RUSKIN®

3900 Dr. Greaves Rd. • Kansas City, MO 64030 • (816) 761-7476 • FAX (816) 765-8955

CD80AF1 and CD80AF2 INDUSTRIAL CONTROL DAMPERS

STANDARD CONSTRUCTION

FRAME
8" x 2" x 14 gauge (203 x 51 x 2) steel channel.

BLADE
Airfoil-shaped, 16 (1.6) gauge double skin construction, 5" to 8" (127 x 203) wide. Standard blade action is Opposed.

LINKAGE
Side linkage out of airstream. 3/16" x 3/4" (5 x 19) plated steel tie bars. 3/8" (10) diameter stainless steel pivot pins with lock type retainers. 10 gauge (4) galvanized steel clevis arms.

AXLES
CD80AF1 – 1/2" (13) diameter plated steel.
CD80AF2 – 3/4" (19) diameter plated steel.

BEARINGS
Stainless steel sleeve pressed into frame.

FINISH
Mill galvanized.

MAXIMUM TEMPERATURE
250˚F is standard. These models can be supplied for temperatures up to 400˚F by increasing clearance between blade ends and frame. For higher operating temperatures, consult Ruskin.

MINIMUM SIZE
Single blade, parallel action – 6"w x 6"h (152 x 152).
Two blade, parallel or opposed action – 6"w x 12"h (152 x 305).

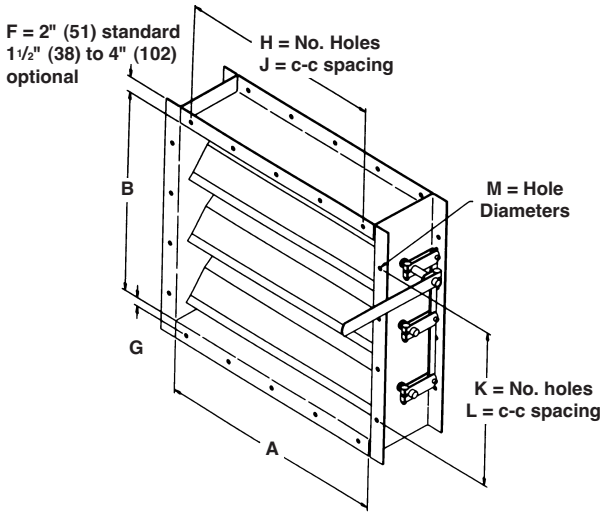
MAXIMUM SINGLE SECTION SIZE
CD80AF1 – 48"w x 96"h (1219 x 2438).
CD80AF2 – 60"w x 96"h (1524 x 2438).

MAXIMUM MULTI-SECTION SIZE
124" w x 96"h (3149 x 2438). Consult Ruskin to discuss multi-section configurations available for larger installations.

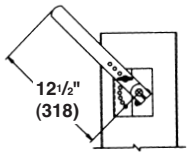
VARIATIONS

Additional variations to those listed in table are available. Consult Ruskin for pricing.
- Elevated Temperature Designs
- Factory supplied and mounted electric, pneumatic, or worm gear operators.
- Epoxy Paint Finish
- Ultra low leakage.

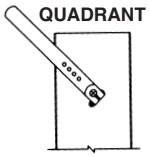
Note: All options at additional cost.
Dimensions in parenthesis ( ) indicate millimeters.



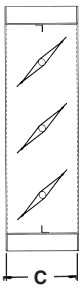
ILLUSTRATED WITH OPTIONAL BOLT HOLES IN FLANGES



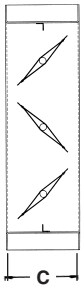
HAND QUADRANT



CRANK LEVER



8" (203) PARALLEL BLADE (PB)



8" (203) OPPOSED BLADE (OB) (STANDARD)

