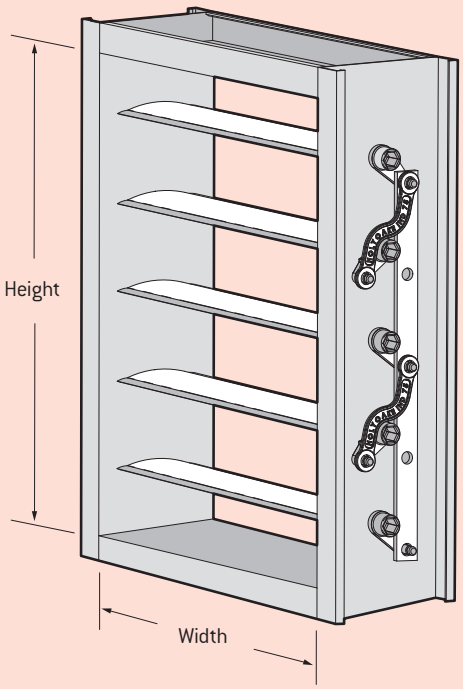
HCD – Airfoil Control Damper

Model: **HCD-75**

The Holyoake HCD-75 is a precision made volume and pressure control device, with extremely low leakage when closed, (in the range of 0.003 m³/s at 100Pa).
It provides better control of an air stream in a size between an OBD3 and the HCD-150.
Like the HCD-150, the HCD-75 offers low resistance when open.



Standard Construction

Frame: 6063 T5 extruded aluminium with square cut ends, mechanically joined with screws tapped into screw pipes.

Blades: 6063 T5 three cavity extrusion providing a full airfoil section.

Linkage: Concealed in frame, with stainless steel cranks and link pins and aluminium control bars.

Axles: Hexagonal stainless steel.

Bearings: Two piece moulded Acetal, pressed into frame, with the outer sleeve locked with locating ribs (-8°to 220°C).

Seals: Blade edge & Jamb: Extruded vinyl, (0°C to 80°C).
Side Seal: Flexible (convex) aluminium.

Control Shaft: (Standard): Round Drive Shaft 120 mm, complete with Motor Mounting Plate - HCD32 Kit (HCD23 & 28).
(Optional):
(1) Hex Extension Shaft 23, 44, 93, or 300 mm, complete with Motor Mounting Plate - HCD 25, 26, 22, or 27, with a HCD 23.
(2) Hex Extension Shaft (93 mm) complete with Quadrant Arm and Plate – HCD31 Kit (HCD22/23/24).

Blade Rotation: (Standard): Opposed
(Optional): Parallel (specify if required).

Finish: Mill standard, anodized and powercoat options available.

Minimum Size: 150 mm wide and 95 mm high (Air Stream).

Maximum Size: 950 mm wide and 898 mm high (Air Stream).

General: The specified size is the duct airstream size. The actual overall size is the airstream size plus 50 mm.

Special Construction Options

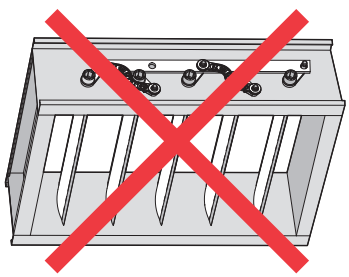
Smoke Damper: High Temperature HCD75-ET version available suitable for smoke applications see page 328H - 329H.

For other features please contact your local Holyoake Branch.

Installation

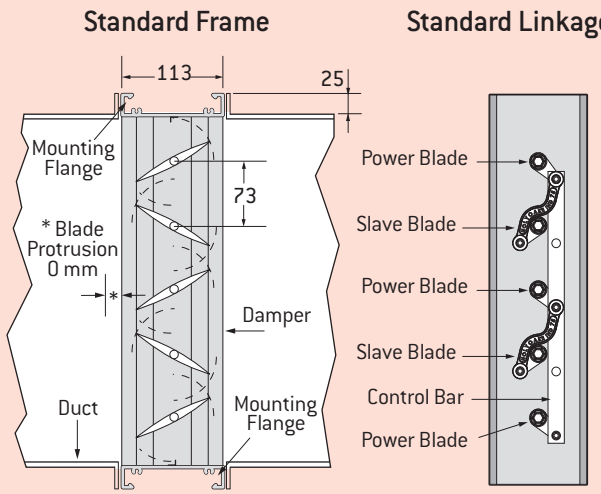
Dampers must be installed square and free from racking. Typically the method of driving the damper depends on its application. Where the actuator is to be located externally, specify Round Drive Shaft 120 mm. For manual control, use Hex Extension Shafts, Quadrant Arm and Plate.

