

This demo simply runs each of the available calculations in the list, with some arbitrary input numbers.

Air flow - get BTUH from CFM and T.D.

CFM = 1000 , T.D. = 19 , Calculated Sensible Heat BTUH = 20,394

Air flow - get CFM from BTUH and T.D.

BTUH = 20394 , T.D. = 19 , Calculated CFM = 1,000

Air flow - get T.D. from CFM and BTUH

CFM input = 1000 , BTUH input = 20394, calculated TD = 19

Fan laws - change RPM, get new Static, CFM, and BHP

Old RPM = 850 Old Static = 0.5 Old CFM = 1000 Old HP = 2

New RPM = 1075
 New Static = 0.8
 New CFM = 1265
 New HP = 4.05

Fan laws - get new Amps from new RPM and old actual Amps

Old RPM = 850 Old Amps = 1.6

New RPM = 1075 New Amps = 3.24

Loan summary calculation

Input :
 Amount 10000
 Months 240
 Interest % / year 8.5

Output :
 Monthly payment 86.78
 Yearly payment 1,041.39
 Total interest 10,827.76
 Total payments 20,827.76

Loan schedule calculation

Input :
 Amount 5000
 Months 24
 Interest % / year 8.5
 Start Month/Year 7/2005

Output :
 Monthly payment 227.28
 Yearly payment 2,727.34
 Total interest 454.68
 Total payments 5,454.68

	Period	Interest	Principal	Total	Balance
001	07/2005	35.42	191.86	227.28	4,808.14
002	08/2005	34.06	193.22	227.28	4,614.92
003	09/2005	32.69	194.59	227.28	4,420.33
004	10/2005	31.31	195.97	227.28	4,224.36
005	11/2005	29.92	197.36	227.28	4,027.00
006	12/2005	28.52	198.75	227.28	3,828.25
	Calendar year	191.92	1,171.75	1,363.67	
	Period	Interest	Principal	Total	Balance
007	01/2006	27.12	200.16	227.28	3,628.09
008	02/2006	25.70	201.58	227.28	3,426.51
009	03/2006	24.27	203.01	227.28	3,223.50
010	04/2006	22.83	204.45	227.28	3,019.06
011	05/2006	21.38	205.89	227.28	2,813.16

012	06/2006	19.93	207.35	227.28	2,605.81
013	07/2006	18.46	208.82	227.28	2,396.99
014	08/2006	16.98	210.30	227.28	2,186.69
015	09/2006	15.49	211.79	227.28	1,974.90
016	10/2006	13.99	213.29	227.28	1,761.61
017	11/2006	12.48	214.80	227.28	1,546.81
018	12/2006	10.96	216.32	227.28	1,330.49
Calendar year		229.58	2,497.76	2,727.34	

	Period	Interest	Principal	Total	Balance
019	01/2007	9.42	217.85	227.28	1,112.64
020	02/2007	7.88	219.40	227.28	893.24
021	03/2007	6.33	220.95	227.28	672.29
022	04/2007	4.76	222.52	227.28	449.77
023	05/2007	3.19	224.09	227.28	225.68
024	06/2007	1.60	225.68	227.28	.00
Calendar year		33.18	1,330.49	1,363.67	

Metal Ducts - get duct size options from CFM & FPM

CFM = 1000 , FPM = 850 Pvel = 0.045

Round metal duct equivalent = 14.7

Surface / 10' = 38.5 sq ft FPM = 850 Pvel = 0.045 FL / 100' = 0.074

Lbs / 10'	18 ga.	20 ga.	22 ga.	24 ga.	26 ga.
Gal. steel	83.0	63.7	54.1	44.5	34.9
Aluminum	21.9	17.4	13.7	10.9	8.6

Rectangular metal duct equivalent (equal friction) = 13.4 " x 13.4 " aspect ratio = 1

Surface / 10' = 44.7 sq ft FPM = 802 Pvel = 0.04

Lbs / 10'	18 ga.	20 ga.	22 ga.	24 ga.	26 ga.
Gal. steel	96.3	74.0	62.8	51.6	40.5
Aluminum	25.4	20.2	15.9	12.7	10.0

