HART COOLEY

Commercial

Grilles, Registers & Diffusers

Edition 10

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T-BAR GRILLES & DIFFUSERS

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T-BAR GRILLES & DIFFUSERS

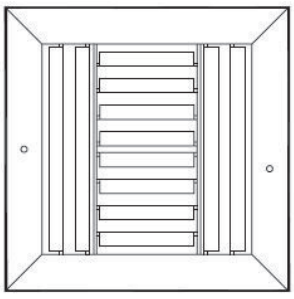
ENGINEERING DATA

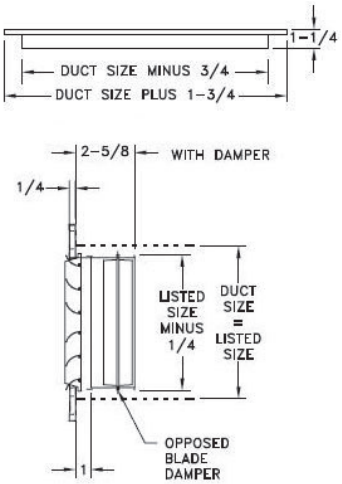
800 Series

- Steel construction
- Curved Blade design
- 1 - 4-way or 2-way corner air diffusion
- Available with or without damper
- Damper options: Multi-Shutter or Opposed Blade
- Individually adjustable bars for easy positive setting
- Opposed Blade damper is screwdriver operated
- Bright White finish

800 Series Available Sizes (in.)																
	WIDTH															
HT	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
18	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
20	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
24	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
26	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
28	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
30	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
32	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
34	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
36	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

x Available in one-way and 2-way only





- 811 one-way no damper
- 811MS one-way with multi-shutter damper
- 811OB one-way with opposed blade damper

- 812 two-way no damper
- 812MS two-way with multi-shutter damper
- 812OB two-way with opposed blade damper

- 812C two-way corner no damper
- 812CMS two-way corner with multi-shutter damper
- 812COB two-way corner with opposed blade damper

- 813 three-way no damper
- 813MS three-way with multi-shutter damper
- 813OB three-way with opposed blade damper

- 814 four-way no damper
- 814MS four-way with multi-shutter damper
- 814OB four-way with opposed blade damper

Registers & Grilles - Steel

821

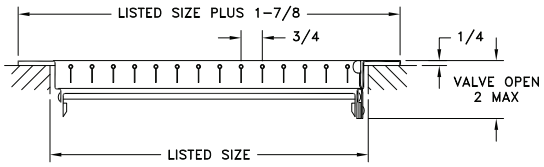
- All-steel construction
- Vertical adjustable face bars
- Horizontal multi-shutter valve
- Bright White finish

821 Available Sizes (in.)

HT	WIDTH										
	6	8	10	12	14	16	18	20	24	30	36
4	X	X	X	X	X	X	X	X	X	X	
5			X	X	X						
6	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X
16						X	X	X	X	X	
18							X	X	X	X	
20								X			
24									X		

Contact factory for sizes not listed.

Note: Screw hole location details on page 119



831

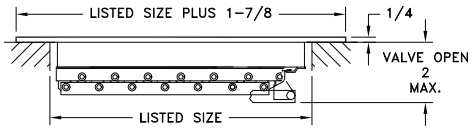
- All-steel construction
- Horizontal adjustable face bars
- Vertical valve
- Adjustable multi-shutter valve
- Bright White finish
- 3/4" fin spacing

831 Available Sizes (in.)

HT	WIDTH									
	8	10	12	14	16	20	24	30	32	36
4	X	X	X	X						
6	X	X	X	X	X	X	X	X		
8		X	X	X	X	X	X	X		
10			X			X	X			
12							X			X
14						X			X	

Contact factory for sizes not listed.

Note: Screw hole location details on page 119

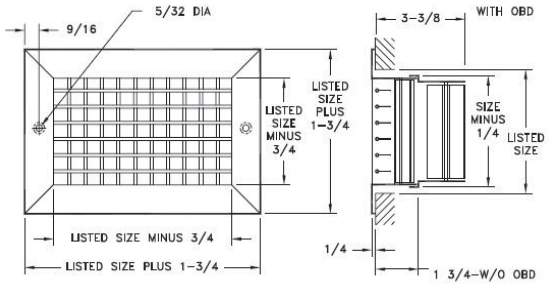


Engineering Data on Page 79-80

92HVO Register

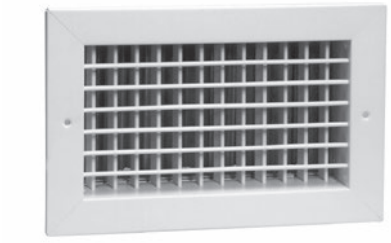
- All-steel construction
- Adjustable face bars may be set to any desired deflection
- Horizontal front bars
- Vertical second bars
- Larger sizes available in multiple-piece construction
- Bright White finish

Note: Screw hole location details on page 119



92HVO Available Sizes (in.)																
HT	WIDTH															
	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X
26											X	X	X	X	X	X
28												X	X	X	X	X
30													X	X	X	X
32														X	X	X
34															X	X
36																X

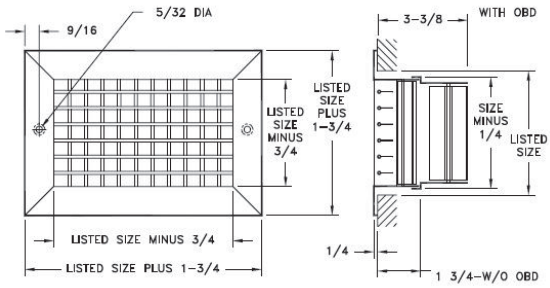
Contact factory for sizes not listed.



92HVV Register

- All-steel construction
- Horizontal front bars
- Vertical second bars
- Opposed-blade damper
- Adjustable face bars may be set to any desired deflection
- Larger sizes available in multiple-piece construction
- Bright White finish

Note: Screw hole location details on page 119

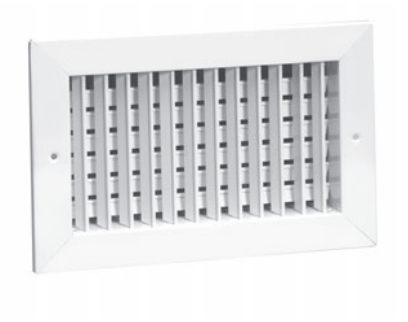


92HVV Available Sizes (in.)																
HT	WIDTH															
	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X
26											X	X	X	X	X	X
28												X	X	X	X	X
30													X	X	X	X
32														X	X	X
34															X	X
36																X

Contact factory for sizes not listed.

Engineering Data on Page 79-80

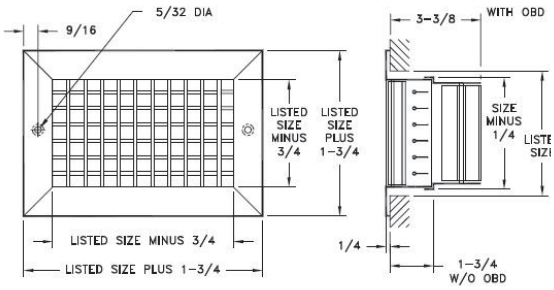
Registers & Grilles - Steel



92VHO Register

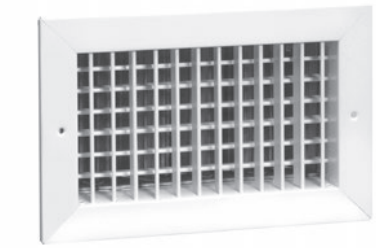
- All-steel construction
- Vertical front bars
- Horizontal second bars
- Adjustable face bars may be set to any desired deflection
- Larger sizes available in multiple-piece construction
- Bright White finish

Note: Screw hole location details on page 119



92VHO Available Sizes (in.)																
HT	WIDTH															
	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X
26											X	X	X	X	X	X
28												X	X	X	X	X
30													X	X	X	X
32														X	X	X
34															X	X
36																X

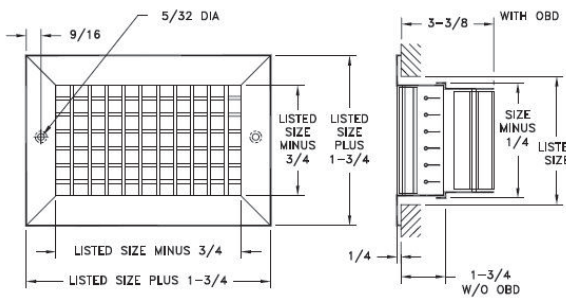
Contact factory for sizes not listed.



92VHV Register

- All-steel construction
- Vertical front bars
- Horizontal second bars
- Adjustable face bars may be set to any desired deflection
- Opposed-blade damper
- Larger sizes available in multiple-piece construction
- Bright White finish

Note: Screw hole location details on page 119



92VHV Available Sizes (in.)																
HT	WIDTH															
	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X
26											X	X	X	X	X	X
28												X	X	X	X	X
30													X	X	X	X
32														X	X	X
34															X	X
36																X

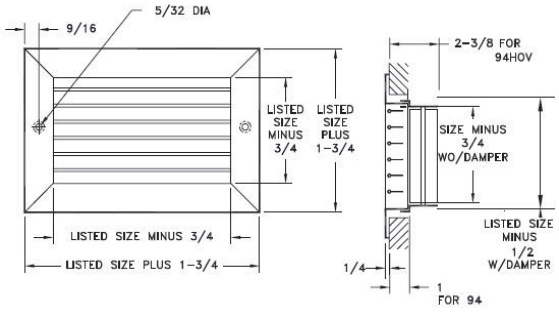
Contact factory for sizes not listed.

Engineering Data on Page 79-80

94 Grille

- All-steel construction
- Horizontal face bars set straight
- Face bars permanently fixed into a heavy steel frame at 90-degree angle from face
- Larger sizes available in multiple-piece construction
- Bright White finish

Note: Screw hole location details on page 119



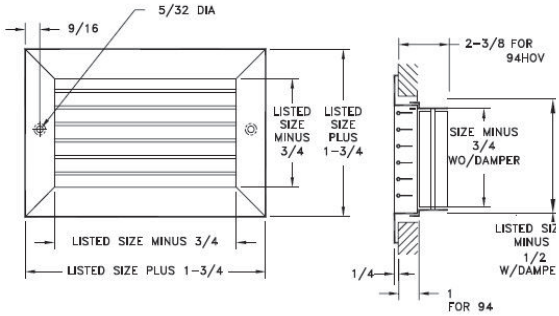
94 Available Sizes (in.)																
HT	WIDTH															
	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X
26											X	X	X	X	X	X
28												X	X	X	X	X
30													X	X	X	X
32														X	X	X
34															X	X
36																X

Contact factory for sizes not listed.

94HOV Register

- All-steel construction
- Horizontal face bars set straight
- Face bars permanently fixed into a heavy steel frame at 90-degree angle from face
- Opposed-blade damper
- Larger sizes available in multiple-piece construction
- Bright White finish

Note: Screw hole location details on page 119



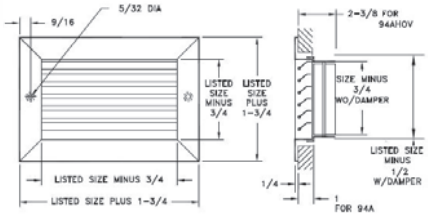
94HOV Available Sizes (in.)																
HT	WIDTH															
	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X
26											X	X	X	X	X	X
28												X	X	X	X	X
30													X	X	X	X
32														X	X	X
34															X	X
36																X

Contact factory for sizes not listed.

Engineering Data on Page 81

94A Grille (No Damper)

- All-steel construction
- 3/4" spaced fins set at 35°, horizontal face bars set at 35°
- Larger sizes available in multiple-piece construction
- Also available as 94AT T-Bar Return Grille (see page 57)
- Bright White finish



94A Available Sizes (in.)

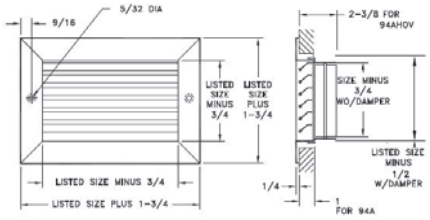
HT \ WIDTH	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X
26											X	X	X	X	X	X
28												X	X	X	X	X
30													X	X	X	X
32														X	X	X
34															X	X
36																X

Contact factory for sizes not listed.

Note: Screw hole location details on page 119

94AHOV Register

- All-steel construction
- 3/4" spaced fins set at 35°, horizontal face bars set at 35°
- Opposed-blade damper
- Larger sizes available in multiple-piece construction
- Bright White finish



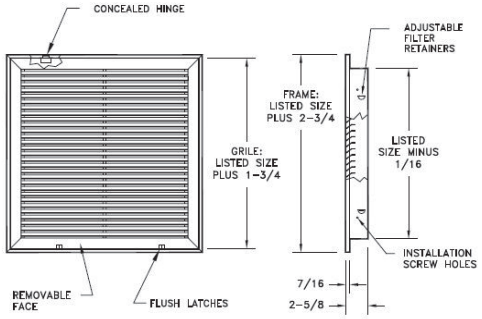
94AHOV Available Sizes (in.)

HT \ WIDTH	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X
26											X	X	X	X	X	X
28												X	X	X	X	X
30													X	X	X	X
32														X	X	X
34															X	X
36																X

Note: Screw hole location details on page 119

96AFB Fixed-Bar Filter Grille

- Steel construction
- Simplifies contractor installation
- Flush, removable face with concealed hinges
- Uses nominal 1" thick disposable filters (not included)
- 96AFB2 uses 2" thick disposable filters and is available by special order
- Equipped with adjustable filter retainers
- 3/4" spaced fins set at 35°
- Also available as 96AFBT T-Bar Fixed Bar Filter Grille (see page 54)
- Bright White finish

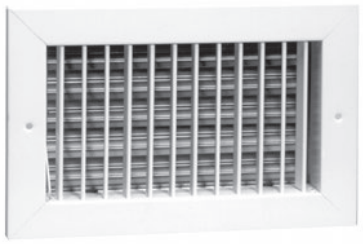


96AFB Standard Sizes (in.)

HT \ WIDTH	10	12	14	16	18	20	24	25	30	36
10						X	X		X	
12		X			X	X	X		X	
14			X			X	X	X	X	
16				X		X	X	X		
18					X	X	X		X	
20	X	X	X	X		X	X	X	X	
24		X	X		X		X		X	X
25			X	X		X		X		
30			X			X	X		X	X
36										X

Contact factory for sizes not listed.

Engineering Data on Page 81



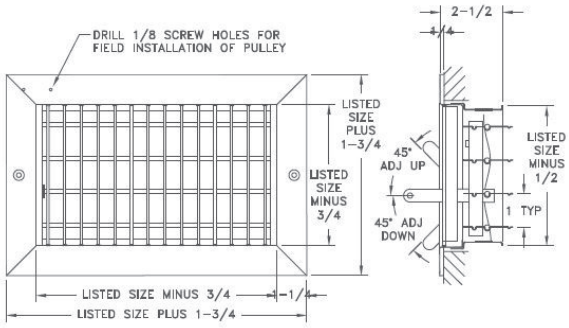
98VOH
Ventilation Register

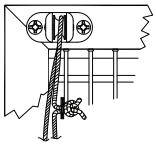
- Steel construction
- Front bars are individually adjustable
- Horizontal blades are gang-operated to deflect air up or down thru face (no shut-off)
- Handle manually operated
- Bright White finish

98VOHP
Ventilation Pulley Assembly

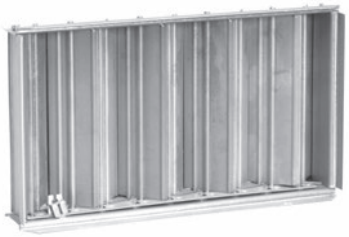
- Pulley field-mounted only
- Pulley assembly must be ordered separately
- Pulley operation allows air deflection adjustments from floor
- Two pulley assembly kits required for grilles over 24" wide

Note: Screw hole location details on page 119





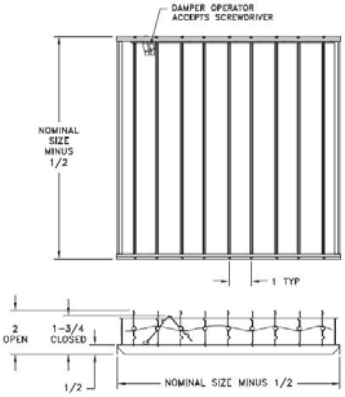
Detail of optional pulley (98VOHP) for remote adjustment of deflection louvers. Field-installed center pulley over lever.



92OOV Damper

- Steel construction
- Opposed-blade damper
- Controls the air volume from full flow to shut-off
- Mill finish
- For use with:
  - 92
  - 94
  - RE5
  - PFG

9200V Available Sizes (in.)
Minimum: 6" x 4"
Maximum: 24" x 24" One Piece

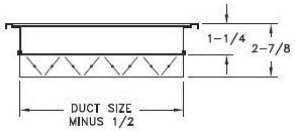


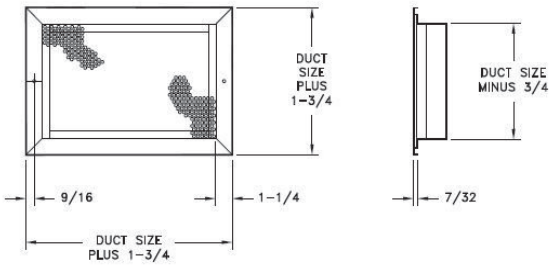
PFG Perforated Face Grille

- All steel construction
- Perforated face
- Optional opposed blade damper
- Optional T-Bar lay-in frames
- Bright white finish

PFG Available Sizes (in.)
Minimum: 6" x 4"
Maximum: 48" x 48" One Piece

Note: Screw hole location details on page 119





Registers & Grilles - Aluminum

HX Grille

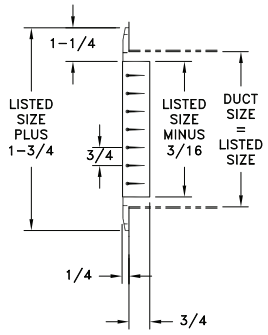
- Extruded aluminum construction
- Horizontal front bars
- Single row of individually adjustable horizontal face bars
- Pivoted bars for easy positive setting
- Bright White or Satin Anodized finish

HX Available Sizes (in.)

HT \ WIDTH	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
24											X	X	X	X	X	X	X	X	X	X	X	X	X
26												X	X	X	X	X	X	X	X	X	X	X	X
28													X	X	X	X	X	X	X	X	X	X	X
30														X	X	X	X	X	X	X	X	X	X
32															X	X	X	X	X	X	X	X	X
34																X	X	X	X	X	X	X	X
36																	X	X	X	X	X	X	X
38																		X	X	X	X	X	X
40																			X	X	X	X	X
42																				X	X	X	X
44																					X	X	X
46																						X	X
48																							X

Other sizes available upon request

Note: Screw hole location details on page 120



HD Register

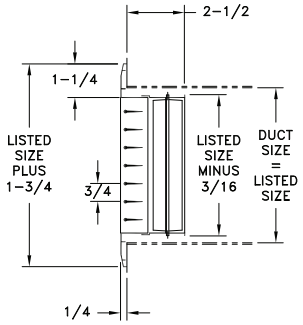
- Extruded aluminum construction
- Single row of individually adjustable horizontal fac bars
- Pivoted bars for easy positive setting
- Opposed-blade damper
- Bright White or Satin Anodized finish

HD Available Sizes (in.)

HT \ WIDTH	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X	X	X	X	X	X	X
26											X	X	X	X	X	X	X	X	X	X	X	X
28												X	X	X	X	X	X	X	X	X	X	X
30													X	X	X	X	X	X	X	X	X	X
32														X	X	X	X	X	X	X	X	X
34															X	X	X	X	X	X	X	X
36																X	X	X	X	X	X	X
38																	X	X	X	X	X	X
40																		X	X	X	X	X
42																			X	X	X	X
44																				X	X	X
46																					X	X
48																						X

Other sizes available upon request

Note: Screw hole location details on page 120

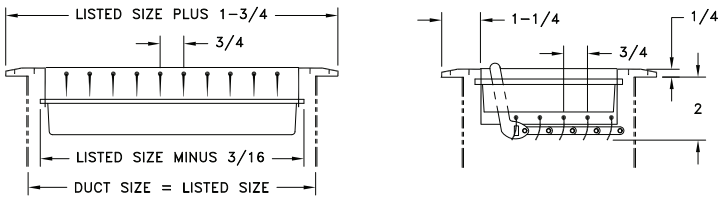


Engineering Data on Page 82-83

HM Register

- Extruded aluminum construction
- Single row of individually adjustable horizontal face bars
- Pivoted bars for easy positive setting
- Lever-operated, multi-shutter valve
- Bright White or Satin Anodized finish

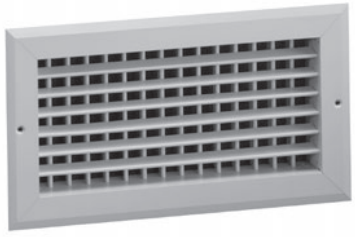
Note: Screw hole location details on page 120



HM Available Sizes (in.)

HT \ WIDTH	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X
26											X	X	X	X	X	X
28												X	X	X	X	X
30													X	X	X	X
32														X	X	X
34															X	X
36																X

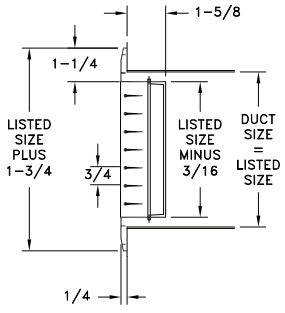
Other sizes available upon request



HV Register

- Extruded aluminum construction
- Horizontal front bars
- Vertical second bars
- Two rows of individually adjustable face bars for horizontal and vertical deflection
- Pivoted bars for easy positive setting
- Bright White or Satin Anodized finish

Note: Screw hole location details on page 120



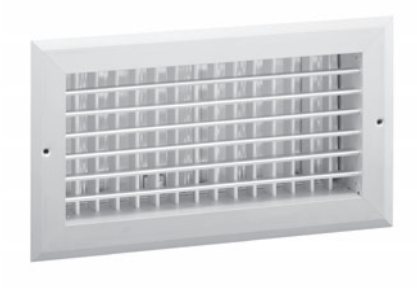
HV Available Sizes (in.)

HT \ WIDTH	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X	X	X	X	X	X	X
26											X	X	X	X	X	X	X	X	X	X	X	X
28												X	X	X	X	X	X	X	X	X	X	X
30													X	X	X	X	X	X	X	X	X	X
32														X	X	X	X	X	X	X	X	X
34															X	X	X	X	X	X	X	X
36																X	X	X	X	X	X	X
38																	X	X	X	X	X	X
40																		X	X	X	X	X
42																			X	X	X	X
44																				X	X	X
46																					X	X
48																						X

Other sizes available upon request

Engineering Data on Page 82-83

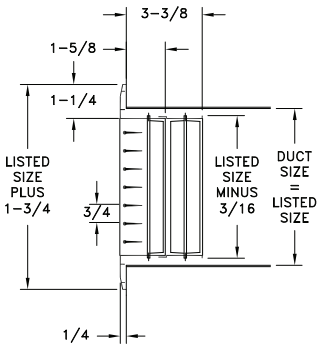
Registers & Grilles - Aluminum



HVD Register

- Extruded aluminum construction
- Two rows of individually adjustable face bars for horizontal and vertical deflection
- Pivoted bars for easy positive setting
- Opposed-blade damper
- Bright White or Satin Anodized finish

Note: Screw hole location details on page 120



HVD Available Sizes (in.)

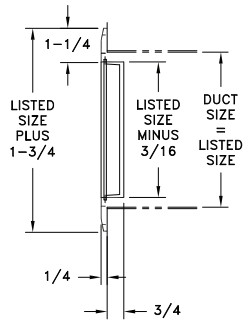
HT \ WIDTH	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X	X	X	X	X	X	X
26											X	X	X	X	X	X	X	X	X	X	X	X
28												X	X	X	X	X	X	X	X	X	X	X
30													X	X	X	X	X	X	X	X	X	X
32														X	X	X	X	X	X	X	X	X
34															X	X	X	X	X	X	X	X
36																X	X	X	X	X	X	X
38																	X	X	X	X	X	X
40																		X	X	X	X	X
42																			X	X	X	X
44																				X	X	X
46																					X	X
48																						X

Other sizes available upon request

VX Grille

- Extruded aluminum construction
- Vertical front bars
- Single row of individually adjustable face bars
- Pivoted bars for easy positive setting
- Bright White or Satin Anodized finish

Note: Screw hole location details on page 120



VX Available Sizes (in.)

HT \ WIDTH	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16							X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
18								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
20									X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22										X	X	X	X	X	X	X	X	X	X	X	X	X	X
24											X	X	X	X	X	X	X	X	X	X	X	X	X
26												X	X	X	X	X	X	X	X	X	X	X	X
28													X	X	X	X	X	X	X	X	X	X	X
30														X	X	X	X	X	X	X	X	X	X
32															X	X	X	X	X	X	X	X	X
34																X	X	X	X	X	X	X	X
36																	X	X	X	X	X	X	X
38																		X	X	X	X	X	X
40																			X	X	X	X	X
42																				X	X	X	X
44																					X	X	X
46																						X	X
48																							X

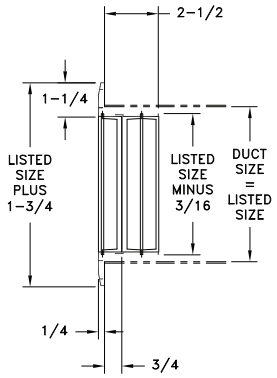
Other sizes available upon request

Engineering Data on Page 82-83

VD Register

- Extruded aluminum construction
- Vertical front bars
- Single row of individually adjustable face bars
- Pivoted bars for easy positive setting
- Opposed-blade damper
- Bright White or Satin Anodized finish

Note: Screw hole location details on page 120



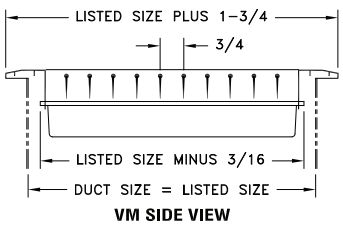
VD Available Sizes (in.)																					
HT	WIDTH																				
	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X	X	X	X	X	X	X
26											X	X	X	X	X	X	X	X	X	X	X	X
28												X	X	X	X	X	X	X	X	X	X	X
30													X	X	X	X	X	X	X	X	X	X
32														X	X	X	X	X	X	X	X	X
34															X	X	X	X	X	X	X	X
36																X	X	X	X	X	X	X
38																	X	X	X	X	X	X
40																		X	X	X	X	X
42																			X	X	X	X
44																				X	X	X
46																					X	X
48																						X

Other sizes available upon request

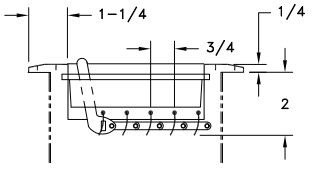
VM Register

- Extruded aluminum construction
- Vertical front bars
- Pivoted bars for easy positive setting
- Lever-operated, multi-shutter valve
- Single row of individually adjustable face bars
- Horizontal valve blades
- Bright White or Satin Anodized finish

Note: Screw hole location details on page 120



VM SIDE VIEW



VM ENDVIEW

VM Available Sizes (in.)																
HT	WIDTH															
	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X
26											X	X	X	X	X	X
28												X	X	X	X	X
30													X	X	X	X
32														X	X	X
34															X	X
36																X

Other sizes available upon request

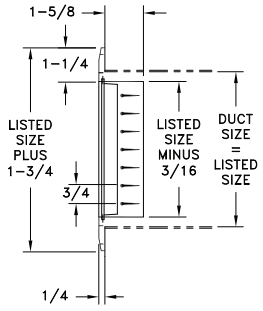
Engineering Data on Page 82-83

Registers & Grilles - Aluminum

VH Register

- Extruded aluminum construction
- Vertical front bars
- Horizontal second bars
- Two rows of individually adjustable face bars for horizontal and vertical deflection
- Pivoted bars for easy positive setting
- Bright White or Satin Anodized finish

Note: Screw hole location details on page 120



VH Available Sizes (in.)