FRAME		BLADES		SEALS (Opt)		AXLES		BEARINGS		LINKAGE		ACCESSORIES	
8" x 2" 14 GA GALVANIZED		16 GA GALVANIZED		EPDM BLADE SEALS 250°F MAX (OPT)		AF1: 1/2" DIA. PLATED STEEL		SS SLEEVE PRESSED		SIDE (EXTERNAL) LINKAGE		HAND QUADRANT - (STD)	
8" x 2" 12 GA GALVANIZED (OPT)		14 GA GALVANIZED (OPT)		SILICONE BLADE SEALS 350°F MAX (OPT)		AF2: 3/4" DIA. PLATED STEEL		SS SLEEVE IN CAST HSG BOLTED TO FRAME (OPT)		FACE (EXPOSED) LINKAGE (OPT)		CRANK LEVER (OPT)	
8" x 2" 14 GA 304SS (OPT)		16 GA 304SS (OPT)		SS BLADE SEALS 400°F MAX. (OPT)		AF1: 1/2" DIA. 304SS (OPT)		BRGS BOLTED TO FRAME W/SHAFT SEAL (OPT)				ELECTRIC ACT. (OPT)	
8" x 2" 14 GA 316SS (OPT)		14 GA 304SS (OPT)		SS JAMB SEALS (OPT)		AF2: 3/4" DIA. 304SS (OPT)						PNEU. ACT. (OPT)	
		16 GA 316SS (OPT)		ULTRA-LOW LEAKAGE (OPT)		AF1: 1/2" DIA. 316SS (OPT)		OUTBOARD BRGS W/SHAFT SEAL (OPT)				BOLT HOLES ONE FLANGE (OPT)	
		14 GA 316SS (OPT)				AF2: 3/4" DIA. 316SS (OPT)						BOLT HOLES BOTH FLANGES (OPT)	
												1 1/2" TO 4" FLANGES (OPT)	
												WORM GEAR WITH HAND WHEEL OR CHAIN WHEEL (OPT)	

QTY.	MODEL	BLADE ACTION		DIMENSIONS										TEMP °F	TAG
		PB	OB	A	B	C	F	G	H	J	K	L	M		

JOB

LOCATION:

CONTRACTOR

LEAKAGE AND PRESSURE

CD80AF1								
DAMPER WIDTH INCHES (MM)	MAX. SYSTEM PRESSURE	MAX. SYSTEM VELOCITY	Leakage w/o Seals*		Leakage with Seals*		Ultra-Low Leakage**	
			Percent of Max. Flow	CFM/Sq. Ft.	Percent of Max. Flow	CFM/Sq. Ft.	Percent of Max. Flow	CFM/Sq. Ft.
48" (1219)	10.0" w.g.	4000	0.80	32.0	0.10	4.0	0.07	2.9
36" (914)	14.8" w.g.	4000	0.80	32.0	0.10	4.0	0.07	2.9
24" (610)	19.3" w.g.	5000	0.80	40.0	0.16	8.0	0.12	5.8
12" (305)	24.0" w.g.	6000	1.00	60.0	0.22	13.0	0.16	9.5

The CD80AF1 may be used in systems with total pressure exceeding 10" w.g. by reducing the damper section width as indicated above. For example, maximum design total pressure of 14" w.g. would require a CD80AF1 damper with maximum section width of 36".

CD80AF2								
DAMPER WIDTH INCHES (MM)	MAX. SYSTEM PRESSURE	MAX. SYSTEM VELOCITY	Leakage w/o Seals*		Leakage with Seals*		Ultra-Low Leakage**	
			Percent of Max. Flow	CFM/Sq. Ft.	Percent of Max. Flow	CFM/Sq. Ft.	Percent of Max. Flow	CFM/Sq. Ft.
60" (1524)	12.0" w.g.	4000	0.80	32.0	0.10	4.0	0.07	2.9
48" (1219)	17.0" w.g.	5000	0.80	32.0	0.08	4.0	0.06	2.9
36" (914)	22.0" w.g.	5000	0.80	32.0	0.08	4.0	0.06	2.9
24" (610)	27.0" w.g.	5000	0.80	40.0	0.16	8.0	0.12	5.8
12" (305)	32.0" w.g.	6000	1.00	60.0	0.22	13.0	0.16	9.5

The CD80AF2 may be used in systems with total pressures exceeding 12" w.g. by reducing the damper section width as indicated in the chart. A maximum design total pressure of 22" w.g. for example, would require a CD80AF2 damper with maximum section width of 36".

