



**COSMOS**<sup>®</sup>  
Air Distribution Products



**ADJUSTABLE  
GRILLS & REGISTERS**

**SELECTION PROCEDURE  
& SELECTION DATA**

## INTRODUCTION

### SINGLE DEFLECTION GRILLES



**Model AG-V**



**Model AG-H**

COSMOS single deflection grilles and registers are recommended for applications requiring pattern adjustment in a single horizontal or vertical plane.

COSMOS make model AG-V is a single deflection grille with vertical adjustable blades and generally used in a high side wall application where vertical blades will control the spread and throw distance of the air pattern to accommodate various layouts.

Model AG-H is also a single deflection grille with horizontal adjustable blades. Horizontal blades will control the rise and drop of the air pattern, typically cool air upwards along the ceiling.

Spacing between the blades is 20mm, thus maintains high effective area, which minimize outlet velocity, reduce pressure drop and assures quite operation.

COSMOS models AG-V-D and AG-H-D are single deflection grilles with integral damper. Dampers are opposed blade design with screwdriver slot operator.

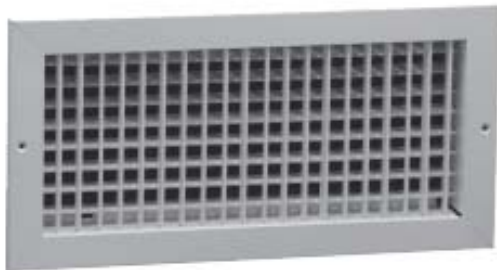
## FEATURES

- High quality, extruded aluminum construction.
- 32mm wide face border with a 27mm flange standard.
- Rigid, heavy gauge extruded frame with reinforced mitered corners.
- Streamline shape extruded blades on 20mm centers. Blades positively hold deflection setting under all conditions of velocity and pressure.
- Aluminum integral dampers are opposed blade design with screwdriver slot operator.
- Adjustable air pattern – Blades are friction pivoted and easily adjusted to provide desired spread or deflection.

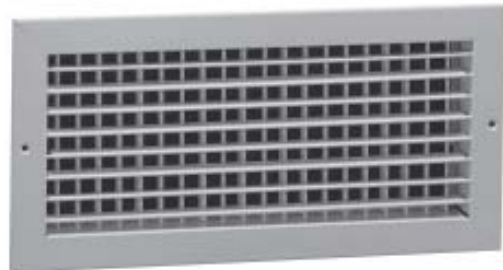
## FINISH

- Standard RAL 9016 powder coated. Collar damper in matt black shade. Other finishes available on request.

## DOUBLE DEFLECTION GRILLES



**Model AG-VH**



**Model AG-HV**

COSMOS double deflection grilles and registers are recommended for applications in systems requiring maximum flexibility.

Front set of blades has the greatest effect on the air pattern and therefore should be selected based on particular requirements.

COSMOS make model AG-VH is a double deflection grille with front vertical adjustable blades and rear horizontal blades. Vertical front blades will control the spread and throw distance of the air pattern to accommodate various layouts.

Model AG-HV is also a double deflection grille with front horizontal adjustable blades and rear vertical blades. Horizontal blades will control the rise and drop of the air pattern, typically cool air upwards along the ceiling.

Spacing between the blades is 20mm, thus maintains high effective area, which minimize outlet velocity, reduce pressure drop and assures quite operation.

COSMOS models AG-VH-D and AG-HV-D are double deflection grilles with integral damper. Dampers are opposed blade design with screwdriver slot operator.

## FEATURES

- High quality, extruded aluminum construction.
- 32mm wide face border with a 27mm flange standard.
- Rigid, heavy gauge extruded frame with reinforced mitered corners.
- Streamline shape extruded blades on 20mm centers. Blades positively hold deflection setting under all conditions of velocity and pressure.
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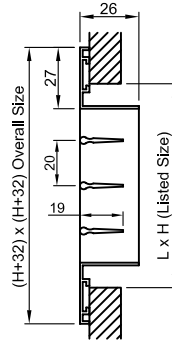
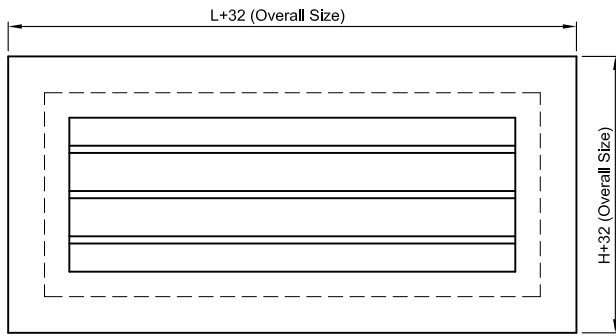
## FINISH

- Standard RAL 9016 powder coated. Collar damper in matt black shade. Other finishes available on request.

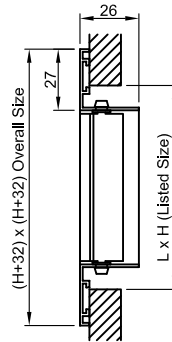
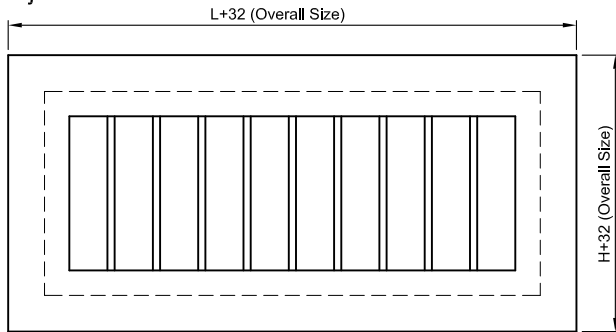
# Dimensional data

## ADJUSTABLE GRILLE

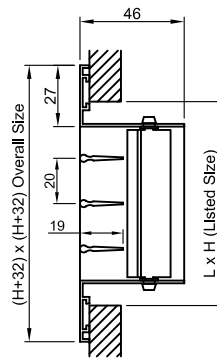
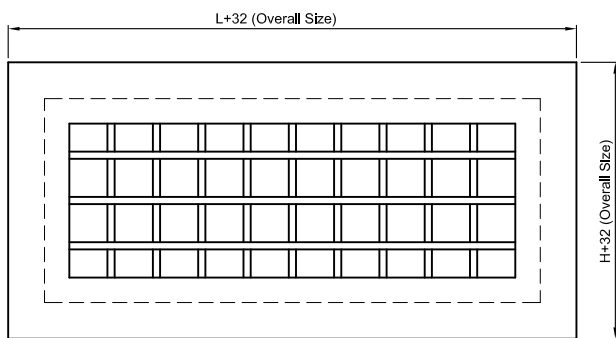
### Horizontal adjustable Louver



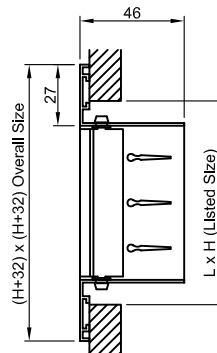
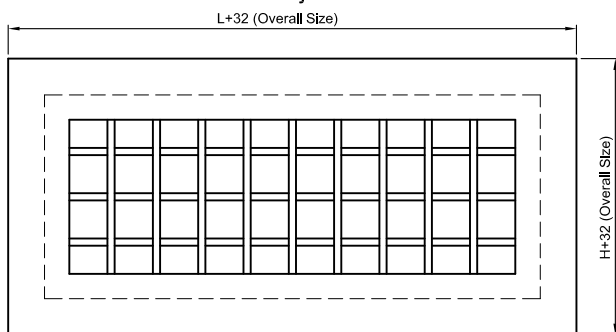
### Vertical adjustable Louver



