

NATURAL VENTILATION

All ridg-vents, and louvers manufactured by MWI are built in accordance w/ the guideline specifications published by SMACNA (Sheet Metal & Air Conditioning Contractors National Association) as well as current industry standards for quality, strength and dependability. The air volumes stated in this publication have been calculated w/ the assistance of the 1981 ASHRAE Handbook.

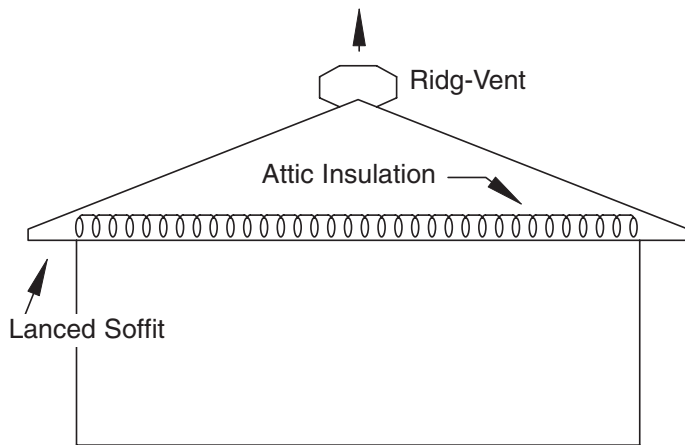
Every precaution has been taken to make each of our products as weather tight as possible and all conform to the highest industry standards. Extreme conditions of snow and wind can cause some “dusting” of snow through any ventilator but most of these cases are isolated and very slight when proper intake louvers or soffits are installed in conjunction w/ the ridg-vent.

The guidelines in this publication are intended for general construction use but will also apply themselves to any animal building if all facts are known (such as the number of air changes required) for the particular case.

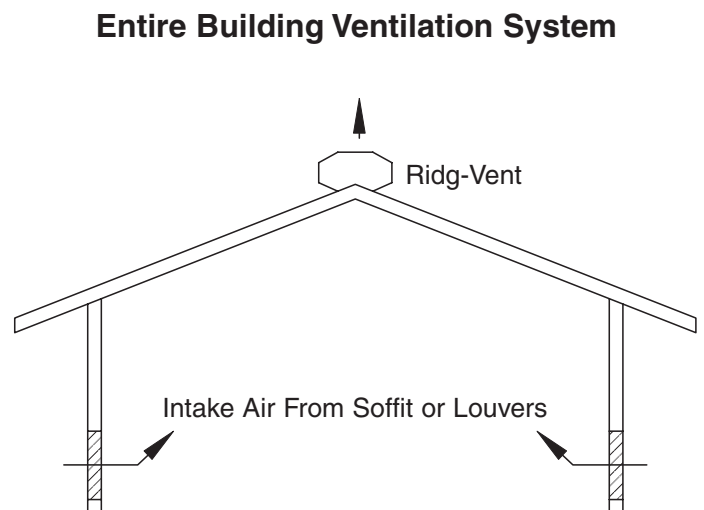
Any further technical assistance should be directed to our Spencer office.

Natural Ventilation Rules

1. Systems using natural ventilation should be designed for effective ventilation regardless of wind direction. There must be adequate ventilation when the wind does not come from the prevailing direction.
2. Inlet openings should not be obstructed by buildings, trees, signboards, or indoor partitions.
3. Greatest flow per unit area of total opening is obtained by using inlet and outlet openings of nearly equal areas. **If there is a difference in size, the lower opening should be slightly larger.**
4. Two openings on opposite sides of a space will tend to increase the ventilation flow. If the openings are at the same level and near the ceiling, much of the flow may bypass the occupied level and be ineffective in diluting contaminant's at the occupied level.
5. There must be vertical distance between openings for temperature difference to produce natural ventilation; the greater the vertical distance, the greater the ventilation.



Attic Ventilation System



Entire Building Ventilation System

• Excerpts taken from the American Society of Heating, Refrigeration and Air Conditioning Engineers 1981 Fundamentals Handbook, Chapter 22 (page 22.7).