Equivalents for equal friction (metal duct) :

2 " x 199 "	Aspect = 99.500	Surface / 10' = 335.0 sq ft	FPM = 362	Pvel = 0.008
4 " x 65 "	Aspect = 16.250	Surface / 10' = 115.0 sq ft	FPM = 554	Pvel = 0.019
6 " x 35 "	Aspect = 5.833	Surface / 10' = 68.3 sq ft	FPM = 686	Pvel = 0.029
8 " x 24 "	Aspect = 3.000	Surface / 10' = 53.3 sq ft	FPM = 750	Pvel = 0.035
10 " x 18 "	Aspect = 1.800	Surface / 10' = 46.7 sq ft	FPM = 800	Pvel = 0.04
12 " x 15 "	Aspect = 1.250	Surface / 10' = 45.0 sq ft	FPM = 800	Pvel = 0.04
14 " x 13 "	Aspect = 1.077	Surface / 10' = 45.0 sq ft	FPM = 791	Pvel = 0.039
16 " x 11 "	Aspect = 1.455	Surface / 10' = 45.0 sq ft	FPM = 818	Pvel = 0.042
18 " x 10 "	Aspect = 1.800	Surface / 10' = 46.7 sq ft	FPM = 800	Pvel = 0.04
20 " x 9 "	Aspect = 2.222	Surface / 10' = 48.3 sq ft	FPM = 800	Pvel = 0.04

Metal Ducts - get duct size options from CFM & Friction Loss / 100 ft

CFM = 1000 FL/100 = 0.07 Length = 35

Round metal duct equivalent = 14.8 " (37.6 cm)

Surface / 10' = 38.7 sq ft FPM = 837 Pvel = 0.044 FL / 100' = 0.072 FL / 35' = 0.0252

Lbs / 10'	18 ga.	20 ga.	22 ga.	24 ga.	26 ga.
Gal. steel	83.5	64.2	54.5	44.8	35.1
Aluminum	22.0	17.5	13.8	11.0	8.7

Rectangular metal duct equivalent (equal friction) = 13.5 " x 13.5 " aspect ratio = 1

Surface / 10' = 45.0 sq ft FPM = 790 Pvel = 0.039

Lbs / 10'	18 ga.	20 ga.	22 ga.	24 ga.	26 ga.
Gal. steel	97.0	74.5	63.3	52.0	40.8
Aluminum	25.6	20.3	16.1	12.8	10.1

Equivalents for equal friction (metal duct) :

4 " x 67 "	Aspect = 16.750	Surface / 10' = 118.3 sq ft	FPM = 537	Pvel = 0.018
6 " x 36 "	Aspect = 6.000	Surface / 10' = 70.0 sq ft	FPM = 667	Pvel = 0.028
8 " x 25 "	Aspect = 3.125	Surface / 10' = 55.0 sq ft	FPM = 720	Pvel = 0.032
10 " x 19 "	Aspect = 1.900	Surface / 10' = 48.3 sq ft	FPM = 758	Pvel = 0.036
12 " x 15 "	Aspect = 1.250	Surface / 10' = 45.0 sq ft	FPM = 800	Pvel = 0.04

14 " x 13 "	Aspect = 1.077	Surface / 10' = 45.0 sq ft	FPM = 791	Pvel = 0.039
16 " x 12 "	Aspect = 1.333	Surface / 10' = 46.7 sq ft	FPM = 750	Pvel = 0.035
18 " x 10 "	Aspect = 1.800	Surface / 10' = 46.7 sq ft	FPM = 800	Pvel = 0.04
20 " x 10 "	Aspect = 2.000	Surface / 10' = 50.0 sq ft	FPM = 720	Pvel = 0.032
22 " x 9 "	Aspect = 2.444	Surface / 10' = 51.7 sq ft	FPM = 727	Pvel = 0.033

Metal Ducts - get duct size options from CFM & Rectangular Dimensions

Side 1 " = 22 Side 2 " = 12 CFM = 1000 Length = 35

Round metal duct equivalent = 17.6 " (44.7 cm)

