150	165	175	270	305	305	310	315
FAN MOTOR DATA	HORSEPOWER	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8
	AMPS @ 115 V / 1 PH. / 60 Hz	2.1	2.1	2.1	2.1	2.1	4.2	4.2	4.2	4.2
FLUE CONNECTION SIZE, INCHES**	4	4	4	5	5	5	5	5	6	6
GAS CONNECTION, INCHES	1/2	1/2	1/2	1/2	1/2	3/4	3/4	3/4	3/4	3/4

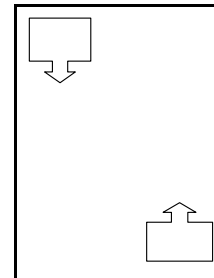
\*Ratings shown are for elevations up to 2,000 feet. For elevations above 2,000 feet, ratings should be reduced at the rate of 4% for each 1,000 feet above sea level.

\*\* Diameter of round pipe-adaptor furnished with heater. ( ) residential horizontal vent. Install 5' MAX length  
A,S-Aluminized or Stainless Steel Heat Exchangers

### RECOMMENDED MOUNTING LOCATIONS FOR UNIT HEATERS IN TWO GENERAL BUILDING SHAPES



Large square shaped building with heaters located to create circulating heated airstream sweeping heat loss surfaces.



Narrow rectangular building with heaters located to create circulating heated airstream sweeping primary heat loss surfaces.



*Advanced Distributor Products<sup>®</sup>*