Simple Ventilation Systems

The statements in the publication are intended to be used as guidelines for good ventilation practice.

The free area tables included are based on certain assumptions we feel are reasonable for most areas and conditions.

Keep in mind these questions when using our ventilation tables:

1. Are you ventilating the attic or the entire building?
2. What are the building dimensions?
3. What is the roof pitch?
4. How is the building used and how it will be occupied?
5. Is there insulation and where is it located?
6. What are the possible locations for air inlets?
7. Which ventilator to use?

Example:

1. Choose the correct table to use for either ventilating the attic space or for ventilating the entire structure.
2. Determine the over all building dimensions. If the table does not include the building width you need, you can average the two closest dimensions. If you have a building longer than 100', you can multiply the free area by the increased ratio (E.G. increase the area by a multiple of 1.5 for a 150' building vs. a 100' building)
3. All our charts are based on buildings that have a 4/12 roof pitch. Even though the side wall height may vary, the roof pitch has the greatest influence on the "chimney effect" (Chimney effect is the draft created as the air flows up along the roof slope. The steeper the pitch, the better the "Chimney effect")

Buildings with a lower roof pitch will ventilate less effectively and buildings with a steeper roof pitch will ventilate faster.

4. If the attic is the only space to be ventilated, the attic worksheet is all that needs to be used. If the entire building is to be ventilated, you should consider the function and how many people will occupy the space. The free area calculated on the "Entire Building Ventilation" sheet is based on one air change every (20) minutes. This should be adequate in buildings where work activity is taking place on a regular basis during the work day. It would also be adequate for buildings such as riding arenas.

If the building is only occupied on limited basis, the ventilation area should be reduced by 33%. This allows for one air change every (30) minutes.(E.G. a 40' x 100' building should have 15.48 sq. ft. of ventilation area if it has people working inside most of the day, if the building is rarely occupied, it would only require 10.37 sq. ft. of free area (15.48 x .67 = 10.37)

••Note: for animal confinement buildings, you should con-

sult with the fan/ventilation supplier for their requirements.

5. If insulation is located under the roof steel for condensation prevention, then the same ventilation numbers can be used.

(Attic or entire building - depending on the application) If the building is heated, the ventilation contractor should be consulted as to how much air should be allowed to exhaust from the building envelope.

6. For any ventilation system to function properly, an equal amount of fresh air must be introduced into the space to allow the vent to exhaust the air out through the ridge, without an equal or slightly greater inlet area, no manufacturer's vent will function properly.

The best location for inlet air for attic ventilation is through vented soffit panels. The capacity of our vented soffit panel is shown on both ventilation work sheets. The use of end wall louvers is only effective on short buildings where air can flow easily to the center of the building. Leaving the foam closures out at the roof edge will not allow enough inlet area to ventilate properly.

(Leaving out the foam closures will only supply about 1.50 sq. in. of free area per lineal foot of eave (each side) for a total of 3 sq. inches of free area per foot of building.

The M.W.I. RV100 Provides 15 sq. inches of free area per lineal foot of ridge.

The M.W.I. vented soffit provides 7.5 sq. inches of free area per lineal foot of eave (each side) for a total of 15 sq. inches of free area per foot of building (based on a 12" overhang)

This creates a matched system with equal intake and exhaust if the Rv100 is run continuously and vented soffit is used on both sides of a building with a 12" overhang.

Soffit inlets can also act as inlets for the entire building. It is important to match the intake to the exhaust in that application also.

If the intake and exhaust aren't matched, it is always better to have the intake slightly larger than the exhaust.

7. To select the right quantities and style of vents, consult the bottom of each worksheet. In most applications, there will be more than one type of vent that will serve the purpose.

You can also determine if you will get enough air inlet to match the ridge-vent using a 12" overhang or if you should recommend a 24" overhang to allow more air into the space.

Metal Components

RIDGE-VENT QUANTITY WORKSHEET

Attic Ventilation

4/12 ROOF PITCH

This chart shows the square feet of free area required to properly ventilate the attic.