Motorised HCD-75 dampers must not be installed with the axles vertical.



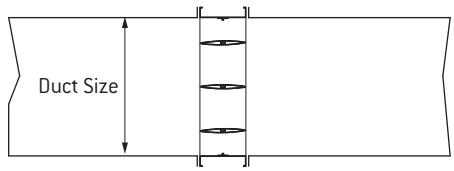
Duct Mounting

The HCD-75 has been specifically designed to be installed using 25 mm proprietary duct flanging systems.
This means that the damper can be installed in exactly the same way as a piece of flanged duct.
This way of mounting the HCD-75 provides an easy installation method and maintains the maximum amount of free area, which is especially important as the HCD-75 control damper is more likely to be used in smaller sized ducts. The HCD-75 can also be mounted inside a duct in much the same way as an HCD-150 Standard Channel damper.



The location to be fitted with either a locking quadrant, or motorised drive shaft **must** be a "power blade" axle on the linkage side of the damper, i.e. every second shaft on opposed blade dampers, or every blade on parallel blade dampers.

Model: **HCD-75 Pressure** Drop Data - Flange Surround



Area Factor Table

Duct Height (mm)	No. of Blades	Duct Width (mm)																
		150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950
95	1	140.5	105.4	84.3	70.2	60.2	52.7	46.8	42.1	38.3	35.1	32.4	30.1	28.1	26.3	24.8	23.4	22.2
168	2	62.4	46.8	37.4	31.2	26.7	23.4	20.8	18.7	17.0	15.6	14.4	13.4	12.5	11.7	11.0	10.4	9.8
241	3	40.1	30.1	24.0	20.0	17.2	15.0	13.4	12.0	10.9	10.0	9.2	8.6	8.0	7.5	7.1	6.7	6.3
314	4	29.5	22.1	17.7	14.8	12.7	11.1	9.8	8.9	8.1	7.4	6.8	6.3	5.9	5.5	5.2	4.9	4.7
387	5	23.4	17.5	14.0	11.7	10.0	8.8	7.8	7.0	6.4	5.8	5.4	5.0	4.7	4.4	4.1	3.9	3.7
460	6	19.3	14.5	11.6	9.7	8.3	7.3	6.4	5.8	5.3	4.8	4.5	4.1	3.9	3.6	3.4	3.2	3.1
533	7	16.5	12.4	9.9	8.2	7.1	6.2	5.5	4.9	4.5	4.1	3.8	3.5	3.3	3.1	2.9	2.7	2.6
606	8	14.4	10.8	8.6	7.2	6.2	5.4	4.8	4.3	3.9	3.6	3.3	3.1	2.9	2.7	2.5	2.4	2.3
679	9	12.7	9.6	7.6	6.4	5.5	4.8	4.2	3.8	3.5	3.2	2.9	2.7	2.5	2.4	2.2	2.1	2.0
752	10	11.4	8.6	6.9	5.7	4.9	4.3	3.8	3.4	3.1	2.9	2.6	2.5	2.3	2.1	2.0	1.9	1.8
825	11	10.4	7.8	6.2	5.2	4.5	3.9	3.5	3.1	2.8	2.6	2.4	2.2	2.1	1.9	1.8	1.7	1.6
898	12	9.5	7.1	5.7	4.8	4.1	3.6	3.2	2.9	2.6	2.4	2.2	2.0	1.9	1.8	1.7	1.6	1.5

(All dimensions assume the duct size is the airstream size of the damper).

To determine the pressure drop through a fully open HCD-75 use the following procedure:

1. Find the Area Factor from the table above, enter Duct Width and Height.
2. Determine the Conversion Velocity (CV) by multiplying the Area Factor by the air flow in m^3/s (CV = Area Factor x m^3/s).
3. Enter the pressure drop chart below with the Area Factor and establish the intersection with the Conversion Velocity (CV) line just determined.
   Read the pressure drop (Pa) on the left hand side of the chart.