*Leakage information based on pressure differential of 1" w.g. tested per AMCA Std. 500 utilizing elastomer blade seals and compression jamb seals.

**For details on "Ultra-Low Leakage," contact Ruskin.

LEAKAGE CORRECTION FACTOR

Static Pressure (in. w.g.)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Correction Factor	1.0	1.4	1.7	2.0	2.2	2.4	2.6	2.8	3	3.2	3.3	3.5	3.6	3.7	3.9	4	4.1	4.2	4.4	4.5

DETERMINING LEAKAGE

To determine leakage at static pressure differentials higher than one inch water gauge, multiply leakage at one inch (determined from appropriate table above) by correction factor for higher static pressure (determined from the Leakage Correction Factor Table).

Example:
Find leakage per square foot for a 36" wide damper equipped with optional blade and jamb seals at 3" SP. Per table, leakage for a 36" wide unit is 4.0 CFM/sq. ft. x 1.7 correction factor = 6.8 CFM/sq. ft. at 3 inches water gauge.

Leakage ratings are based on AMCA Standard 500 using Test Setup Apparatus Figure 5.5. Torque applied holding damper closed at 10 in. lbs. per sq. ft. of damper with minimum of 20 in. lbs.

INSTALLATION

For proper operation, damper must be installed square and free from racking. Opposed blade dampers must be operated from a power blade on the drive axle.

NOTE:

The standard design and construction for damper models CD80AF1 and CD80AF2 is based on operation with the blades ("A" dimension) horizontally oriented. Dampers which are to be installed with vertically oriented blades require additional features to provide the necessary axle support. Contact Ruskin for details and support when your project includes dampers with vertically oriented blades.

PRESSURE DROP INFORMATION

AREA FACTOR TABLE

Hgt. Dim. B	Dimension A — Width in Inches																		
	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60
6	6.55	4.37	3.28	2.62	2.18	1.87	1.64	1.46	1.31	1.19	1.09	1.01	.94	.87	.82	.77	.73	.69	.66
9	3.89	2.60	1.95	1.56	1.30	1.11	.97	.87	.78	.71	.65	.60	.56	.52	.49	.46	.43	.41	.39
12	2.72	1.81	1.36	1.09	.91	.78	.68	.60	.54	.49	.45	.42	.39	.36	.34	.32	.30	.29	.27
15	2.03	1.35	1.01	.81	.68	.58	.51	.45	.41	.37	.34	.31	.29	.27	.25	.24	.23	.21	.20
18	1.72	1.14	.86	.69	.57	.49	.43	.38	.34	.31	.29	.26	.25	.23	.21	.20	.19	.18	.17
24	1.25	.84	.63	.50	.42	.36	.31	.28	.25	.23	.21	.19	.18	.17	.16	.15	.14	.13	.13
30	.95	.64	.48	.38	.32	.27	.24	.21	.19	.17	.16	.15	.14	.13	.12	.11	.11	.10	.10
36	.79	.53	.40	.32	.26	.23	.20	.18	.16	.14	.13	.12	.11	.11	.10	.09	.09	.08	.08
42	.68	.45	.34	.27	.23	.19	.17	.15	.14	.12	.11	.10	.10	.09	.08	.08	.08	.07	.07
48	.59	.39	.30	.24	.20	.17	.15	.13	.12	.11	.10	.09	.08	.08	.07	.07	.07	.06	.06
54	.52	.35	.26	.21	.17	.15	.13	.12	.10	.10	.09	.08	.07	.07	.07	.06	.06	.06	.05
60	.46	.31	.23	.19	.15	.13	.12	.10	.09	.08	.08	.07	.07	.06	.06	.05	.05	.05	.05
66	.42	.28	.21	.17	.14	.12	.11	.09	.08	.08	.07	.06	.06	.06	.05	.05	.05	.04	.04
72	.39	.26	.19	.15	.13	.11	.10	.09	.08	.07	.06	.06	.06	.05	.05	.05	.04	.04	.04
78	.36	.24	.18	.14	.12	.10	.09	.08	.07	.06	.06	.05	.05	.05	.04	.04	.04	.04	.04
84	.33	.22	.17	.13	.11	.09	.08	.07	.07	.06	.06	.05	.05	.04	.04	.04	.04	.03	.03
90	.31	.21	.15	.12	.10	.09	.08	.07	.06	.06	.05	.05	.04	.04	.04	.04	.03	.03	.03
96	.29	.19	.14	.11	.10	.08	.07	.06	.06	.05	.05	.04	.04	.04	.04	.03	.03	.03	.03