There must be an equal area of intake for proper ventilation to occur.

The ventilation area is based on **1 sq. ft. of vent area per 300 sq. ft. of attic area**
(one half at the eave and one half at the ridge).

BUILDING WIDTH

	20	22	24	26	28	30	32	34	36	38	40	44	48	52	56	60	64	68	72
20	0.69	0.76	0.83	0.90	0.97	1.04	1.11	1.18	1.25	1.32	1.39	1.53	1.67	1.81	1.94	2.08	2.22	2.36	2.50
22	0.76	0.84	0.92	0.99	1.07	1.15	1.22	1.30	1.38	1.45	1.53	1.68	1.83	1.99	2.14	2.29	2.44	2.60	2.75
24	0.83	0.92	1.00	1.08	1.17	1.25	1.33	1.42	1.50	1.58	1.67	1.83	2.00	2.17	2.33	2.50	2.67	2.83	3.00
26	0.90	0.99	1.08	1.17	1.26	1.35	1.44	1.53	1.63	1.72	1.81	1.99	2.17	2.35	2.53	2.71	2.89	3.07	3.25
28	0.97	1.07	1.17	1.26	1.36	1.46	1.56	1.65	1.75	1.85	1.94	2.14	2.33	2.53	2.72	2.92	3.11	3.31	3.50
30	1.04	1.15	1.25	1.35	1.46	1.56	1.67	1.77	1.88	1.98	2.08	2.29	2.50	2.71	2.92	3.13	3.33	3.54	3.75
32	1.11	1.22	1.33	1.44	1.56	1.67	1.78	1.89	2.00	2.11	2.22	2.44	2.67	2.89	3.11	3.33	3.56	3.78	4.00
34	1.18	1.30	1.42	1.53	1.65	1.77	1.89	2.01	2.13	2.24	2.36	2.60	2.83	3.07	3.31	3.54	3.78	4.01	4.25
36	1.25	1.38	1.50	1.63	1.75	1.88	2.00	2.13	2.25	2.38	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50
38	1.32	1.45	1.58	1.72	1.85	1.98	2.11	2.24	2.38	2.51	2.64	2.90	3.17	3.43	3.69	3.96	4.22	4.49	4.75
40	1.39	1.53	1.67	1.81	1.94	2.08	2.22	2.36	2.50	2.64	2.78	3.06	3.33	3.61	3.89	4.17	4.44	4.72	5.00
44	1.53	1.68	1.83	1.99	2.14	2.29	2.44	2.60	2.75	2.90	3.06	3.36	3.67	3.97	4.28	4.58	4.89	5.19	5.50
48	1.67	1.83	2.00	2.17	2.33	2.50	2.67	2.83	3.00	3.17	3.33	3.67	4.00	4.33	4.67	5.00	5.33	5.67	6.00
52	1.81	1.99	2.17	2.35	2.53	2.71	2.89	3.07	3.25	3.43	3.61	3.97	4.33	4.69	5.06	5.42	5.78	6.14	6.50
56	1.94	2.14	2.33	2.53	2.72	2.92	3.11	3.31	3.50	3.69	3.89	4.28	4.67	5.06	5.44	5.83	6.22	6.61	7.00
60	2.08	2.29	2.50	2.71	2.92	3.13	3.33	3.54	3.75	3.96	4.17	4.58	5.00	5.42	5.83	6.25	6.67	7.08	7.50
64	2.22	2.44	2.67	2.89	3.11	3.33	3.56	3.78	4.00	4.22	4.44	4.89	5.33	5.78	6.22	6.67	7.11	7.56	8.00
68	2.36	2.60	2.83	3.07	3.31	3.54	3.78	4.01	4.25	4.49	4.72	5.19	5.67	6.14	6.61	7.08	7.56	8.03	8.50
72	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75	5.00	5.50	6.00	6.50	7.00	7.50	8.00	8.50	9.00
76	2.64	2.90	3.17	3.43	3.69	3.96	4.22	4.49	4.75	5.01	5.28	5.81	6.33	6.86	7.39	7.92	8.44	8.97	9.50
80	2.78	3.06	3.33	3.61	3.89	4.17	4.44	4.72	5.00	5.28	5.56	6.11	6.67	7.22	7.78	8.33	8.89	9.44	10.00
84	2.92	3.21	3.50	3.79	4.08	4.38	4.67	4.96	5.25	5.54	5.83	6.42	7.00	7.58	8.17	8.75	9.33	9.92	10.50
88	3.06	3.36	3.67	3.97	4.28	4.58	4.89	5.19	5.50	5.81	6.11	6.72	7.33	7.94	8.56	9.17	9.78	10.39	11.00
92	3.19	3.51	3.83	4.15	4.47	4.79	5.11	5.43	5.75	6.07	6.39	7.03	7.67	8.31	8.94	9.58	10.22	10.86	11.50
96	3.33	3.67	4.00	4.33	4.67	5.00	5.33	5.67	6.00	6.33	6.67	7.33	8.00	8.67	9.33	10.00	10.67	11.33	12.00
100	3.47	3.82	4.17	4.51	4.86	5.21	5.56	5.90	6.25	6.60	6.94	7.64	8.33	9.03	9.72	10.42	11.11	11.81	12.50