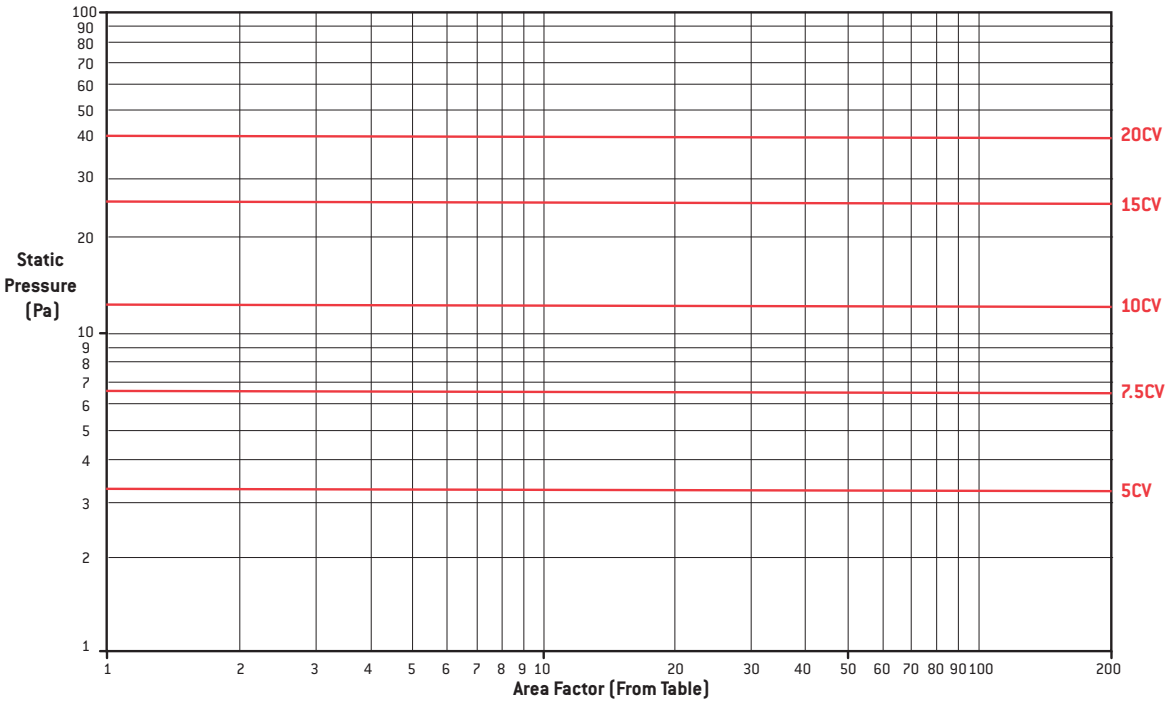
Note: Interpolations while not precise are adequate for most calculations.

Example:

Find the pressure drop across a 600 mm wide x 606 mm high model HCD-75 with a flange surround (Airstream Size), passing 2.8 m^3/s.

1. From the table using the interpolation, the Area Factor is 3.6.
2. CV = 2.8 x 3.6 = 10.
3. From the chart below, the pressure drop reads 13 Pa.

Guide Product Weights	
HCD 75 Airfoil Flanged	Approximate Weight in Kg
300 x 200	2.39
500 x 200	3.16