Surface / 10' = 46.1 sq ft	FPM = 592	Pvel = 0.022	FL / 100' = 0.029	FL / 35' = 0.01015	
Lbs / 10'	18 ga.	20 ga.	22 ga.	24 ga.	26 ga.
Gal. steel	99.3	76.3	64.8	53.3	41.7
Aluminum	26.2	20.8	16.4	13.1	10.3

Rectangular metal duct equivalent (equal friction) = 22 " x 12 " aspect ratio = 1.833

Surface / 10' = 56.7 sq ft FPM = 545 Pvel = 0.019

Lbs / 10'	18 ga.	20 ga.	22 ga.	24 ga.	26 ga.
Gal. steel	122.2	93.8	79.7	65.5	51.3
Aluminum	32.2	25.6	20.2	16.1	12.7

Equivalents for equal friction (metal duct) :

12 " x 22 "	Aspect = 1.833	Surface / 10' = 56.7 sq ft	FPM = 545	Pvel = 0.019
14 " x 18 "	Aspect = 1.286	Surface / 10' = 53.3 sq ft	FPM = 571	Pvel = 0.02
16 " x 16 "	Aspect = 1.000	Surface / 10' = 53.3 sq ft	FPM = 562	Pvel = 0.02
18 " x 14 "	Aspect = 1.286	Surface / 10' = 53.3 sq ft	FPM = 571	Pvel = 0.02
20 " x 13 "	Aspect = 1.538	Surface / 10' = 55.0 sq ft	FPM = 554	Pvel = 0.019
22 " x 12 "	Aspect = 1.833	Surface / 10' = 56.7 sq ft	FPM = 545	Pvel = 0.019
24 " x 11 "	Aspect = 2.182	Surface / 10' = 58.3 sq ft	FPM = 545	Pvel = 0.019
26 " x 10 "	Aspect = 2.600	Surface / 10' = 60.0 sq ft	FPM = 554	Pvel = 0.019
28 " x 10 "	Aspect = 2.800	Surface / 10' = 63.3 sq ft	FPM = 514	Pvel = 0.016
30 " x 9 "	Aspect = 3.333	Surface / 10' = 65.0 sq ft	FPM = 533	Pvel = 0.018

Metal Ducts - get duct size options from CFM & Round Diameter

Diam. inch = 14 CFM = 800 Length = 65

Round metal duct equivalent = 14 inches CFM = 800 Length = 65 feet

Surface / 10' = 36.7 sq ft FPM = 748 Pvel = 0.035 FL / 100' = 0.062 FL / 65' = 0.0403

Lbs / 10'	18 ga.	20 ga.	22 ga.	24 ga.	26 ga.
Gal. steel	79.0	60.7	51.5	42.4	33.2
Aluminum	20.9	16.6	13.1	10.4	8.2

Rectangular metal duct equivalent (equal friction) = 12.7 " x 12.7 " aspect ratio = 1

Surface / 10' = 42.3 sq ft FPM = 714 Pvel = 0.032

Lbs / 10'	18 ga.	20 ga.	22 ga.	24 ga.	26 ga.
Gal. steel	91.3	70.1	59.5	48.9	38.4
Aluminum	24.1	19.1	15.1	12.0	9.5

Equivalents for equal friction (metal duct) :

2 " x 174 "	Aspect = 87.000	Surface / 10' = 293.3 sq ft	FPM = 331	Pvel = 0.007
4 " x 57 "	Aspect = 14.250	Surface / 10' = 101.7 sq ft	FPM = 505	Pvel = 0.016
6 " x 31 "	Aspect = 5.167	Surface / 10' = 61.7 sq ft	FPM = 619	Pvel = 0.024
8 " x 21 "	Aspect = 2.625	Surface / 10' = 48.3 sq ft	FPM = 686	Pvel = 0.029
10 " x 16 "	Aspect = 1.600	Surface / 10' = 43.3 sq ft	FPM = 720	Pvel = 0.032
12 " x 13 "	Aspect = 1.083	Surface / 10' = 41.7 sq ft	FPM = 738	Pvel = 0.034
14 " x 12 "	Aspect = 1.167	Surface / 10' = 43.3 sq ft	FPM = 686	Pvel = 0.029
16 " x 10 "	Aspect = 1.600	Surface / 10' = 43.3 sq ft	FPM = 720	Pvel = 0.032
18 " x 9 "	Aspect = 2.000	Surface / 10' = 45.0 sq ft	FPM = 711	Pvel = 0.032
20 " x 8 "	Aspect = 2.500	Surface / 10' = 46.7 sq ft	FPM = 720	Pvel = 0.032