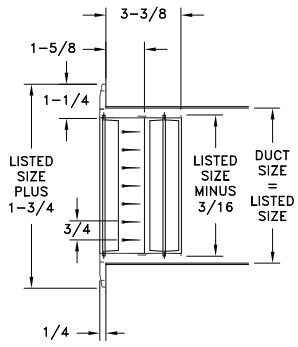
HT \ WIDTH	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X	X	X	X	X	X	X
26											X	X	X	X	X	X	X	X	X	X	X	X
28												X	X	X	X	X	X	X	X	X	X	X
30													X	X	X	X	X	X	X	X	X	X
32														X	X	X	X	X	X	X	X	X
34															X	X	X	X	X	X	X	X
36																X	X	X	X	X	X	X
38																	X	X	X	X	X	X
40																		X	X	X	X	X
42																			X	X	X	X
44																				X	X	X
46																					X	X
48																						X

Other sizes available upon request

VHD Register

- Extruded aluminum construction
- Vertical front bars
- Horizontal second bars
- Two rows of individually adjustable face bars for horizontal and vertical deflection
- Pivoted bars for easy positive setting
- Opposed-blade damper
- Bright White or Satin Anodized finish

Note: Screw hole location details on page 120

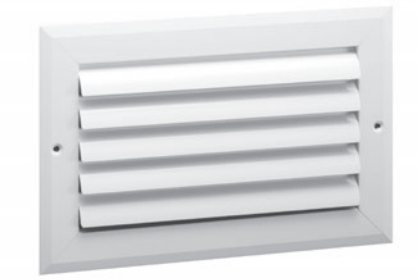


VHD Available Sizes (in.)

HT \ WIDTH	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X	X	X	X	X	X	X
26											X	X	X	X	X	X	X	X	X	X	X	X
28												X	X	X	X	X	X	X	X	X	X	X
30													X	X	X	X	X	X	X	X	X	X
32														X	X	X	X	X	X	X	X	X
34															X	X	X	X	X	X	X	X
36																X	X	X	X	X	X	X
38																	X	X	X	X	X	X
40																		X	X	X	X	X
42																			X	X	X	X
44																				X	X	X
46																					X	X
48																						X

Other sizes available upon request

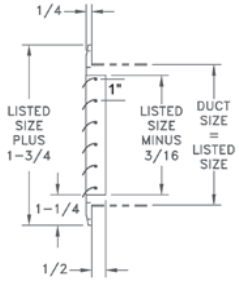
Engineering Data on Page 82-83



CH1 Grille

- Extruded aluminum construction
- One-way deflection
- Individually adjustable curved-face bars
- Pivoted bars for easy positive setting
- Bright White or Satin Anodized finish

Note: Screw hole location details on page 120



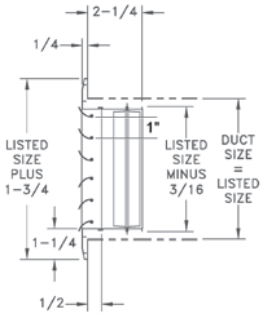
CH1 Available Sizes (in.)																
HT	WIDTH															
	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X
26											X	X	X	X	X	X
28												X	X	X	X	X
30													X	X	X	X
32														X	X	X
34															X	X
36																X

Other sizes available upon request

CHD1 Register

- Extruded aluminum construction
- One-way deflection
- Individually adjustable curved-face bars
- Pivoted bars for easy positive setting
- Opposed-blade damper
- Bright White or Satin Anodized finish

Note: Screw hole location details on page 120



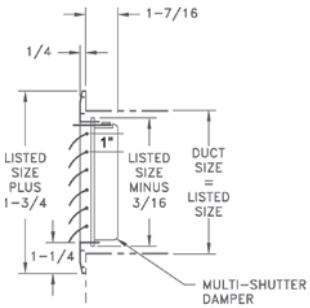
CHD1 Available Sizes (in.)																
HT	WIDTH															
	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X
26											X	X	X	X	X	X
28												X	X	X	X	X
30													X	X	X	X
32														X	X	X
34															X	X
36																X

Other sizes available upon request

CHM1 Register

- Extruded aluminum construction
- One-way deflection
- Individually adjustable curved-face bars
- Pivoted bars for easy positive setting
- Multi-shutter valve
- Bright White or Satin Anodized finish

Note: Screw hole location details on page 120



CHM1 Available Sizes (in.)																
HT	WIDTH															
	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X
26											X	X	X	X	X	X
28												X	X	X	X	X
30													X	X	X	X
32														X	X	X
34															X	X
36																X

Other sizes available upon request

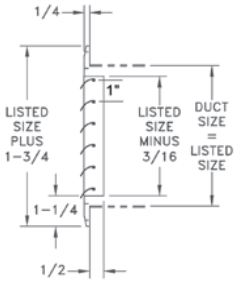
Engineering Data on Page 84

Registers & Grilles - Aluminum

CH2 Grille

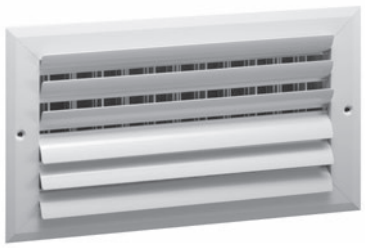
- Extruded aluminum construction
- Two-way deflection
- Individually adjustable curved-face bars
- Pivoted bars for easy positive setting
- Bright White or Satin Anodized finish

Note: Screw hole location details on page 120



CH2 Available Sizes (in.)																
HT	WIDTH															
	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X
26											X	X	X	X	X	X
28												X	X	X	X	X
30													X	X	X	X
32														X	X	X
34															X	X
36																X

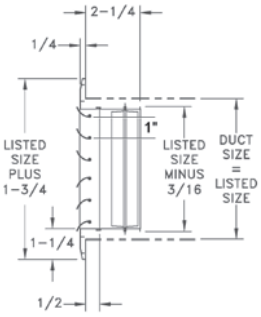
Other sizes available upon request



CHD2 Register

- Extruded aluminum construction
- Two-way deflection
- Individually adjustable curved-face bars
- Pivoted bars for easy positive setting
- Opposed-blade damper
- Bright White or Satin Anodized finish

Note: Screw hole location details on page 120



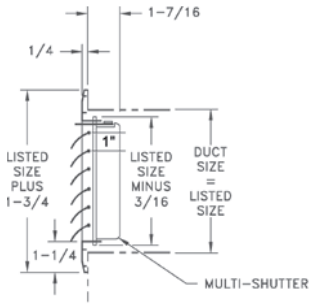
CHD2 Available Sizes (in.)																
HT	WIDTH															
	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X
26											X	X	X	X	X	X
28												X	X	X	X	X
30													X	X	X	X
32														X	X	X
34															X	X
36																X

Other sizes available upon request

CHM2 Register

- Extruded aluminum construction
- Two-way deflection
- Individually adjustable curved-face bars
- Pivoted bars for easy positive setting
- Multi-shutter valve
- Bright White or Satin Anodized finish

Note: Screw hole location details on page 120



CHM2 Available Sizes (in.)																
HT	WIDTH															
	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X
26											X	X	X	X	X	X
28												X	X	X	X	X
30													X	X	X	X
32														X	X	X
34															X	X
36																X

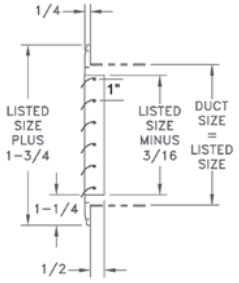
Other sizes available upon request

Engineering Data on Page 84

C3 Grille

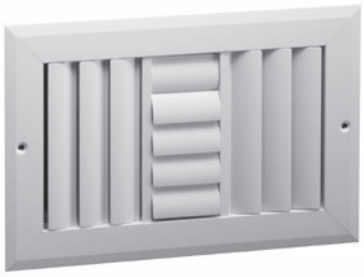
- Extruded aluminum construction
- Three-way deflection
- Individually adjustable curved-face bars
- Pivoted bars for easy positive setting
- Bright White or Satin Anodized finish

Note: Screw hole location details on page 120



C3 Available Sizes (in.)															
HT	WIDTH														
	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X
26											X	X	X	X	X	X
28												X	X	X	X	X
30													X	X	X	X
32														X	X	X
34															X	X
36																X

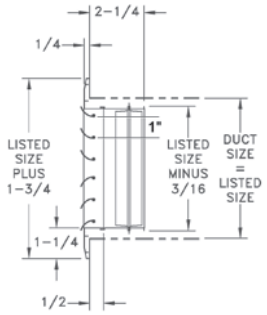
Other sizes available upon request



CD3 Register

- Extruded aluminum construction
- Three-way deflection
- Individually adjustable curved-face bars
- Pivoted bars for easy positive setting
- Opposed-blade damper
- Bright White or Satin Anodized finish

Note: Screw hole location details on page 120



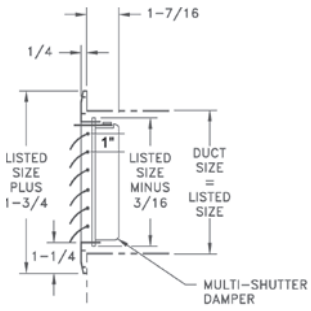
CD3 Available Sizes (in.)															
HT	WIDTH														
	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X
26											X	X	X	X	X	X
28												X	X	X	X	X
30													X	X	X	X
32														X	X	X
34															X	X
36																X

Other sizes available upon request

CM3 Register

- Extruded aluminum construction
- Three-way deflection
- Individually adjustable curved-face bars
- Pivoted bars for easy positive setting
- Multi-shutter valve
- Bright White or Satin Anodized finish

Note: Screw hole location details on page 120

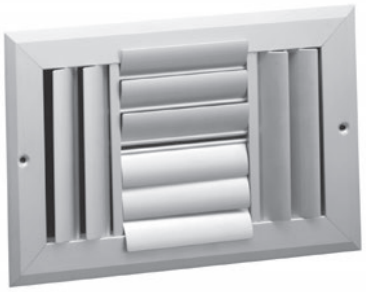


CM3 Available Sizes (in.)															
HT	WIDTH														
	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X
26											X	X	X	X	X	X
28												X	X	X	X	X
30													X	X	X	X
32														X	X	X
34															X	X
36																X

Other sizes available upon request

Engineering Data on Page 85

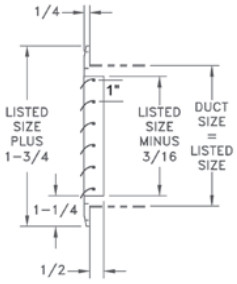
Registers & Grilles - Aluminum



C4 Grille

- Extruded aluminum construction
- Four-way deflection
- Individually adjustable curved-face bars
- Pivoted bars for easy positive setting
- Bright White or Satin Anodized finish

Note: Screw hole location details on page 120



C4 Available Sizes (in.)

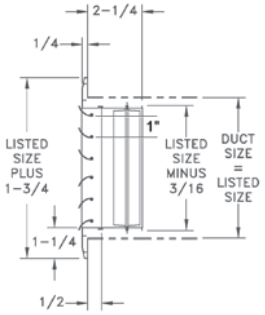
HT \ WIDTH	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X
26											X	X	X	X	X	X
28												X	X	X	X	X
30													X	X	X	X
32														X	X	X
34															X	X
36																X

Other sizes available upon request

CD4 Register

- Extruded aluminum construction
- Four-way deflection
- Individually adjustable curved-face bars
- Pivoted bars for easy positive setting
- Opposed-blade damper
- Bright White or Satin Anodized finish

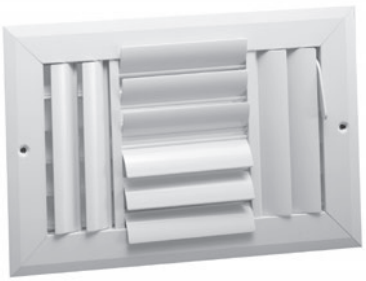
Note: Screw hole location details on page 120



CD4 Available Sizes (in.)

HT \ WIDTH	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X
26											X	X	X	X	X	X
28												X	X	X	X	X
30													X	X	X	X
32														X	X	X
34															X	X
36																X

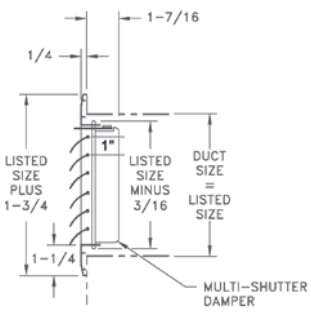
Other sizes available upon request



CM4 Register

- Extruded aluminum construction
- Four-way deflection
- Individually adjustable curved-face bars
- Pivoted bars for easy positive setting
- Multi-shutter valve
- Bright White or Satin Anodized finish

Note: Screw hole location details on page 120



CM4 Available Sizes (in.)

HT \ WIDTH	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X
26											X	X	X	X	X	X
28												X	X	X	X	X
30													X	X	X	X
32														X	X	X
34															X	X
36																X

Other sizes available upon request

Engineering Data on Page 85

CH2CL Grille

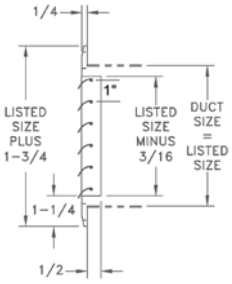
- Extruded aluminum construction
- Two-way deflection
- Individually adjustable curved-face bars
- Pivoted bars for easy positive setting
- Bright White or Satin Anodized finish

CH2CL Available Sizes (in.)

HT \ WIDTH	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X
26											X	X	X	X	X	X
28												X	X	X	X	X
30													X	X	X	X
32														X	X	X
34															X	X
36																X

Other sizes available upon request

Note: Screw hole location details on page 120



CH2CR Grille

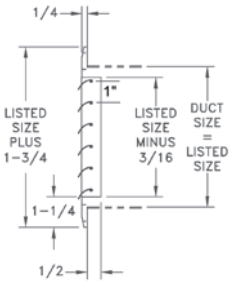
- Extruded aluminum construction
- Two-way deflection
- Individually adjustable curved-face bars
- Pivoted bars for easy positive setting
- Bright White or Satin Anodized finish

CH2CR Available Sizes (in.)

HT \ WIDTH	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X
26											X	X	X	X	X	X
28												X	X	X	X	X
30													X	X	X	X
32														X	X	X
34															X	X
36																X

Other sizes available upon request

Note: Screw hole location details on page 120

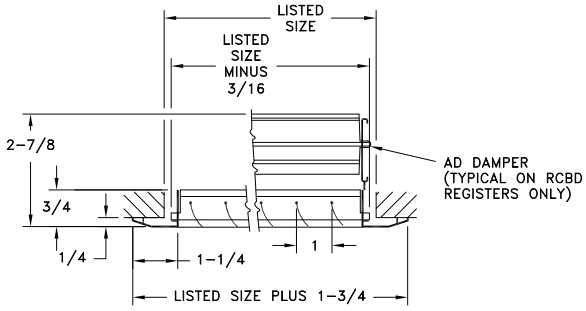


Engineering Data on Page 84

Blades at 40° angle

RCB Grille
RCBD Register

- Extruded aluminum construction
- Curved blades fixed on one-inch spacing
- Opposed-blade damper
- Bright White or Satin Anodized finish



RCB, RCBD Available Sizes (in.)

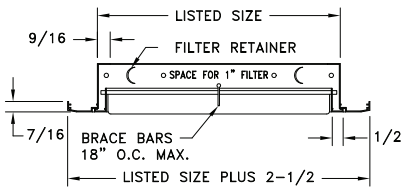
HT \ WIDTH	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X	X	X	X	X	X	X
26											X	X	X	X	X	X	X	X	X	X	X	X
28												X	X	X	X	X	X	X	X	X	X	X
30													X	X	X	X	X	X	X	X	X	X
32														X	X	X	X	X	X	X	X	X
34															X	X	X	X	X	X	X	X
36																X	X	X	X	X	X	X
38																	X	X	X	X	X	X
40																		X	X	X	X	X
42																			X	X	X	X
44																				X	X	X
46																					X	X
48																						X

Other sizes available upon request

Blades at 40° angle

RCBF Filter Grille

- Extruded aluminum construction
- Horizontal curved blades
- Hinged on bottom edge, removable face
- Accommodates standard 1" thick disposable filter (not included)
- Filter grilles equipped with plastic slide latch
- Bright White or Satin Anodized finish

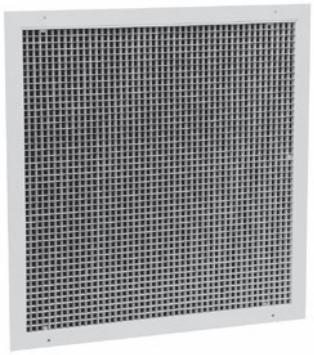


RCBF Available Sizes (in.)

HT \ WIDTH	6	8	10	12	14	16	18	20	22	24	25	26	28	30	32	34	36	38	40	42	44	46	48
6	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
20						X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22								X	X			X	X	X	X	X	X	X	X	X	X	X	X
24									X			X	X	X	X	X	X	X	X	X	X	X	X
25								X			X												
26												X	X	X	X	X	X	X	X	X	X	X	X
28													X	X	X	X	X	X	X	X	X	X	X
30														X	X	X	X	X	X	X	X	X	X
32															X	X	X	X	X	X	X	X	X
34																X	X	X	X	X	X	X	X
36																	X	X	X	X	X	X	X
38																		X	X	X	X	X	X
40																			X	X	X	X	X
42																				X	X	X	X
44																					X	X	X
46																						X	X
48																							X

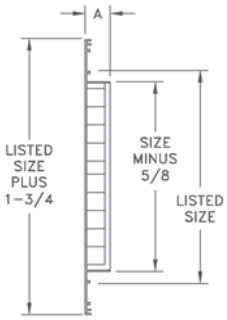
Other sizes available upon request

Engineering Data on Page 86



RE5 Grille

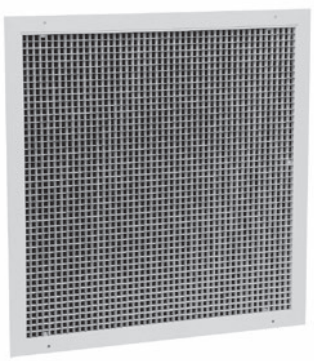
- All-aluminum construction
- Grid core 1/2" x 1/2" x 1/2"
- Square core design with extruded aluminum frame
- Bright White or Mill finish



MODEL	GRID CORE DIMENSIONS	A
RE5	½ x ½ x ½	1–1/16
RE510	½ x ½ x 1	1–9/16
RE1	1 x 1 x 1	1–9/16

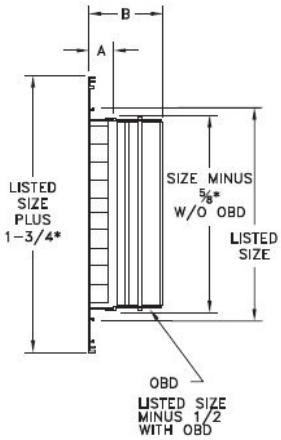
RE5 Available Sizes (in.)

HT \ WIDTH	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X	X	X	X	X	X	X
26											X	X	X	X	X	X	X	X	X	X	X	X
28												X	X	X	X	X	X	X	X	X	X	X
30													X	X	X	X	X	X	X	X	X	X
32														X	X	X	X	X	X	X	X	X
34															X	X	X	X	X	X	X	X
36																X	X	X	X	X	X	X
38																	X	X	X	X	X	X
40																		X	X	X	X	X
42																			X	X	X	X
44																				X	X	X
46																					X	X
48																						X



RED5 Register

- Aluminum construction
- Opposed-blade, galvanized damper
- Square core design with extruded aluminum construction
- Bright White or Mill finish



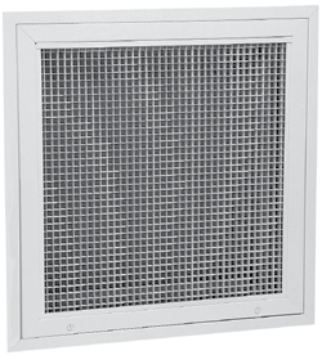
RED5 REGISTER

MODEL	GRID CORE DIMENSIONS	A	B
RE5	1/2x1/2x1/2	1–1/4	2–1/2
RE510	1/2x1/2x1	1–1/4	2–15/16
RE1	1x1x1	1–1/4	2–15/16

RED5 Available Sizes (in.)

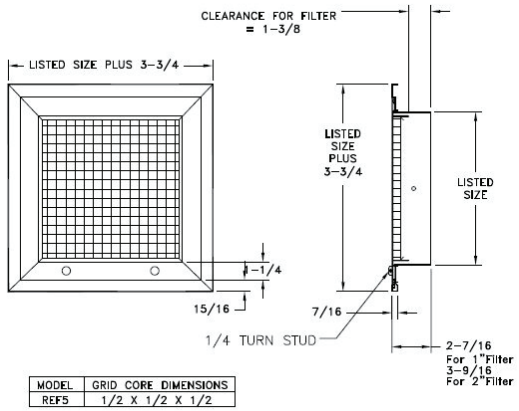
HT \ WIDTH	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X	X	X	X	X	X	X
26											X	X	X	X	X	X	X	X	X	X	X	X
28												X	X	X	X	X	X	X	X	X	X	X
30													X	X	X	X	X	X	X	X	X	X
32														X	X	X	X	X	X	X	X	X
34															X	X	X	X	X	X	X	X
36																X	X	X	X	X	X	X
38																	X	X	X	X	X	X
40																		X	X	X	X	X
42																			X	X	X	X
44																				X	X	X
46																					X	X
48																						X

Engineering Data on Page 87



REF5 Filter Grille, Grid Core

- All-aluminum construction
- 1/2" x 1/2" x 1/2" square core design
- Accommodates standard 1" thick disposable filter (not included)
- Filter grilles equipped with quarter turn fasteners
- Bright White or Mill finish
- Specify REF52 for 2" filter



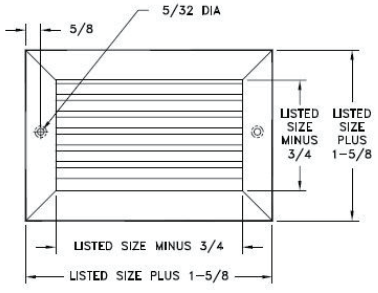
MODEL	GRID CORE DIMENSIONS
REF5	1/2 X 1/2 X 1/2

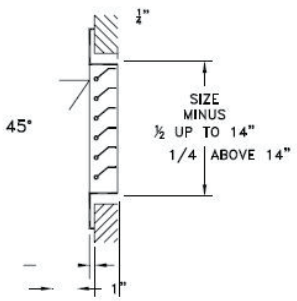
REF5 Available Sizes (in.)																
HT	WIDTH															
	6	8	10	12	14	16	18	20	22	24	25	26	28	30	32	34	36
4	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X
10			X	X	X	X	X	X	X	X		X	X	X	X	X	X
12				X	X	X	X	X	X	X		X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X		X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X	X
22									X	X		X	X	X	X	X	X
24										X		X	X	X	X	X	X
25								X			X						
26												X	X	X	X	X	X
28													X	X	X	X	X
30														X	X	X	X
32															X	X	X
34																X	X
36																	X

ER45 Return Air Grille

- Extruded aluminum construction
- Horizontal louvers fixed at 45 degree deflection
- Available in aluminum or white paint
- Minimum size - 4x4, Maximum size - 48x60
- One piece construction
- An economical choice for your light commercial needs

ER45 Available Sizes (in.)
Min Size 4x4, Max Size 48x60



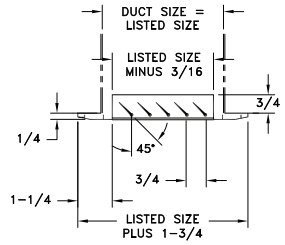


Engineering Data on Page 86-87

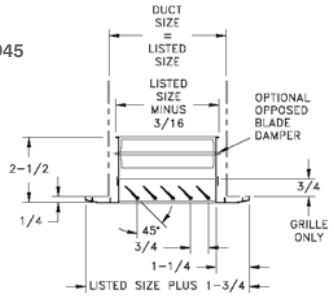
RH45 Grille
RHD45 Register

- Extruded aluminum construction
- Horizontal bars at 45 degrees
- Face bars permanently fixed into heavy aluminum frames at a 45-degree angle
- Opposed-blade damper on RHD45
- Bright White or Satin Anodized finish

RH45



RHD45



RH45 Available Sizes (in.)