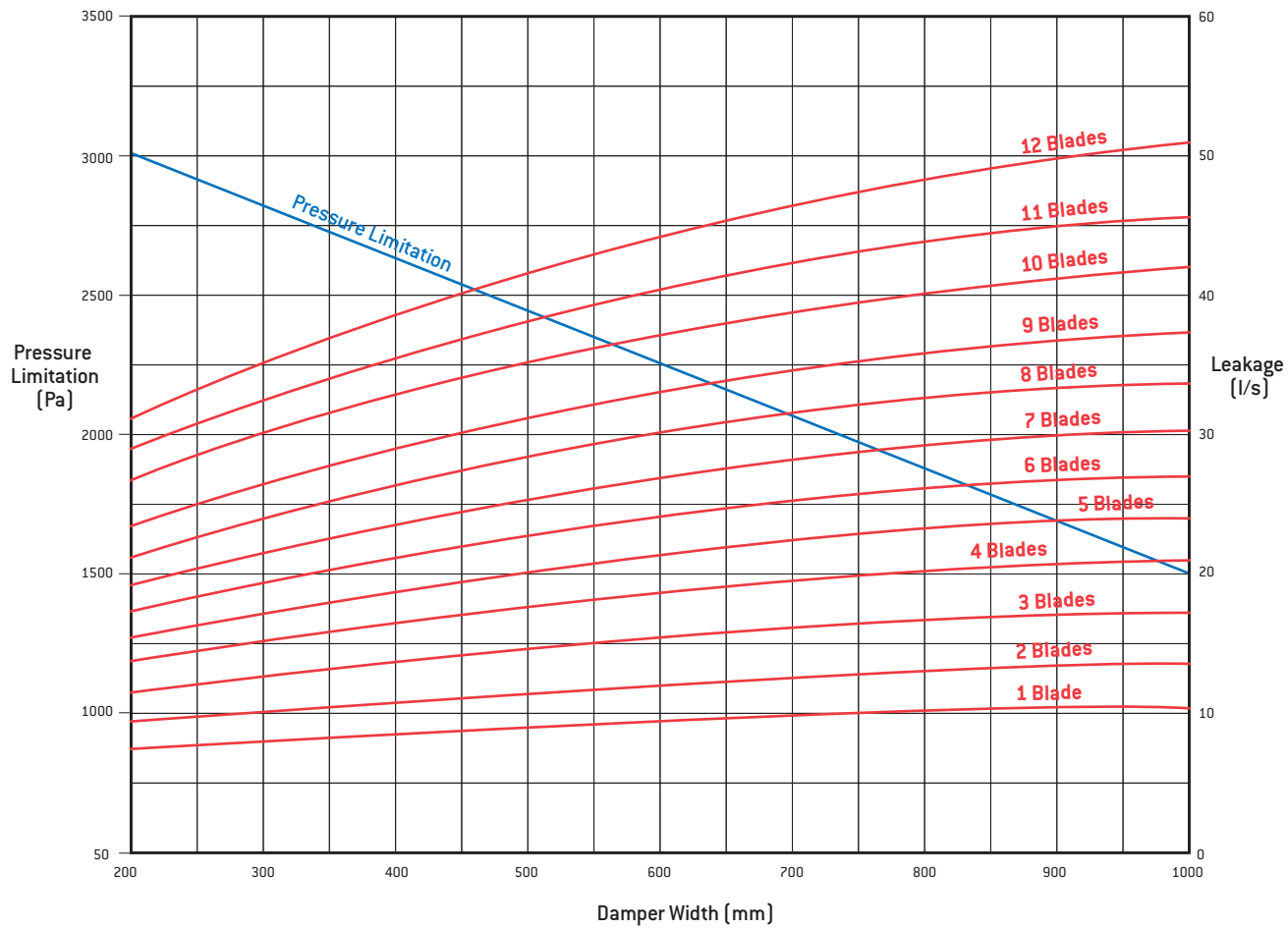


Notes

1. Static Pressure and Conversion Velocities are for air density of 1.2kg/m^3.
2. Pressure drop data is for dampers tested with ductwork on both the up and downstream sides. These values need to be suitably increased where dampers are mounted with ductwork on one side only, or when mounted onto plenum walls. (Refer to SMACNA, or ASHRAE system design guides).
3. Data is for the specific sizes in the Area Factor Table. For other sizes use the next size down and make a proportional adjustment based on the approximate increase in free area.

HCD – Performance Data

Model: **HCD-75 Leakage Data**



Leakage through a Closed HCD-75

Example:

To determine the leakage through a 600 mm wide x 444 mm high (5 bladed) damper at 1500 Pa ΔP.

(A) Enter the graph above at 600 mm width and read the intersection at the 5 blade line. Read the right hand side of the chart at 21 l/s.

(B) Read the leakage correction factor for 600 mm width and 1500 Pa from the table below = 1.

(C) Calculate leakage as 21 x 1 = 21 l/s.

Pressure Limitations on a Closed HCD-75

Example:

To establish pressure differential limitations for a damper with 600 mm long blades.

(A) Enter the graph above at 600 mm damper width.

(B) Read the intersection with the 'Pressure Limitation' line at the left hand side of the chart as 2250 Pa.

For ΔP's other than 1.5k Pa, Use table below.

LEAKAGE CORRECTION FACTOR												
ΔP (Pa)	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
Width												
200	0.38	0.58	0.68	0.80	0.91	1.00	1.06	1.06	1.06	1.10	1.21	1.40
400	0.38	0.58	0.68	0.80	0.91	1.00	1.06	1.06	1.06	1.10		
600	0.38	0.58	0.68	0.80	0.91	1.00	1.06	1.06	1.06			
800	0.38	0.60	0.66	0.76	0.91	1.00	1.06					
1000	0.38	0.60	0.66	0.76	0.86	1.00						

Notes

1. Leakage is frequently specified as a percentage of maximum design flow. Typically full flow velocity on the above example would be 5 m/s, which would require volumetric flow of 5 x 0.6 x 0.444 = 1332 l/s. Leakage would in this case be (21 x 100) / 1332 = 1.58%.
2. Above leakage figures are based on a minimum closing torque of 2.4 Nm.
3. Pressure limitations established by the above graph are intended to limit deflection on the longest blade (1000 mm) to 7 mm. Deflections for 800 mm or shorter blades, at higher pressure differentials, will be substantially less.