### Horizontal Front & Vertical Rear adjustable Louver

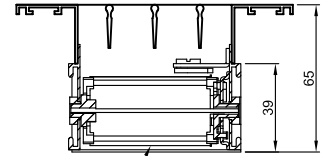


### Vertical Front & Horizontal Rear adjustable Louver

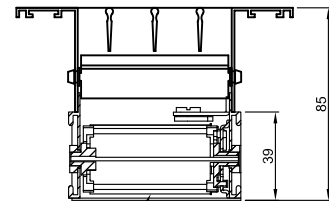


### Accessory

With attached Opposed blade damper



Opposed blade volume control damper



Opposed blade volume control damper

## SELECTION OF SUPPLY GRILLES AND REGISTERS

(See Table 6 for Models)

The following data are required for proper selection :

1. **CFM** : The air volume to be delivered to each space is calculated by the system designer and the cfm per grille/register is determined by the number of grilles which supply each space.
2. **NC level** : The permissible sound level in each space is specified by the consultant or determined by the designing engineer. Fig. 1 indicates the recommended NC levels for various applications.

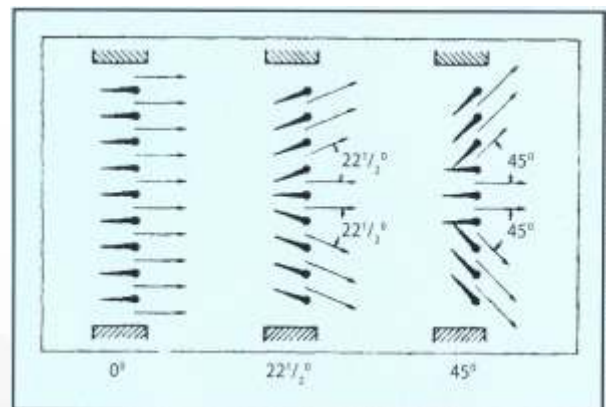
| NC Range   | Communication |           | Typical Application  |
|------------|---------------|-----------|--|
|            | Telephone     | Voice     |  |
| 20-25      | Excellent     | 30-50 Ft. | Concert Halls,<br>Sound Reproduction Studios                           |
| 25-30      | Excellent     | 20-40Ft.  | Board Rooms,<br>Conference Rooms                                       |
| 30-35      | Good          | 10-30 Ft. | Private Office,<br>Banquet Rooms,<br>Hospital Rooms,<br>Movie Theaters |
| 35-40      | Fair          | 6-12 Ft.  | Building Lobbies,<br>Restaurants,<br>General Offices                   |
| 40-45      | Fair          | 4-9 Ft.   | Halls and Corridors,<br>Cafeterias                                     |
| 45-50      | Poor          | 3-6 Ft.   | Department Stores<br>(Main Floor),<br>Restaurant Kitchens              |
| Over 50 NC | Very Poor     | 1-2 Ft.   | Manufacturing Areas  |

**Table 1 - Recommended NC Levels**

**3. Throw** : This is determined from a drawing of the space. Usually, the throw is the distance from the outlet to the opposite wall or to the meeting point of the air stream with air being delivered from another air outlet.

Other information to be kept in mind in selecting a grille/register is the required spread, drop and maximum pressure drop. The air stream should spread sufficiently so that the wall or space at the end of the throw is properly covered. The drop of the air stream should not be so great that it is within 5 feet of the floor. The pressure drop through the register should be within the overall design static pressure.

Table 1 lists the air volume, the static pressure drop and two values of throw for each grille area factor. The MINIMUM THROW is the distance the air will travel to a terminal velocity of 125 FPM and the MAXIMUM THROW is the distance the air will travel to a terminal velocity of 80 FPM. For each cfm and grille size, selection data are given at three spread angles - 0°, 22.5° and 45° - see Fig. 2. NC level is colour coded in 5 db increments for each cfm, spread angle and area factor in the table.



**Fig. 2 - Spread Angles**

The area factor shown at the top of each column is the key to actual grille size selection. The sizes shown are not the only ones which can be selected. Table 2 gives alternate sizes based on the area factor. Dampers in registers do not affect throw, spread and drop if the damper is wide open. However, the pressure drop and the sound level are affected by the damper and Table 3 shows the effect on these two characteristics. The NC level of a register is obtained by adding the "NC addition factor" to the NC level of the grille as selected from Table 1. Static pressure loss of the register is obtained by multiplying the grille static pressure by the "Ps multiplier" of the damper. Both these factors vary with the width of the grille.

**Example :** A register is to deliver 200 cfm. The throw requirement is 28 ft. The space is to be used as a general office, and a grille NC level of 35 is specified. Assume that a spread angle of 00 will be used.

**Solution :** Use Table 1. At 200 cfm and a 28 ft. throw, two grille selections seem reasonable. For the smaller of the two grilles, the area factor  $A_k$  equals 0.10. The maximum and minimum throws are 25 ft. and 39 ft., And the static pressure is 0.09. The NC level would be between 30 and 35. A typical grille size for this  $A_k$  is 8 x 4.

The other possibility gives an area factor,  $A_k$  of 0.15, throws of 20 to 32 ft., static pressure of 0.05 and NC between 20 and 25. A typical grille size for this  $A_k$  would be 10 x 4.

The larger grille  $A_k = 0.15$  would probably be the better selection for an office, since the maximum

listed throw is 32 ft. and the throw requirement is 28 ft.

Because a register was specified, the effects of dampers on performance shown in table 3 must be considered.

If a 10 x 4 size is chosen, the NC addition is 8 and the register NC would be between 28 and 33. The static pressure multiplier is 1.9 and the register static pressure is 0.10 ( $.05 \times 1.9 = 0.095$ )

Alternate size selections are also available. Table 2 on page 5 gives area factors based upon nominal grille width and height. In the example given above it will be noted that the actual area factors for the example sizes are :

10 x 4 -  $A_k$  equals 0.17 sq. ft.

8 x 5 -  $A_k$  equals 0.17 sq. ft.

Another size, a 6 x 6 having an  $A_k$  of 0.15 sq. ft. could also have been selected. In larger sizes a greater variety of grille dimensions can be chosen within a rather limited range of area factors.

## DROP

The drop of a cooled air stream is shown in Table 4. This is the vertical distance which the air will have dropped as it travels across the room and slows to a velocity of 50 ft. per min.

Note that, at a constant cfm, the drop increases as the grille area factor increases. This occurs because the air Velocity at the grille face decreases as the grille area increases. On the other hand, it must be

realized that the farther the air travels - the longer the throw - the greater the drop becomes. For this reason, drop increases as cfm is increased if the grille size and spread angle are kept constant

In the example given previously,  $A_k = 0.15$  and air volume is 200 cfm, the drop would be about 5.5 ft - unless the air were deflected upward at a 200 angle. The drop would then be about 2.5 ft. (see note 2 of Table 4). This should be a satisfactory application for a ceiling height of 9 to 10 ft and mounting height from 12 to 18 in. below the ceiling.