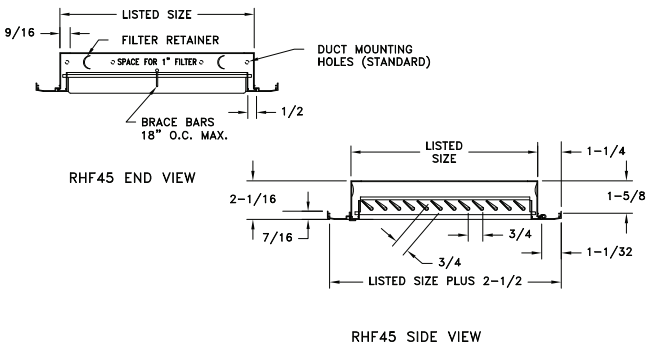
HT \ WIDTH	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16							X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
18								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
20									X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22										X	X	X	X	X	X	X	X	X	X	X	X	X	X
24											X	X	X	X	X	X	X	X	X	X	X	X	X
26												X	X	X	X	X	X	X	X	X	X	X	X
28													X	X	X	X	X	X	X	X	X	X	X
30														X	X	X	X	X	X	X	X	X	X
32															X	X	X	X	X	X	X	X	X
34																X	X	X	X	X	X	X	X
36																	X	X	X	X	X	X	X
38																		X	X	X	X	X	X
40																			X	X	X	X	X
42																				X	X	X	X
44																					X	X	X
46																						X	X
48																							X

Other sizes available upon request

RHF45 Filter Grille

- Extruded aluminum construction
- Horizontal bars at 45 degrees
- Hinged on the bottom edge, face is removable
- Accommodates standard 1" thick disposable filter (not included)
- Filter grilles equipped with plastic slide latch
- Bright White or Satin Anodized finish
- RHF452 - Accepts 2" filter
- RHF454 - Accepts 4" filter

Note: CFM capacity is equal to the filter capacity rating of two CFM per square inch of gross filter area.



RHF45 Available Sizes (in.)

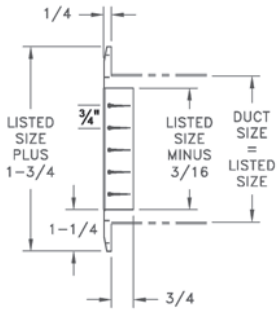
HT \ WIDTH	6	8	10	12	14	16	18	20	22	24	25	26	28	30	32	34	36	38	40	42	44	46	48
6	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
20						X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22									X	X		X	X	X	X	X	X	X	X	X	X	X	X
24										X		X	X	X	X	X	X	X	X	X	X	X	X
25								X			X												
26												X	X	X	X	X	X	X	X	X	X	X	X
28													X	X	X	X	X	X	X	X	X	X	X
30														X	X	X	X	X	X	X	X	X	X
32															X	X	X	X	X	X	X	X	X
34																X	X	X	X	X	X	X	X
36																	X	X	X	X	X	X	X
38																		X	X	X	X	X	X
40																			X	X	X	X	X
42																				X	X	X	X
44																					X	X	X
46																						X	X
48																							X

Other sizes available upon request

Engineering Data on Page 86

RH90 Grille

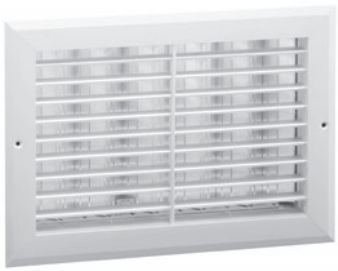
- Extruded aluminum construction
- Face bars permanently fixed into heavy aluminum frames at a 90-degree angle from face
- Bright White or Satin Anodized finish



RH90 Available Sizes (in.)

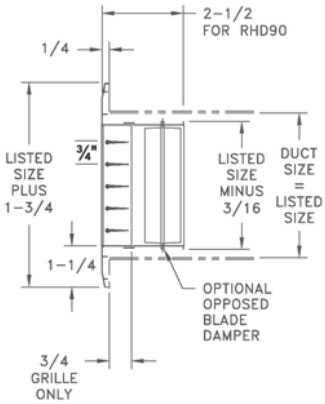
HT \ WIDTH	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16							X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
18								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
20									X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22										X	X	X	X	X	X	X	X	X	X	X	X	X	X
24											X	X	X	X	X	X	X	X	X	X	X	X	X
26												X	X	X	X	X	X	X	X	X	X	X	X
28													X	X	X	X	X	X	X	X	X	X	X
30														X	X	X	X	X	X	X	X	X	X
32															X	X	X	X	X	X	X	X	X
34																X	X	X	X	X	X	X	X
36																	X	X	X	X	X	X	X
38																		X	X	X	X	X	X
40																			X	X	X	X	X
42																				X	X	X	X
44																					X	X	X
46																						X	X
48																							X

Other sizes available upon request



RHD90 Register

- Extruded aluminum construction
- Face bars permanently fixed into heavy aluminum frames at a 90-degree angle from face
- Opposed-blade damper
- Bright White or Satin Anodized finish



RHD90 Available Sizes (in.)

HT \ WIDTH	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X	X	X	X	X	X	X
26											X	X	X	X	X	X	X	X	X	X	X	X
28												X	X	X	X	X	X	X	X	X	X	X
30													X	X	X	X	X	X	X	X	X	X
32														X	X	X	X	X	X	X	X	X
34															X	X	X	X	X	X	X	X
36																X	X	X	X	X	X	X
38																	X	X	X	X	X	X
40																		X	X	X	X	X
42																			X	X	X	X
44																				X	X	X
46																					X	X
48																						X

Engineering Data on Page 87

TG Transfer Grille

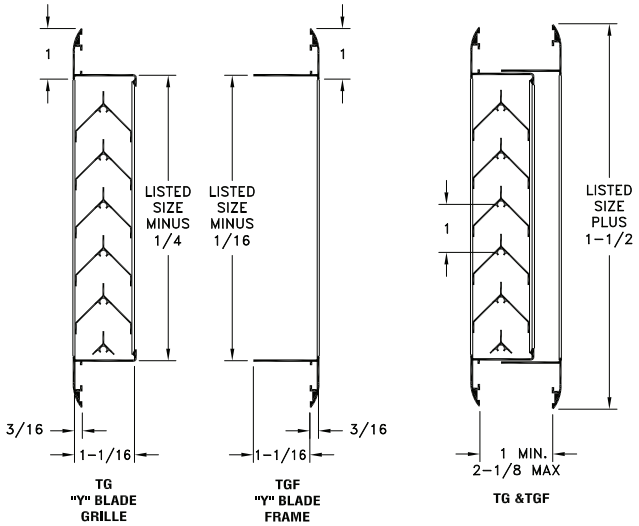
- Extruded aluminum construction
- Vision proof
- Inverted “Y” type grille bar for best vision proof quality and airflow
- Excellent for installation in doors or partitions
- Bright White or Satin Anodized finish

TGF Transfer Grille Frame

- Extruded aluminum construction

Note: When framing both sides of the door or partition opening, use the TGF frame with the TG Grille. Adjustable from 1” to 2 1/8” door thickness.

TG/TGF Transfer Grille with Transfer Grille Frame



TG/TGF Available Sizes (in.)															
HT	WIDTH														
	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10			X	X	X	X	X	X	X	X	X	X	X	X	X	X
12				X	X	X	X	X	X	X	X	X	X	X	X	X
14					X	X	X	X	X	X	X	X	X	X	X	X
16						X	X	X	X	X	X	X	X	X	X	X
18							X	X	X	X	X	X	X	X	X	X
20								X	X	X	X	X	X	X	X	X
22									X	X	X	X	X	X	X	X
24										X	X	X	X	X	X	X
26											X	X	X	X	X	X
28												X	X	X	X	X
30													X	X	X	X
32														X	X	X
34																X
36																X

Other sizes available upon request

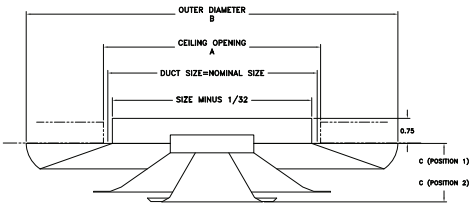
Engineering Data on Page 88

Ceiling Diffusers - Steel

20 Round Diffuser

- Steel construction
- For ceiling or exposed duct installation
- Five-step positioning of air pattern adjustment
- 360-degree pattern, horizontal to vertical pattern change
- Removable center core
- Diffuser outer shell fastens directly to duct; margins fit tight to ceiling for optimum ceiling appearance
- Optional #19 damper; duct-mount only
- Bright White finish

Listed Size	A	B	C Pos. 1	C Pos. 2
6	6-1/2	11-1/8	1-1/8	1-3/4
8	8-1/2	14-3/4	1-1/2	2-1/8
10	10-1/2	18-1/4	2-1/8	2-7/8
12	12-1/2	22	2-3/8	3-1/8
14	14-1/2	26	2-5/8	3-3/8
16	16-1/2	29	3-1/4	4
18	18-1/2	33-1/2	3-7/8	4-3/4

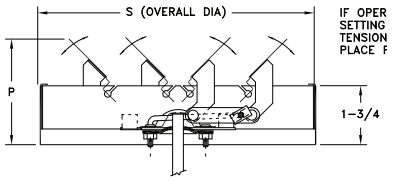


19 Damper

- Steel construction
- Opposed-blade damper
- Bright White finish
- Duct-mount only

19 Damper Listed Sizes (in.)								
Damper	6	8	10	12	14	15	16	18
S	$5^{15}/_{16}$	$7^{15}/_{16}$	$9^{15}/_{16}$	$11^{15}/_{16}$	$13^{15}/_{16}$	$14^{15}/_{16}$	$15^{15}/_{16}$	$17^{15}/_{16}$
P	3	$3^{1}/_{2}$	$4^{9}/_{16}$	$4^{9}/_{16}$	$4^{9}/_{16}$	$4^{9}/_{16}$	$4^{9}/_{16}$	$4^{9}/_{16}$

Note: 3/16" Hex Damper handle (by others) will lock into position if inserted too far into damper



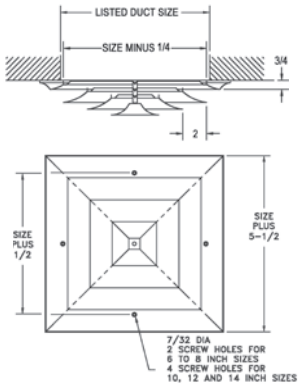
CROSS SECTION WITH VALVES PARTLY OPEN
SHOWING OPPOSED-BLADE OPERATION

Engineering Data on Page 88

24 Square Ceiling Diffuser

- All-steel construction
- Step-down face deflects air stream 360 degrees
- Bright White finish

Only available in sizes shown.



24 Ceiling Diffuser (in.)		
Size	Free Area Sq. Inches	No. of Cones
6	41	3
8	65	3
10	84	3
12	123	4
14	152	4
16	199	5
18	236	5
20	293	6
22	338	6
24	404	7

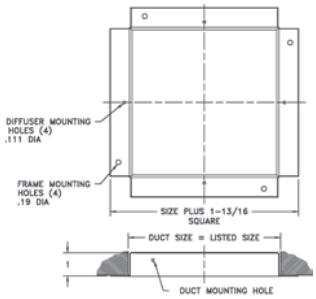
21 Installation Frame

- All-steel construction
- Golden Sand enamel finish
- Used but not furnished with #24 ceiling diffusers.

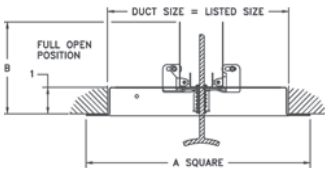
Not required when using 22 Butterfly Damper or 23 Opposed Blade Damper.

Cannot be used with SD or SDD.

21 Available Sizes (in.)
6, 8, 10, 12, 14, 16, 18, 20, 22, 24



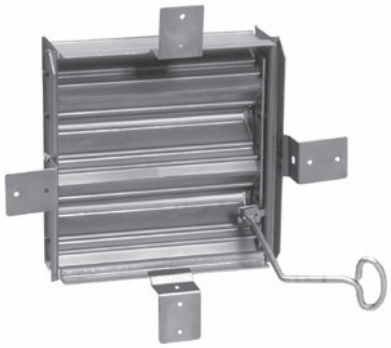
22 Butterfly Damper



- All-steel construction
- Used with #24 Ceiling Diffuser
- Knob control for quick adjustment (removable)
- Installation flange included
- Golden Sand enamel finish

22 Available Sizes (in.)		
Size	A	B
6	$6^{3}/_{16}$	$3^{11}/_{16}$
8	$8^{3}/_{16}$	$4^{11}/_{16}$
10	$10^{3}/_{16}$	$5^{11}/_{16}$
12	$12^{3}/_{16}$	$6^{11}/_{16}$
14	$14^{3}/_{16}$	$7^{11}/_{16}$

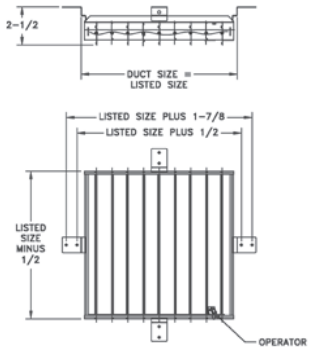
Only available in sizes shown.



23 Opposed-Blade Damper

- All-steel construction
- Used with #24 Ceiling Diffuser
- Controls air volume over entire diffuser
- Key operated
- Mill finish

23 Available Sizes (in.)
6, 8, 10, 12, 14, 16, 18, 20, 22, 24



Engineering Data on Page 88

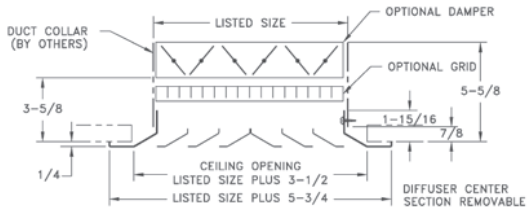
Ceiling Diffusers - Steel

SRE Diffuser

- Steel construction
- Removable core
- Flat margin style
- Optional opposed blade damper available for field installation (see SR7 damper)
- Bright White enamel finish

See page 34 for available air patterns.

SRE Available Sizes (in.)							
HT	WIDTH						
	6	9	12	15	18	21	24
6	X	X	X	X	X	X	X
9		X	X	X	X	X	X
12			X	X	X	X	X
15				X	X	X	X
18					X	X	X
21						X	X
24							X

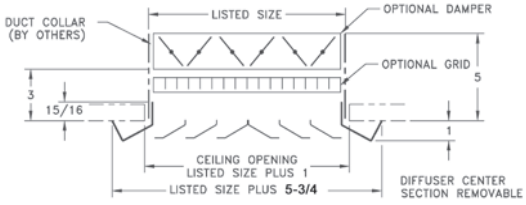


SRS Diffuser

- Steel construction
- Removable core
- Beveled (step-down) margin style
- Optional opposed blade damper available for field installation (see SR7 damper)
- Bright White enamel finish

See page 34 for available air patterns.

SRS Available Sizes (in.)							
HT	WIDTH						
	6	9	12	15	18	21	24
6	X	X	X	X	X	X	X
9		X	X	X	X	X	X
12			X	X	X	X	X
15				X	X	X	X
18					X	X	X
21						X	X
24							X

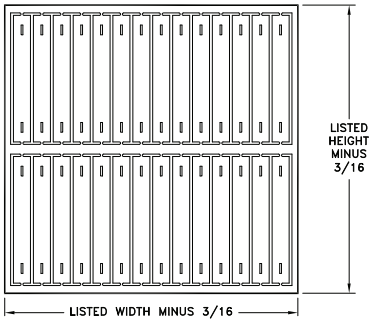


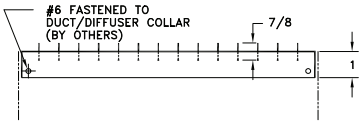
Engineering Data on Page 89-94

SR6 Control Grid

- Steel construction
- Field-mounts on diffuser
- Used to control airflow at the diffuser
- Mill finish

SR6 Available Sizes (in.)							
HT	WIDTH						
	6	9	12	15	18	21	24
6	X	X	X	X	X	X	X
9		X	X	X	X	X	X
12			X	X	X	X	X
15				X	X	X	X
18					X	X	X
21						X	X
24							X

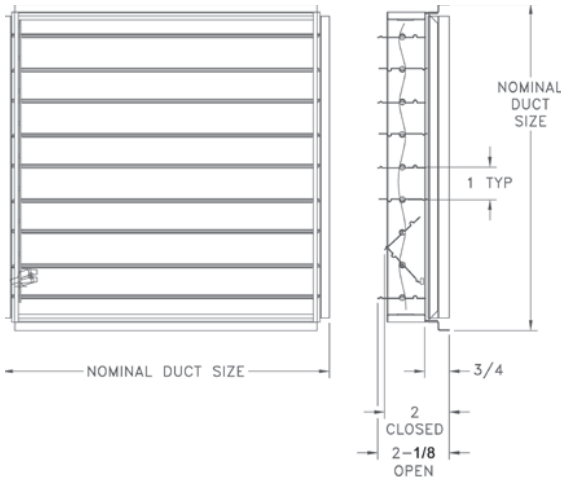




SR7 Volume Damper

- Steel construction
- Used to control airflow at the diffuser
- Mill finish
- Field installed for use with SRE, SRS or SRT diffusers

SR7 Available Sizes (in.)							
HT	WIDTH						
	6	9	12	15	18	21	24
6	X	X	X	X	X	X	X
9		X	X	X	X	X	X
12			X	X	X	X	X
15				X	X	X	X
18					X	X	X
21						X	X
24							X



Ceiling Diffusers - Aluminum

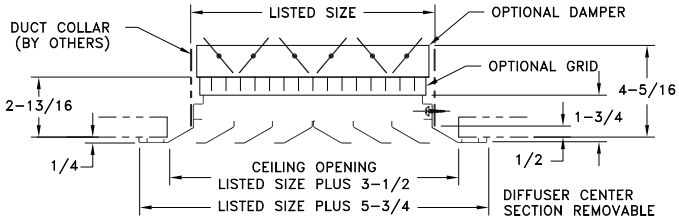
ARE Diffuser

- Extruded aluminum construction
- Removable core
- Flat margin style
- Optional factory-mounted aluminum opposed-blade damper available as ARED
- Bright White or Satin Anodized finish

See page 34 for available air patterns.

ARE Available Sizes (in.)											
HT	WIDTH										
	6	9	12	15	18	21	24	27	30	33	36
6	X	X	X	X	X	X	X	X	X	X	X
9		X	X	X	X	X	X	X	X	X	X
12			X	X	X	X	X	X	X	X	X
15				X	X	X	X	X	X	X	X
18					X	X	X	X	X	X	X
21						X	X	X	X	X	X
24							X	X	X	X	X
27								X	X	X	X
30									X	X	X
33										X	X
36											X

Note: Number of cones varies by size of diffuser



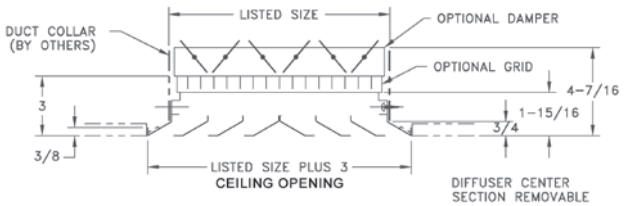
ARF Diffuser

- Extruded aluminum construction
- Removable core
- Flush margin style
- Optional factory-mounted, aluminum opposed-blade damper available as ARFD
- Bright White or Satin Anodized finish

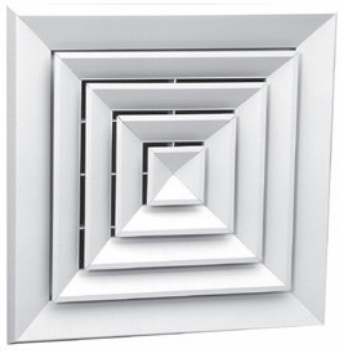
See page 34 for available air patterns.

ARF Available Sizes (in.)											
HT	WIDTH										
	6	9	12	15	18	21	24	27	30	33	36
6	X	X	X	X	X	X	X	X	X	X	X
9		X	X	X	X	X	X	X	X	X	X
12			X	X	X	X	X	X	X	X	X
15				X	X	X	X	X	X	X	X
18					X	X	X	X	X	X	X
21						X	X	X	X	X	X
24							X	X	X	X	X
27								X	X	X	X
30									X	X	X
33										X	X
36											X

Note: Number of cones varies by size of diffuser



Engineering Data on Page 89-94



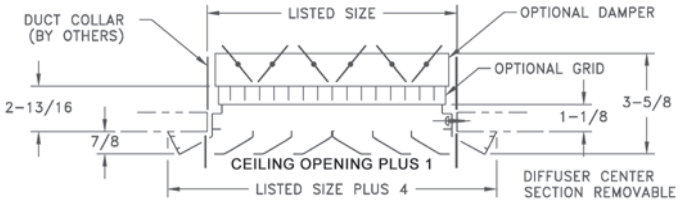
ARS Diffuser

- Extruded aluminum construction
- Removable core
- Beveled (step-down) margin style
- Optional factory-mounted, aluminum, opposed-blade damper available as ARSD
- Bright White or Satin Anodized finish

See page 34 for available air patterns.

ARS Available Sizes (in.)											
HT	WIDTH										
	6	9	12	15	18	21	24	27	30	33	36
6	X	X	X	X	X	X	X	X	X	X	X
9		X	X	X	X	X	X	X	X	X	X
12			X	X	X	X	X	X	X	X	X
15				X	X	X	X	X	X	X	X
18					X	X	X	X	X	X	X
21						X	X	X	X	X	X
24							X	X	X	X	X
27								X	X	X	X
30									X	X	X
33										X	X
36											X

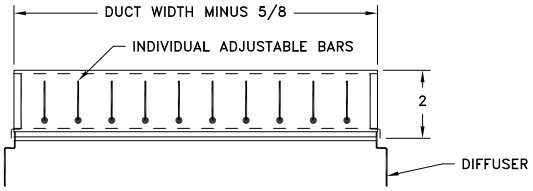
Note: Number of cones varies by size of diffuser



AR6 Control Grid

- Extruded aluminum construction
- Mounts on diffuser hanger bracket
- Provides uniform airflow in diffuser collar
- Mill finish

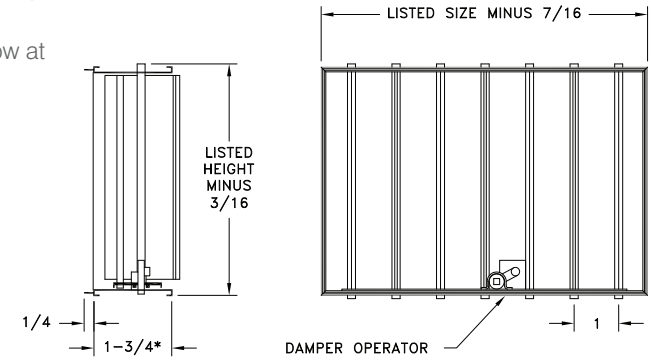
AR6 Available Sizes (in.)
Minimum: 6" x 6"
Maximum: 36" x 36" (in multiple sections)



AR7 Damper

- Extruded aluminum construction
- Mounts on diffuser hanger bracket
- Used to control airflow at the diffuser
- Mill finish

AR7 Available Sizes (in.)
Minimum: 6" x 6"
Maximum: 36" x 36" (in multiple sections)

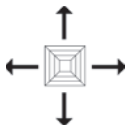
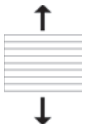
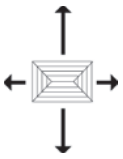
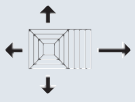
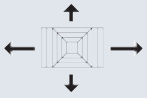
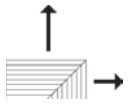
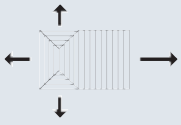
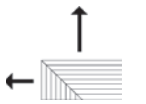
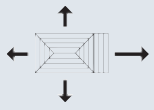
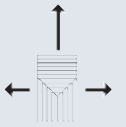
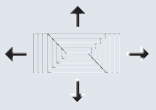
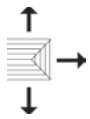


Engineering Data on Page 89-94

Ceiling Diffusers - Steel/Aluminum

HART COOLEY

Neck View — Type SR & AR Air Patterns

Style	Listed Sizes	Style	Listed Sizes	Style	Listed Sizes
 STYLE 4	6x6 9x9 12x12 15x15 18x18 21x21 24x24 27x27 30x30 33x33 36x36 **24 x 24 Max. in Steel**	 STYLE 3	6x6 9x9 12x12 15x15 18x18 21x21 24x24 27x27 30x30 33x33 36x36 **24 x 24 Max. in Steel**	 STYLE 2L	9x6 to 36x6, 12x9 to 36x9, 15x12 to 36x12, 18x15 to 36x15, 21x18 to 36x18 24x21 to 36x21, 27x24 to 36x24, 30x27 to 36x27, 33x30 to 36x30, 36x33 **24 x 21 Max. in Steel**
 STYLE 4	9x6 to 45x6, 12x9 to 45x9, 15x12 to 45x12, 18x15 to 45x15, 21x18 to 45x18 24x21 to 45x21, 27x24 to 45x24, 30x27 to 45x27, 33x30 to 45x30, 36x33 to 45x33 **24 x 21 Max. in Steel**	 STYLE 3S	9x6, 12x9, 15x9, 15x12 to 21x12, 18x15 to 27x15, 21x18 to 33x18 24x21 to 36x21, 27x24 to 42x24, 30x27 to 42x27, 33x30 to 42x30, 36x33 **24 x 21 Max. in Steel**	 STYLE 2S	9x6 to 36x6, 12x9 to 36x9, 15x12 to 36x12, 18x15 to 36x15, 21x18 to 36x18 24x21 to 36x21, 27x24 to 36x24, 30x27 to 36x27, 33x30 to 36x30, 36x33 **24 x 21 Max. in Steel**
 STYLE 41	9x6 to 36x6, 12x9 to 36x9, 15x12 to 36x12, 18x15 to 36x15, 21x18 to 36x18 24x21 to 36x21, 27x24 to 36x24, 30x27 to 36x27, 33x30 to 36x30, 36x33	 STYLE 3S	12x6, 18x9, 24x12, 30x15, 36x18	 STYLE 2C	6x6 9x9 12x12 15x15 18x18 21x21 24x24 27x27 30x30 33x33 36x36
 STYLE 42	9x6 to 36x6, 12x9 to 36x9, 15x12 to 36x12, 18x15 to 36x15, 21x18 to 36x18 24x21 to 36x21, 27x24 to 36x24, 30x27 to 36x27, 33x30 to 36x30, 36x33	 STYLE 3S	15x6, 21x9, 27x12 to 36x12, 33x15, 36x15 to 36x6 to 36x9 to 36x12	 STYLE 2CR	9x6 to 36x6, 12x9 to 36x9, 15x12 to 36x12, 18x15 to 36x15, 21x18 to 36x18 24x21 to 36x21, 27x24 to 36x24, 30x27 to 36x27, 33x30 to 36x30, 36x33 **24 x 21 Max. in Steel**
 STYLE 41L	9x9 to 36x9, 12x12 to 36x12, 15x15 to 36x15, 18x18 to 36x18, 21x21 to 36x21 24x24 to 36x24, 27x27 to 36x27, 30x30 to 36x30, 33x33 to 36x33, 36x36	 STYLE 31S	6x6 to 9x6, 9x9 to 15x9, 12x12 to 21x12, 15x15 to 27x15, 18x18 to 33x18, 21x21 to 36x21 24x24 to 36x24, 27x27 to 36x27, 30x30 to 36x30, 33x33 to 36x33, 36x36	 STYLE 2CL	9x6 to 36x6, 12x9 to 36x9, 15x12 to 36x12, 18x15 to 36x15, 21x18 to 36x18 24x21 to 36x21, 27x24 to 36x24, 30x27 to 36x27, 33x30 to 36x30, 36x33 **24 x 21 Max. in Steel**
 STYLE 41S	12x6 to 36x6, 15x9 to 36x9, 18x12 to 36x12, 21x15 to 36x15, 24x18 to 36x18 27x21 to 36x21, 30x24 to 36x24, 33x27 to 36x27, 36x30	 STYLE 31L	9x6 to 36x6, 12x9 to 36x9, 15x12 to 36x12, 18x15 to 36x15, 21x18 to 36x18 24x21 to 36x21, 27x24 to 36x24, 30x27 to 36x27, 33x30 to 36x30, 36x33	 STYLE 1	6x6 9x9 12x12 15x15 18x18 21x21 24x24 27x27 30x30 33x33 36x36 39x39 42x42 **24 x 24 Max. in Steel**
 STYLE 42S	12x6 to 36x6, 15x9 to 36x9, 18x12 to 36x12, 21x15 to 36x15, 24x18 to 36x18 27x21 to 36x21, 30x24 to 36x24, 33x27 to 36x27, 36x30	 STYLE 3L	9x6 to 36x6, 12x9 to 36x9, 15x12 to 36x12, 18x15 to 36x15, 21x18 to 36x18 24x21 to 36x21, 27x24 to 36x24, 30x27 to 36x27, 33x30 to 36x30, 36x33 **24 x 21 Max. in Steel**	 STYLE 1L	9x6 to 36x6, 12x9 to 36x9, 15x12 to 36x12, 18x15 to 36x15, 21x18 to 36x18 24x21 to 36x21, 27x24 to 36x24, 30x27 to 36x27, 33x30 to 36x30, 36x33 **24 x 21 Max. in Steel**
		 STYLE 2	6x6 9x9 12x12 15x15 18x18 21x21 24x24 27x27 30x30 33x33 36x36 **24 x 24 Max. in Steel**	 STYLE 1S	9x6 to 36x6, 12x9 to 36x9, 15x12 to 36x12, 18x15 to 36x15, 21x18 to 36x18 24x21 to 36x21, 27x24 to 36x24, 30x27 to 36x27, 33x30 to 36x30, 36x33 **24 x 21 Max. in Steel**

