

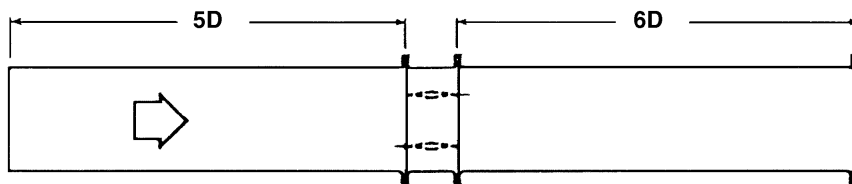
## AIR PERFORMANCE DATA FOR ALL SMOKE DAMPERS

### PRESSURE DROP DATA

The air performance of a damper is described by the pressure drop across the damper. So what is pressure drop? Pressure drop can be defined as the resistance to airflow across an open damper and increases as turbulent flow increases. Pressure drop is figured using one of the three arrangements found below. Ruskin's pressure drop testing was conducted in accordance with AMCA Standard 500 using figure 5.3 shown. All data has been corrected to represent standard air at a density of .075 lb/ft³. Actual pressure drop found in any HVAC system is dependent upon many factors. This pressure drop information along with an analysis of other system influences should be used to estimate actual pressure losses for a damper installed in a given HVAC system.

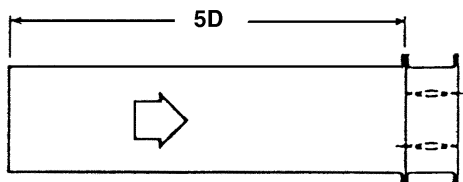
### AMCA TEST FIGURES

**Figure 5.3** illustrates a fully ducted damper. This configuration has the lowest pressure drop of the three test configurations.



**Figure 5.3**

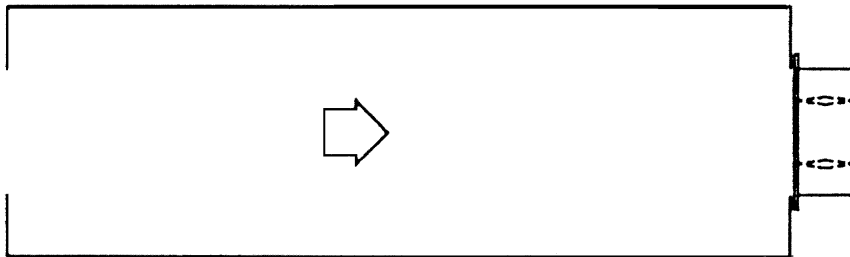
**Figure 5.2** illustrates a ducted damper exhausting air into an open area. This configuration has a lower pressure drop than Figure 5.5



**Figure 5.2**

$$D = \sqrt{\frac{4 (W) (H)}{3.14}}$$

**Figure 5.5** illustrates a plenum mounted damper. This configuration has the highest pressure drop.



**Figure 5.5**

# PERFORMANCE DATA FOR SD60, 60-2, 37 and SD50

## NOTES:

1. Ratings are based on AMCA Standard 500 using test set up apparatus figures 5.3 (damper installed with duct upstream and downstream).
2. Static pressure and conversion velocities are corrected to .075 lb./cu. ft. air density.
3. For installations where damper is not installed in ductwork such as return air from ceiling plenum through fire damper into return air shaft, multiply static pressure drop obtained from the table below by  $2.8 + \sqrt{1 \div \text{AREA FACTOR}}$