The spread angle setting affects all of the performance characteristics of a grille. The following general rules can be used to estimate the spread.

1. For  $0^\circ$  spread angle, the total spread of the air stream is one-third of the throw.
2. For  $22.5^\circ$  spread angle, the total spread of the air stream is about 45% of the throw.
3. For  $45^\circ$  spread angle, the total spread of the air stream is 1.5 times the throw.

These values are the total spread of the air stream, but they do not consider grille width which should be added to the spread estimated above.

### COMBINING SOUND SOURCES

Determining the sound level which results from the combined effects of several sound sources is not as difficult as it is confusing. The NC data for registers and grilles given in Table 1 contains an allowance for

the sound absorbing properties of the average room and its contents. This absorption is assumed to be 8 db with sound power level referred to 10 - 12 watt. (the absorption is 18 db referenced to 10 - 13 watt). For relatively small spaces - about 250 sq. ft. or less of floor area and ceiling height of 10 ft. or less - the following simplified method for estimating NC level produced by combinations of supply and return registers and grilles can be used :

1. Determine the difference in NC level between the grilles or registers having the highest NC and the second highest NC level.
2. From Table 5 determine the number of decibels to be added to the NC level of the grille having the highest NC level. This sum is the combined NC level generated by the two grilles or registers.
3. If three grilles serve the space, determine the difference between the combined NC level for the first two grilles and the NC level of the third grille. Determine the NC addition as above, and add this to the combined NC level of the first two units

If the difference between NC levels of two grilles is 10 db or more, the sound generated by the quieter grille will not affect the space NC.

**Example :** Two supply registers having an NC level of 30 and a return grille having an NC level of 35 serve a room. What is the combined NC level generated ?

**Solution :** The return has the highest NC level, 35 db. The second highest is one of the supply grilles at 30

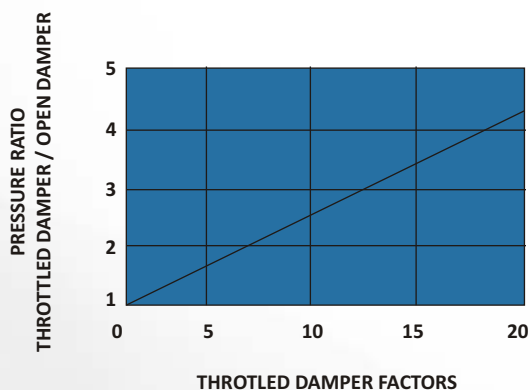


db. The difference between them is 5 db. From Table 5, the NC addition for a 5 db difference is about one. Adding this to the higher NC gives a combined NC of 36.

To take the second supply into consideration, follow the same procedure as above. The NC calculated above is 36. The NC of the supply is 30. The difference between them is 6. The NC addition for this difference is one and the combined effect of the two supply registers and the return grille is NC 37.

For larger spaces and specific room absorption conditions, calculation using sound power level data are required.

Closing the damper of a register does two things. It restricts the flow of air, thereby increasing the pressure drop and decreasing the cfm. In doing these things, the damper also generates sound - increases the NC level. Fig. 3 shows the db addition of throttled dampers.



**Fig 3 - NC addition to open damper  
sound ratings**

For example, a damper closed sufficiently to double the pressure loss of a register (pressure ratio of 2) causes an NC increase of about 7 db (As a rule of

thumb - and for general reference only - it can be assumed that closing an opposed blade damper to an effective ratio of 70 percent doubles the pressure loss of the damper outlet combination. Closing the damper to an effective opening ratio of fifty percent increases the pressure loss to 4 times the grille-open damper loss).