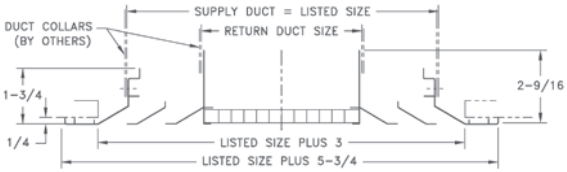
Aluminum Only

SR Sizes:
6x6 to 24x24 in 3" Increments (see page 30)

AR Sizes:
6x6 to 36x36 in 3" Increments (see page 32)

ASRE Diffuser

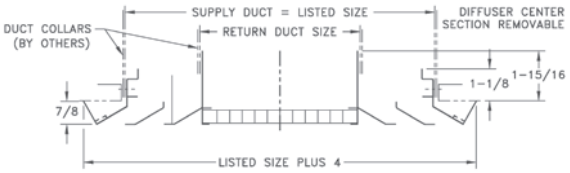
- Extruded aluminum construction
- Flat margins overlap opening
- For use with roof-mounted installations
- Removable core
- Return damper available - AR7
- Supply damper available - AS7
- Bright White or Satin Anodized finish



ASRE Available Sizes (in.)			
Supply Size	Return Neck	Supply Size	Return Neck
9 x 9	6 x 6	27 x 18	21 x 12
12 x 12	9 x 9	27 x 15	21 x 9
12 x 9	9 x 6	27 x 12	21 x 6
15 x 15	9 x 9	30 x 30	21 x 21
15 x 12	12 x 9	30 x 27	21 x 18
15 x 9	12 x 6	30 x 24	21 x 15
15 x 6	12 x 3	30 x 21	21 x 12
18 x 18	12 x 12	30 x 18	24 x 12
18 x 15	12 x 9	30 x 15	24 x 9
18 x 12	12 x 6	33 x 33	21 x 21
18 x 9	15 x 6	33 x 30	24 x 21
21 x 21	15 x 15	33 x 27	24 x 18
21 x 18	15 x 12	33 x 24	24 x 15
21 x 15	15 x 9	33 x 21	24 x 12
21 x 12	15 x 6	33 x 18	27 x 12
21 x 9	18 x 6	33 x 15	27 x 9
24 x 24	18 x 18	36 x 36	24 x 24
24 x 21	18 x 15	36 x 33	27 x 24
24 x 18	18 x 12	36 x 30	27 x 21
24 x 15	18 x 9	36 x 27	27 x 18
24 x 12	18 x 6	36 x 24	27 x 15
24 x 9	21 x 6	36 x 21	27 x 12
27 x 27	18 x 18	36 x 18	30 x 12
27 x 24	18 x 15	42 x 18	27 x 12
27 x 21	21 x 15		

ASRS Diffuser

- Extruded aluminum construction
- Step-down (beveled) margins overlap opening and lowers the diffuser from the ceiling
- For use with roof-mounted installations
- Removable core
- Bright White or Satin Anodized finish
- Return damper available - AR7
- Supply damper available - AS7



ASRS Available Sizes (in.)			
Supply Size	Return Neck	Supply Size	Return Neck
9 x 9	6 x 6	27 x 18	21 x 12
12 x 12	9 x 9	27 x 15	21 x 9
12 x 9	9 x 6	27 x 12	21 x 6
15 x 15	9 x 9	30 x 30	21 x 21
15 x 12	12 x 9	30 x 27	21 x 18
15 x 9	12 x 6	30 x 24	21 x 15
15 x 6	12 x 3	30 x 21	21 x 12
18 x 18	12 x 12	30 x 18	24 x 12
18 x 15	12 x 9	30 x 15	24 x 9
18 x 12	12 x 6	33 x 33	21 x 21
18 x 9	15 x 6	33 x 30	24 x 21
21 x 21	15 x 15	33 x 27	24 x 18
21 x 18	15 x 12	33 x 24	24 x 15
21 x 15	15 x 9	33 x 21	24 x 12
21 x 12	15 x 6	33 x 18	27 x 12
21 x 9	18 x 6	33 x 15	27 x 9
24 x 24	18 x 18	36 x 36	24 x 24
24 x 21	18 x 15	36 x 33	27 x 24
24 x 18	18 x 12	36 x 30	27 x 21
24 x 15	18 x 9	36 x 27	27 x 18
24 x 12	18 x 6	36 x 24	27 x 15
24 x 9	21 x 6	36 x 21	27 x 12
27 x 27	18 x 18	36 x 18	30 x 12
27 x 24	18 x 15	42 x 18	27 x 12
27 x 21	21 x 15		

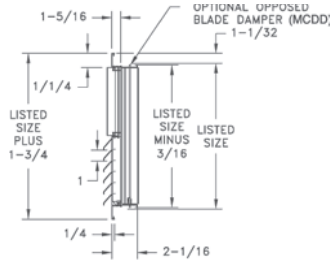
Engineering Data on Page 95-96

Ceiling Diffusers - Aluminum

MCD Adjustable Modular Diffuser

- Extruded aluminum construction
- Four modular cores provide variable pattern adjustments of four-way, three-way, two-way, or one-way horizontal air patterns
- Flat margin
- Fixed fins
- Bright White finish

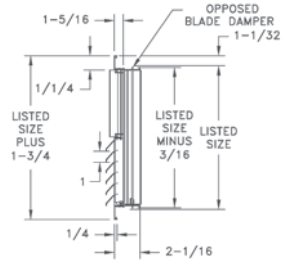
MCD Available Sizes (in.)
6" x 6", 8" x 8", 10" x 10", 12" x 12", 14" x 14", 16" x 16", 18" x 18", 20" x 20", 22" x 22"



MCDD Adjustable Modular Diffuser

- Extruded aluminum construction
- Opposed-blade damper
- Four modular cores provide variable pattern adjustments of four-way, three-way, two-way, or one-way horizontal air patterns
- Removable modules provide easy access to damper
- Flat margin
- Fixed fins
- Bright White finish

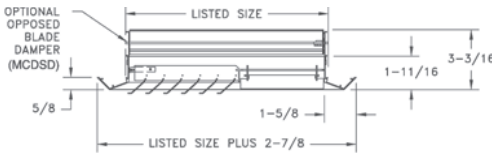
MCDD Available Sizes (in.)
6" x 6", 8" x 8", 10" x 10", 12" x 12", 14" x 14", 16" x 16", 18" x 18", 20" x 20", 22" x 22"



MCDS Adjustable Modular Diffuser

- Extruded aluminum construction
- Step-down (beveled) margin
- Four modular cores provide variable pattern adjustments of four-way, three-way, two-way, or one-way horizontal air patterns
- Fixed fins
- Bright White finish

MCDS Available Sizes (in.)
6" x 6", 8" x 8", 10" x 10", 12" x 12", 14" x 14", 16" x 16", 18" x 18", 20" x 20", 22" x 22"



For T-Bar application, see page 71

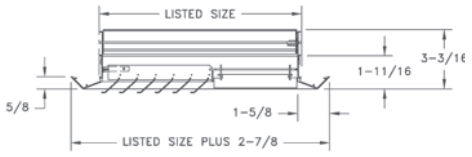
Engineering Data on Page 97-98

MCDSD Adjustable Modular Diffuser

- Extruded aluminum construction
- Opposed-blade damper
- Step-down (beveled) margin
- Four modular cores provide variable pattern adjustments of four-way, three-way, two-way, or one-way horizontal air patterns
- Removable modules provide easy access to damper
- Fixed fins
- Bright White finish

For T-Bar application, see page 71.

MCDSD Available Sizes (in.)
6" x 6", 8" x 8", 10" x 10", 12" x 12", 14" x 14", 16" x 16", 18" x 18", 20" x 20", 22" x 22"

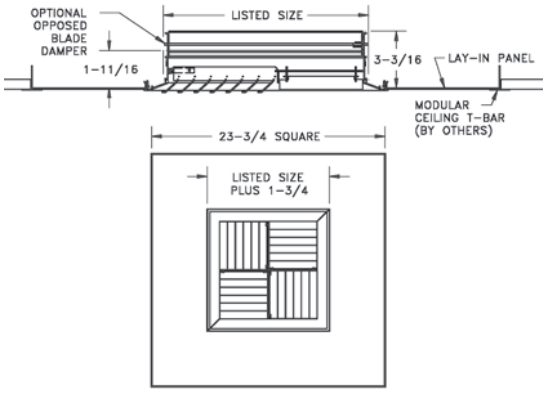


Modular T-Bar Panel

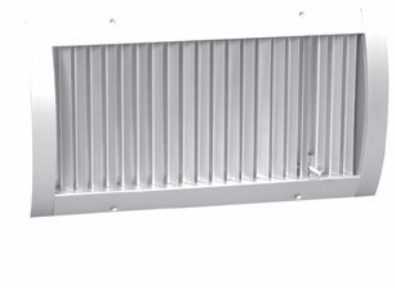
- Steel construction (aluminum optional)
- Adapts MCD and MCDD for T-Bar installation
- Bright White finish

Note: Aluminum panel for factory-mounted, step-down margin. Available as Models MCDST and MCDSDT.

Modular T-Bar Panel Available Sizes
Opening 6" - 20"
Overall 23-3/4" x 23-3/4"



Spiral Diffusers

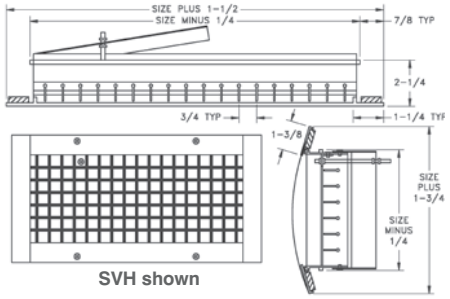


(Shown with scoop)
Size restrictions apply.
See price list for sizes and ordering information.

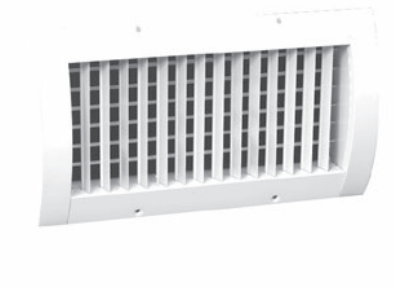
Model SV
Single-Deflection Diffuser

SV Available Sizes (in.)
10" x 3" to 36" x 12"

- Extruded aluminum construction
- Single row of individually adjustable vertical blades for horizontal air-deflection control
- Available as diffuser only or diffuser with air scoop (SV3)
- Optional face adjustable scoop to direct airflow
- Counter-sunk screw holes
- Available sizes: 10x3 to 36x12 for 6'' to 50'' ducts
- Bright White and Satin Anodized finishes



SVH shown

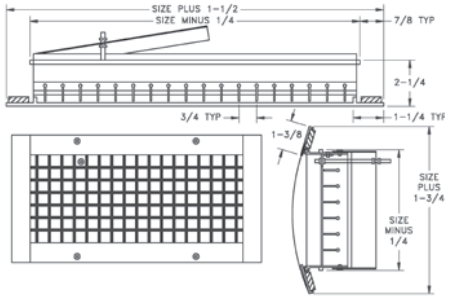


Size restrictions apply.
See price list for sizes and ordering information.

Model SVH
Double-Deflection Diffuser

SVH Available Sizes (in.)
10" x 3" to 36" x 12"

- Extruded aluminum construction
- Two rows of individually adjustable blades for horizontal and vertical deflection control
- Optional face adjustable scoop to direct airflow
- Counter-sunk screw holes
- Available sizes: 10x3 to 36x12 for 6'' to 50'' ducts
- Bright White and Satin Anodized finishes

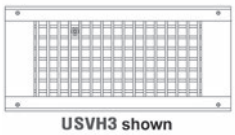


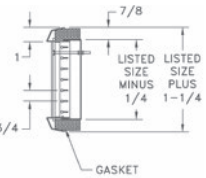
Size restrictions apply.
See price list for sizes and ordering information.

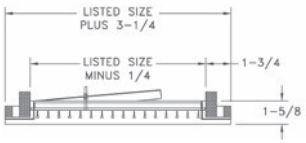
Model USV
Single-Deflection Universal Diffuser

USV Available Sizes (in.)
10" x 3" to 36" x 12"

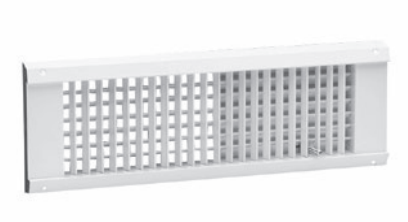
- Extruded aluminum construction
- Single row of individually adjustable vertical blades for horizontal air deflection control
- Optional face adjustable scoop to direct airflow
- Counter-sunk screw holes
- Available sizes: 10x3 to 36x12
- Fits duct sizes 6'' on up, based on diffuser height
- Bright White and Satin Anodized finishes


USVH3 shown





Engineering Data on Page 101

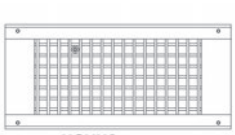


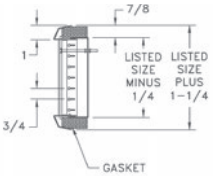
Size restrictions apply.
See price list for sizes and ordering information.

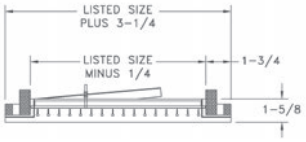
Model USVH
Double Deflection Universal Diffuser

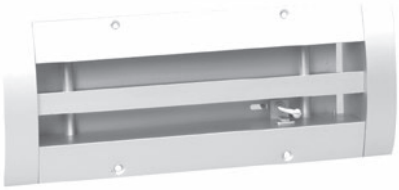
- Extruded aluminum construction
- Two rows of individually adjustable blades for horizontal and vertical deflection control
- Optional face adjustable scoop to direct airflow
- Counter-sunk screw holes
- Available sizes: 10x3 to 36x12
- Fits duct sizes 6'' on up, based on diffuser height
- Bright White and Satin Anodized finishes

USVH Available Sizes (in.)
10" x 3" to 36" x 12"







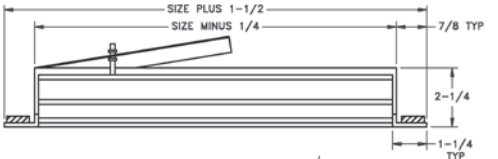


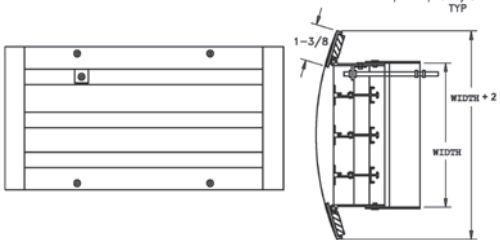
Size restrictions apply.
See price list for sizes and ordering information.

Model SS
Slot Face Diffuser

- Extruded aluminum construction
- Slot sizes available: 1/2'', 3/4'', 1''
- Optional face adjustable scoop to direct airflow. Scoop not available for 1/2'' or 3/4'' one slot
- Counter-sunk screw holes
- Available in one to four slots wide up to 48'' length for 6'' to 50'' ducts
- Bright White and Satin Anodized finishes

SS Available Sizes (in.)
One to four slots wide up to 48" long





Width/Minimum Duct Diameter				
Slot Width	Number of Slots			
	1	2	3	4
50 (1/2")	1.75/6	3.00/ 8	4.25/12	5.50/16
75 (3/4")	2.00/6	3.50/10	5.00/14	6.50/22
10 (1")	2.25/6	4.00/12	5.75/16	7.50/28

For Models SV and SVH
Minimum Duct Diameter per listed size

Height \ Width	10	12	14	16	18	20	24	30	36
3	5	5	5	5	5	5	5	5	5
4	6	6	6	6	6	6	6	6	6
6	8	8	8	8	8	8	8	8	8
8	10	10	10	10	10	10	10	10	10
10		12	12	12	12	12	12	12	12
12			14	14	14	14	14	14	14

Maximum duct diameter for all sizes is 36".

For Models USV and USVH
Minimum Duct Diameter

Height \ Width	10	12	14	16	18	20	24	30	36
3	6	6	6	6	6	6	6	6	6
4	10	10	10	10	10	10	10	10	10
6	12	12	12	12	12	12	12	12	12
8	20	20	20	20	20	20	20	20	20
10			24	24	24	24	24	24	24
12					30	30	30	30	30

Engineering Data on Page 99-101

Minimum width 1-1/2”

Note: Floor application must be ordered as “LF.” Eight-inch maximum width for constant traffic; 12” maximum width for occasional traffic; maximum length 72”.

See following page for dimensional data.

LS/LF Series Diffuser

- Extruded aluminum construction
- Ceiling, sidewall, sill or floor applications
- Available in 0, 15, or 30 degrees and pencil proof bar deflections
- Four mounting styles-standard, hanger bracket, mounting frame and screw holes in margin
- Maximum one-piece length 72”, width 24” (1/2” width increments)
- Lengths over 72” made in multiple units with keyway splices to form even continuous lengths
- Bright White or Satin Anodized finish

HOW TO ORDER

L — X

- LF (for floor application)
- LS (for sill, sidewall and ceiling applications)

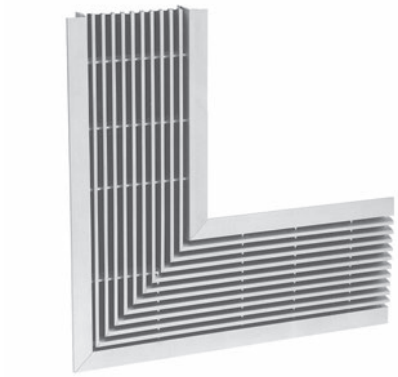
TYPE
1 - Grille Only
2 - Grille With Control Grid
3 - Grille With Damper
4 - Grille With Control Grid and Damper

BAR STYLE
00 - Straight
01 - Pencil Proof
15 - 15° deflection
30 - 30° deflection

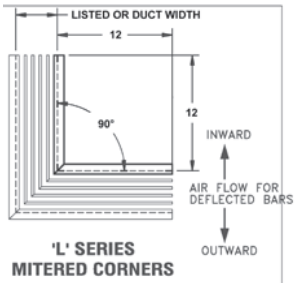
MOUNTING STYLE
0 - Standard (Floor or Sill)
1 - Hanger Bracket (1-1/2” thru 12” only for 00 bar style only without mounted damper/control grid)
NOTE: #1 mounting style requires inside hemmed duct for hanger bracket
2 - Mounting Frame
3 - Screw Holes in Margin
GO - Concrete/Tile Mounting Frame
OO - Bars only

SIZE
Length x Width (inches)

FINISH
SA - Satin Anodized
W - Painted White



Mitered Corner Sections furnished as shown.
Blank off baffles available upon request.



See page 47 for distribution plenums.

L Series Mitered Corners

Mitered corner sections furnished as shown.

HOW TO ORDER

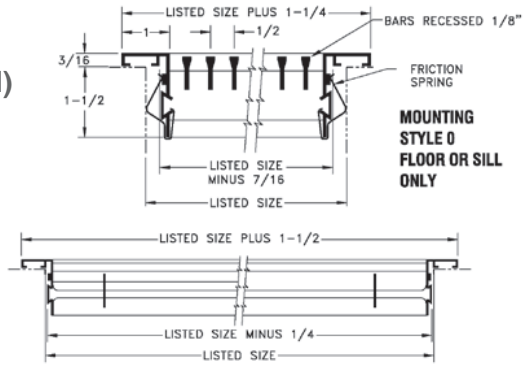
MCL1

- MODEL
- F - Floor
  S - Sidewall
- BAR STYLE
  00 - Straight
  01 - Pencil Proof
  15 - 15° deflection
  30 - 30° deflection
- MOUNTING STYLE
  0 - Standard (Floor or Sill)
  1 - Hanger Bracket (1-1/2” thru 12” for 00 bar style only)
  NOTE: #1 mounting style requires inside hemmed duct for hanger bracket
  2 - Mounting Frame
  3 - screw holes in Margin
- MITER TYPE
  - Specify I (Inside) or O (Outside) deflection on Bar Style 15 or 30 only
  - For all sidewall applications specify SI (Sidewall Inside) or SO (Sidewall Outside)
  - For Bar Style 15 and 30 sidewall also specify up or down — SIU, SID, SOU, SOD
- MITER DEGREE
  (Specify Miter Angle)
- WIDTH
- FINISH
  SA - Satin Anodized
  W - Painted White

Engineering Data on Page 102-103

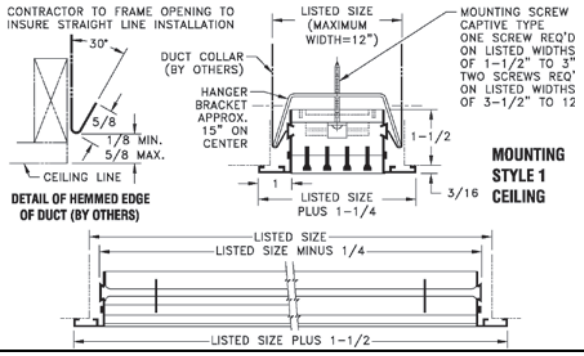
L Series - Dimensional Data

Mounting Style 0 (Floor/Sill) LF

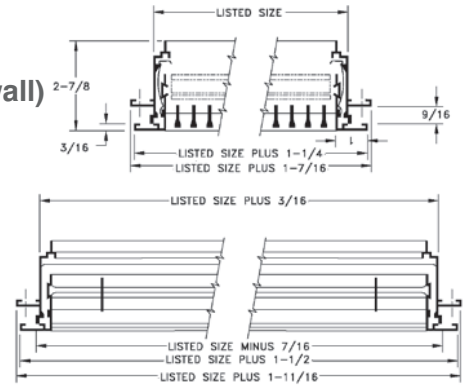


Mounting Style 1 (Ceiling) LS

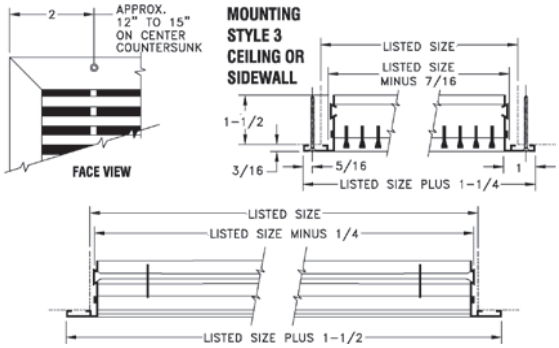
00 Bar Style Only w/o Mounted Damper or Control Grid



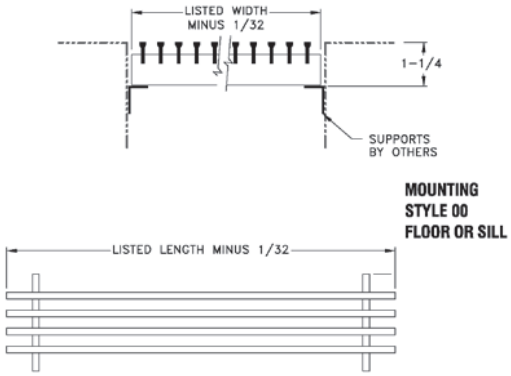
Mounting Style 2 (Ceiling/Sidewall) LS



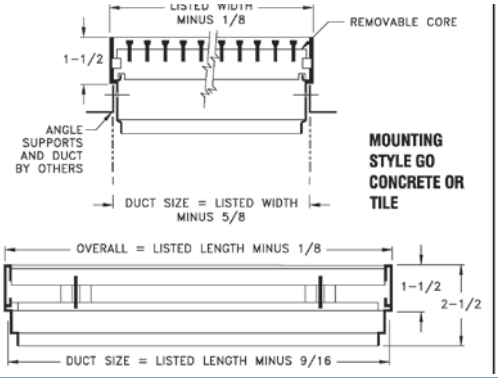
Mounting Style 3 (Ceiling/Sidewall) LS

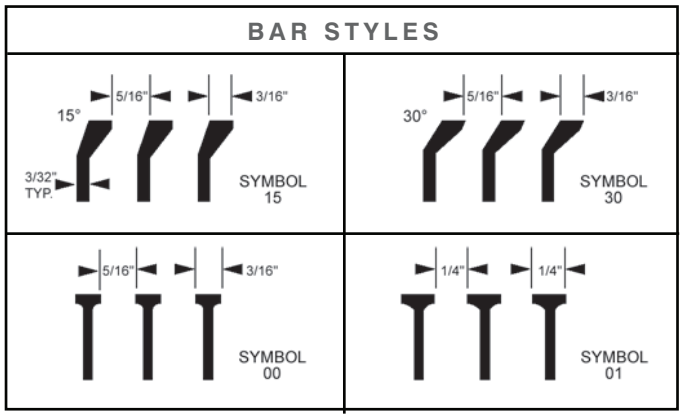


Mounting Style 00 (Bars Only)



Mounting Style GO (Concrete/Tile) LF





Bars on 1/2" Centers

Note: Quantity of bars = 2 x listed width minus 2.

