FIRE DAMPER / ENGINEERING AND PERFORMANCE DATA

Although the primary purpose of a fire damper is to maintain the fire resistance of a fire separation, its inclusion in the HVAC system of a building necessarily affects the air handling characteristics of the system during the normal operating mode. Fire dampers inpose some resistance to air flow and therefore must be considered by the designer in determining the required flow rate (cfm) to each space. The main design considerations are:
Free Area, Flow and Leakage.

FREE AREA:
The total minimum area of the openings in the air outlet or inlet through which air can pass.

TYPE A

Free Area is expressed in sq. ft.

DUCT WIDTH (IN.)

DUCT HEIGHT (IN.)	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
4	.05	.11	.15	.2	.2	.3	.4	.5	.5	.6	.6	.7	.7	.8	.9
8	.11	.33	.45	.7	.8	1.0	1.2	1.6	1.7	1.8	2.0	2.1	2.2	2.4	2.5
12	.15	.55	.76	.95	1.3	1.7	2.0	2.2	2.6	2.9	3.1	3.3	3.6	3.8	3.9
16	.2	.7	1.1	1.4	1.8	2.1	2.5	2.9	3.2	3.6	4.0	4.3	4.7	5.1	5.4
20	.2	.8	1.3	1.8	2.3	2.8	3.3	3.7	4.2	4.7	5.2	5.6	6.1	6.6	7.0
24	.3	1.1	1.6	2.2	2.8	3.4	3.9	4.5	4.9	5.6	6.2	6.8	7.3	7.9	8.5
28	.4	1.2	1.9	2.6	3.2	3.9	4.8	5.4	5.9	6.7	7.3	8.1	8.8	9.4	10.0
32	.5	1.4	2.2	2.9	3.7	4.5	5.8	6.6	7.3	8.1	8.8	9.8	10.4	11.1	11.5
36	.5	1.5	2.4	3.3	4.4	5.3	6.1	7.2	7.8	8.8	9.7	10.8	11.8	12.6	13.1
40	.6	1.7	2.7	3.8	4.8	5.9	6.9	8.0	8.8	9.7	10.7	11.8	12.7	13.8	14.6
44	.6	1.9	2.9	4.0	5.1	6.3	7.3	8.4	9.6	10.8	11.9	12.9	13.9	15.3	16.2
48	.7	2.0	3.2	4.4	5.6	6.9	8.0	9.3	10.5	11.9	13.3	14.1	15.6	16.6	17.7
52	.7	2.2	3.6	4.8	6.1	7.5	8.8	10.2	11.6	12.7	13.9	15.2	16.7	17.9	19.2
56	.8	2.3	3.8	5.3	6.6	8.0	9.5	10.9	12.3	13.6	15.2	16.6	17.9	19.3	20.8
60	.9	2.5	4.0	5.5	7.1	8.6	10.1	11.6	13.2	14.7	16.3	17.8	19.3	20.9	22.5

TYPE B

DUCT WIDTH (IN.)