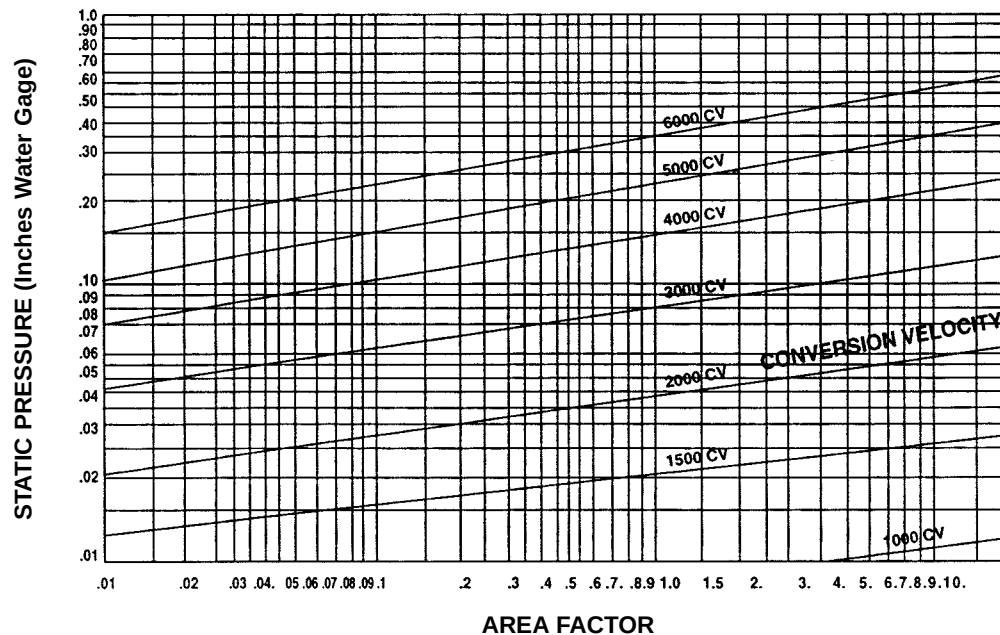
## To determine the pressure drop:

1. Determine area factor for the damper based on the duct width and height (A x B) using the appropriate chart based on damper style.
2. Find the conversion velocity (CV) by multiplying area factor for the selected size damper by flow rate in CFM.
3. Locate the area factor at bottom of the pressure drop chart. Move up the chart to the appropriate conversion velocity (CV) line. From the intersection point, move left to pressure drop at left side of the chart.

AREA FACTOR TABLE

| Ht.<br>Dim.<br>B | Width – Dimension A |              |              |              |              |              |              |              |               |               |               |               |               |               |
|------------------|---------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|---------------|---------------|---------------|---------------|---------------|
|                  | 8"<br>(203)         | 12"<br>(305) | 16"<br>(406) | 20"<br>(508) | 24"<br>(610) | 28"<br>(711) | 32"<br>(813) | 36"<br>(914) | 40"<br>(1016) | 44"<br>(1118) | 48"<br>(1219) | 52"<br>(1321) | 56"<br>(1422) | 60"<br>(1524) |
| 8"<br>(203)      | 5.41                | 3.26         | 2.31         | 1.79         | 1.48         | 1.24         | 1.55         | 1.56         | 1.21          | 1.09          | .99           | .91           | .84           | .78           |
| 10"<br>(254)     | 4.12                | 2.47         | 1.75         | 1.36         | 1.12         | .94          | .97          | .85          | .75           | .68           | .62           | .56           | .52           | .48           |
| 12"<br>(305)     | 3.07                | 1.84         | 1.30         | 1.01         | .83          | .70          | .78          | .68          | .60           | .54           | .49           | .45           | .42           | .39           |
| 14"<br>(356)     | 2.44                | 1.46         | 1.04         | .80          | .66          | .56          | .60          | .52          | .46           | .42           | .35           | .35           | .32           | .30           |
| 16"<br>(406)     | 2.13                | 1.28         | .91          | .70          | .58          | .48          | .48          | .42          | .38           | .34           | .31           | .28           | .26           | .24           |
| 18"<br>(457)     | 1.81                | 1.09         | .77          | .59          | .49          | .41          | .43          | .38          | .34           | .30           | .27           | .25           | .23           | .22           |
| 20"<br>(508)     | 1.57                | .94          | .66          | .52          | .43          | .36          | .37          | .32          | .29           | .26           | .23           | .22           | .20           | .18           |
| 24"<br>(610)     | 1.29                | .77          | .55          | .42          | .35          | .29          | .30          | .26          | .23           | .21           | .19           | .17           | .16           | .15           |
| 28"<br>(711)     | 1.09                | .65          | .46          | .36          | .29          | .25          | .24          | .21          | .19           | .17           | .15           | .14           | .15           | .12           |
| 32"<br>(813)     | .93                 | .56          | .40          | .31          | .26          | .21          | .21          | .18          | .16           | .15           | .13           | .12           | .11           | .10           |
| 36"<br>(914)     | .80                 | .48          | .34          | .26          | .22          | .18          | .18          | .16          | .14           | .13           | .12           | .11           | .10           | .09           |