**TABLE 1 — SELECTION DATA**  
**(3/4-in. Adjustable Louvers on 3/4-in. Centres)**

| Area Factor   |                 | .05  |      |     | .10 |      |     | .15      |      |     | .20      |      |     | .25       |      |     | .30       |          |     |     |
|---------------|-----------------|------|------|-----|-----|------|-----|----------|------|-----|----------|------|-----|-----------|------|-----|-----------|----------|-----|-----|
| Typical Sizes |                 | 4x4  |      |     | 6x4 |      |     | 10x4 6x6 |      |     | 12x4 8x6 |      |     | 10x6 12x5 |      |     | 12x6 10x8 |          |     |     |
| Spread Angle  |                 | 0°   | 22½° | 45° | 0°  | 22½° | 45° | 0°       | 22½° | 45° | 0°       | 22½° | 45° | 0°        | 22½° | 45° | 0°        | 22½°     | 45° |     |
| CFM           |                 |      |      |     |     |      |     |          |      |     |          |      |     |           |      |     |           |          |     |     |
| 50            | Throw           | Min  | 9    | 6   | 5   | 6    | 4   | 3        | 5    | 4   | 3        |      |     |           |      |     |           |          |     |     |
|               | Ft.             | Max. | 14   | 10  | 7   | 10   | 7   | 5        | 8    | 6   | 4        |      |     |           |      |     |           |          |     |     |
|               | Static Pressure |      | .03  | .05 | .08 | -    | .01 | .02      | -    | -   | -        |      |     |           |      |     |           |          |     |     |
| 75            | Throw           | Min  | 13   | 9   | 7   | 9    | 7   | 5        | 8    | 5   | 4        | 7    | 5   | 4         | 6    | 4   | 3         |          |     |     |
|               | Ft.             | Max. | 21   | 15  | 11  | 15   | 10  | 8        | 12   | 8   | 6        | 10   | 7   | 6         | 9    | 7   | 5         |          |     |     |
|               | Static Pressure |      | .05  | .11 | .16 | .02  | .03 | .04      | -    | .01 | .02      | -    | -   | .01       | -    | -   | -         |          |     |     |
| 100           | Throw           | Min  | 17   | 13  | 9   | 12   | 9   | 7        | 10   | 7   | 6        | 9    | 6   | 5         | 8    | 6   | 4         | 7        | 5   | 4   |
|               | Ft.             | Max. | 27   | 20  | 15  | 19   | 14  | 10       | 16   | 11  | 8        | 14   | 10  | 7         | 12   | 9   | 7         | 11       | 8   | 6   |
|               | Static Pressure |      | .09  | .20 | .29 | .03  | .05 | .08      | .01  | .02 | .03      | -    | .01 | .02       | -    | -   | .01       | -        | -   | -   |
| 150           | Throw           | Min  |      |     |     | 19   | 13  | 10       | 15   | 11  | 8        | 13   | 9   | 7         | 12   | 8   | 6         | 11       | 8   | 6   |
|               | Ft.             | Max. |      |     |     | 28   | 20  | 15       | 24   | 17  | 13       | 21   | 15  | 11        | 18   | 13  | 10        | 17       | 12  | 9   |
|               | Static Pressure |      |      |     |     | .07  | .11 | .16      | .03  | .05 | .08      | .02  | .03 | .04       | .01  | .02 | .03       | -        | .01 | .02 |
| 200           | Throw           | Min  |      |     |     | 25   | 18  | 13       | 20   | 15  | 11       | 18   | 13  | 9         | 16   | 11  | 8         | 14       | 10  | 8   |
|               | Ft.             | Max. |      |     |     | 39   | 28  | 21       | 32   | 23  | 17       | 27   | 20  | 15        | 25   | 18  | 13        | 22       | 16  | 12  |
|               | Static Pressure |      |      |     |     | .09  | .20 | .29      | .05  | .03 | .13      | .03  | .05 | .08       | .02  | .03 | .05       | .01      | .02 | .04 |
| 250           | Throw           | Min  |      |     |     |      |     |          | 25   | 18  | 14       | 22   | 16  | 12        | 20   | 14  | 11        | 18       | 13  | 10  |
|               | Ft.             | Max. |      |     |     |      |     |          | 39   | 28  | 21       | 34   | 25  | 18        | 31   | 22  | 17        | 28       | 20  | 15  |
|               | Static Pressure |      |      |     |     |      |     |          | .06  | .13 | .20      | .04  | .08 | .11       | .03  | .05 | .08       | .02      | .04 | .05 |
| 300           | Throw           | Min  |      |     |     |      |     |          |      |     |          | 26   | 19  | 14        | 24   | 17  | 13        | 21       | 15  | 12  |
|               | Ft.             | Max. |      |     |     |      |     |          |      |     |          | 41   | 30  | 22        | 37   | 26  | 20        | 34       | 24  | 18  |
|               | Static Pressure |      |      |     |     |      |     |          |      |     |          | .07  | .11 | .16       | .04  | .07 | .10       | .03      | .05 | .08 |
| 350           | Throw           | Min  |      |     |     |      |     |          |      |     |          | 31   | 22  | 17        | 27   | 20  | 13        | 25       | 18  | 14  |
|               | Ft.             | Max. |      |     |     |      |     |          |      |     |          | 48   | 35  | 26        | 43   | 31  | 23        | 39       | 28  | 21  |
|               | Static Pressure |      |      |     |     |      |     |          |      |     |          | .07  | .15 | .22       | .05  | .10 | .14       | .04      | .07 | .10 |
| 400           | Throw           | Min  |      |     |     |      |     |          |      |     |          |      |     |           |      |     | 28        | 20       | 16  |     |
|               | Ft.             | Max. |      |     |     |      |     |          |      |     |          |      |     |           |      |     | 45        | 32       | 24  |     |
|               | Static Pressure |      |      |     |     |      |     |          |      |     |          |      |     |           |      |     |           | .04      | .09 | .13 |
| 450           | Throw           | Min  |      |     |     |      |     |          |      |     |          |      |     |           |      |     | 32        | 23       | 17  |     |
|               | Ft.             | Max. |      |     |     |      |     |          |      |     |          |      |     |           |      |     | 50        | 36       | 17  |     |
|               | Static Pressure |      |      |     |     |      |     |          |      |     |          |      |     |           |      |     |           | .07      | .11 | .16 |
| 500           | Throw           | Min  |      |     |     |      |     |          |      |     |          |      |     |           |      |     |           |          |     |     |
|               | Ft.             | Max. |      |     |     |      |     |          |      |     |          |      |     |           |      |     |           |          |     |     |
|               | Static Pressure |      |      |     |     |      |     |          |      |     |          |      |     |           |      |     |           |          |     |     |
| 600           | Throw           | Min  |      |     |     |      |     |          |      |     |          |      |     |           |      |     |           |          |     |     |
|               | Ft.             | Max. |      |     |     |      |     |          |      |     |          |      |     |           |      |     |           |          |     |     |
|               | Static Pressure |      |      |     |     |      |     |          |      |     |          |      |     |           |      |     |           |          |     |     |
| 700           | Throw           | Min  |      |     |     |      |     |          |      |     |          |      |     |           |      |     |           |          |     |     |
|               | Ft.             | Max. |      |     |     |      |     |          |      |     |          |      |     |           |      |     |           |          |     |     |
|               | Static Pressure |      |      |     |     |      |     |          |      |     |          |      |     |           |      |     |           |          |     |     |
| 800           | Throw           | Min  |      |     |     |      |     |          |      |     |          |      |     |           |      |     |           |          |     |     |
|               | Ft.             | Max. |      |     |     |      |     |          |      |     |          |      |     |           |      |     |           |          |     |     |
|               | Static Pressure |      |      |     |     |      |     |          |      |     |          |      |     |           |      |     |           |          |     |     |
| 900           | Throw           | Min  |      |     |     |      |     |          |      |     |          |      |     |           |      |     |           |          |     |     |
|               | Ft.             | Max. |      |     |     |      |     |          |      |     |          |      |     |           |      |     |           |          |     |     |
|               | Static Pressure |      |      |     |     |      |     |          |      |     |          |      |     |           |      |     |           |          |     |     |
| 1000          | Throw           | Min  |      |     |     |      |     |          |      |     |          |      |     |           |      |     | NC        | below 20 |     |     |
|               | Ft.             | Max. |      |     |     |      |     |          |      |     |          |      |     |           |      |     | NC        | 20 to 25 |     |     |
|               | Static Pressure |      |      |     |     |      |     |          |      |     |          |      |     |           |      |     |           |          |     |     |
| 1200          | Throw           | Min  |      |     |     |      |     |          |      |     |          |      |     |           |      |     | NC        | 25 to 30 |     |     |
|               | Ft.             | Max. |      |     |     |      |     |          |      |     |          |      |     |           |      |     | NC        | 30 to 35 |     |     |
|               | Static Pressure |      |      |     |     |      |     |          |      |     |          |      |     |           |      |     |           |          |     |     |
| 1400          | Throw           | Min  |      |     |     |      |     |          |      |     |          |      |     |           |      |     | NC        | 35 to 40 |     |     |
|               | Ft.             | Max. |      |     |     |      |     |          |      |     |          |      |     |           |      |     | NC        | 40 to 45 |     |     |
|               | Static Pressure |      |      |     |     |      |     |          |      |     |          |      |     |           |      |     |           |          |     |     |

Minimum Throw at Vt=125 fpm

Maximum Throw at Vt=80 fpm

TABLE 1 — SELECTION DATA

(3/4-in. Adjustable Louvers on 3/4-in. Centres)