DUCT HEIGHT (IN.)	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
4	.06	.15	.2	.3	.4	.4	.5	.6	.7	.8	.9	1.0	1.1	1.2	1.3
8	.15	.45	.60	.8	1.0	1.3	1.5	1.5	1.8	1.8	2.2	2.4	2.6	2.8	3.0
12	.2	.70	.88	1.2	1.5	2.0	2.2	2.4	2.8	3.0	3.4	3.7	4.0	4.3	4.6
16	.3	.8	1.1	1.6	2.1	2.5	2.9	3.2	3.6	4.2	4.6	5.0	5.4	5.9	6.3
20	.4	.9	1.4	2.0	2.7	3.3	3.6	4.1	4.7	5.2	5.7	6.3	6.8	7.4	7.9
24	.4	1.1	1.7	2.3	3.1	3.8	4.3	5.2	5.7	6.3	6.9	7.6	8.2	9.0	9.6
28	.5	1.3	2.2	2.9	3.6	4.4	5.3	5.8	6.6	7.2	8.1	8.8	9.6	10.3	11.0
32	.6	1.4	2.3	3.1	4.2	5.3	5.9	6.9	7.6	8.5	9.4	10.1	11.0	11.8	12.8
36	.7	1.5	2.6	3.5	4.7	5.7	6.6	7.7	8.6	9.6	10.6	11.5	12.3	13.3	14.3
40	.7	1.9	3.0	3.9	5.2	6.4	7.4	8.6	9.5	10.8	11.2	12.9	13.9	14.9	16.1
44	.7	1.9	3.1	4.3	5.7	6.9	8.2	9.5	10.5	11.7	13.0	14.1	15.3	16.5	17.7
48	.8	2.1	3.4	4.8	6.2	7.6	8.8	10.2	11.4	12.7	14.1	15.5	16.7	18.0	19.4
52	.9	2.3	3.7	5.2	6.7	8.2	9.5	11.1	12.6	13.9	15.3	16.8	18.4	19.7	21.0
56	1.0	2.4	4.0	5.6	7.2	8.8	10.3	11.9	13.5	15.1	16.6	18.2	19.5	21.3	22.6
60	1.2	2.6	4.3	6.0	7.8	9.5	11.1	12.7	14.5	16.0	17.6	19.4	21.0	22.8	24.4