DETERMINING PRESSURE DROP

Use the Area Factor Table and Pressure Drop Chart to determine pressure drop through Ruskin CD80AF1/CD80AF2 control dampers.

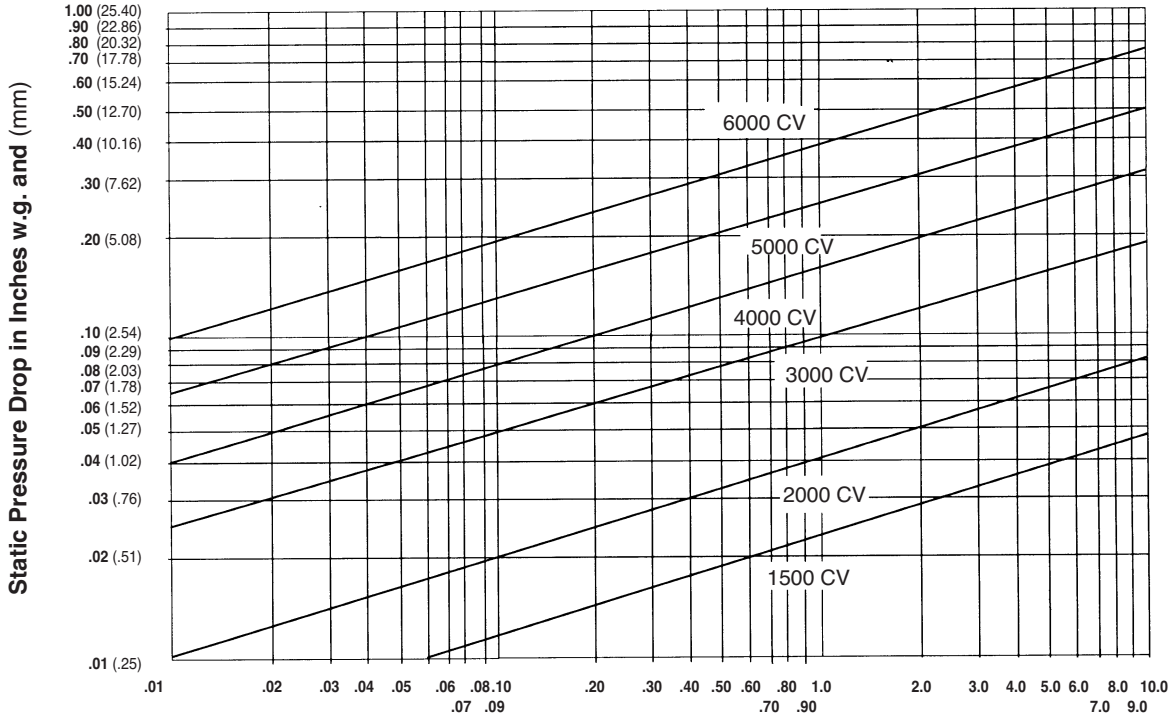
1. Determine area factor for damper by entering the area factor table through duct width and height.
2. Find the conversion velocity (CV) by multiplying the selected size damper's area factor by the flow rate in CFM: **CV = Area Factor x CFM.**
3. Enter the pressure drop chart at the determined area factor and proceed up to appropriate conversion velocity (CV) line. Then, read across to pressure drop at left side of chart.