BUILDING LENGTH

RV100 = 1.04 SQ. FT. PER VENT TOTAL SQ. FT. _____ / 1.04 = _____ RV100 VENTS REQUIRED

RV25 = 2.10 SQ. FT. PER VENT TOTAL SQ. FT. _____ / 2.10 = _____ #25 VENTS REQUIRED

RV35 = 2.50 SQ. FT. PER VENT TOTAL SQ. FT. _____ / 2.50 = _____ #35 VENTS REQUIRED

RV400 = 3.00 SQ. FT. PER VENT TOTAL SQ. FT. _____ / 3.00 = _____ #400 VENTS REQUIRED

*** Independent testing has shown that ventilators manufactured by Metal Works Inc. are less restrictive to air flow than other brands.

12" OVERHANG ON BOTH SIDES OF BUILDING= 0.105 X _____ (LENGTH OF BUILDING)= _____ FREE AREA (SQ.FT.)

24" OVERHANG ON BOTH SIDES OF BUILDING= 0.210 X _____ (LENGTH OF BUILDING)= _____ FREE AREA (SQ.FT.)



RIDG-VENT QUANTITY WORKSHEET

Entire Building Ventilation

4/12 ROOF PITCH

Minutes Per Air Change	Building Type	Building Usage
20	Warehouse/Storage Riding Arena	Daily Work Activity
30	Storage	Light Work Activity

This chart shows the square feet of free area required to change the air in the building every 20 minutes. There must be an equal area of intake for proper ventilation to occur. If one air change every 30 minutes is acceptable, the ventilation area can be reduced by 33%.