Example: 4" listed width = 4" x 2 = 8 minus 2 = 6 bars.

Engineering Data on Page 102-103

L Series Single-Leaf Damper Option

- Aluminum construction
- Leaf type for sizes 1 1/2" to 3"

Note: Order with desired diffuser for attachment at factory.

Cannot be used with hanger brackets.

L Series G Grid Option

- Aluminum construction
- Individual adjustable blades
- Cannot be used with hanger brackets

Note: G Grid blades are assembled parallel to short dimension. Order with desired diffuser for factory fitting.

L Series D Damper Option

- Extruded aluminum construction
- Controls the air volume from full flow to shut-off
- Fits widths of 3 1/2" and wider

Note: Order with desired diffuser for attachment at factory.

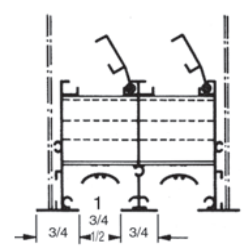
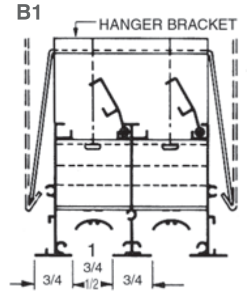
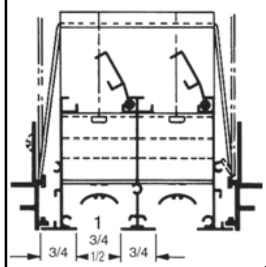
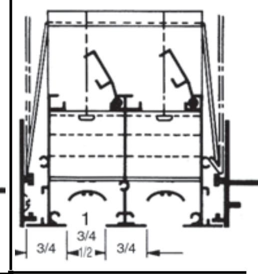
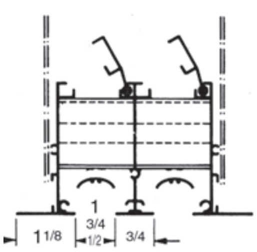
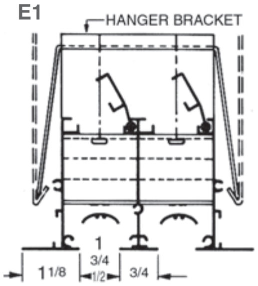
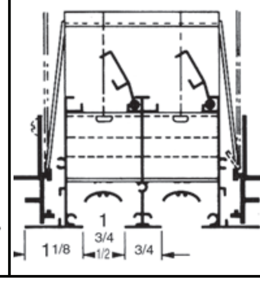
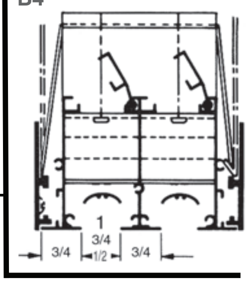
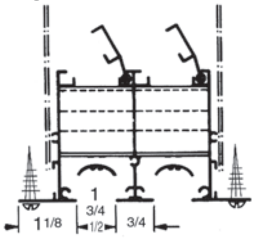
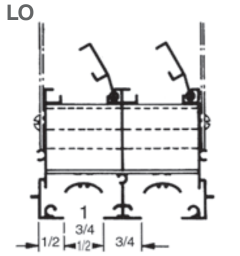
Must be ordered separately and duct-mounted if mounting style #1 is used.

D Available Sizes (in.)
3 1/2" and wider

Engineering Data on Page 102-103

HART COOLEY

S Series Slot Diffusers

MARGIN STYLE	SLOT	DIFFUSER ONLY Mounting Style 0	with Hanger Bracket Mounting Style 1	with No. 2 Standard Mounting Plaster Frame	with No. 3 Wall-Mounting Plaster Frame
 End Cap	1" 3/4" 1/2"	BO 	B1 	B2 	B3 
	1" 3/4" 1/2"	EO 	E1 	E2 	with No. 4 Wall-to-Wall Mounting Plaster Frame B4 
 End Cap	1" 3/4" 1/2"	FO 			
	1" 3/4" 1/2"	LO  **Note:** Narrow regress T-Bar ceiling only.			

HOW TO ORDER

S __ __ __ __ __ __ __ __

- TYPE
  - 50 - 1/2" Slot
  - 75 - 3/4" Slot
  - 10 - 1" Slot
- STYLE
  - 1 - Diffuser Only
  - 2 - Diffuser w/Pattern Controller
  - 3 - Diffuser w/ Damper
  - 4 - Diffuser w/Pattern Controller and Damper
- Number of slots 01 to 10
- MARGIN (see pages 45-46)
  - B
  - E
  - F
  - L
- MOUNTING STYLE
  - 0 - None (Diffuser only)
  - 1 - Hanger Bracket*
  - 2 - Standard Mounting Frame
  - 3 - Wall Mounting Frame
  - 4 - Wall-to-Wall Mounting Frame
- END CAPS
  - E1 - One End
  - E2 - Both Ends
  - 00 - None
- LENGTH (in.)
- FINISH (SA, W)

Note: Margins ordered without mounting frame may require hanger brackets and inside hemmed duct for installation.

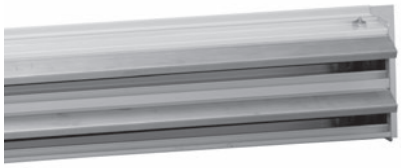
Note: The width dimension is determined by the slot width and the number of slots.

* When using the larger bracket for sheetrock, the E margin is recommended.

- Extruded aluminum construction
- Three slot sizes: 1/2" slot, 3/4" slot, 1" slot
- One to ten slots wide for air volume of 10-350 cfm per foot
- Adjustable pattern controller
- Four margin styles
- Maximum one-piece length 72", lengths over 72" made in multiple units with keyway splices for even continuous lengths. Any fractional inch increment of length.
- Available as diffuser only, diffuser with damper or pattern controller, and diffuser with damper and pattern controller. See style details on page 41.

See page 47 for distribution plenums.

Engineering Data on Page 104-107



Damper

Single-leaf dampers are furnished in each slot opening throughout the entire diffuser length when specified. Dampers are fastened to the margin and are spring-loaded to hold their setting at all duct pressures. Multiple dampers are furnished for grille lengths over 24 inches.

Dampers are part of the S Series and are not specified separately.

Frames

Plaster frames are available to provide a positive-dimensioned ceiling or wall opening for the diffuser or grille.

Frames for S Series diffusers are furnished with formed bridge spacers to maintain a uniform, rigid opening during installation. The duct collar is fastened to the frame.

See specific S Series for frame dimensions and installation details.

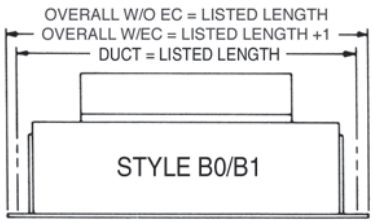
No. 2

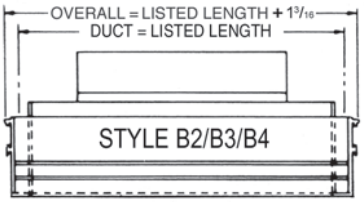
No. 3

No. 4

STYLE DETAILS	
1  DIFFUSER ONLY	2  DIFFUSER AND PATTERN CONTROLLER
3  DIFFUSER AND DAMPER	4  DIFFUSER, DAMPER AND PATTERN CONTROLLER

Engineering Data on Page 104-107

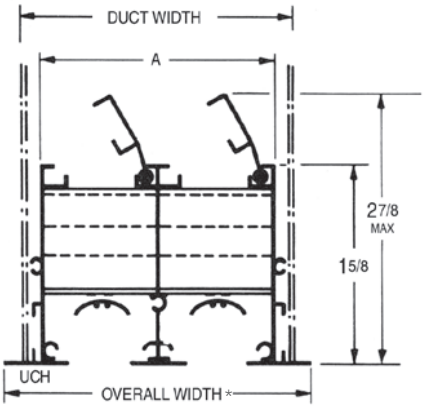




STYLE B0

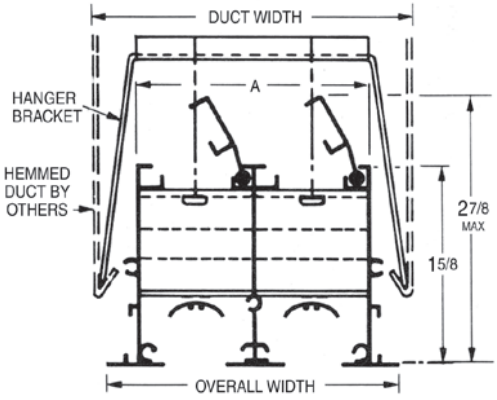
Also for T-Bar applications

Order 22 3/4" or 46 3/4" lengths *with End Caps.*



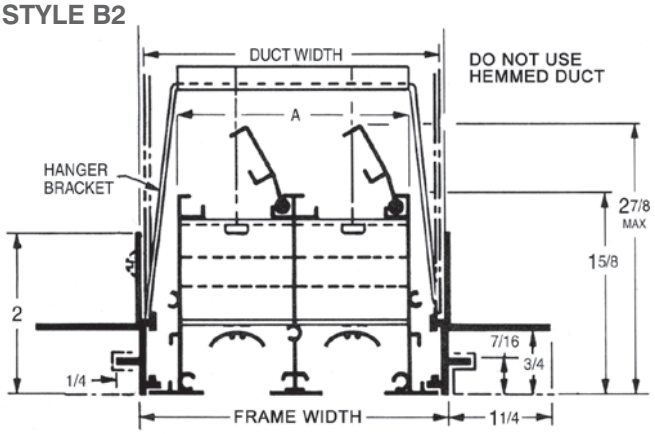
*Overall width is only 5/16" greater than the duct width.

STYLE B1

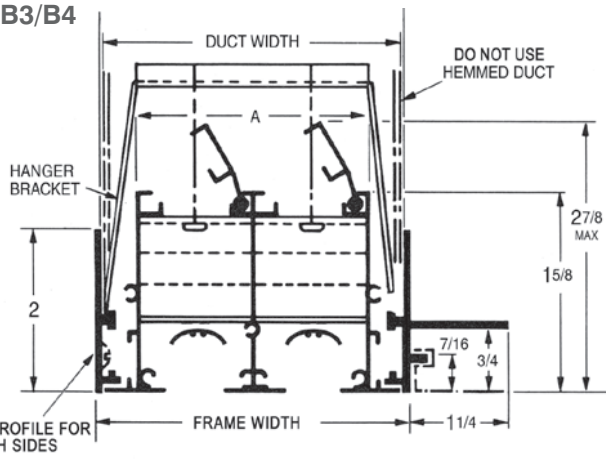


Duct width equals overall width.

STYLE B2



STYLE B3/B4



Style BO

Dimension	Type	Number of Slots										Duct Width	Overall Width
		1	2	3	4	5	6	7	8	9	10		
A	50	1 1/4	2 1/2	3 3/4	5	6 1/4	7 1/2	8 3/4	10	11 1/4	12 1/2	A + 7/16	A + 3/4
	75	1 1/2	3	4 1/2	6	7 1/2	9	10 1/2	12	13 1/2	15	A + 7/16	A + 3/4
	10	1 3/4	3 1/2	5 1/4	7	8 3/4	10 1/2	12 1/4	14	15 3/4	17 1/2	A + 7/16	A + 3/4

Style B1

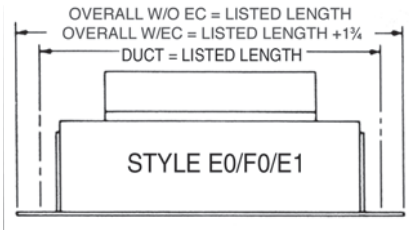
Dimension	Type	Number of Slots										Duct Width	Overall Width
		1	2	3	4	5	6	7	8	9	10		
A	50	1 1/4	2 1/2	3 3/4	5	6 1/4	7 1/2	8 3/4	10	11 1/4	12 1/2	A + 3/4	A + 3/4
	75	1 1/2	3	4 1/2	6	7 1/2	9	10 1/2	12	13 1/2	15	A + 3/4	A + 3/4
	10	1 3/4	3 1/2	5 1/4	7	8 3/4	10 1/2	12 1/4	14	15 3/4	17 1/2	A + 3/4	A + 3/4

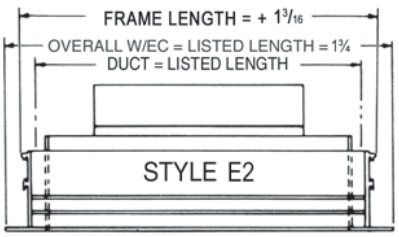
Style B2/B3/B4

Dimension	Type	Number of Slots										Duct Width	Frame Width
		1	2	3	4	5	6	7	8	9	10		
A	50	1 1/4	2 1/2	3 3/4	5	6 1/4	7 1/2	8 3/4	10	11 1/4	12 1/2	A + 13/16	A + 15/16
	75	1 1/2	3	4 1/2	6	7 1/2	9	10 1/2	12	13 1/2	15	A + 13/16	A + 15/16
	10	1 3/4	3 1/2	5 1/4	7	8 3/4	10 1/2	12 1/4	14	15 3/4	17 1/2	A + 13/16	A + 15/16

Engineering Data on Page 104-107

Linear and Slot Diffusers

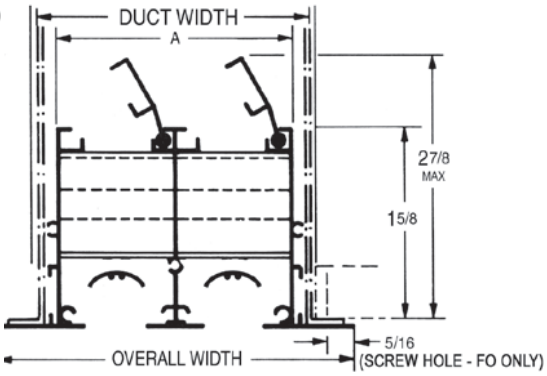




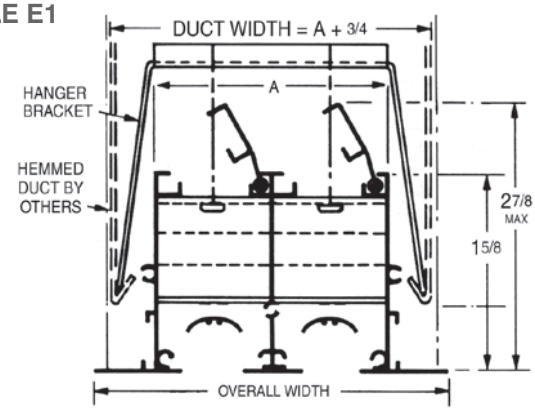
STYLE E0/F0

Also for T-Bar applications

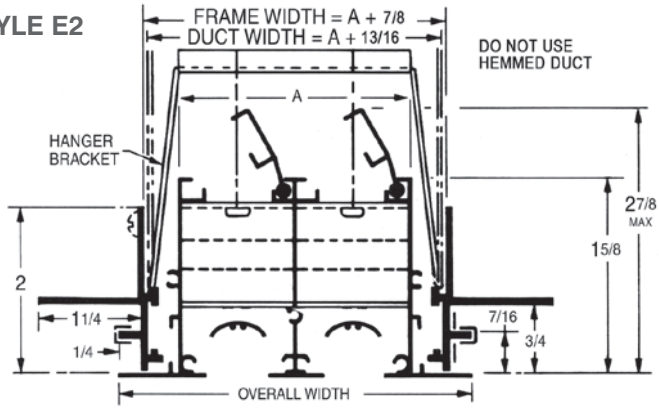
For E0, order 22" and 46" lengths *with End Caps*.



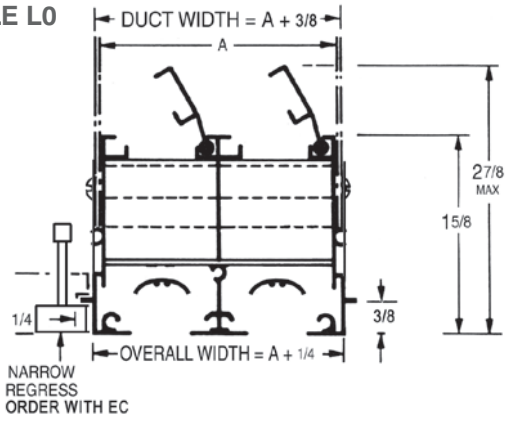
STYLE E1



STYLE E2



STYLE L0



Style E1

Dimension	Type	Number of Slots										Overall Width
		1	2	3	4	5	6	7	8	9	10	
A	50	1 1/4	2 1/2	3 3/4	5	6 1/4	7 1/2	8 3/4	10	11 1/4	12 1/2	A + 1 1/2
	75	1 1/2	3	4 1/2	6	7 1/2	9	10 1/2	12	13 1/2	15	A + 1 1/2
	10	1 3/4	3 1/2	5 1/4	7	8 3/4	10 1/2	12 1/4	14	15 3/4	17 1/2	A + 1 1/2

Style E2

Dimension	Type	Number of Slots										Overall Width
		1	2	3	4	5	6	7	8	9	10	
A	50	1 1/4	2 1/2	3 3/4	5	6 1/4	7 1/2	8 3/4	10	11 1/4	12 1/2	A + 1 1/2
	75	1 1/2	3	4 1/2	6	7 1/2	9	10 1/2	12	13 1/2	15	A + 1 1/2
	10	1 3/4	3 1/2	5 1/4	7	8 3/4	10 1/2	12 1/4	14	15 3/4	17 1/2	A + 1 1/2

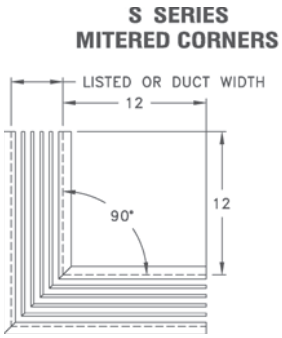
Style E0/F0

Dimension	Type	Number of Slots										Duct Width	Overall Width
		1	2	3	4	5	6	7	8	9	10		
A	50	1 1/4	2 1/2	3 3/4	5	6 1/4	7 1/2	8 3/4	10	11 1/4	12 1/2	A + 7/16	A + 1 1/2
	75	1 1/2	3	4 1/2	6	7 1/2	9	10 1/2	12	13 1/2	15	A + 7/16	A + 1 1/2
	10	1 3/4	3 1/2	5 1/4	7	8 3/4	10 1/2	12 1/4	14	15 3/4	17 1/2	A + 7/16	A + 1 1/2

Style L0

Dimension	Type	Number of Slots										Overall Width
		1	2	3	4	5	6	7	8	9	10	
A	50	1 1/4	2 1/2	3 3/4	5	6 1/4	7 1/2	8 3/4	10	11 1/4	12 1/2	A + 1 1/2
	75	1 1/2	3	4 1/2	6	7 1/2	9	10 1/2	12	13 1/2	15	A + 1 1/2
	10	1 3/4	3 1/2	5 1/4	7	8 3/4	10 1/2	12 1/4	14	15 3/4	17 1/2	A + 1 1/2

Engineering Data on Page 104-107



S Series Mitered Corners

90-degree mitered corners are available as factory-fabricated section. Precise factory cutting and assembly reduces field fabrication time and assures proper fit. Corner sections are furnished and blanked off. Corner sections butt to adjacent straight sections, which are spliced together with aligning keys.

Mitered corners are furnished in style #4 (with pattern controller and damper). When viewed from the room side, the mitered corner section appears identical to the butting straight sections.

Plaster frame mitered corners can be specified with the outlet mitered corner.

Mitered Corner Sections Order as:

S — TYPE
50 - 1/2" Slot
75 - 3/4" Slot
10 - 1" Slot

NO. OF SLOTS
01 - 10

MARGIN (see page 43)
B
E
F
L

MOUNTING STYLE
0 - None (Diffuser only)
1 - Hanger Bracket
2 - Standard Mounting Frame
3 - Wall Mounting Frame
4 - Wall-to-Wall Mounting Frame

MITER TYPE
C - Ceiling
SI - Sidewall Inside
SO - Sidewall Outside

MC 90

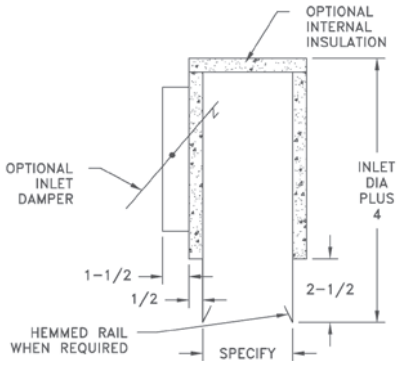
FINISH
SA - Satin Anodized
W - Painted White

Note: Margins ordered without mounting frame may require hanger brackets and inside hemmed duct for installation.

DP Distribution Plenum

- Galvannealed steel construction
- For L and S Series Linears and Slots
- Available in insulated or noninsulated designs

DP Available Sizes
12", 24", 36", 48", 60", 72" lengths



DP

I - Internally insulated
N - Noninsulated

Nominal Length - 12" to 72"

Number of slots for slot diffuser. Listed width in inches for linear bar grilles

S - Slots for slot diffusers
W - Listed width for linear bar grilles

H - Hemmed rail for concealed mfg. hanger brackets - Do not use with mounting frames
S - Straight sides - Use with all mounting frames

Inlet size 5" to 12"

N - No Inlet
O - Oval Inlet
R - Round Inlet

D - Inlet Damper
N - No Damper

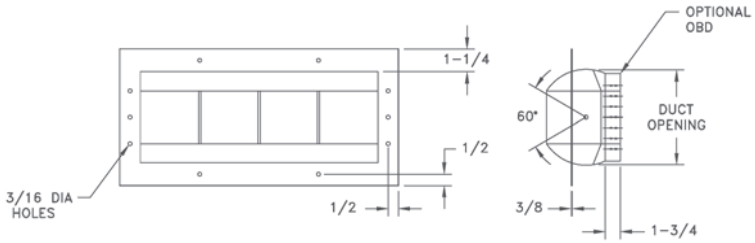
Engineering Data on Page 104-107

DL Drum Louver

- All-aluminum construction
- Horizontal and vertical air stream control
- Galvanized, opposed-blade damper (optional)
- Adjustable drum and vane design
- White or Mill finish

Drum Louver Available Sizes
6" x 12", 6" x 18", 6" x 24", 6" x 30", 6" x 48", 6" x 60"
10" x 20", 10" x 25", 10" x 30", 10" x 35", 10" x 40", 10" x 50"
12" x 30", 12" x 40", 12" x 50", 12" x 70"
15" x 30", 15" x 50", 15" x 60", 15" x 70"

Order H x W



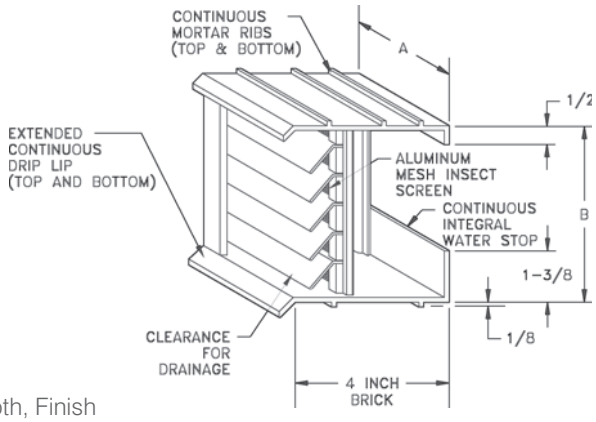
Duct Opening Sizing		
Listed Height Size	**Duct Opening Height**	**Duct Opening Width**
6	Listed Size Plus $^{5}/_{8}$	Listed Size Plus $1^{1}/_{8}$
10	Listed Size Plus $^{3}/_{8}$	Listed Size Plus $1^{1}/_{8}$
12	Listed Size Plus $^{3}/_{8}$	Listed Size Plus $1^{1}/_{8}$
15	Listed Size Plus $^{3}/_{8}$	Listed Size Plus $1^{1}/_{8}$

Other sizes not available.

Engineering Data on Page 108-109

BV Brick/Block Vent

- Extruded aluminum construction
- Standard masonry size
- Maximum water protection
- 6063-T5 extruded aluminum alloy
- 18 x 16 mesh aluminum insect screen standard
- 4" standard depth
- Satin Anodized finish



Note: To order specify Model, Depth, Finish

Example: BV168 4 SA

DIMENSIONS/FREE AREA

	BV Model	Masonry Opening Size	A Width Inches	B Height Inches	Free Area Sq. Ft.
STANDARD BRICK	802	ONE BRICK	8	$2^1/_2$	.01
	805	TWO BRICK	8	$4^3/_4$	.06
	162	TWO BRICK	$16^3/_8$	$2^1/_2$	.02
	808	THREE BRICK	8	$7^1/_2$	.13
	242	THREE BRICK	$24^3/_4$	$2^1/_2$	.04
	165	FOUR BRICK	$16^3/_8$	$4^3/_4$	.14
	168	SIX BRICK	$16^3/_8$	$7^1/_2$	.30
	245	SIX BRICK	$24^3/_4$	$4^3/_4$	.23
	248	NINE BRICK	$24^3/_4$	$7^1/_2$	.50
JUMBO BRICK	122	ONE JUMBO	$11^5/_8$	$2^1/_2$	.02
	125	TWO JUMBO	$11^5/_8$	$4^3/_4$	.10
	128	THREE JUMBO	$11^5/_8$	$7^1/_2$	.21
MODULAR BLOCK	158	STANDARD BLOCK	$15^1/_2$	$7^1/_2$	.30
	318	TWO STANDARD BLOCK	$31^3/_8$	$7^1/_2$	.66
	168	JUMBO BLOCK	$16^3/_8$	$7^1/_2$	.30

Notes:

1. Brick/Block vent depths are identical with or without the optional opposed-blade damper.
2. Contact factory regarding applications requiring custom size widths and/or heights.
3. Masonry opening sizes listed are representative of the blocks or bricks shown. Field dimensions must be verified to guarantee fit.