EXAMPLE:
Find the pressure drop across an 18" wide x 18" high (457 x 457) Model CD80AF2 control damper handling 8772 CFM. From the Area Factor Table, area factor is determined to be .57.

CFM x AREA FACTOR EQUALS CONVERSION VELOCITY

Therefore, CV (Conversion Velocity) = 8772 CFM x .57 = 5000. Using the Pressure Drop Chart, pressure drop = .22 inches water gauge.

CD80AF PRESSURE DROP CHART



NOTES:
1. Ratings are based on AMCA Standard 500 using Test Setup Apparatus Figure 5.3 (damper is installed with duct upstream and downstream).
2. Static Pressure and Conversion Velocities are corrected to .075 lb./cu. ft. air density.

CD80AF1 SUGGESTED SPECIFICATION

Furnish and install, at locations shown in plans or in accordance with schedules, industrial grade control dampers meeting the following construction standards: Industrial damper shall be manufactured in an ISO9001 certified factory. Frame shall be minimum 8" deep x 2" flanged 14 gauge (203 x 51 x 2), galvanized steel channel. Blades shall be double skin airfoil design, maximum 8" (203) wide and minimum 16 gauge (1.6) galvanized steel. Axles shall be minimum 1/2" (13) diameter plated steel rod. Bearing shall be stainless steel sleeve pressed into frame. Oil impregnated bronze or synthetic bearings are not acceptable. Linkage shall be located in jamb out of airstream and constructed of minimum 10 gauge (3.5) steel clevis arms with 3/16" x 3/4" (4.8 x 19) plated steel tie bars pivoting on 3/8" (9.5) diameter stainless steel pivot pins with lock type retainers. Standard construction shall include (specifier choose) locking hand quadrant for manual operation or crank lever for motor operation.

Submittal data must include leakage, pressure drop and maximum pressure data based on AMCA Standard 500 testing. Data shall be for full range of damper sizes. Data from one size sample test is not acceptable. Damper shall be Ruskin model CD80AF1 Control Damper.

ADD TO SPECIFICATION IF REQUIRED:
Dampers shall be equipped with blade and jamb seals for low leakage application. Blade seals shall be mechanically attached to blade. Adhesive type seals are not acceptable. Jamb seals shall be flexible stainless steel located between blade edge and jamb for maximum sealing compression. Wind stops or sponge seals are not acceptable.

CD80AF2 SUGGESTED SPECIFICATION

Furnish and install, at locations shown in plans or in accordance with schedules, industrial grade control dampers meeting the following construction standards: Industrial damper shall be manufactured in an ISO9001 certified factory. Frame shall be minimum 8" deep x 2" flanged 14 gauge (203 x 51 x 2), galvanized steel channel. Blades shall be double skin airfoil design, maximum 8" (203) wide and minimum 16 gauge (1.6) galvanized steel. Axles shall be minimum 3/4" (19) diameter plated steel rod. Bearing shall be stainless steel sleeve pressed into frame. Oil impregnated bronze or synthetic bearings are not acceptable. Linkage shall be located in jamb out of airstream and constructed of minimum 10 gauge (3.5) steel clevis arms with 3/16" x 3/4" (4.8 x 19) plated steel tie bars pivoting on 3/8" (9.5) diameter stainless steel pivot pins with lock type retainers. Face linkage in airstream is not acceptable. Standard construction shall include (specifier choose) locking hand quadrant for manual operation or crank lever for motor operation. Submittal data must include leakage, pressure drop and maximum pressure data based on AMCA Standard 500 testing. Data shall be for full range of damper sizes. Data from one size sample test is not acceptable. Damper shall be Ruskin model CD80AF2 Control Damper.

ADD TO SPECIFICATION IF REQUIRED:
Dampers shall be equipped with blade and jamb seals for low leakage application. Blade seals shall be mechanically attached to blade. Adhesive type seals are not acceptable. Jamb seals shall be flexible stainless steel located between blade edge and jamb for maximum sealing compression. Wind stops or sponge seals are not acceptable.

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