BUILDING WIDTH

	20	22	24	26	28	30	32	34	36	38	40	44	48	52	56	60	64	68	72
20	1.40	1.56	1.71	1.88	2.04	2.21	2.38	2.56	2.73	2.91	3.10	3.47	3.86	4.26	4.67	5.09	5.52	5.97	6.43
22	1.54	1.71	1.89	2.06	2.25	2.43	2.62	2.81	3.01	3.20	3.40	3.82	4.24	4.68	5.13	5.60	6.08	6.57	7.07
24	1.68	1.87	2.06	2.25	2.45	2.65	2.86	3.07	3.28	3.49	3.71	4.16	4.63	5.11	5.60	6.11	6.63	7.16	7.71
26	1.82	2.02	2.23	2.44	2.65	2.87	3.10	3.32	3.55	3.79	4.02	4.51	5.01	5.53	6.07	6.62	7.18	7.76	8.36
28	1.96	2.18	2.40	2.63	2.86	3.09	3.33	3.58	3.83	4.08	4.33	4.86	5.40	5.96	6.53	7.13	7.73	8.36	9.00
30	2.10	2.33	2.57	2.81	3.06	3.31	3.57	3.83	4.10	4.37	4.64	5.21	5.79	6.38	7.00	7.63	8.29	8.96	9.64
32	2.24	2.49	2.74	3.00	3.27	3.54	3.81	4.09	4.37	4.66	4.95	5.55	6.17	6.81	7.47	8.14	8.84	9.55	10.29
34	2.38	2.64	2.91	3.19	3.47	3.76	4.05	4.34	4.64	4.95	5.26	5.90	6.56	7.24	7.93	8.65	9.39	10.15	10.93
36	2.52	2.80	3.09	3.38	3.68	3.98	4.29	4.60	4.92	5.24	5.57	6.25	6.94	7.66	8.40	9.16	9.94	10.75	11.57
38	2.66	2.95	3.26	3.57	3.88	4.20	4.52	4.85	5.19	5.53	5.88	6.59	7.33	8.09	8.87	9.67	10.50	11.34	12.21
40	2.80	3.11	3.43	3.75	4.08	4.42	4.76	5.11	5.46	5.82	6.19	6.94	7.71	8.51	9.33	10.18	11.05	11.94	12.86
44	3.08	3.42	3.77	4.13	4.49	4.86	5.24	5.62	6.01	6.41	6.81	7.63	8.49	9.36	10.27	11.20	12.15	13.13	14.14
48	3.36	3.73	4.11	4.50	4.90	5.30	5.71	6.13	6.56	6.99	7.43	8.33	9.26	10.21	11.20	12.21	13.26	14.33	15.43
52	3.64	4.04	4.46	4.88	5.31	5.75	6.19	6.64	7.10	7.57	8.05	9.02	10.03	11.07	12.13	13.23	14.36	15.52	16.71
56	3.92	4.35	4.80	5.25	5.72	6.19	6.67	7.15	7.65	8.15	8.67	9.72	10.80	11.92	13.07	14.25	15.47	16.72	18.00
60	4.20	4.67	5.14	5.63	6.13	6.63	7.14	7.67	8.20	8.74	9.29	10.41	11.57	12.77	14.00	15.27	16.57	17.91	19.29
64	4.48	4.98	5.49	6.00	6.53	7.07	7.62	8.18	8.74	9.32	9.90	11.10	12.34	13.62	14.93	16.29	17.68	19.10	20.57
68	4.76	5.29	5.83	6.38	6.94	7.51	8.10	8.69	9.29	9.90	10.52	11.80	13.11	14.47	15.87	17.30	18.78	20.30	21.86
72	5.04	5.60	6.17	6.76	7.35	7.96	8.57	9.20	9.84	10.48	11.14	12.49	13.89	15.32	16.80	18.32	19.89	21.49	23.14
76	5.32	5.91	6.51	7.13	7.76	8.40	9.05	9.71	10.38	11.07	11.76	13.19	14.66	16.17	17.73	19.34	20.99	22.69	24.43
80	5.60	6.22	6.86	7.51	8.17	8.84	9.52	10.22	10.93	11.65	12.38	13.88	15.43	17.02	18.67	20.36	22.10	23.88	25.71
84	5.88	6.53	7.20	7.88	8.58	9.28	10.00	10.73	11.48	12.23	13.00	14.58	16.20	17.88	19.60	21.38	23.20	25.08	27.00
88	6.15	6.84	7.54	8.26	8.98	9.72	10.48	11.24	12.02	12.81	13.62	15.27	16.97	18.73	20.53	22.39	24.30	26.27	28.29
92	6.43	7.15	7.89	8.63	9.39	10.17	10.95	11.75	12.57	13.40	14.24	15.96	17.74	19.58	21.47	23.41	25.41	27.46	29.57
96	6.71	7.46	8.23	9.01	9.80	10.61	11.43	12.26	13.11	13.98	14.86	16.66	18.51	20.43	22.40	24.43	26.51	28.66	30.86
100	6.99	7.78	8.57	9.38	10.21	11.05	11.90	12.78	13.66	14.56	15.48	17.35	19.29	21.28	23.33	25.45	27.62	29.85	32.14

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