4ABC Adjustable Louver

- Extruded aluminum construction
- Adjustable baffle blades on 4" centers
- 4" louver depth
- Channel frame
- Max. one-piece size 60" W x 72" H
- Mill finish standard
- Lever activated, manually
- Blades open to 45°; closes fully

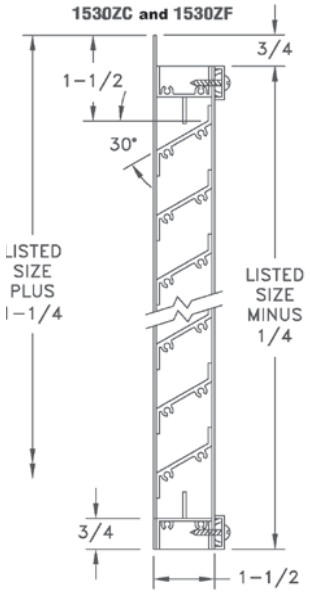
1530ZC Shown

1530ZC Stationary Louver

- Extruded aluminum construction
- Fixed Z blade louver
- Blades at 30-degree angle
- $1\frac{1}{2}$" louver depth
- Channel frame
- Available with bird screen or insect screen
- Mill finish standard

1530ZF Stationary Louver

- Extruded aluminum construction
- Fixed Z blade louver
- Blades at 30-degree angle
- $1\frac{1}{2}$" louver depth
- Flange frame
- Available with bird screen or insect screen
- Mill finish standard



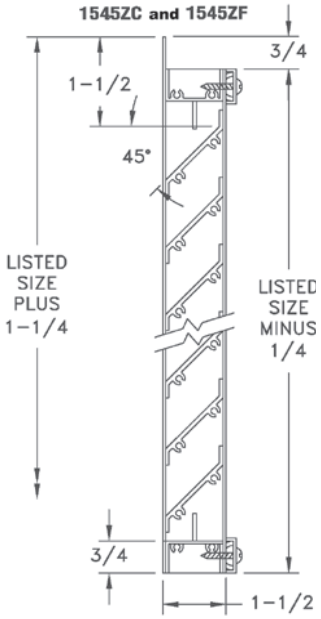
1545ZF Shown

1545ZC Stationary Louver

- Extruded aluminum construction
- Fixed Z blade louver
- Blades at 45-degree angle
- $1\frac{1}{2}$" louver depth
- Channel frame
- Available with bird screen or insect screen
- Mill finish standard

1545ZF Stationary Louver

- Extruded aluminum construction
- Fixed Z blade louver
- Blades at 45-degree angle
- $1\frac{1}{2}$" louver depth
- Flange frame
- Available with bird screen or insect screen
- Mill finish standard



Engineering Data on Page 110

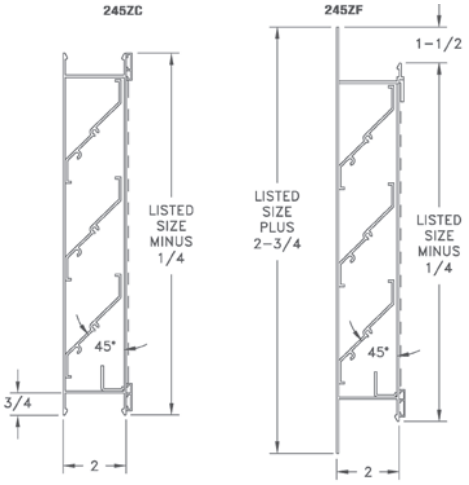
245ZF Shown

245ZC Stationary Louver

- Extruded aluminum construction
- Fixed-blade louver
- Blades at 45-degree angle
- 2” louver depth
- Channel frame
- Available with bird screen or insect screen
- Mill finish standard

245ZF Stationary Louver

- Extruded aluminum construction
- Fixed-blade louver
- Blades at 45-degree angle
- 2” louver depth
- Flange frame
- Available with bird screen or insect screen
- Mill finish standard



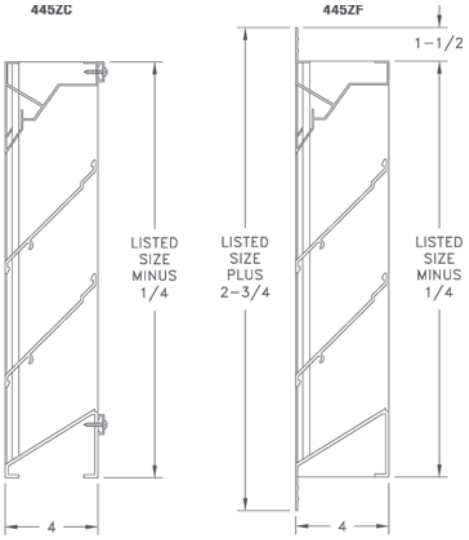
445ZF Shown

445ZC Stationary Louver

- Extruded aluminum construction
- Fixed-blade louver
- Blades at 45-degree angle
- 4” louver depth
- Channel frame
- Available with bird screen or insect screen
- Mill finish standard

445ZF Stationary Louver

- Extruded aluminum construction
- Fixed-blade louver
- Blades at 45-degree angle
- 4” louver depth
- Flange frame
- Available with bird screen or insect screen
- Mill finish standard



645ZC Shown

645ZC Fixed Louver

- Extruded aluminum construction
- Fixed-blade louver
- Blades at 45-degree angle
- 6” louver depth
- Channel frame
- Available with bird screen or insect screen
- Mill finish standard

645ZF Fixed Louver

- Extruded aluminum construction
- Fixed-blade louver
- Blades at 45-degree angle
- 6” louver depth
- Flange frame
- Available with bird screen or insect screen
- Mill finish standard

Engineering Data on Page 110

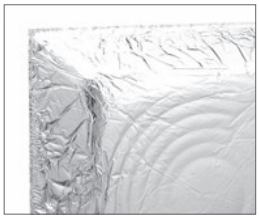
T-Bar Construction Features

Our popular supply and return products for T-Bar ceilings are an innovative response to the challenge of creating a better indoor environment. T-Bar products combine clean appearance with installation ease, and include critical design details to ensure consistent performance. Glass fiber insulation minimizes condensation, and the aluminum foil vapor barrier protects the insulation from moisture, if condensation occurs.

Patented adjustable deflectors permit a variety of directional patterns and minimizes static pressure loss.

A unique modular collar system provides a standard collar and damper unit, which can be shared between a number of different T-Bar products. In addition, Hart & Cooley offers specialty T-Bar products to meet specific design demands. Surfaire® diffusers feature deflector apertures that enhance mixing of conditioned air.

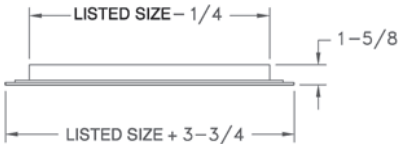
T-Bar products are offered in lanced, perforated, louvered and fixed-bar face styles, with steel or molded fiberglass backs. They include a choice of easy mounting systems and adjustable damper designs.



659T
Steel
Lanced Filter Grille

659T / 659TI Available Sizes
20" x 20" with extended frame (overall 23 3/4" x 23 3/4") for 24" x 24" openings
44" x 20" with extended frame (overall 47 3/4" x 23 3/4") for 48"x24" opening (659T only)

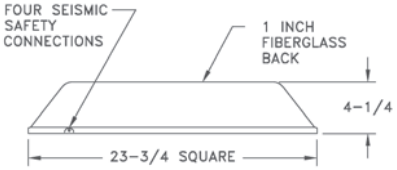
- Steel construction
- Lanced-face design with 1/3" blade spacing
- Flush, removable face with concealed latches and hinges can be installed in any direction
- Uses standard 1" disposable filters (not furnished)
- Bright White finish



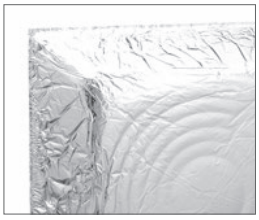
659TI With Insulated Back

Includes these features

- Molded fiberglass back R4.2, R6 (see information on page 54)
- Accepts 6" to 14" unique tab collar (6400 series) or 6" to 16" unique snap-in collar (5400 and 5400PP series); also accepts standard spin-in collar
- Frame includes four seismic safety connections



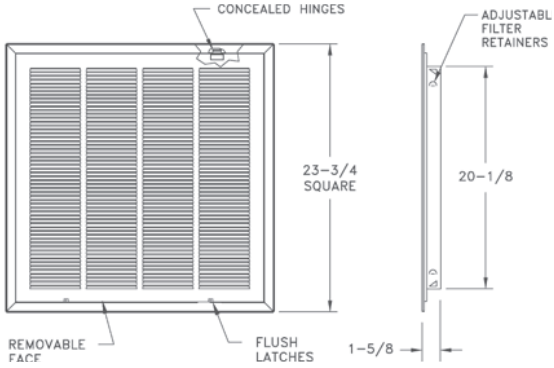
See page 54 for fiberglass specifications.



673T
Steel
Filter Grille

673T/673TI Available Size
20" x 20", overall 23 3/4" x 23 3/4"

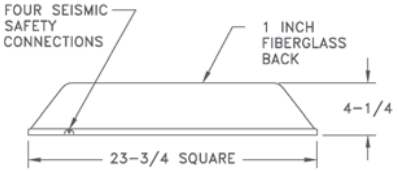
- Steel construction
- Lanced-face design with 1/2" blade spacing
- Flush, removable face with concealed latches and hinges can be installed in any direction
- Uses standard 1" disposable filters (not furnished)
- Bright White finish



673TI With Insulated Back

Includes these features

- Molded fiberglass back R4.2, R6 (see information on page 54)
- Accepts 6" to 14" unique tab collar (6400 series) or 6" to 16" unique snap-in collar (5400 and 5400PP series); also accepts standard spin-in collar
- Frame includes four seismic safety connections

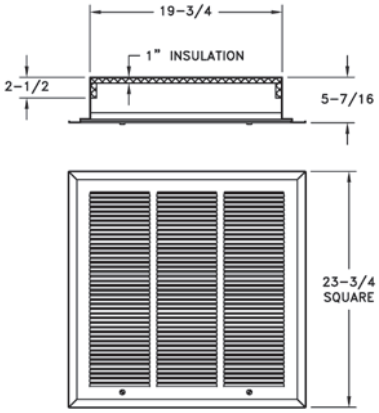


T-Bar Return-Air Filter Grilles

673TPI R6
Steel
Filter Grille

- Steel construction
- Lanced-face design with 1/2" blade spacing
- Flush, face with screwdriver latches and piano hinges can be installed in any direction
- Plenum box with R6 insulated ductboard
- Uses standard 1" disposable filters (not furnished)
- Bright White finish

673TPI R6 Available Size
20" x 20", overall 23¾" x 23¾"



Note: Attachment of molded fiberglass back and 5400 collar requires 5400PP (push pins).

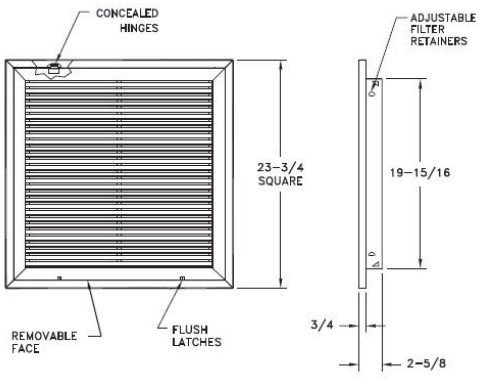
Molded Fiberglass Back
R4.2, R6 & R8

- These fiberglass backs are sold separately for field installation. (Glue or double sided tape recommended)
- Available in 4.2, 6.0 and 8.0 "R" values
- Recommended for T-bar diffusers without steel back panel
- Accepts 6"-14" tab collars (6400 series) or 6"-18" snap in collar (5400 & 5400PP Series)
- Accepts standard spin-in collar
- Bonded foil vapor barrier minimizes condensation
- Fiberglass back meets or exceeds the following tests and ratings:
  Meets 25/50 tested in accordance with A.S.T.M. E84 (UL723)
  UL181 Erosion and Impact Test, and will not support microbial growth

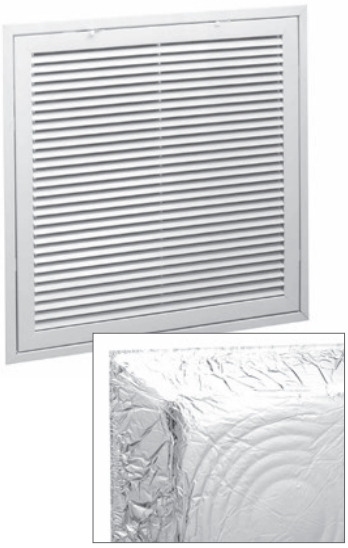
96AFBT
Steel
Fixed-Bar Filter Grille

- All-steel construction
- Bar-style face design
- Flush, removable face with concealed latches and hinges, can be installed in any direction
- Uses standard 1" disposable filters (not furnished)
- Bright White finish
- Specify 96AFBT2 for 2" filters

96AFBT Available Sizes
20" x 20", overall 23¾" x 23¾"
44" x 20", overall 47¾" x 23¾"



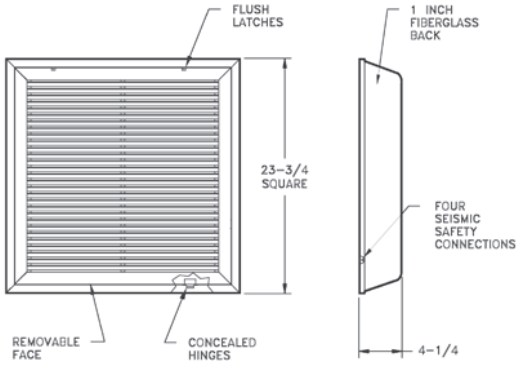
Engineering Data on Page 114



See page 54 for fiberglass specifications.

96AFBTI
Steel
Fixed-Bar Filter Grille with Fiberglass Back

96AFBTI Available Size
20" x 20", overall 23¾" x 23¾"

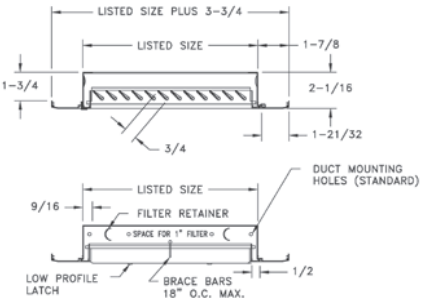


- Steel construction
- Bar-style face design
- Flush, removable face with concealed latches and hinges, can be installed in any direction
- R4.2 molded fiberglass back
- Accepts 6" to 14" unique tab collar (6400 series) or 6" to 16" unique snap-in collar (5400 and 5400PP series); also accepts standard spin-in collar
- Frame includes four seismic safety connections
- Uses standard 1" disposable filters (not furnished)
- Bright White finish

RHF45T
Aluminum
Bar-Style Filter Grille

RHF45T Available Sizes
20" x 20" with extended frame (overall 23 3/4" x 23 3/4") for 24" x 24" openings
44" x 20" with extended frame (overall 47 3/4" x 23 3/4") for 48" x 24" openings

- Extruded aluminum construction
- Bar-style face
- Hinged to filter frame, removable face
- Mounts flush with T-Bar ceilings
- Filter grilles equipped with plastic slide latch
- Uses standard 1" disposable filter (not furnished)
- Bright White or Satin Anodized finish
- Specify RHF45T2 for 2" filters

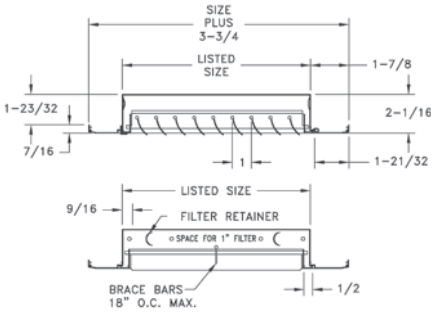


RCBFT
Aluminum
Curved-Blade Filter Grille

RCBFT Available Sizes
20" x 20" with extended frame (overall 23¾" x 23¾") for 24" x 24" openings
44" x 20" with extended frame (overall 47¾" x 23¾") for 48" x 24" openings

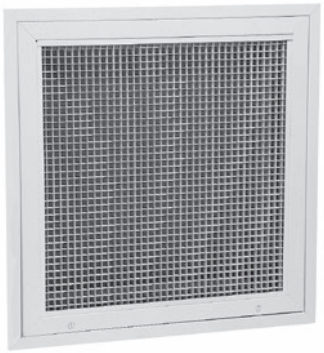
Engineering Data not available

- Extruded aluminum construction
- Curved-blade style face
- Hinged to filter frame
- Mount flush with T-Bar ceilings
- Filter grilles equipped with plastic slide latch
- Uses standard 1" disposable filter (not furnished)
- Bright White or Satin Anodized finish



Engineering Data on Page 114

T-Bar Return-Air Filter Grilles

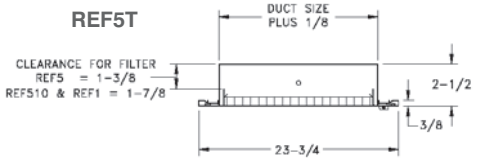


REF5T/REF5TI *Aluminum* Egg Crate Filter Grille

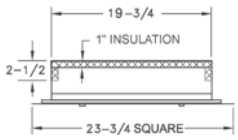
	Available Sizes
REF5T/ REF5TI	20” x 20” with extended frame (overall 23¾” x 23¾”) for 24” x 24” openings
REF5T only	44” x 20” with extended frame (overall 47¾” x 23¾”) for 48” x 24” openings

- Aluminum and steel construction
- Egg crate style face
- Hinged to filter frame
- Mount flush with T-Bar ceilings
- REF5T with thumb screw fasteners, REF5TI with cam lock
- Uses standard 1” disposable filter (not furnished)
- Bright White or Mill Aluminum finish
- Specify REF5T2 for 2” filters

REF5T



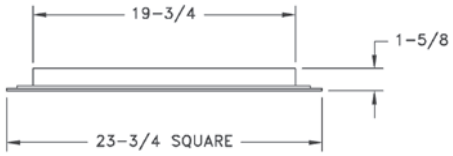
REF5TI R4.2 R6.0

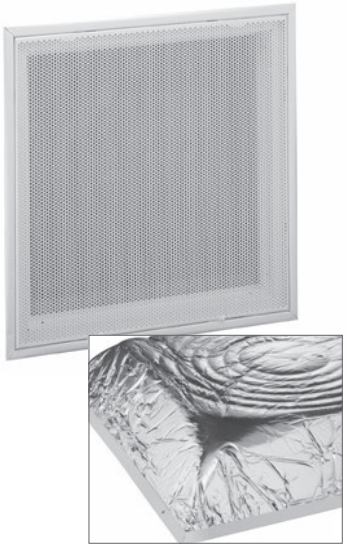


PFT *Steel* Perforated Filter Grille

PFT Available Size
20” x 20”, overall 23¾” x 23¾”

- Steel construction
- Perforated face design
- Flush, removable face with concealed latches and hinges, ca be installed in any direction
- Uses standard 1” disposable filte (not furnished)
- Bright White finish

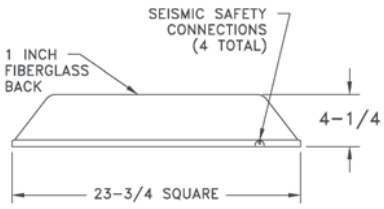




PFTI *Steel* Perforated Filter Grille with Insulated Back

PFTI Available Size
20” x 20”, overall 23¾” x 23¾”

- Steel construction
- Perforated face design
- Flush, removable face with concea latches and hinges, can be installe any direction
- Molded fiberglass back, available in R4.2 or R6
- Accepts 6” to 14” unique tab collar (6400 series) or 6” to 16” unique snap-in collar (5400 and 5400PP series); also accepts standard spin-in collar
- Frame includes four seismic safety connections
- Uses standard 1” disposable filters (not furnished)
- Bright White finish



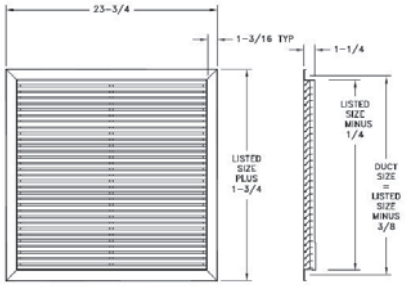
See page 54 for fiberglass specifications.

Engineering Data on Page 114

94AT *Steel* Bar-Style Return Grille

- Steel construction
- Mount flush with T-Bar ceilings
- Bright White finish

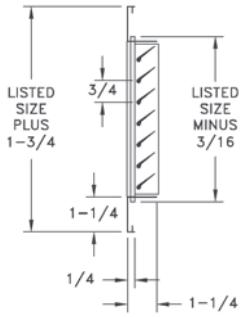
94AT Available Sizes
22" x 22" (overall 23¾" x 23¾") for 24" x24" openings
46" x 22" (overall 47¾" x 23¾") for 48" x 24" openings



RH45T *Aluminum* Bar-Style Return Grille

- Extruded aluminum construction
- Horizontal bars at 45 degree
- Mount flush with T-Bar ceilings
- Bright White or Satin Anodized finish

RH45T Available Sizes
22" x 22" (overall 23¾" x 23¾") for 24" x24" openings
46" x 22" (overall 47¾" x 23¾") for 48" x 24" openings

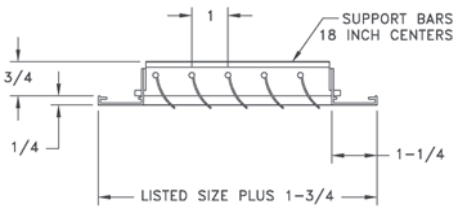


RCBT *Aluminum* Curved-Blade Return Grille

- Extruded aluminum construction
- Horizontal curved blades
- Mount flush with T-Bar ceilings
- Bright White or Satin Anodized finish

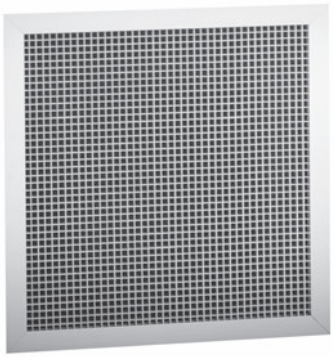
RCBT Available Sizes
22" x 22" (overall 23¾" x 23¾") for 24" x24" openings
46" x 22" (overall 47¾" x 23¾") for 48" x 24" openings

Engineering Data not available



Engineering Data on Page 114

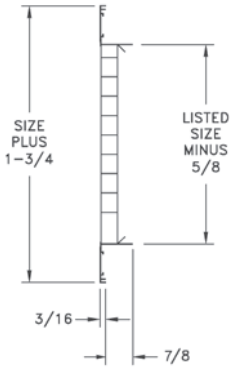
T-Bar Return-Air Grilles

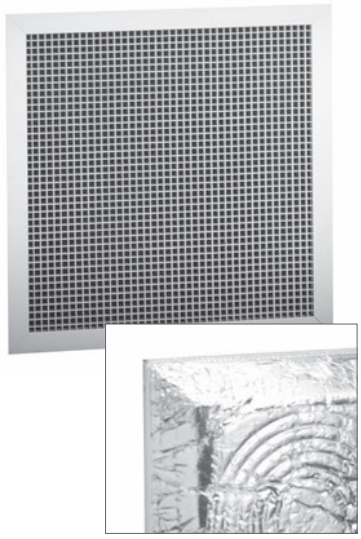


RE5T
Aluminum
Egg Crate Return Grille

RE5T Available Sizes
22" x 22" (overall 23¾" x 23¾") for 24" x24" openings
22" x 46" (overall 47¾" x 23¾") for 48" x 24" openings

- All aluminum construction
- Egg crate style face
- Mount flush with T-Bar ceilings
- Bright White or Mill Aluminum finish

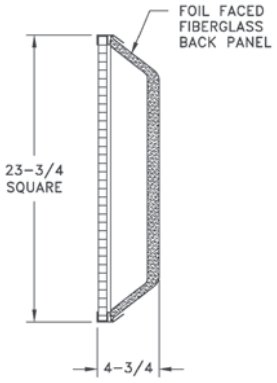




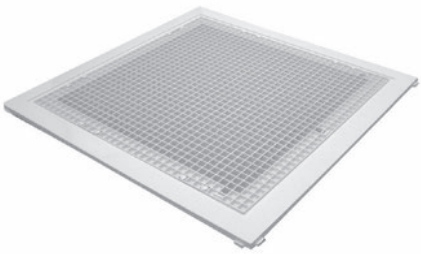
RE5TI
Aluminum
Egg Crate Return Grille with Insulated Back

RE5TI Available Size
grid core face ½" x ½" x ½"

- All aluminum construction
- Egg crate style face
- R4.2 molded fiberglass back
- Accepts 6" to 14" unique tab collar (6400 series) or 6" to 16" unique snap-in collar (5400 and 5400PP series); also accepts standard spin-in collar
- Bright White finish
- No steel, great for MRI rooms



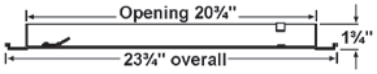
See page 54 for fiberglass specifications.