| .40  |      |      | .50  |      |       | .60  |       |      | .70   |      |       | .80  |       |     | .90 |      |     | 1.00 |      |     |  |      |
|------|------|------|------|------|-------|------|-------|------|-------|------|-------|------|-------|-----|-----|------|-----|------|------|-----|--|------|
| 12x8 | 16x6 | 20x6 | 14x8 | 16x8 | 12x12 | 20x8 | 16x10 | 30x6 | 14x12 | 24x8 | 16x12 | 28x8 | 18x12 |     |     |      |     |      |      |     |  |      |
| 0°   | 22½° | 45°  | 0°   | 22½° | 45°   | 0°   | 22½°  | 45°  | 0°    | 22½° | 45°   | 0°   | 22½°  | 45° | 0°  | 22½° | 45° | 0°   | 22½° | 45° |  |      |
|      |      |      |      |      |       |      |       |      |       |      |       |      |       |     |     |      |     |      |      |     |  | CFM  |
|      |      |      |      |      |       |      |       |      |       |      |       |      |       |     |     |      |     |      |      |     |  |      |
|      |      |      |      |      |       |      |       |      |       |      |       |      |       |     |     |      |     |      |      |     |  | 50   |
|      |      |      |      |      |       |      |       |      |       |      |       |      |       |     |     |      |     |      |      |     |  |      |
|      |      |      |      |      |       |      |       |      |       |      |       |      |       |     |     |      |     |      |      |     |  | 75   |
|      |      |      |      |      |       |      |       |      |       |      |       |      |       |     |     |      |     |      |      |     |  |      |
|      |      |      |      |      |       |      |       |      |       |      |       |      |       |     |     |      |     |      |      |     |  | 100  |
|      |      |      |      |      |       |      |       |      |       |      |       |      |       |     |     |      |     |      |      |     |  |      |
|      |      |      |      |      |       |      |       |      |       |      |       |      |       |     |     |      |     |      |      |     |  |      |
| 9    | 7    | 5    | 8    | 6    | 5     |      |       |      |       |      |       |      |       |     |     |      |     |      |      |     |  |      |
| 15   | 10   | 8    | 13   | 9    | 7     |      |       |      |       |      |       |      |       |     |     |      |     |      |      |     |  | 150  |
| -    | -    | .01  | -    | -    | -     |      |       |      |       |      |       |      |       |     |     |      |     |      |      |     |  |      |
| 12   | 9    | 7    | 11   | 8    | 6     | 10   | 7     | 5    |       |      |       |      |       |     |     |      |     |      |      |     |  |      |
| 19   | 14   | 10   | 17   | 12   | 9     | 16   | 11    | 9    |       |      |       |      |       |     |     |      |     |      |      |     |  | 200  |
| -    | .01  | .02  | -    | -    | .01   | -    | -     | -    |       |      |       |      |       |     |     |      |     |      |      |     |  |      |
| 16   | 11   | 8    | 14   | 10   | 7     | 13   | 9     | 7    | 12    | 8    | 6     | 11   | 8     | 6   |     |      |     |      |      |     |  |      |
| 24   | 17   | 13   | 22   | 16   | 12    | 20   | 14    | 11   | 18    | 13   | 10    | 17   | 13    | 9   |     |      |     |      |      |     |  | 250  |
| .01  | .02  | .03  | -    | .01  | .02   | -    | -     | .01  | -     | -    | .01   | -    | -     | -   |     |      |     |      |      |     |  |      |
| 19   | 13   | 10   | 17   | 12   | 9     | 15   | 11    | 8    | 14    | 10   | 8     | 13   | 9     | 7   | 12  | 9    | 7   | 12   | 8    | 6   |  |      |
| 29   | 21   | 16   | 26   | 19   | 14    | 24   | 17    | 13   | 22    | 16   | 12    | 21   | 15    | 11  | 19  | 14   | 10  | 18   | 13   | 10  |  | 300  |
| .02  | .03  | .04  | .01  | .02  | .03   | -    | .01   | .02  | -     | .01  | .02   | -    | -     | .01 | -   | -    | -   | -    | -    | -   |  |      |
| 22   | 16   | 12   | 19   | 14   | 10    | 18   | 13    | 10   | 16    | 12   | 9     | 15   | 11    | 8   | 15  | 10   | 8   | 14   | 10   | 7   |  |      |
| 34   | 24   | 18   | 30   | 22   | 16    | 28   | 20    | 15   | 26    | 18   | 14    | 24   | 17    | 13  | 23  | 16   | 12  | 22   | 15   | 12  |  | 350  |
| .02  | .04  | .06  | .02  | .02  | .04   | .01  | .02   | .03  | -     | .01  | .02   | -    | .01   | .02 | -   | -    | .01 | -    | -    | .01 |  |      |
| 25   | 18   | 13   | 22   | 16   | 12    | 20   | 15    | 11   | 19    | 13   | 10    | 18   | 13    | 9   | 17  | 12   | 9   | 16   | 11   | 8   |  |      |