PRESSURE DROP CONVERSION VELOCITY



# PERFORMANCE DATA FOR SD36, 35, 34

## AREA FACTOR TABLE

| Height<br>Dim.<br>B | Width – Dimension A |              |              |              |              |              |              |              |              |               |               |               |               |               |               |               |               |               |
|---------------------|---------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
|                     | 8"<br>(203)         | 12"<br>(305) | 16"<br>(406) | 20"<br>(508) | 24"<br>(610) | 28"<br>(711) | 30"<br>(762) | 32"<br>(813) | 36"<br>(914) | 40"<br>(1016) | 44"<br>(1118) | 48"<br>(1219) | 52"<br>(1321) | 56"<br>(1422) | 60"<br>(1524) | 64"<br>(1626) | 68"<br>(1727) | 72"<br>(1829) |
| 9"<br>(229)         | 4.76                | 2.86         | 2.04         | 1.58         | 1.30         | 1.10         | 1.02         | 1.13         | .997         | .941          | .847          | .769          | .706          | .651          | .605          | .565          | .529          | .498          |
| 10"<br>(254)        | 4.00                | 2.38         | 1.69         | 1.32         | 1.08         | .917         | .847         | .914         | .807         | .762          | .685          | .623          | .571          | .528          | .490          | .457          | .429          | .403          |
| 12"<br>(305)        | 3.33                | 2.04         | 1.45         | 1.12         | .917         | .775         | .719         | .738         | .652         | .615          | .554          | .503          | .461          | .426          | .396          | .369          | .346          | .326          |
| 14"<br>(356)        | 2.63                | 1.58         | 1.12         | .877         | .719         | .588         | .565         | .565         | .498         | .459          | .423          | .385          | .353          | .326          | .302          | .282          | .265          | .249          |
| 16"<br>(406)        | 2.17                | 1.30         | .926         | .719         | .588         | .497         | .463         | .457         | .403         | .381          | .343          | .312          | .286          | .264          | .245          | .229          | .214          | .202          |
| 20"<br>(508)        | 1.69                | 1.01         | .725         | .565         | .461         | .390         | .362         | .349         | .308         | .291          | .262          | .238          | .218          | .201          | .187          | .175          | .164          | .154          |
| 24"<br>(610)        | 1.38                | .833         | .595         | .463         | .379         | .322         | .299         | .282         | .249         | .235          | .212          | .193          | .176          | .163          | .151          | .141          | .132          | .125          |
| 28"<br>(711)        | 1.12                | .676         | .483         | .376         | .308         | .260         | .242         | .229         | .202         | .190          | .171          | .156          | .143          | .132          | .122          | .114          | .107          | .101          |
| 32"<br>(813)        | .990                | .592         | .423         | .329         | .270         | .228         | .211         | .198         | .175         | .165          | .148          | .135          | .127          | .114          | .106          | .099          | .093          | .087          |
| 36"<br>(914)        | .877                | .526         | .376         | .292         | .239         | .202         | .188         | .175         | .154         | .145          | .131          | .119          | .109          | .101          | .094          | .087          | .082          | .077          |
| 40"<br>(1016)       | .762                | .457         | .326         | .254         | .208         | .176         | .163         | .152         | .134         | .127          | .114          | .104          | .095          | .088          | .082          | .076          | .071          | .067          |
| 44"<br>(1118)       | .691                | .414         | .296         | .230         | .188         | .159         | .148         | .138         | .122         | .132          | .104          | .094          | .086          | .080          | .074          | .069          | .065          | .061          |
| 48"<br>(1219)       | .632                | .379         | .271         | .211         | .172         | .146         | .135         | .126         | .111         | .105          | .095          | .086          | .079          | .073          | .068          | .063          | .059          | 0.56          |

Find the pressure drop through an SD37 that is 24"w x 24"h, handling 3957 cfm.