TYPE C:
All 100% Free Area

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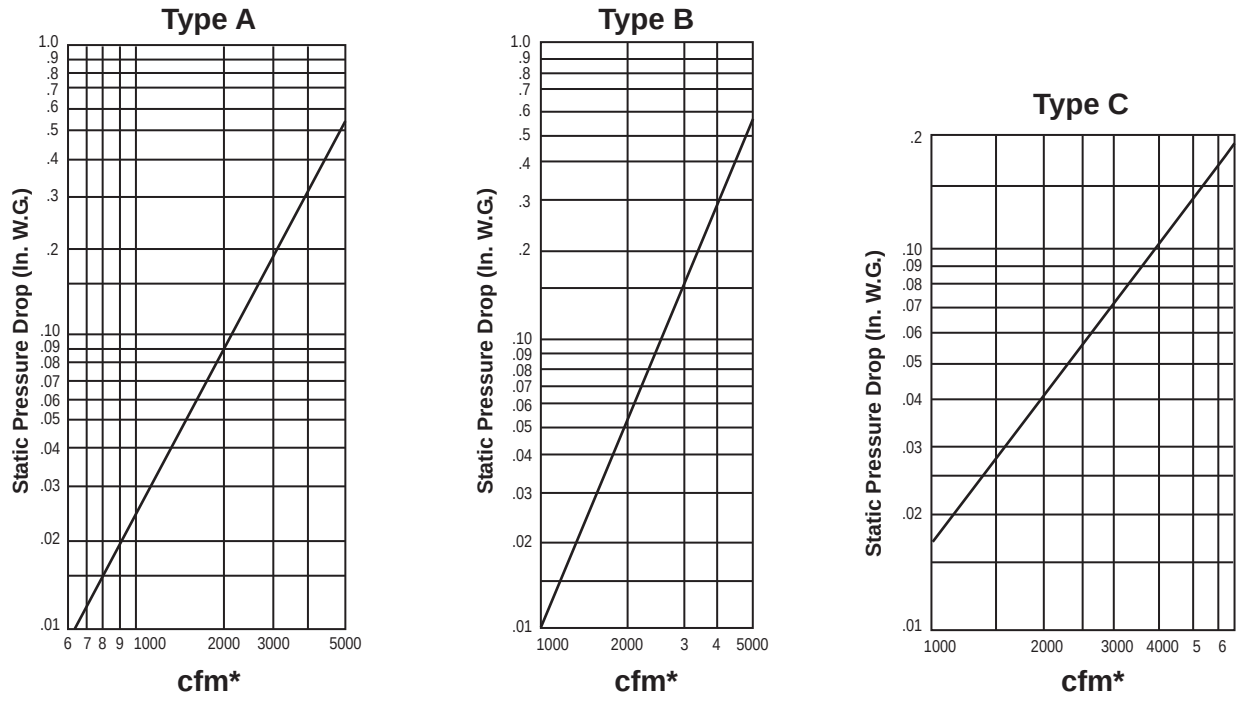
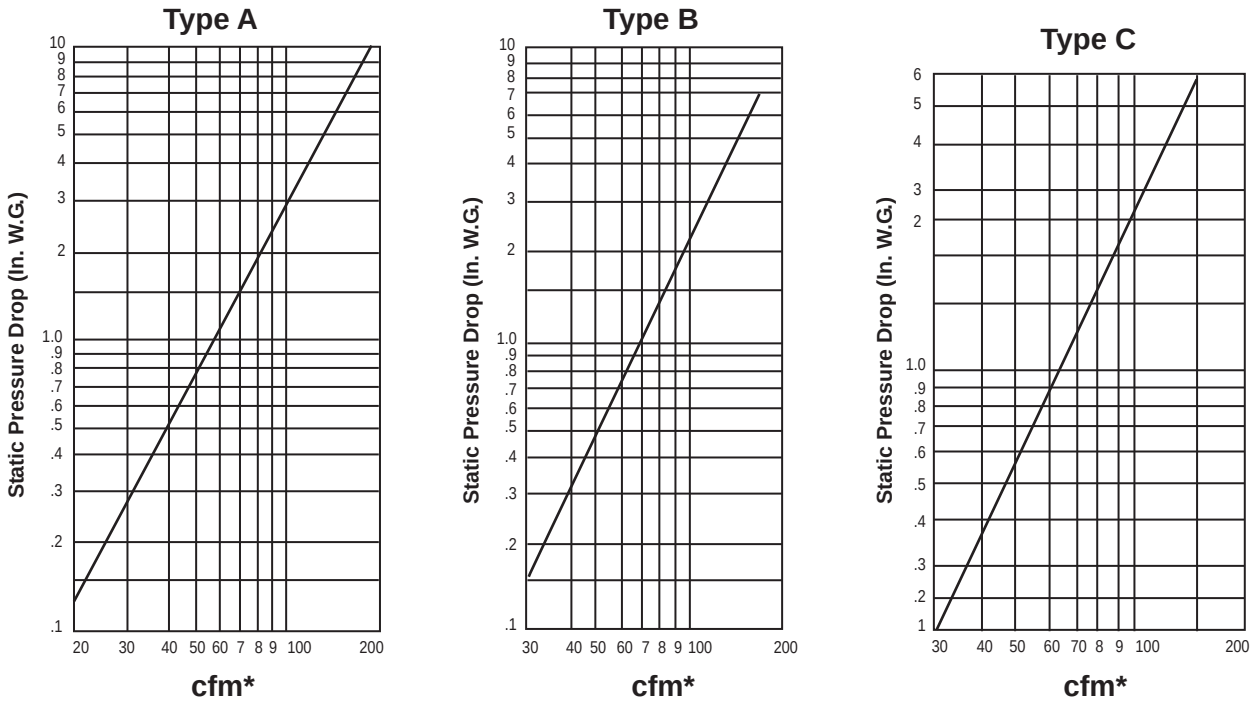
PERFORMANCE CHARACTERISTICS

FLOW: A dynamic loss of static pressure as a result of damper obstructions. This is expressed as a measure of the Free Area X Free Area Velocity versus Static Pressure Drop (inches W.G.).

*cfm = Free Area (sq. ft.) x Free Area Velocity (fpm or cfm/sq/ ft.)



LEAKAGE: Duct leakage is a significant factor in controlling the performance of the HVAC system. If leakage is uncontrolled, energy will be wasted and the system may fail to perform as specified. Leakage is expressed as the drop in static pressure.



TYPE A VERSUS TYPE B . . .

The Controversy By offering two frame styles, A and B, to accommodate low and medium velocity duct systems, respectively, the fire damper industry has attempted to serve the needs of the HVAC designer. However, this accommodation has inadvertently caused some conflict of interest. To explain, most contractors prefer to use Type A fire dampers whenever possible because of their low cost and ease of installation (a further cost savings versus Type B). Engineers, on the other hand, prefer the more expensive Type B fire dampers because of their superior air handling characteristics.