| 39   | 28   | 21   | 35   | 25   | 19    | 32   | 23    | 17   | 29    | 21   | 16    | 27   | 20    | 15  | 26  | 19   | 14  | 25   | 18   | 13  |  | 400  |
| .03  | .05  | .08  | .02  | .03  | .05   | .01  | .02   | .04  | .01   | .02  | .03   | -    | .01   | .02 | -   | .01  | .02 | -    | -    | .01 |  |      |
| 28   | 20   | 13   | 25   | 18   | 13    | 23   | 16    | 12   | 21    | 15   | 11    | 20   | 14    | 11  | 19  | 13   | 10  | 18   | 13   | 10  |  |      |
| 44   | 31   | 24   | 39   | 28   | 21    | 36   | 26    | 19   | 33    | 24   | 18    | 31   | 22    | 17  | 29  | 21   | 16  | 28   | 20   | 15  |  | 450  |
| .03  | .06  | .08  | .02  | .04  | .06   | .02  | .03   | .04  | .01   | .02  | .03   | -    | .02   | .03 | -   | .01  | .02 | -    | .01  | .02 |  |      |
| 31   | 22   | 17   | 28   | 20   | 15    | 25   | 18    | 14   | 23    | 17   | 13    | 22   | 16    | 12  | 21  | 15   | 11  | 20   | 14   | 11  |  |      |
| 48   | 35   | 26   | 43   | 31   | 23    | 40   | 29    | 21   | 37    | 26   | 20    | 34   | 25    | 18  | 32  | 23   | 17  | 31   | 22   | 17  |  | 500  |
| .04  | .08  | .11  | .03  | .05  | .08   | .02  | .04   | .05  | .02   | .03  | .04   | .01  | .02   | .03 | .01 | .02  | .03 | -    | .01  | .02 |  |      |
| 37   | 27   | 20   | 33   | 24   | 18    | 30   | 22    | 16   | 28    | 20   | 15    | 26   | 19    | 14  | 25  | 18   | 13  | 24   | 17   | 13  |  |      |
| 58   | 42   | 31   | 52   | 37   | 26    | 48   | 34    | 26   | 44    | 32   | 24    | 41   | 30    | 22  | 39  | 28   | 21  | 37   | 26   | 20  |  | 600  |
| .06  | .11  | .16  | .04  | .07  | .10   | .03  | .05   | .08  | .02   | .04  | .06   | .02  | .03   | .04 | .01 | .02  | .04 | .01  | .02  | .03 |  |      |
|      |      |      | 39   | 28   | 21    | 36   | 26    | 10   | 33    | 24   | 18    | 31   | 22    | 17  | 29  | 21   | 16  | 27   | 20   | 15  |  |      |
|      |      |      | 61   | 44   | 33    | 55   | 40    | 30   | 51    | 37   | 28    | 48   | 34    | 26  | 45  | 33   | 24  | 43   | 31   | 23  |  | 700  |
|      |      |      | .05  | .10  | .14   | .04  | .07   | .10  | .03   | .05  | .08   | .02  | .04   | .06 | .02 | .03  | .05 | .02  | .03  | .04 |  |      |
|      |      |      |      |      |       | 41   | 29    | 22   | 38    | 27   | 20    | 35   | 25    | 19  | 33  | 24   | 18  | 31   | 23   | 17  |  |      |
|      |      |      |      |      |       | 63   | 45    | 34   | 58    | 42   | 32    | 55   | 39    | 30  | 51  | 37   | 28  | 49   | 35   | 26  |  | 800  |
|      |      |      |      |      |       | .05  | .09   | .13  | .03   | .06  | .10   | .03  | .05   | .08 | .02 | .04  | .06 | .02  | .03  | .05 |  |      |
|      |      |      |      |      |       | 46   | 33    | 25   | 42    | 30   | 23    | 39   | 28    | 21  | 37  | 27   | 20  | 35   | 25   | 19  |  |      |
|      |      |      |      |      |       | 72   | 51    | 39   | 66    | 48   | 36    | 62   | 44    | 33  | 58  | 42   | 31  | 55   | 40   | 30  |  | 900  |
|      |      |      |      |      |       | .06  | .13   | .16  | .04   | .08  | .12   | .03  | .06   | .10 | .03 | .05  | .08 | .02  | .04  | .06 |  |      |
|      |      |      |      |      |       |      |       |      | 47    | 34   | 25    | 44   | 32    | 23  | 41  | 30   | 22  | 39   | 28   | 21  |  |      |
|      |      |      |      |      |       |      |       |      | 74    | 53   | 40    | 68   | 49    | 37  | 65  | 47   | 35  | 61   | 44   | 33  |  | 1000 |
|      |      |      |      |      |       |      |       |      | .05   | .10  | .15   | .04  | .08   | .11 | .03 | .06  | .09 | .03  | .05  | .08 |  |      |
|      |      |      |      |      |       |      |       |      |       |      |       | 53   | 38    | 28  | 50  | 36   | 27  | 47   | 34   | 25  |  |      |
|      |      |      |      |      |       |      |       |      |       |      |       | 32   | 59    | 44  | 77  | 56   | 42  | 74   | 53   | 40  |  | 1200 |
|      |      |      |      |      |       |      |       |      |       |      |       | .06  | .11   | .16 | .05 | .09  | .13 | .04  | .07  | .10 |  |      |
|      |      |      |      |      |       |      |       |      |       |      |       |      |       |     |     |      |     | 55   | 40   | 30  |  |      |
|      |      |      |      |      |       |      |       |      |       |      |       |      |       |     |     |      |     | 86   | 62   | 46  |  | 1400 |
|      |      |      |      |      |       |      |       |      |       |      |       |      |       |     |     |      |     | .05  | .10  | .14 |  |      |

