

Duct and Round Pipe System Design

For Systems up to 60' from Unit to Register *
(not recommended where any line in system is over 60')

C.F.M.	Heating BTU	Cooling BTU	Round Pipe	Square Duct	Floor Diffuser ¹	Sidewall Diffuser ²	Baseboard Diffuser ¹	Return Grille ⁴
32	2,400	970	4"					
60	4,400	1,820	5"			10" x 6"	24"	
100	7,400	3,030	6"	3¼" x 10"	2¼" x 10"		48"	10" x 6"
120	8,900	3,640		3¼" x 12"	2¼" x 12"	12" x 6"		12" x 6"
145	10,700	4,390	7"	3¼" x 14"	4" x 14"	14" x 6"		14" x 6"
180	13,300	5,450		8" x 6"				
210	15,600	6,360	8"					
270	20,000	8,200		8" x 8"				24" x 6"
290	21,500	8,800	9"					
300	22,200	9,100						30" x 6"
370	27,400	11,200		8" x 10"				
390	28,900	11,800	10"					
460	34,000	13,900		8" x 12"				
500	37,000	15,200	11"					
560	41,500	17,000		8" x 14"				
620	45,900	18,800	12"					
660	48,900	20,000		8" x 16"				
770	57,000	23,300	13"					
800	59,300	24,200		8" x 18"				
900	66,700	27,300		8" x 20"				
930	68,900	28,200	14"					
1,000	74,100	30,300		8" x 22"				
1,100	81,500	33,300		8" x 24"				
1,140	84,400	34,500	15"					
1,200	88,900	36,400		8" x 26"				
1,300	96,300	39,400	16"	8" x 28"				
1,400	103,700	42,400		8" x 30"				
1,500	111,100	45,500	17"	10" x 24"				
1,700	125,900	51,500		10" x 26"				
1,800	133,300	54,500	18"					
1,900	140,700	57,600		10" x 28"				
2,000	148,100	60,600		10" x 30"				
2,100	155,600	63,600	19"					
2,200	163,000	66,700		10" x 32"				
2,300	170,400	69,700		10" x 34"				
2,400	177,800	72,700	20"					
2,500	185,200	75,800		10" x 36"				

* Based on 1 supply and 1 return and average number of fittings. For one or two long branch lines suggest one size larger branch pipe.

¹ Use proper size floor diffuser based on 6 to 7½ foot throw based on actual CFM required (see register specs.)

² Use proper size wall diffuser based on vertical throw of 6 to 7½ foot above floor based on actual CFM required (see register specs.)

³ One full stud space must be provided for 10, 12 and 14 inch grilles and two full stud spaces for 24 and 30 inch grilles.



System design instructions. With the room by room heat loss figured by the above method, or manual 3, and the room by room heat gain figured proceed as follows. Where the systems is to be used for heating only, disregard the references to cooling.

1. Select equipment by comparing BTU capacity of unit with requirements of building
2. Adjust BTU for each room if building requirements varies more than 10% from equipment capacity
3. Select register location, sizes, and number (See chart) based on adjusted BTU for each room. Where system is to be used for both heating and cooling use the greater CFM equal to adjusted BTU for each room on heating and cooling.
4. Size branch pipe fro chart based on step 3 CFM or BTU and locate trunk line.
5. If trunk line is less than 30 feet, suggest the use of extended plenum system.
 - a) Add together CFM equal to BTU adjusted (heating or cooling, which ever greater) for all branch pipe coming off of trunk line. Size trunk line from chart to carry total CFM..
6. For step down trunk, start at end of trunk furthest from unit and add together CFM of branch pipes until step up of size is desired. Select trunk size from chart.
7. For return air system repeat steps 3, 4, 5 and 6 above.