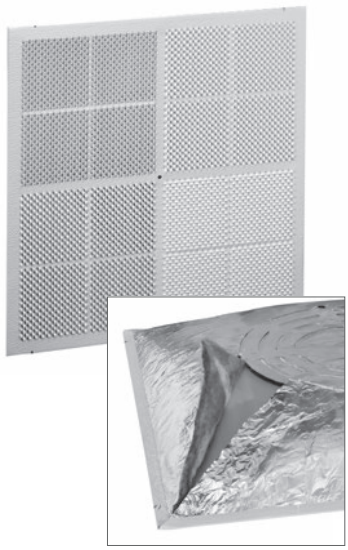
Rezzin Plastic T-Bar Egg-Crate Filter Grille

Available Size
20" x 20", overall 23¾" x 23¾"

- Egg crate style face, ½" x ½" x ½" grid pattern
- Face is hinged to filter frame
- Mounts flush with T-bar ceilings
- Uses Rezzin back panel or standard fiberglass back
- Uses standard 1" disposable filters
- Bright white finish
- Contains metal screws

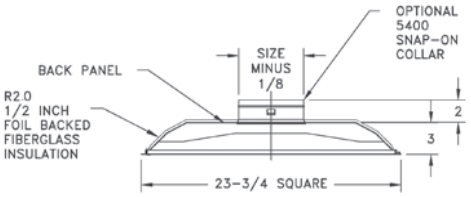


Engineering Data on Page 114

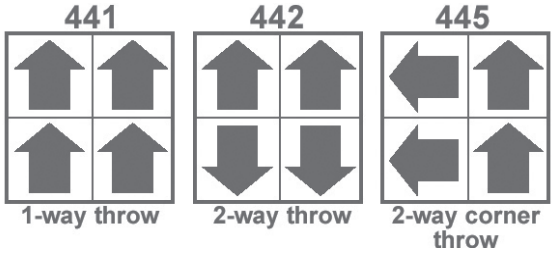


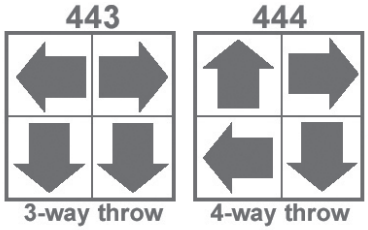
444 SurfAire®
Aluminum Face
Renovator Series Diffuser

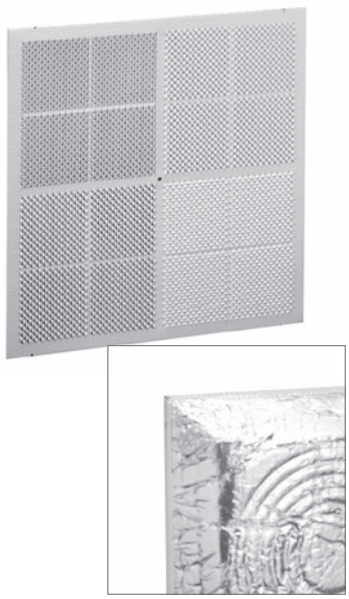
444 Available Size
overall size 23¾" x 23¾"



- Aluminum face
- Unique deflector apertures
- Air distributed in thin layers along ceiling surface allowing optimum mixing of conditioned air
- Formed galvanized steel back panel
- Frame includes four seismic safety connections
- Back plate covered with glass fiber insulation to reduce condensation
- Aluminum foil vapor barrier protects insulation from harmful effects of condensation
- Insulation prescored to accommodate collar size desired
- Accepts snap-in collar (5400 Series) (6" to 12")
- 444 - 14" collar is factory-installed
- Utilizes butterfly damper (3800 Series) inserted in collar
- Damper adjusted through diffuser face to allow proper air balancing
- Bright White finish

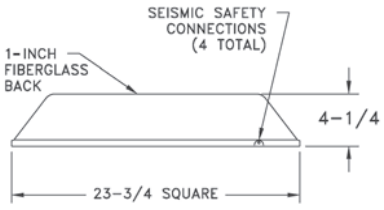






REN4
Aluminum Face
Renovator Series Diffuser with Insulated Back

REN4 Available Size
20" x 20", overall 23¾" x 23¾"



- Aluminum face
- Unique deflector apertures
- Molded fiberglass back panel, available in R4.2 or R6
- Accepts 6" to 14" unique tab collar (6400 series) or 6" to 16" unique snap-in collar (5400 and 5400PP series); also accepts standard spin-in collar
- Frame includes four seismic safety connections
- Bright White finish

See page 54 for fiberglass specifications.

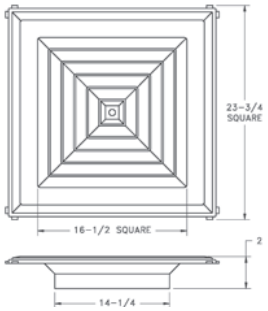
Engineering Data on Page 114-115

T-Bar Rezzin Diffusers

4-Way Rezzin T-Bar Diffuser

- Engineered polymer construction
- Four-way deflection
- Available with Rezzin square-to-round, ordered separately
- Bright White finish
- Contains metal screws

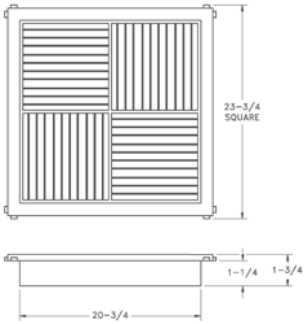
4-Way Diffuser Available Size (in.)
24 x 24



Rezzin T-Bar Modular Core Diffuser

- Engineered polymer construction
- Modular cores provide one, two, three, or four-way horizontal air patterns
- Removable modules provide easy access to accessories
- Available with Rezzin back panel, ordered separately
- Bright White finish

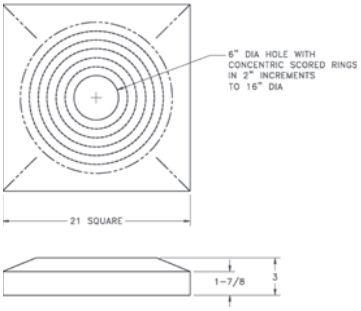
Modular Core Available Size (in.)
24 x 24



Rezzin Back Panel

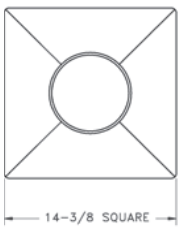
- Engineered polymer construction
- Use 6400 Series Tab Collar
- Bright White finish
- Use with Rezzin Modular Core and Rezzin Egg Crate diffuser

Back Panel Available Size (in.)
24 x 24

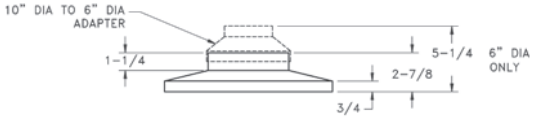


Rezzin Square-to-Round Transition

- Engineered polymer construction
- Allows flex duct installation for 4-Way Rezzin Diffuser
- Black finish
- Contains metal screws/clips
- Can use RD damper

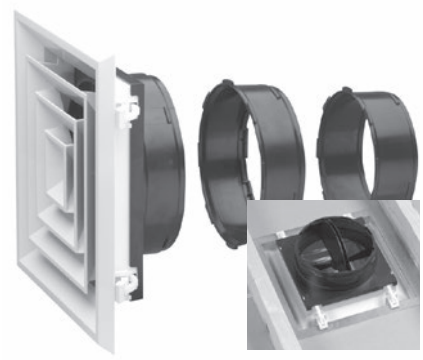


Sq to Rd Available Sizes (in.)	
Square Size	Round Neck
14 x 14	6
14 x 14	8
14 x 14	10
14 x 14	12
14 x 14	14



Engineering Data on Page 111-112

T-Bar Rezzin Diffusers

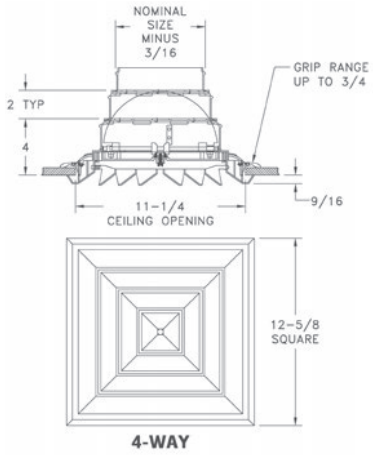


T-Bar Backer Plate or Rafter Rough-In Plate Available

Rezzin Square Ceiling Diffuser

- Engineered polymer construction
- 12”x12” face
- 6”, 7” and 8” collars included
- Ratcheting cam lock–install without screws
- Removable core and integral damper
- Available in 4-way, 3-way and 2-way corner
- Bright White finish
- Contains metal parts

Square Available Size (in.)
12 x 12



3-Way

4-Way

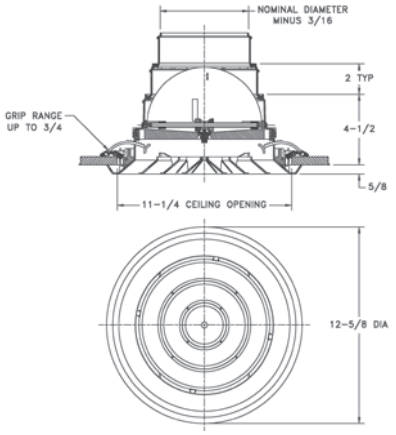
2-Way Corner

T-Bar Backer Plate or Rafter Rough-In Plate Available

Rezzin Plastic Round Ceiling Diffuser

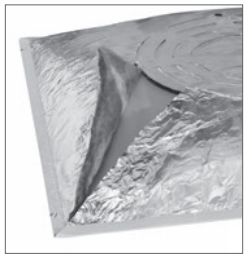
- Engineered polymer construction
- 12” round face
- 6”, 7” and 8” collars included
- Ratcheting cam lock–install without screws
- Removable core and integral damper
- Bright White finish
- Contains metal parts

Round Available Size (in.)
12"



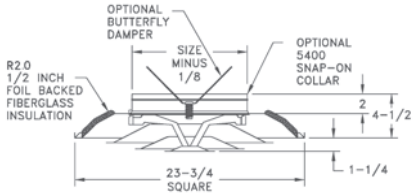
Engineering Data on Page 113

T-Bar Fixed-Pattern Diffusers



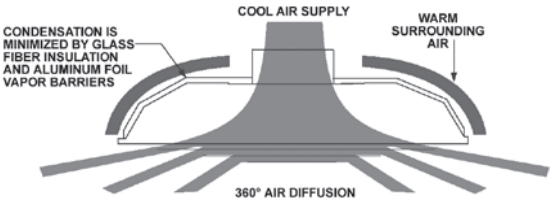
HVS/HVS R6
Steel
High-Volume Supply

HVS Available Size
Overall Size 23 3/4" x 23 3/4"



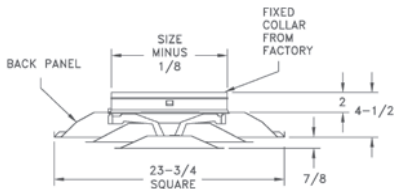
HVS Shown

- Steel construction
- Provides high air volume delivery
- 360-degree air diffusion
- Formed back panel
- Fixed core
- Fiberglass insulation blanket with foil vapor barrier to minimize condensation on HVS
- Insulation prescored to accommodate collar size desired
- R6 molded fiberglass back on HVS R6; use 5400 with 5400PP
- Accepts unique 2" high snap-in collar (5400 series) (6" to 12")
- Utilizes butterfly damper (3800 Series) inserted in collar
- Bright White finish
- HVS14–14" collar factory-installed

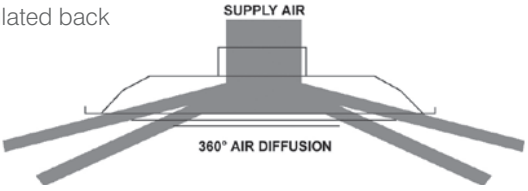


FPD/FPD R6
AFPD/AFPD R6
Steel/Aluminum
Fixed-Pattern Diffuser

FPD T-Bar Available Size
Overall Size 23 3/4" x 23 3/4"



- Steel construction - FPD
- Aluminum construction - AFPD
- Provides high air volume delivery
- 360-degree air diffusion
- Two-cone fixed core
- Fixed collar 6" to 14"
- Unique 2" high collar permits easy flex connections
- Utilizes butterfly damper (3800 Series) inserted in collar; order separately
- Damper adjustable through face
- Formed back panel
- Bright White finish
- FPD R6/AFPD R6 features insulated back

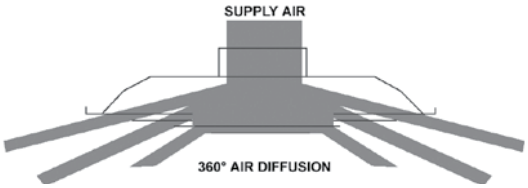


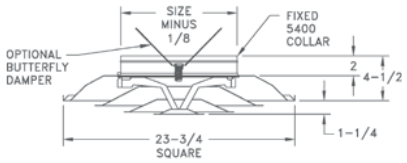
Engineering Data on Page 115

FPD3/FPD3 R6
Steel
Fixed-Pattern Diffuser

- Steel construction
- Provides high air volume delivery
- 360-degree air diffusion
- Three cone fixed core
- Fixed collar 6" to 14"
- Unique 2" high collar permits easy flex connections
- Utilizes butterfly damper (3800 Series) inserted in collar–order separately
- Damper adjustable thru face
- Formed steel back panel
- Bright White finish
- FPD3 R6 features insulated back

FPD3 T-Bar Available Size
Overall Size 23 3/4" x 23 3/4"

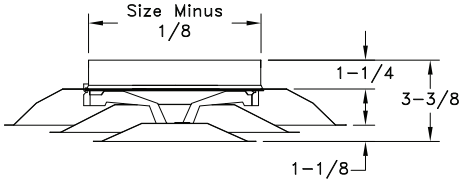




FPD12 Steel Fixed Pattern Diffuser

- Steel construction
- 360-degree air diffusion
- Two-cone fixed core
- Fixed collar
- Removable plug for damper
- Used with SMF (page 74) for surface-mount applications
- Bright White finish
- Accepts Model RD Radial Damper

FPD12 Available Size
Overall Size 11-3/4" x11-3/4"



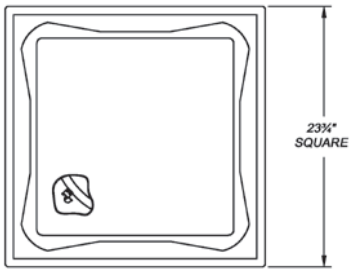
Engineering Data on Page 115, 118

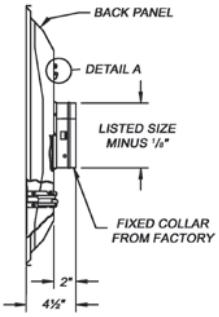
T-Bar Fixed-Pattern Diffusers

DPD/DPD R6
Steel
T-Bar Plate Diffuser

DPD/DPD R6 Available Sizes				
6"	8"	10"	12"	14"

- Aesthetically appealing, single-face plate design
- 360° air diffusion pattern
- Detachable face plate
- 2" fixed collar
- Optional R6 insulated back (DPD R6)
- White finish

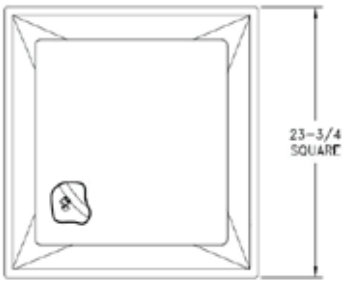


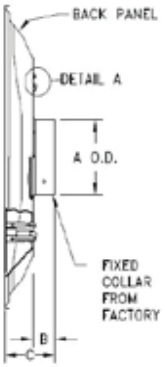


Removing Face Plate
1. Remove black push pins from hook.
2. Push the face plate towards the back panel. This will disengage the hooks from the backside panel slots *(Detail A)*.
3. Rotate the face plate counterclockwise, and pull plate away from back panel and hooks through the slots.

ADPD
Aluminum
T-Bar Plate Diffuser

- Aesthetically appealing, single-face plate design
- 360° air diffusion pattern
- Detachable face plate
- 2" fixed collar
- Constructed of 100% aluminum allowing for MRI applications
- Can be used with SMF 24 x 24 W surface mount frames for drywall applications
- White finish

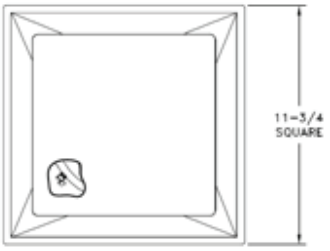




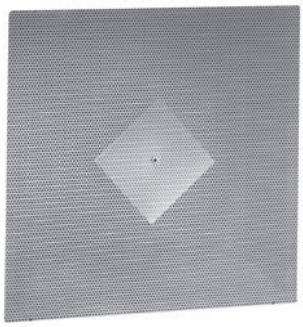
Tbar grid	round duct size	B	C
12 x 12	6, 7	1-1/8"	2-1/4"
	8	1-1/4"	2-3/8"
24 x 24	6,8	1-1/4"	3-3/4"
	10,12,14	1-3/8"	3-7/8"

DPD12
Steel
T-Bar Plate Diffuser

- Aesthetically appealing, single-face plate design
- 360° air diffusion pattern
- Detachable face plate
- Constructed of heavy gauge steel for 1' x 1' Tbar grids
- Can be used with SMF 12 x 12 W surface mount frames for drywall applications
- White finish



Engineering Data on Page 115, 118

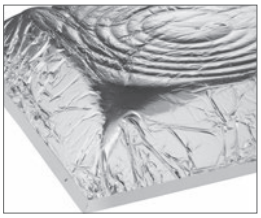


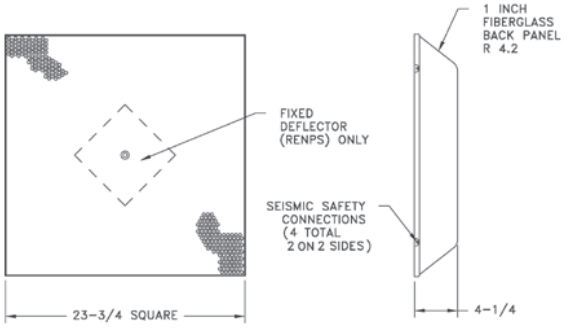
RENPS/ARENPS
RENPS R6
Steel/Aluminum
Perforated Supply Diffuser with Insulated Back

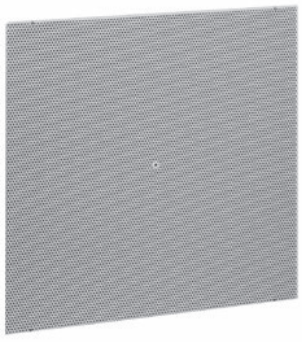
RENPS Available Size
Overall 23¾" x 23¾"

- Perforated steel face with deflector
- Molded fiberglass back panel, available in R4.2 or R6
- Accepts 6" to 14" unique tab collar (6400 series) or 6" to 16" unique snap-in collar (5400 and 5400PP series); also accepts standard spin-in collar
- ARENPS constructed with aluminum face
- Bright White finish

See page 54 for fiberglass specifications.



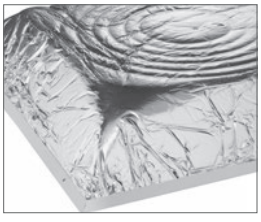




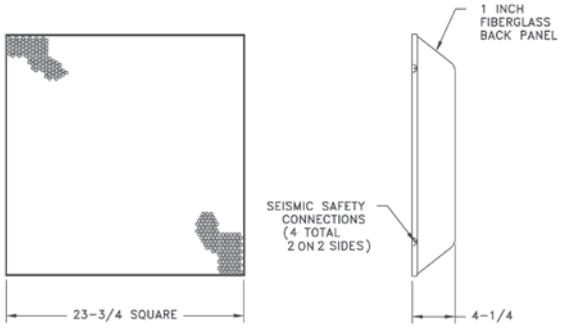
RENP
Steel
Perforated Return with Insulated Back

RENP Available Size
Overall 23¾" x 23¾"

- Perforated steel face
- R4.2 molded fiberglass back panel
- Accepts 6" to 14" unique tab collar (6400 series) or 6"-16" unique snap-in collar (5400 and 5400PP series; also accepts standard spin-in collar
- Bright White finish



See page 54 for fiberglass specifications.



Engineering Data on Page 115-116

T-Bar Perforated Supply/Return

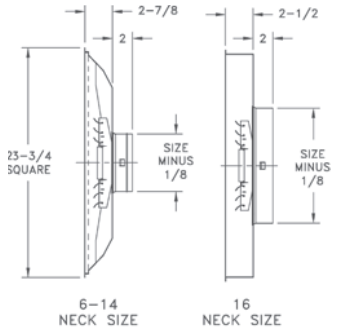
CBPS Curved-Blade Perforated Supply

CBPR Curved-Blade Perforated Return

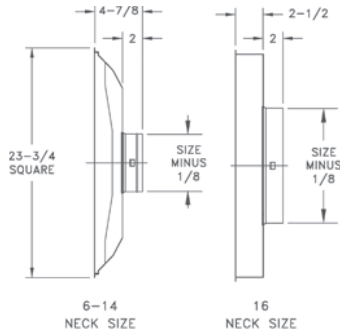
CBPS/CBPR
Steel
Curved-Blade Perforated Supply/Return

- Steel construction
- Removable, hinged face allows for easy access to air pattern control core
- Individually adjustable pattern deflectors factory-set at 4-way deflection; can be field-adjusted for 1, 2, 3-way air patterns
- Available in 6”, 8”, 10”, 12”, 14” and 16” diameter necks
- Unique 2” high collar permits easy flex connections
- Accepts 3800 Series butterfly damper (order separately)
- For 16”, use T19
- Bright White finish

CBPS/CBPR Available Size
Overall Size 23 3/4” x 23 3/4”



CBPS

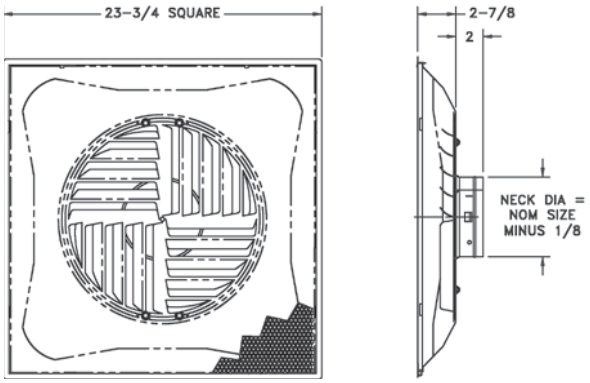


CBPR

SCBPS
Steel
Stamped Curved-Blade Perforated Supply Diffuser

- Steel construction
- Removable, hinged face allows for easy access t pattern control core
- Available in 6”, 8”, 10”, 12”, and 14” diameter necks
- Unique 2” high collar permits easy flex connections
- Accepts 3800 Series butterfly damper (order separately)
- Bright White finish

SCBPS Available Size
Overall Size 23 3/4” x 23 3/4”



Engineering Data on Page 117-118

FBCS Flat Back Perforated Supply

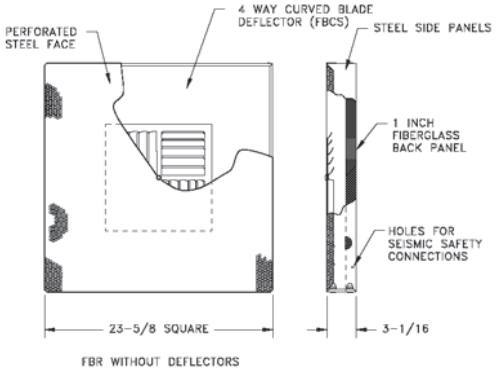
FBR Flat Back Return

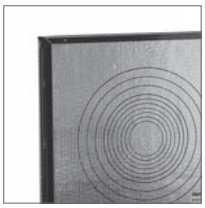
FBCS/FBR
Steel
Flat Back Perforated Supply/Return Diffuser

- Supply diffuser with 4-way deflector
- Return without deflector
- 1" thick fiberglass back with foil vapor barrier
- Back with preprinted template accepts 6" to 18" spin collar or unique tab collar (6400 series 6"-14"), 5400 6"-18" with 5400PP
- Bright White finish

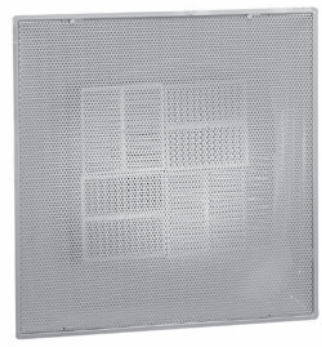
FBCS/FBR Available Size
Overall Size 23 3/4" x 23 3/4"

Engineering Data not available





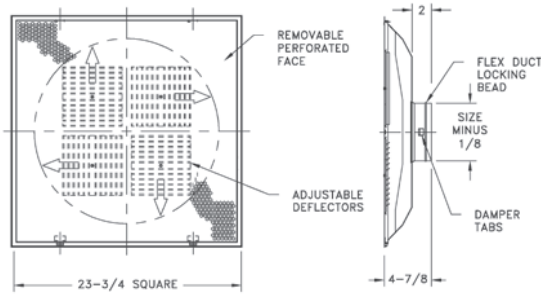
Back surface of insulation for FBCS/FBR



SBP
Steel
Shallow Back Perforated Supply

- Steel construction
- Available in 6" to 14" collar sizes
- Face-mounted, adjustable deflectors
- Removable perforated face
- Hinged/latched face for easy access to deflector and damper
- Bright White finish

SBP Available Size
Overall Size 23 3/4" x 23 3/4"



Engineering Data on Page 116

T-Bar Perforated Supply/Return

RFPS Removable Face Perforated Supply
U.S. Pat. No. 4815934

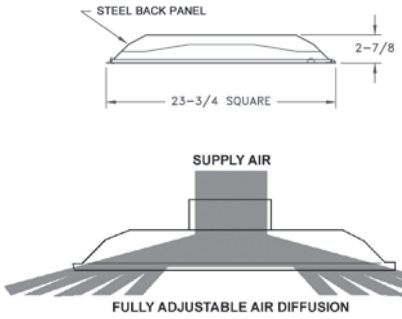
RFPR Removable Face Perforated Return

RFPS/RFPR
Steel
Removable Face Perforated Supply/Return

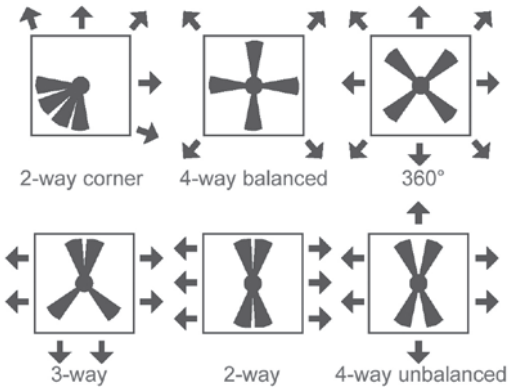
- Steel construction
- Removable hinged face for easy access to deflectors
- Face can be removed for cleaning
- Patented adjustable deflectors provide various directional patterns
- Formed steel black back panel
- Accepts 6" through 12" round snap in collar (5400 Series) – order separately
- For 14", order as RFPS14
- Utilizes butterfly damper in sizes 6" to 14" (3800 Series) inserted in collar
- Damper adjusted through diffuser face to allow proper air balancing
- Bright White finish

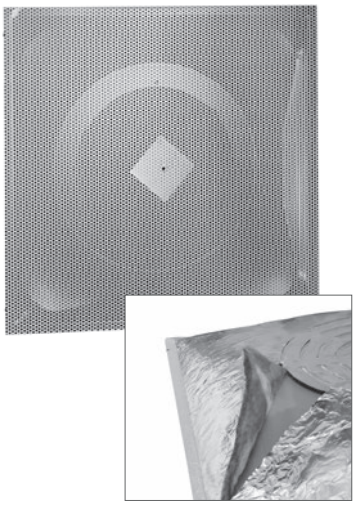
14" RFPR not available

RFPS/RFPR Available Size
Overall Size 23 3/4" x 23 3/4"



Pattern Selection: An almost infinite number of pattern selections are possible.