Minimum Throw at Vt=125 fpm

Maximum Throw at Vt=80 fpm



**TABLE 1 — SELECTION DATA**

**(3/4-in. Adjustable Louvers on 3/4-in. Centres)**

| 5.0         |          |     | 6.0         |      |     | 8.0         |      |     | 10.0  |      |     | 12.0        |      |     | 14.0  |      |     | 15.0  |      |     |       |
|-------------|----------|-----|-------------|------|-----|-------------|------|-----|-------|------|-----|-------------|------|-----|-------|------|-----|-------|------|-----|-------|
| 56x18 40x26 |          |     | 60x20 52x24 |      |     | 60x28 44x36 |      |     | 56x36 |      |     | 60x40 52x44 |      |     | 56x48 |      |     | 60x48 |      |     |       |
| 0°          | 22½°     | 45° | 0°          | 22½° | 45° | 0°          | 22½° | 45° | 0°    | 22½° | 45° | 0°          | 22½° | 45° | 0°    | 22½° | 45° | 0°    | 22½° | 45° | CFM   |
| NC          | below 20 |     |             |      |     |             |      |     |       |      |     |             |      |     |       |      |     |       |      |     | 400   |
| NC          | 20 to 25 |     |             |      |     |             |      |     |       |      |     |             |      |     |       |      |     |       |      |     | 450   |
| NC          | 25 to 30 |     |             |      |     |             |      |     |       |      |     |             |      |     |       |      |     |       |      |     | 500   |
| NC          | 30 to 35 |     |             |      |     |             |      |     |       |      |     |             |      |     |       |      |     |       |      |     | 600   |
| NC          | 35 to 40 |     |             |      |     |             |      |     |       |      |     |             |      |     |       |      |     |       |      |     | 700   |
|             |          |     |             |      |     |             |      |     |       |      |     |             |      |     |       |      |     |       |      |     | 800   |
|             |          |     |             |      |     |             |      |     |       |      |     |             |      |     |       |      |     |       |      |     | 900   |
|             |          |     |             |      |     |             |      |     |       |      |     |             |      |     |       |      |     |       |      |     | 1000  |
|             |          |     |             |      |     |             |      |     |       |      |     |             |      |     |       |      |     |       |      |     | 1200  |
|             |          |     |             |      |     |             |      |     |       |      |     |             |      |     |       |      |     |       |      |     | 1400  |
| 28          | 20       | 15  |             |      |     |             |      |     |       |      |     |             |      |     |       |      |     |       |      |     |       |
| 44          | 32       | 24  |             |      |     |             |      |     |       |      |     |             |      |     |       |      |     |       |      |     | 1600  |
| -           | -        | -   |             |      |     |             |      |     |       |      |     |             |      |     |       |      |     |       |      |     |       |
| 32          | 23       | 17  | 29          | 21   | 16  |             |      |     |       |      |     |             |      |     |       |      |     |       |      |     |       |
| 50          | 36       | 27  | 45          | 32   | 24  |             |      |     |       |      |     |             |      |     |       |      |     |       |      |     | 1800  |
| -           | -        | .01 | -           | -    | -   |             |      |     |       |      |     |             |      |     |       |      |     |       |      |     |       |
| 35          | 25       | 19  | 32          | 23   | 17  |             |      |     |       |      |     |             |      |     |       |      |     |       |      |     |       |
| 55          | 40       | 30  | 50          | 36   | 27  |             |      |     |       |      |     |             |      |     |       |      |     |       |      |     | 2000  |
| -           | -        | .01 | -           | -    | -   |             |      |     |       |      |     |             |      |     |       |      |     |       |      |     |       |
| 44          | 32       | 24  | 40          | 29   | 22  | 35          | 25   | 19  |       |      |     |             |      |     |       |      |     |       |      |     |       |
| 69          | 49       | 37  | 63          | 45   | 34  | 54          | 39   | 29  |       |      |     |             |      |     |       |      |     |       |      |     | 2500  |
| -           | .01      | .02 | -           | -    | .01 | -           | -    | -   |       |      |     |             |      |     |       |      |     |       |      |     |       |
| 53          | 38       | 29  | 48          | 35   | 26  | 42          | 30   | 23  | 37    | 27   | 20  |             |      |     |       |      |     |       |      |     |       |
| 83          | 59       | 45  | 75          | 54   | 41  | 65          | 47   | 35  | 58    | 42   | 31  |             |      |     |       |      |     |       |      |     | 3000  |
| .01         | .02      | .03 | -           | .01  | .02 | -           | -    | .01 | -     | -    | -   |             |      |     |       |      |     |       |      |     |       |
| 62          | 45       | 33  | 56          | 40   | 30  | 49          | 35   | 26  | 43    | 31   | 23  |             |      |     |       |      |     |       |      |     |       |
| 96          | 69       | 52  | 88          | 63   | 47  | 76          | 55   | 41  | 68    | 49   | 37  |             |      |     |       |      |     |       |      |     | 3500  |
| .02         | .03      | .04 | .01         | .02  | .03 | -           | -    | .02 | -     | -    | .01 |             |      |     |       |      |     |       |      |     |       |
| 70          | 51       | 38  | 64          | 46   | 35  | 56          | 40   | 30  | 50    | 36   | 27  | 45          | 33   | 25  |       |      |     |       |      |     |       |
| 110         | 79       | 59  | 100         | 72   | 54  | 87          | 63   | 47  | 78    | 56   | 42  | 71          | 51   | 38  |       |      |     |       |      |     | 4000  |
| .02         | .03      | .05 | .01         | .02  | .04 | -           | .01  | .02 | -     | -    | .01 | -           | -    | -   |       |      |     |       |      |     |       |
| 79          | 57       | 43  | 72          | 52   | 39  | 63          | 45   | 34  | 56    | 40   | 30  | 51          | 37   | 28  | 47    | 34   | 25  | 46    | 33   | 25  |       |
| 124         | 89       | 67  | 113         | 81   | 61  | 98          | 71   | 53  | 87    | 63   | 47  | 80          | 57   | 43  | 71    | 53   | 40  | 71    | 51   | 38  | 4500  |
| .02         | .04      | .07 | .02         | .03  | .04 | -           | .02  | .03 | -     | -    | .02 | -           | -    | .01 | -     | -    | -   | -     | -    | -   |       |
| 88          | 63       | 48  | 80          | 58   | 43  | 70          | 50   | 38  | 62    | 45   | 33  | 57          | 41   | 31  | 52    | 38   | 28  | 51    | 37   | 27  |       |
| 138         | 99       | 75  | 125         | 90   | 68  | 109         | 79   | 59  | 97    | 70   | 52  | 88          | 64   | 48  | 82    | 59   | 44  | 79    | 57   | 43  | 5000  |
| .03         | .05      | .08 | .02         | .04  | .05 | .01         | .02  | .03 | -     | .01  | .02 | -           | -    | .01 | -     | -    | .01 | -     | -    | -   |       |
| 106         | 76       | 57  | 96          | 69   | 52  | 83          | 60   | 45  | 74    | 54   | 40  | 68          | 49   | 37  | 63    | 45   | 34  | 61    | 44   | 33  |       |
| 165         | 119      | 89  | 150         | 108  | 81  | 130         | 94   | 70  | 116   | 84   | 63  | 106         | 76   | 57  | 98    | 71   | 53  | 95    | 68   | 51  | 6000  |
| .03         | .07      | .10 | .03         | .05  | .08 | .02         | .03  | .04 | .01   | .02  | .03 | -           | .02  | .02 | -     | -    | .02 | -     | -    | .01 |       |
| 123         | 89       | 66  | 113         | 81   | 61  | 97          | 70   | 53  | 87    | 63   | 47  | 80          | 57   | 43  | 73    | 53   | 40  | 71    | 51   | 38  |       |
| 193         | 139      | 105 | 175         | 126  | 95  | 157         | 109  | 82  | 136   | 98   | 74  | 124         | 89   | 67  | 114   | 82   | 62  | 111   | 80   | 60  | 7000  |
| .05         | .10      | .14 | .05         | .07  | .10 | .02         | .04  | .06 | .02   | .03  | .04 | .01         | .02  | .03 | -     | .02  | .02 | -     | -    | .01 |       |
|             |          |     | 28          | 92   | 69  | 111         | 80   | 60  | 99    | 72   | 54  | 91          | 65   | 49  | 84    | 60   | 45  | 81    | 58   | 44  |       |
|             |          |     | 199         | 144  | 108 | 174         | 125  | 94  | 155   | 112  | 84  | 142         | 102  | 77  | 131   | 94   | 71  | 127   | 91   | 69  | 8000  |
|             |          |     | .05         | .09  | .13 | .03         | .05  | .08 | .02   | .03  | .05 | .02         | .03  | .04 | .01   | .02  | .03 |       |      |     | .02   |
|             |          |     | 144         | 104  | 78  | 125         | 90   | 68  | 112   | 81   | 61  | 102         | 73   | 55  | 94    | 68   | 51  | 91    | 66   | 49  |       |
|             |          |     | 226         | 162  | 122 | 196         | 141  | 106 | 175   | 126  | 95  | 159         | 115  | 86  | 147   | 106  | 80  | 143   | 103  | 77  | 9000  |
|             |          |     | .06         | .11  | .16 | .03         | .06  | .10 | .03   | .04  | .06 | .02         | .03  | .04 | .01   | .02  | .03 | .01   | .02  | .03 |       |
|             |          |     | 161         | 116  | 87  | 139         | 100  | 75  | 124   | 89   | 67  | 113         | 81   | 61  | 105   | 76   | 57  | 101   | 73   | 55  |       |
|             |          |     | 250         | 180  | 135 | 217         | 156  | 117 | 194   | 140  | 105 | 177         | 127  | 96  | 164   | 118  | 89  | 159   | 114  | 86  | 10000 |
|             |          |     | .07         | .14  | .20 | .04         | .08  | .10 | .03   | .05  | .07 | .02         | .04  | .05 | .02   | .02  | .04 | .01   | .02  | .03 |       |