1. Damper will handle 3957 cfm, and measures 24"w x 24"h. Area factor from table for damper having these dimensions is .379.

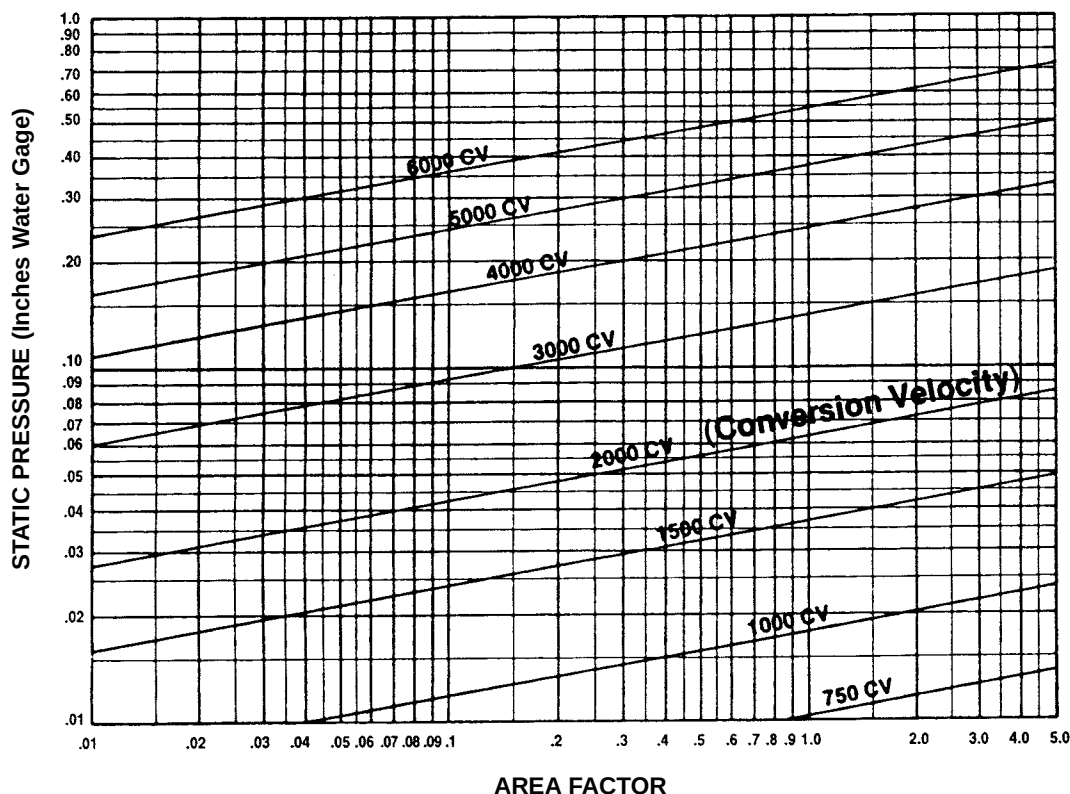
2. Multiply CFM by area factor to find conversion velocity:

$$\frac{3957}{\text{(cfm)}} \times \frac{.379}{\text{(area factor)}} = 1500 \text{ (conversion velocity)}$$