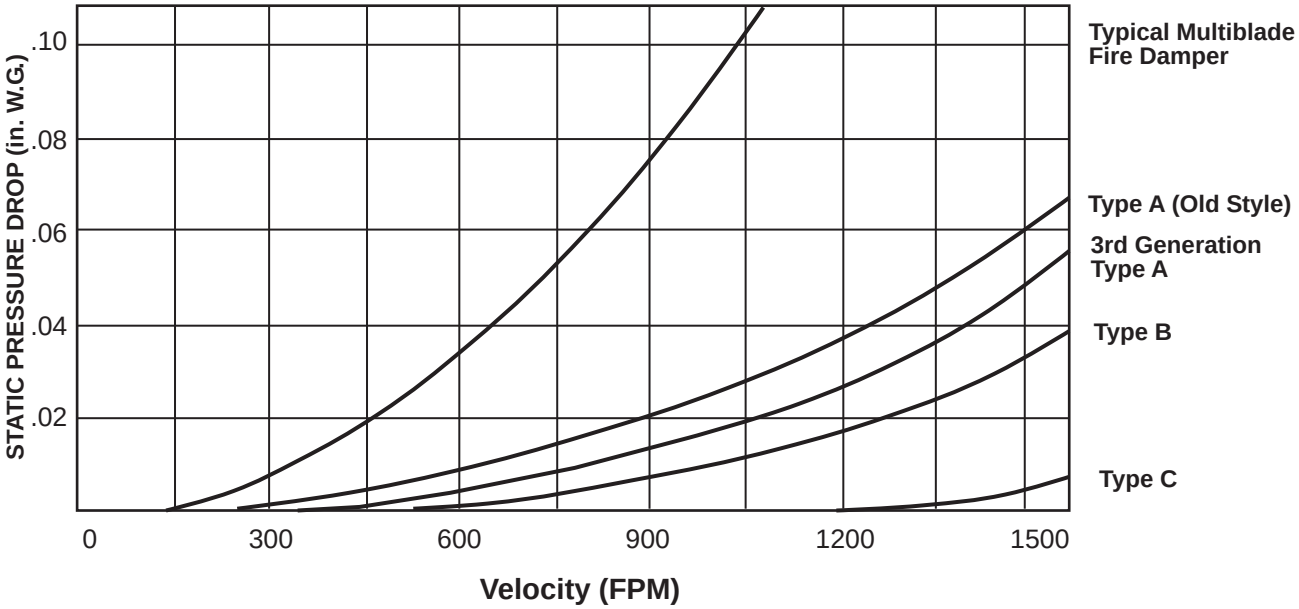
Rule of Thumb As a natural result of these different interests, an industry "Rule of Thumb" developed:

For low and medium velocity duct up to 12" height, use Type B.
For low and medium velocity ducts over 13" height, use Type A.
For high velocity duct systems, use Type C.

Third Generation NCA Manufacturing's third generation fire damper permits improvement in this guideline. By virtue of our narrow blade profile, we are able to offer greater free area than ordinary Type A's. We are also able to offer a less costly fire damper than the wide blade A's which use more material. In summary, our third generation Type A offers the least costly fire damper with the greatest free area.

See chart below.

PRESSURE LOSS COMPARISON CURVES



Size	% Free Area			Static Pressure Drop at 1500 fpm (inches W.G.)		
	A Old Style	A 3rd Generation	B	A Old Style	A 3rd Generation	B
12 x 12	72%	78%	88%	.06	.048	.033
20 x 20	74%	83%	92%	.058	.046	.030
30 x 30	79%	86%	95%	.057	.044	.028
40 x 40	82%	88%	96%	.056	.041	.026

SI UNITS To convert cubic feet per minute (cfm) to cubic meters per second (m/s) multiply by 0.000 471 947.
To convert feet per minute (fpm) to meters per second (m/s) multiply by 0.005 080.
To convert inches of water to pascals (Pa) or newtons per square meter (N/m2), multiply by 249.082.
To convert square inches to square meters, multiply by 0.000 645 16.
To convert inches to meters, multiply by 0.0254.

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