Minimum Throw at Vt=125 fpm

Maximum Throw at Vt=80 fpm

**TABLE 2 — AREA FACTORS,  $A_v$ , FOR SELECTION OF  
SUPPLY REGISTERS AND GRILLES — ¾ -IN. LOUVRES**

| Grille<br>Width in. | Grille Height, in. |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |       |       |       |
|---------------------|--------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|
|                     | 4                  | 5    | 6    | 8    | 10   | 12   | 14   | 16   | 18   | 20   | 22   | 24   | 26   | 28   | 30   | 36    | 40    | 44    | 48    |
| 4                   | .06                |      |      |      |      |      |      |      |      |      |      |      |      |      |      |       |       |       |       |
| 5                   | .08                | .10  |      |      |      |      |      |      |      |      |      |      |      |      |      |       |       |       |       |
| 6                   | .09                | .12  | .15  |      |      |      |      |      |      |      |      |      |      |      |      |       |       |       |       |
| 8                   | .13                | .17  | .21  | .29  |      |      |      |      |      |      |      |      |      |      |      |       |       |       |       |
| 10                  | .17                | .21  | .26  | .36  | .46  |      |      |      |      |      |      |      |      |      |      |       |       |       |       |
| 12                  | .20                | .26  | .32  | .44  | .56  | .68  |      |      |      |      |      |      |      |      |      |       |       |       |       |
| 14                  | .24                | .31  | .38  | .52  | .66  | .81  | .95  |      |      |      |      |      |      |      |      |       |       |       |       |
| 16                  | .27                | .35  | .44  | .60  | .76  | .93  | 1.10 | 1.25 |      |      |      |      |      |      |      |       |       |       |       |
| 18                  | .31                | .40  | .49  | .68  | .86  | 1.05 | 1.23 | 1.42 | 1.60 |      |      |      |      |      |      |       |       |       |       |
| 20                  | .34                | .45  | .55  | .76  | .96  | 1.17 | 1.37 | 1.60 | 1.80 | 2.00 |      |      |      |      |      |       |       |       |       |
| 22                  | .38                | .49  | .61  | .83  | 1.06 | 1.29 | 1.50 | 1.75 | 1.95 | 2.20 | 2.40 |      |      |      |      |       |       |       |       |
| 24                  | .41                | .54  | .66  | .91  | 1.16 | 1.41 | 1.65 | 1.90 | 2.15 | 2.40 | 2.65 | 2.90 |      |      |      |       |       |       |       |
| 26                  | .45                | .58  | .72  | .99  | 1.26 | 1.55 | 1.80 | 2.10 | 2.35 | 2.60 | 2.90 | 3.15 | 3.45 |      |      |       |       |       |       |
| 28                  | .50                | .63  | .78  | 1.07 | 1.36 | 1.65 | 1.95 | 2.25 | 2.55 | 2.80 | 3.10 | 3.40 | 3.70 | 4.00 |      |       |       |       |       |
| 30                  | .55                | .68  | .83  | 1.15 | 1.46 | 1.75 | 2.10 | 2.40 | 2.70 | 3.05 | 3.35 | 3.65 | 3.95 | 4.30 | 4.60 |       |       |       |       |
| 36                  | .65                | .85  | 1.00 | 1.38 | 1.75 | 2.15 | 2.50 | 2.90 | 3.25 | 3.65 | 4.00 | 4.40 | 4.80 | 5.20 | 5.50 | 6.70  |       |       |       |
| 40                  | .75                | .95  | 1.15 | 1.55 | 1.95 | 2.40 | 2.80 | 3.20 | 3.65 | 4.10 | 4.50 | 4.90 | 5.30 | 5.70 | 6.20 | 7.40  | 8.30  |       |       |
| 44                  | .80                | 1.05 | 1.25 | 1.70 | 2.10 | 2.60 | 3.10 | 3.55 | 4.05 | 4.50 | 5.00 | 5.40 | 5.90 | 6.30 | 6.80 | 8.20  | 9.10  | 9.70  |       |
| 48                  | .90                | 1.15 | 1.35 | 1.85 | 2.35 | 2.85 | 3.40 | 3.90 | 4.40 | 4.90 | 5.40 | 5.90 | 6.40 | 6.90 | 7.40 | 8.90  | 9.90  | 11.00 | 12.00 |
| 52                  | 1.00               | 1.20 | 1.50 | 2.05 | 2.55 | 3.05 | 3.60 | 4.15 | 4.70 | 5.30 | 5.80 | 6.40 | 6.90 | 7.40 | 7.90 | 9.70  | 10.80 | 12.00 | 13.00 |
| 56                  | 1.05               | 1.30 | 1.60 | 2.20 | 2.75 | 3.30 | 3.80 | 4.40 | 5.00 | 5.60 | 6.20 | 6.80 | 7.40 | 7.90 | 8.50 | 10.50 | 11.60 | 12.80 | 14.00 |
| 60                  | 1.10               | 1.40 | 1.70 | 2.35 | 2.95 | 3.55 | 4.00 | 4.70 | 5.40 | 6.00 | 6.60 | 7.30 | 7.90 | 8.40 | 9.10 | 11.20 | 12.50 | 13.70 | 15.00 |

**TABLE 3 — NC AND STATIC PRESSURE FACTORS FOR REGISTERS (Open Damper)**

| Grille Width      | 4   | 5   | 6-7 | 8-9 | 10-11 | 12-13 | 14-17 | 18-21 | 22-23 | 24-27 | 28-33 | 34-41 | 42-48 |
|-------------------|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| NC Addition (1)   | 12  | 11  | 10  | 9   | 8     | 7     | 6     | 5     | 5     | 4     | 4     | 4     | 3     |
| Ps Multiplier (2) | 2.5 | 2.4 | 2.2 | 2.0 | 1.9   | 1.8   | 1.7   | 1.6   | 1.5   | 1.5   | 1.4   | 1.3   | 1.2   |

**Notes :** (1) NC Addition plus Grille NC equals Register NC level.

(2)  $P_s$  Multiplier times Grille Static Pressure equals Register Static Pressure.

**TABLE 4 — DROP OF COOLED SUPPLY AIR**

**(Feet Below Bottom of Grille)**

| Area Factor  | .15  |         | .25  |     | .50  |      | 1.00 |     | 2.00 |     | 3.00 |     | 4.00 |     |
|--------------|------|---------|------|-----|------|------|------|-----|------|-----|------|-----|------|-----|
| Spread Angle | 0°   | 45°     | 0°   | 45° | 0°   | 45°  | 0°   | 45° | 0°   | 45° | 0°   | 45° | 0°   | 45° |
| CFM          |      |         |      |     |      |      |      |     |      |     |      |     |      |     |
| 75           | 4.0  | 2.0     | 4.5  | 2.5 | 5.0  | 2.5  |      |     |      |     |      |     |      |     |
| 100          | 4.5  | 2.0     | 5.0  | 2.5 | 5.5  | 2.5  | 6.0  | 3.0 |      |     |      |     |      |     |
| 150          | 5.0  | 2.5     | 5.5  | 2.5 | 6.0  | 3.0  | 6.5  | 3.0 |      |     |      |     |      |     |
| 200          | 5.5  | 2.5 6.0 | 3.0  | 6.5 | 3.5  | 7.5  | 3.5  | 8.0 | 4.0  |     |      |     |      |     |
| 300          | 6.5  | 3.0     | 7.5  | 3.5 | 8.5  | 4.0  | 9.0  | 4.5 | 10.0 | 5.0 |      |     |      |     |
| 500          | 8.5  | 4.0     | 9.5  | 4.5 | 10.5 | 5.0  | 11.0 | 5.5 | 12.0 | 5.5 |      |     |      |     |
| 700          | 9.5  | 4.5     | 10.5 | 5.0 | 11.5 | 5.5  | 12.5 | 6.0 | 13.0 | 6.5 |      |     |      |     |
| 1000         | 12.0 | 5.5     | 13.0 | 6.5 | 14.0 | 6.5  | 14.5 | 7.0 |      |     |      |     |      |     |
| 1500         | 13.0 | 6.5     | 15.0 | 7.0 | 15.5 | 7.5  | 16.5 | 8.0 |      |     |      |     |      |     |
| 2000         | 16.0 | 8.0     | 17.0 | 8.5 | 18.0 | 8.5  |      |     |      |     |      |     |      |     |
| 2500         | 17.0 | 8.5     | 18.0 | 9.0 | 19.0 | 9.5  |      |     |      |     |      |     |      |     |
| 3000         | 18.5 | 9.0     | 19.5 | 9.5 | 20.5 | 10.0 |      |     |      |     |      |     |      |     |

**Notes :** (1) For 22½° spread angle, drop is approximately 90 percent of drop at 0°.

(2) For 15° to 20° upward deflection use drop values for 45° spread.

(3) Values tabulated for 20 deg supply-to-room air temperature difference.

Increase drop by 20 percent for 25 deg supply-to-room air temperature difference.

**TABLE 5 — NC ADDITION FOR COMBINING EFFECTS OF SOUND SOURCES**

| Difference Between Two Levels To Be Combined                | 0 | 1  | 2 | 4  | 6 | 9 | 10 |
|---|---|----|---|----|---|---|----|
| Number To Be Added To Higher Level To Obtain Combined Level | 3 | 2½ | 2 | 1½ | 1 | ½ | 0  |

**TABLE 6 — MODEL NUMBERS**

| Model | Description  |
|-------|--|
| DHV   | Double deflection (Front horizontal / Rear vertical louvres) |
| DVH   | Double deflection (Front vertical / Rear horizontal louvres) |
| SH    | Single deflection (Horizontal louvres)                       |
| SV    | Single Deflection (Vertical louvres)                         |

Mfg. & Mkt. By:

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