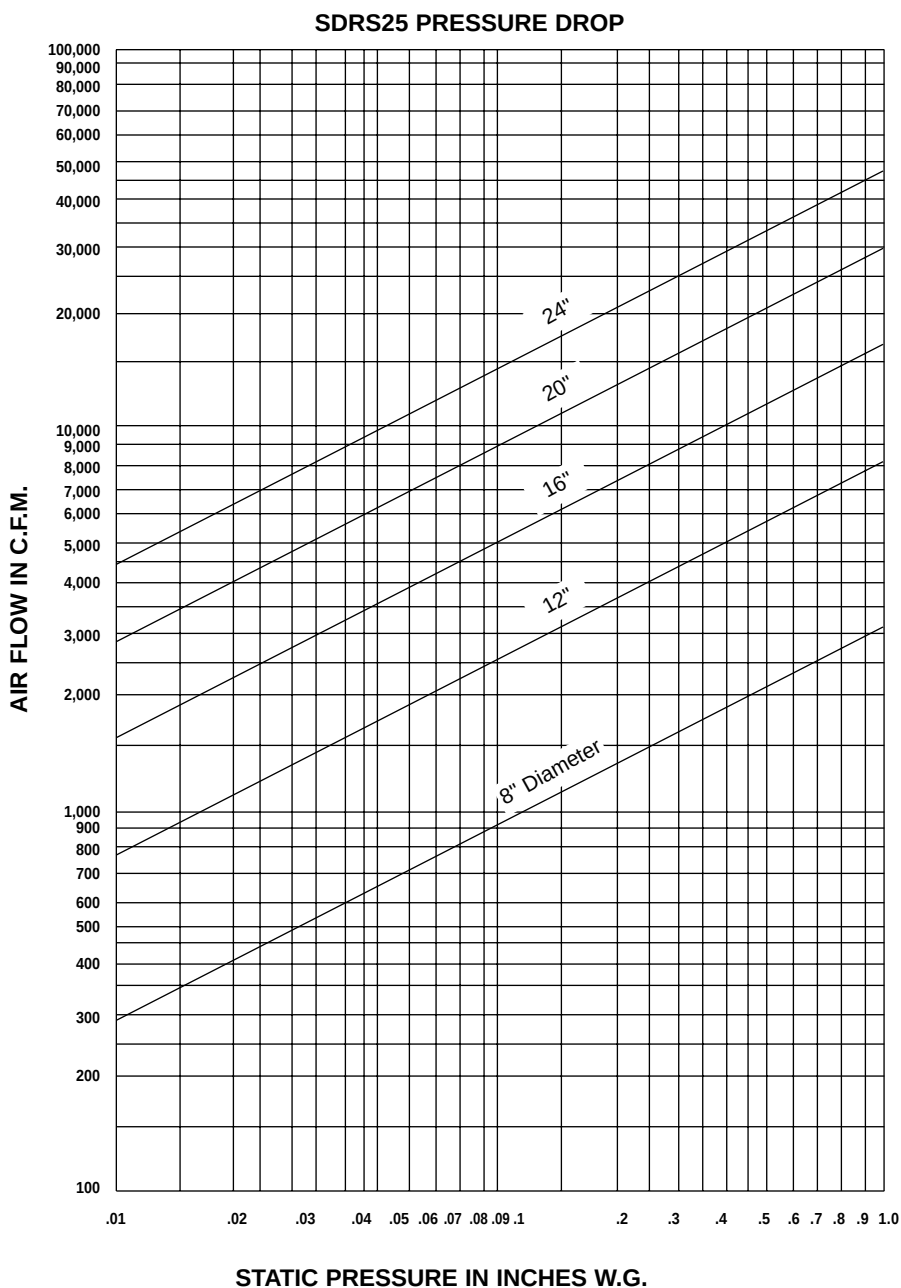
3. With area factor from step 1, enter at bottom of airflow resistance chart and proceed upward to appropriate conversion velocity line (CV). From CV/area factor intersection point, read left straight across to pressure drop.

Pressure drop through a 24"w x 24"h damper carrying 3957 cfm is found to be approximately .031 in. w.g.

## PRESSURE DROP CONVERSION VELOCITY



## PERFORMANCE DATA



To determine static pressure drop through an open damper, enter the Pressure Drop chart from the left side. Given the CFM or air flow through the damper, follow the CFM line to the diagonal line with the damper size required, then down to the static pressure drop of the unit.

Example: The pressure drop of a 8" (203) damper with 700 CFM flow is .06 inches w.g.

Ratings are based on AMCA Standard 500 using test setup apparatus. Figure 5.3 (damper installed with upstream and downstream duct work).

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