Metal Ducts - Heat gain / loss in insulated metal ducts

Side 1 = 20" Side 2 = 30" Length = 25 ft CFM = 5000
Added R-value = 6 Entering DB = 140 Outer (surrounding) DB = 40

Surface / 10' = 83.3 sq ft	Velocity = 1200 FPM	Pvel = 0.09
R value of the metal = 1.6	Total R value = 7.6	Net U value = 0.13158

BTUH gain / loss = -2,741 BTUH DB gain / loss = -0.5 F Final supply air DB = 139.5 F

Round metal duct equivalent = 26.6 "

Surface / 10' = 69.6 sq ft Velocity = 1296 FPM Pvel = 0.105
 FL / 100' = 0.082 " WG FL / 25' = 0.0205
 BTUH gain / loss = -2,291 BTUH DB gain / loss = -0.4 F Final supply air DB = 139.6 F

Metal Ducts - Rectangular to Round equivalent and options, equal friction

Side 1 " = 20 Side 2 " = 30 CFM = 5000 Length = 65

Round metal duct equivalent = 26.6 " (67.6 cm)

Surface / 10' = 69.6 sq ft FPM = 1296 Pvel = 0.105 FL / 100' = 0.082 FL / 65' = 0.0533
 Lbs / 10' 18 ga. 20 ga. 22 ga. 24 ga. 26 ga.
 Gal. steel 150.1 115.3 97.9 80.5 63.1
 Aluminum 39.6 31.5 24.9 19.8 15.6

Rectangular metal duct equivalent (equal friction) = 20 " x 30 " aspect ratio = 1.5

Surface / 10' = 83.3 sq ft FPM = 1200 Pvel = 0.09

Lbs / 10' 18 ga. 20 ga. 22 ga. 24 ga. 26 ga.
 Gal. steel 179.7 138.0 117.2 96.3 75.5
 Aluminum 47.4 37.7 29.8 23.7 18.7

Equivalents for equal friction (metal duct) :

10 " x 73 "	Aspect = 7.300	Surface / 10' = 138.3 sq ft	FPM = 986	Pvel = 0.061
12 " x 56 "	Aspect = 4.667	Surface / 10' = 113.3 sq ft	FPM = 1071	Pvel = 0.072
14 " x 46 "	Aspect = 3.286	Surface / 10' = 100.0 sq ft	FPM = 1118	Pvel = 0.078
16 " x 39 "	Aspect = 2.438	Surface / 10' = 91.7 sq ft	FPM = 1154	Pvel = 0.083
18 " x 34 "	Aspect = 1.889	Surface / 10' = 86.7 sq ft	FPM = 1176	Pvel = 0.086
20 " x 30 "	Aspect = 1.500	Surface / 10' = 83.3 sq ft	FPM = 1200	Pvel = 0.09
22 " x 27 "	Aspect = 1.227	Surface / 10' = 81.7 sq ft	FPM = 1212	Pvel = 0.092
24 " x 25 "	Aspect = 1.042	Surface / 10' = 81.7 sq ft	FPM = 1200	Pvel = 0.09
26 " x 23 "	Aspect = 1.130	Surface / 10' = 81.7 sq ft	FPM = 1204	Pvel = 0.09
28 " x 21 "	Aspect = 1.333	Surface / 10' = 81.7 sq ft	FPM = 1224	Pvel = 0.093