Diam.	Cir.	Area	Diam.	Cir.	Area	Diam.	Cir.	Area	Diam.	Cir.	Area
1/2"	1 9/16"	.196	10"	31 3/8"	78.540	20"	62 7/8"	314.160	36"	113 1/8"	1017.878
5/8"	1 15/16"	.306	1/4"	32 1/4"	82.516	1/4"	63 5/8"	322.063	1/2"	114 5/8"	1046.349
3/4"	2 11/32"	.441	1/2"	33"	86.590	1/2"	64 3/8"	330.064	37"	116 1/4"	1075.213
7/8"	2 3/4"	.601	3/4"	33 3/4"	90.762	3/4"	65 1/8"	338.163	1/2"	117 3/4"	1104.498
1"	3 1/8"	.785	11"	34 1/2"	85.033	21"	66"	346.361	38"	119 3/8"	1134.118
1/4"	3 7/8"	1.227	1/4"	35 3/8"	99.402	1/4"	66 3/4"	354.657	1/2"	121"	1164.159
1/2"	4 3/4"	1.767	1/2"	36 1/8"	103.869	1/2"	67 1/2"	363.051	39"	122 1/2"	1194.593
3/4"	5 1/2"	2.405	3/4"	36 7/8"	108.434	3/4"	68 3/8"	371.543	1/2"	124 1/8"	1225.420
2"	6 1/4"	3.141	12"	37 3/4"	113.098	22"	69 1/8"	380.134	40"	125 5/8"	1256.640
1/4"	7 1/8"	3.976	1/4"	38 1/2"	117.859	1/4"	69 7/8"	388.822	1/2"	127 1/4"	1288.250
1/2"	7 7/8"	4.908	1/2"	39 1/4"	122.718	1/2"	70 5/8"	397.608	41"	128 3/4"	1320.260
3/4"	8 5/8"	5.939	3/4"	40"	127.676	3/4"	71 1/2"	406.495	1/2"	130 3/8"	1352.650
3"	9 3/8"	7.068	13"	40 7/8"	132.733	23"	72 1/4"	415.477	42"	132"	1385.440
1/4"	10 1/4"	8.295	1/4"	41 5/8"	137.866	1/4"	73"	424.557	1/2"	133 1/2"	1418.630
1/2"	11"	9.621	1/2"	42 3/8"	143.139	1/2"	73 7/8"	433.740	43"	135 1/8"	1452.210
3/4"	11 3/4"	11.045	3/4"	43 1/4"	148.489	3/4"	74 5/8"	443.014	1/2"	136 5/8"	1486.170
4"	12 1/2"	12.566	14"	44"	153.938	24"	75 3/8"	452.390	44"	138 1/4"	1520.530
1/4"	13 3/8"	14.186	1/4"	44 3/4"	159.485	1/2"	77"	471.436	1/2"	139 3/4"	1555.280
1/2"	14 1/8"	15.904	1/2"	45 1/2"	165.130	25"	78 1/2"	490.875	45"	141 3/8"	1590.430
3/4"	14 7/8"	17.720	3/4"	46 3/8"	170.873	1/2"	80 1/8"	510.706	1/2"	143"	1625.970
5"	15 3/4"	19.635	15"	47 1/8"	176.715	26"	81 5/8"	530.930	46"	144 1/2"	1661.910
1/4"	16 1/2"	21.647	1/4"	47 7/8"	182.654	1/2"	83 1/4"	551.547	1/2"	146 1/8"	1698.230
1/2"	17 1/4"	23.758	1/2"	48 3/4"	188.692	27"	84 7/8"	572.557	47"	147 5/8"	1734.950
3/4"	18 1/8"	25.967	3/4"	49 1/2"	194.828	1/2"	86 3/8"	593.958	1/2"	149 1/4"	1772.050
6"	18 7/8"	28.274	16"	50 1/4"	201.062	28"	88"	615.754	48"	150 3/4"	1809.560
1/4"	19 5/8"	30.679	1/4"	51"	207.390	1/2"	89 1/2"	637.941			
1/2"	20 3/8"	33.183	1/2"	51 7/8"	213.825	29"	91 1/8"	660.521			
3/4"	21 1/4"	35.784	3/4"	52 5/8"	220.353	1/2"	92 5/8"	683.494			
7"	22"	38.484	17"	53 3/8"	226.981	30"	94 1/4"	706.860			
1/4"	22 3/4"	41.281	1/4"	54 1/4"	233.705	1/2"	95 7/8"	730.618			
1/2"	23 1/2"	44.178	1/2"	55"	240.528	31"	97 3/8"	754.769			
3/4"	24 3/8"	47.173	3/4"	55 3/4"	247.450	1/2"	99"	779.919			
8"	25 1/8"	50.265	18"	56 1/2"	254.467	32"	100 1/2"	804.250			
1/4"	25 7/8"	53.456	1/4"	57 3/8"	261.587	1/2"	102 1/8"	829.578			
1/2"	26 3/4"	56.745	1/2"	58 1/8"	268.803	33"	103 5/8"	855.301			
3/4"	27 1/2"	60.132	3/4"	58 7/8"	276.117	1/2"	105 1/4"	881.415			
9"	28 1/4"	63.617	19"	59 3/4"	283.529	34"	106 7/8"	907.922			
1/4"	29"	67.200	1/4"	60 1/2"	291.039	1/2"	108 3/8"	934.822			
1/2"	29 7/8"	70.822	1/2"	61 1/4"	298.648	35"	110"	962.115			
3/4"	30 5/8"	74.662	3/4"	62"	306.355	1/2"	111 1/2"	989.800			

For U.S.S Gauge #'s 25 and 26, the above table will apply as it is; but for every fourth number heavier add one-eighth inch to above measure.