Metal Ducts - Round to Rectangular equivalent and options, equal friction

Diam. inch = 12 CFM = 800 Length = 75

Round metal duct equivalent = 12 inches CFM = 800 Length = 75 feet

Surface / 10' = 31.4 sq ft FPM = 1019 Pvel = 0.065 FL / 100' = 0.138 FL / 75' = 0.1035

Lbs / 10' 18 ga. 20 ga. 22 ga. 24 ga. 26 ga.
 Gal. steel 67.7 52.0 44.2 36.3 28.5
 Aluminum 17.9 14.2 11.2 8.9 7.0

Rectangular metal duct equivalent (equal friction) = 10.9 " x 10.9 " aspect ratio = 1

Surface / 10' = 36.3 sq ft FPM = 970 Pvel = 0.059

Lbs / 10' 18 ga. 20 ga. 22 ga. 24 ga. 26 ga.
 Gal. steel 78.3 60.2 51.1 42.0 32.9
 Aluminum 20.7 16.4 13.0 10.3 8.1

Equivalents for equal friction (metal duct) :

2 " x 116 "	Aspect = 58.000	Surface / 10' = 196.7 sq ft	FPM = 497	Pvel = 0.015
4 " x 38 "	Aspect = 9.500	Surface / 10' = 70.0 sq ft	FPM = 758	Pvel = 0.036
6 " x 22 "	Aspect = 3.667	Surface / 10' = 46.7 sq ft	FPM = 873	Pvel = 0.048
8 " x 15 "	Aspect = 1.875	Surface / 10' = 38.3 sq ft	FPM = 960	Pvel = 0.057
10 " x 12 "	Aspect = 1.200	Surface / 10' = 36.7 sq ft	FPM = 960	Pvel = 0.057
12 " x 10 "	Aspect = 1.200	Surface / 10' = 36.7 sq ft	FPM = 960	Pvel = 0.057
14 " x 9 "	Aspect = 1.556	Surface / 10' = 38.3 sq ft	FPM = 914	Pvel = 0.052
16 " x 8 "	Aspect = 2.000	Surface / 10' = 40.0 sq ft	FPM = 900	Pvel = 0.05
18 " x 7 "	Aspect = 2.571	Surface / 10' = 41.7 sq ft	FPM = 914	Pvel = 0.052
20 " x 6 "	Aspect = 3.333	Surface / 10' = 43.3 sq ft	FPM = 960	Pvel = 0.057

Pulleys - get belt size from pulley sizes and shaft distance

Motor pulley = 8" Blower pulley = 14" Shafts C-2-C = 20" Belt size = 75 "

Note - always set the motor mounting base to mid-point in the adjusting slots before measuring

C2C shaft distance so you have maximum adjustability for the new belt.

Pulleys - get blower RPM, CFM, BHP, Amps from pulley size changes and motor RPM

Old RPM = 850 Old Motor pulley = 8" Old Blower Pulley = 14" Old BHP = 5
 Old CFM = 1200 Old Blower RPM = 486 Old Amps = 6

New RPM = 1075 New Motor pulley = 10" New Blower Pulley = 12" New BHP = 31.33
 New CFM = 2212 New Blower RPM = 896 New Amps = 37.6

Shafts C-2-C = 24" Belt size = 83 "

Note - always set the motor mounting base to mid-point in the adjusting slots before measuring C2C shaft distance so you have maximum adjustability for the new belt.

Pump laws - Change impeller diameter, get new FOH, BHP, RPM, GPM

Old Impeller diameter input = 6
 Feet of head input = 12
 BHP input = 5
 RPM input = 850
 GPM input = 1000

New Impeller diameter input = 8

New Feet of Head = 21.3
 New BHP = 11.85
 New GPM = 1,333.3

Pump laws - Change RPM, get new FOH, BHP, RPM, GPM

Old RPM input = 850
 Impeller diameter input = 6
 Feet of head input = 12
 BHP input = 5
 GPM input = 1000

New RPM input = 1075

New Feet of Head = 19.2
 New BHP = 10.11
 New GPM = 1,264.7