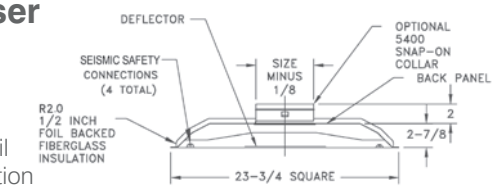


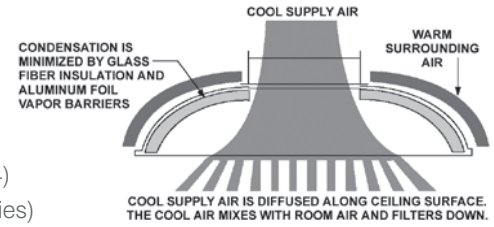


PDS
Steel
Perforated Supply Diffuser
(with fixed deflector)

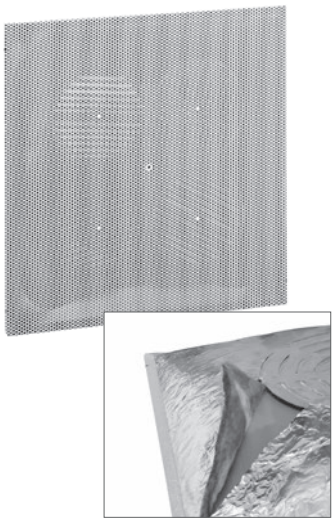
- Perforated steel face
- Formed steel, black back panel
- Fiberglass insulation blanket with foil vapor barrier to minimize condensation
- Insulation prescored to accommodate collar size desired
- Accepts unique snap-in collar (5400 Series) 6" to 12" – order separately
- Available in 14" fixed collar (PDS14)
- Utilizes butterfly damper (3800 Series) inserted in collar
- Damper adjusted through diffuser face to allow proper air balancing
- Bright White finish

PDS Available Size
Overall Size 23 3/4" x 23 3/4"



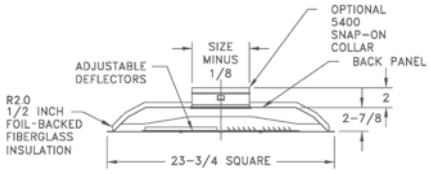


Engineering Data on Page 115-116

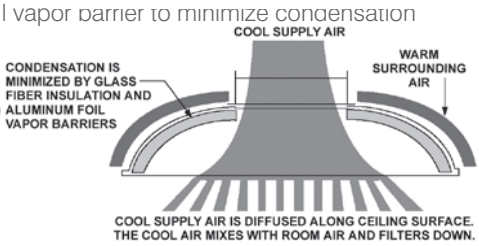


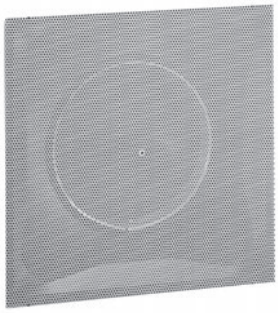
PDSD
Steel
Perforated Diffuser Supply
(with adjustable deflector)

PDSD Available Size
Overall Size 23 3/4" x 23 3/4"



- Perforated steel face
- Face adjustable deflectors
- Formed steel, black back panel
- Fiberglass insulation blanket with foil vapor barrier to minimize condensation
- Insulation prescored to accommodate collar size desired
- Accepts unique snap-in collar (5400 Series) 6" to 12" – order separately
- Available in 14" fixed collar (PDSD14)
- Utilizes butterfly damper (3800 Series) inserted in collar
- Damper adjusted through diffuser face to allow proper air balancing
- Bright White finish

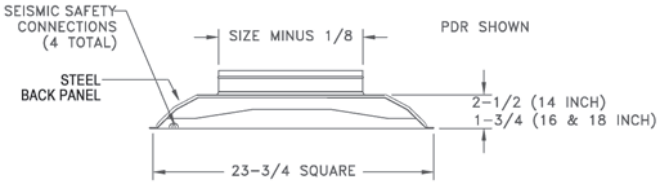


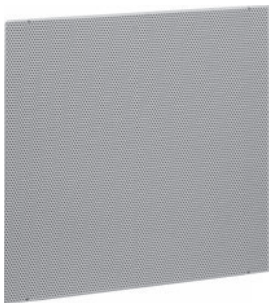


PDR
Steel
Perforated Return Grille

PDR Available Size
Overall Size 23 3/4" x 23 3/4"

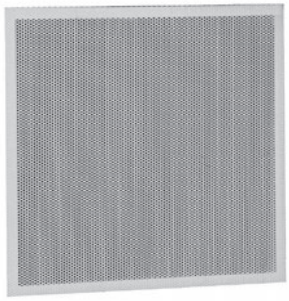
- 51% net free area
- Available with 14", 16", or 18" fixed collars
- Formed steel, black back panel
- White finish





PD
Steel
Perforated Return Face Only–No Back

- Face only return for plenum ceilings
- Available in 24" x 12", 24" x 24" and 48" x 24" sizes
- White finish

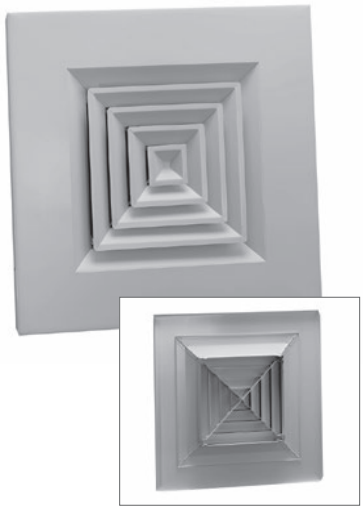


PDF
Steel
Perforated Return Face with Frame–No Back

- Perforated face with frame for duct connection
- Available in 24" x 12", 24" x 24" and 48" x 24" sizes
- Neck size = Listed Size minus 2"
- White finish

Engineering Data on Page 115-116

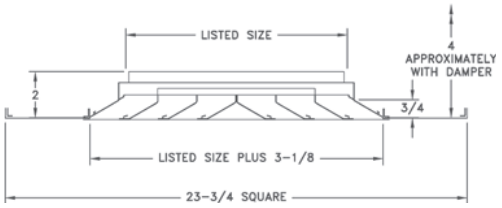
T-Bar Directional/Modular Diffuser

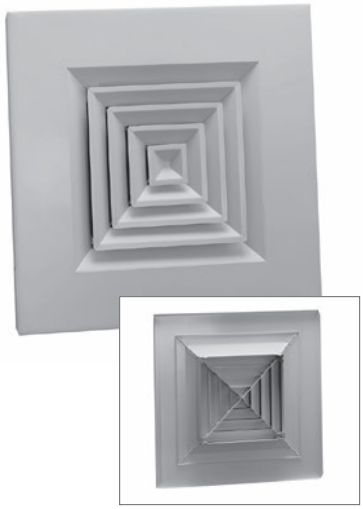


ART
Aluminum
Square and Rectangular T-Bar Diffusers

ART Available Sizes
6" x 6", 9" x 9", 12" x 12", 15" x 15", 21" x 21"
Note: For 18" x 18" neck, order ARE 18" x 18".

- Aluminum construction
- Available in one, two, three and four-way deflections
- Removable core
- Bright White or Satin Anodized finish

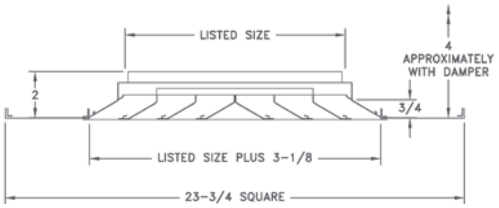




SRT
Steel
Square and Rectangular T-Bar Diffusers

SRT Available Sizes
6" x 6", 9" x 9", 12" x 12", 15" x 15"
Note: For 18" x 18" neck, order SRE 18" x 18".

- Steel construction
- Available in one, two, three and four-wav deflections
- Removable core
- Bright White finish



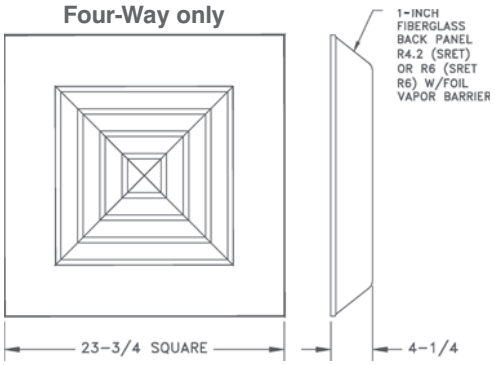
SRET/SRET R6
Steel
Square and Rectangular T-Bar Diffusers

SRET Available Size
overall size 23¾" x 23¾"

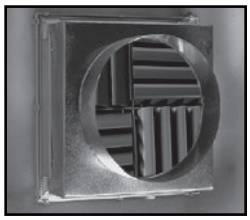
- Steel construction
- Standard SRET features R4.2 molded fiberglass back (R6 available with Model SRET R6)
- Accepts 6" to 14" unique tab collar (6400 series) or 6" to 16" unique snap-in collar (5400 and 5400PP series; also accepts standard spin-collar
- 15" by 15" removable core
- Bright White finish

See page 54 for fiberglass specifications.

Four-Way only



Engineering Data on Page 89-94

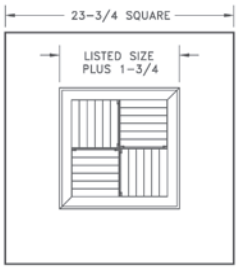


MCDSTSR

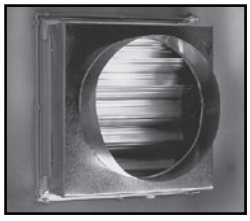
MCDST
Aluminum
Modular Core Diffuser

- Extruded aluminum diffuser in aluminum panel
- Modular cores provide one, two, three, and four-way air patterns
- Removable modules provide easy access to duct-mounted damper
- Available in 6" to 20"
- Available as MCDSTSR wi square-to-round transition attached
- Bright White finish

MCDST/MCDSTSR Available Sizes
6" x 6", 8" x 8", 10" x 10", 12" x 12", 14" x 14", 16" x 16", 18" x 18", 20" x 20"



MCDSDT

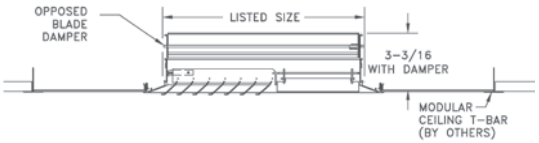


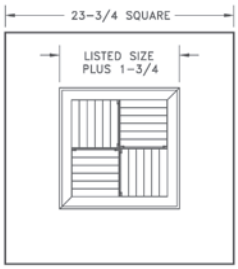
MCDSDTSR

MCDSDT
Aluminum
Modular Core Diffuser with Damper

- Extruded aluminum diffuser in aluminum panel
- Modular cores provide one two, three, and four-way ai patterns
- Removable modules provide easy access to damper
- Aluminum opposed-blade damper
- Available in 6" to 20"
- Available as MCDSDTSR with square-to-round transition attached
- Bright White finish

MCDSDT/MCDSDTSR Available Sizes
6" x 6", 8" x 8", 10" x 10", 12" x 12", 14" x 14", 16" x 16", 18" x 18", 20" x 20"





Engineering Data on Page 97-98

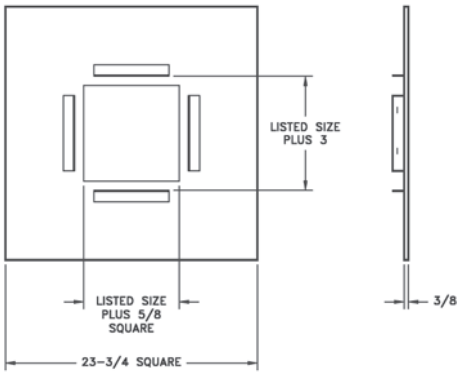
T-Bar Directional/Modular Diffuser

A504MS/A504OB
Four-way deflection

A500P
Steel
T-Bar Panel for A500 Series Diffusers

- Adapts A500 diffuser to T-Bar installation
- Diffuser snaps in behind panel for clean appearance
- Steel panel
- Diffuser must be ordered separately
- Bright White finish
- Diffuser sizes 6”x6” to 14”x14”

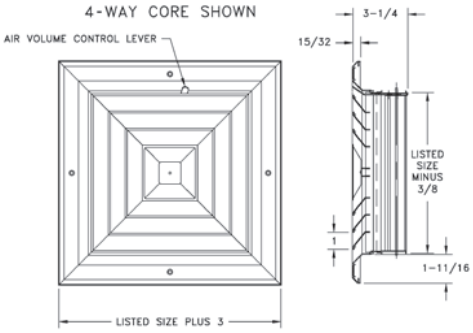
A500P T-Bar Panel Available Size
Opening 6” to 14”
Overall 23 3/4” x 23 3/4”



A501MS/A501OB
One-way deflection

A502MS/A502OB
Two-way deflection

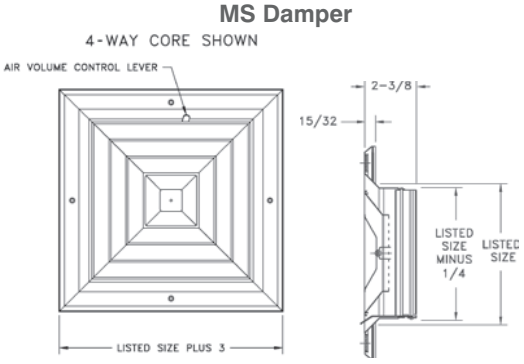
OB Damper



A503MS/A503OB
Three-way deflection

A505MS/A505OB
Two-way corner deflection

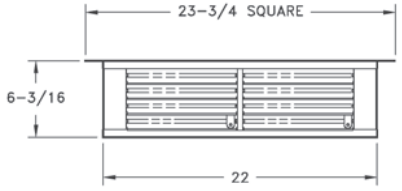
MS Damper



ECBXT
Steel
4-Way Ceiling Diffuser Box

- Heavy-duty steel construction
- Adjustable dampers provide directional airflow or closure capabilities
- Bright White finish

ECBXT Available Size
22” x 22”, Overall Size 23 3/4” x 23 3/4”

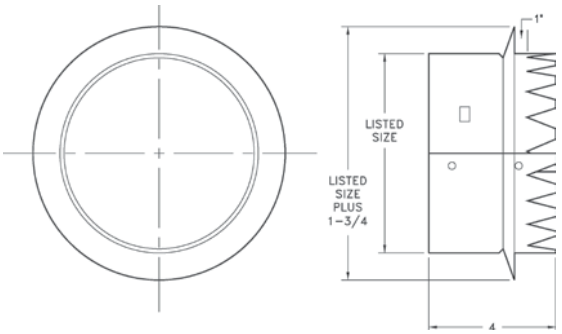


Engineering Data on Page 98

6400 Tab Collar

- Galvanized steel construction
- For use with fiberglass-backed ceiling diffusers
- Tabbed for easy installation
- Accepts 3800 Series damper

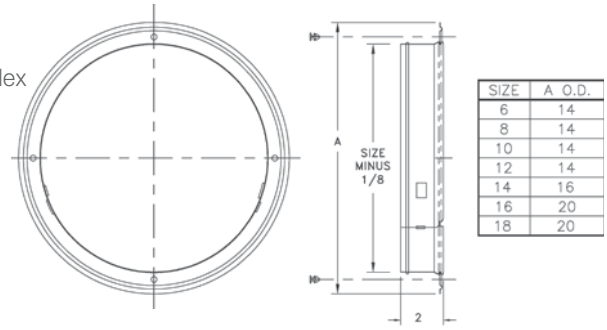
6400 Series Available Sizes				
6”	8”	10”	12”	14”



5400 Series Collar Ring*

- Unique snap-in design for easy installation
- 2” high collar permits easy flex connections
- Bead on collar improves the strength and provides retention for flexible duct connections

5400 Series Available Sizes								
6”	7”	8”	9”	10”	12”	14”*	16”	18”



SIZE	A O.D.
6	14
8	14
10	14
12	14
14	16
16	20
18	20

*14” collar is mounted to diffuser at factory for steel back panels only.

Note: Uses 5400PP (black push pins) with insulated back panels (non-steel).

5400PP Push Pins

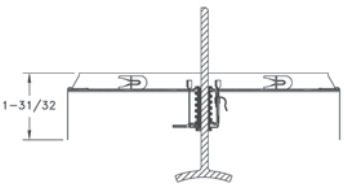
- Attaches 5400 collar to molded fiberglass back for the following products:

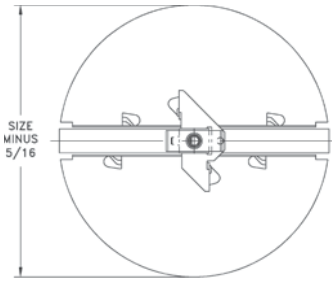
659TI	1¼” long
PFTI	1¼” diameter head
RENP	
RENPS/RENPS R6	
RE5TI	
96AFBTI	
REN4	
HVS R6	
SRET/SRET R6	

3800 Series Damper

- Adjustable butterfly damper with removable handle (included)
- For use with 5400 and 6400 Series collars
- Golden Sand finish

3800 Series Available Sizes						
6”	7”	8”	9”	10”	12”	14”



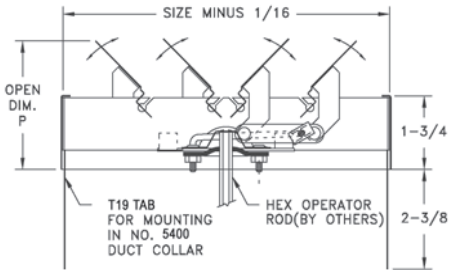


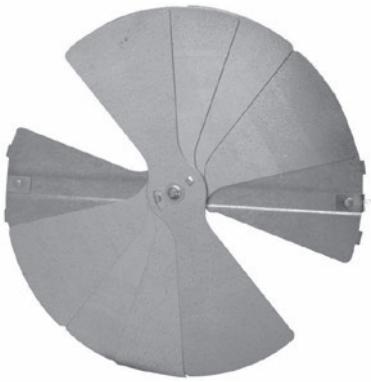
T19 Series Damper

- Multi-blade damper
- Tabs for easy installation
- For use with 5400 Series collar
- Bright White finish

Note: 3/16 hex operator by others

19 Series Available Sizes					
6”	8”	10”	12”	14”	16”

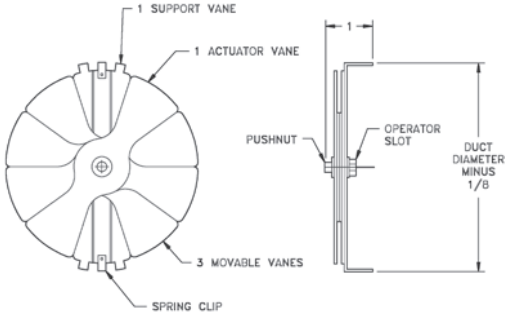




RD Radial Damper

- Galvanized steel construction
- Face-adjustable
- For use with round neck diffusers
- Mill finish

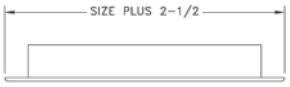
RD Available Sizes				
6”	8”	10”	12”	14”

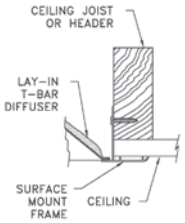


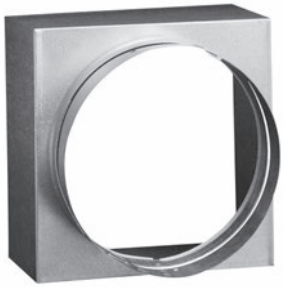
SMF
Aluminum
Surface Mount Frame

- Aluminum construction
- Permits installation of standard T-Bar diffusers in a plaster ceiling
- Accepts standard T-Bar diffusers
- Bright White finish

SMF Available Sizes
12” x 12”, 24” x 12”, 24” x 24”, 24” x 48”



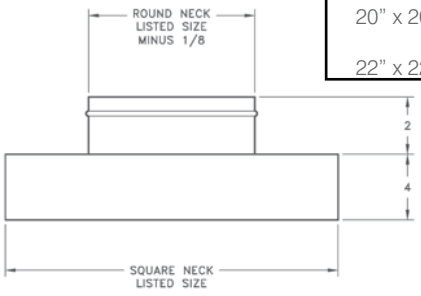




SR
Steel
Square-to-Round Transition

- Galvanized steel construction
- Allows flex duct installation with square neck diffusers
- Round collar accepts 3800 butterfly damper
- Unique 2” high collar

Available Sizes	
Square Size	Round Neck
6” x 6”	6”
9” x 9”	6”, 8”
12” x 12”	10”, 12”
15” x 15”	12”, 14”
18” x 18”	16”, 18”
20” x 20”	14”, 16”, 18”
22” x 22”	14”, 16”, 18”

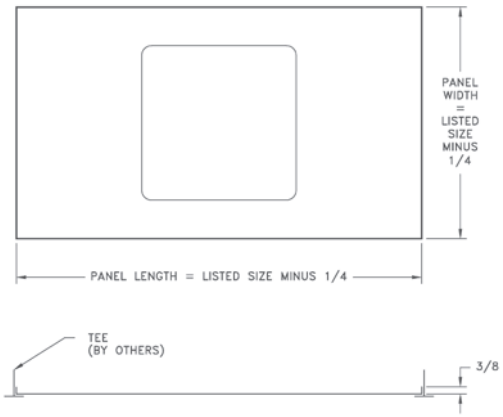


P Filler Panel

- Steel or aluminum construction
- Available in 9 sizes from 12” x 12” to 36” x 36” in 12” increments
- Bright White finish

Diffusers are factory-installed (must order with diffuser).

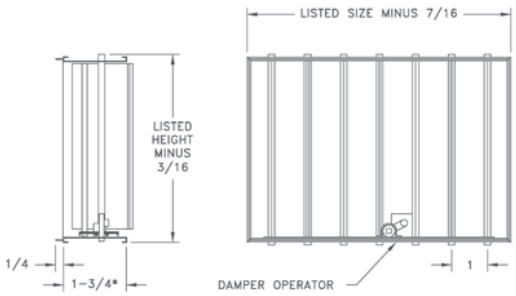
P Filler Panel Available Sizes
12” x 12”, 24” x 12”, 36” x 12”, 48” x 12”, 24” x 24”, 36” x 24”, 48” x 24”, 36” x 36”



AD *Aluminum* Opposed-Blade Damper

- Extruded aluminum construction
- Opposed-blade damper
- Controls the air volume from full flow to shut-off

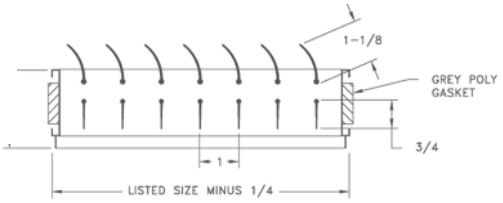
AD Available Sizes
Minimum: 6” x 4”, 1¾” x 4”
Maximum: 24” x 24” One-Piece



DT Air Diverter

- Extruded aluminum construction
- Two sets of individually adjustable blades
- Equalizes flow and controls volume at collar take-offs to registers and grilles
- Equipped with gasket around outside of frame for positioning firmly in duct
- Mill finish

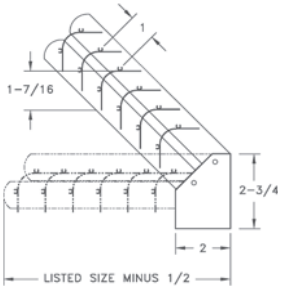
DT Available Sizes
Minimum: 6” x 4”
Maximum: 48” x 48”



FT Flexiturn

- Extruded aluminum construction
- Designed to pick up air from the main trunk at branch take-offs and divert it toward the grille
- Mounts easily with sheet metal screws
- Gang-operated blades move from 45 degrees open to fully closed
- Positive setting
- Mill finish

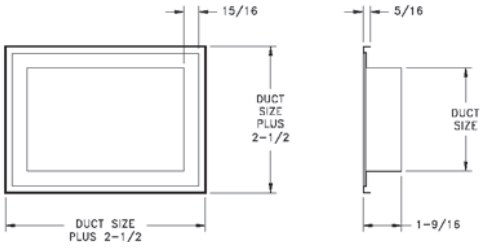
FT Flexiturn Available Sizes
Minimum: 8” x 4”
Maximum: 36” x 18”



APF
Aluminum
Plaster Frame

- Aluminum construction
- Provides attractive appearance for registers and grilles around plaster
- Bright White finish

APF Available Sizes
Minimum: 6” x 4”
Maximum: 48” x 48”



Using the Engineering Data

For most of the models & sizes we've done the calculations for you.
CFM = volume of air flow in cubic feet per minute

421

Face Velocity		300	400	500	600	700	800
Pressure Loss		.006	.010	.016	.022	.031	.040
4x10 Ak .170	CFM	50	70	85	100	120	135
	Spread	4.5	5.0	6.5	7.5	9.0	10.0
	Throw	4.0	6.0	8.0	10.0	11.0	12.5

Terminal velocity of 50 fpm

821-defl A

Face Velocity		400	500	600	700	800
Pressure Loss		.010	.016	.022	.031	.040
24 x 8 Ak 1.045	CFM	420	525	625	730	835
	Throw	17.0	21.0	25.0	29.0	33.0

Terminal velocity is 75 fpm

Face Velocity = speed of air at the face of diffuser in feet per minute (FPM)

Ak = net area in square feet. This is the lab measured area across the face when air is mechanically forced through the opening.

Free Area (if given) = daylight area (in^2) of blade openings. Free area is typically only required on natural / gravity movement of air, non-mechanically forced, as in free area needed for combustion air requirements on heating equipment. Use the Ak value (*144 to get to in^2) if the free area has not been calculated, but is needed for a given size/model grille requiring free area for combustion.

Equation of Airflow: CFM = Ak (ft^2) x Face Velocity (fpm)
Example from 421 table above: 100 = .17 x 600 _ numbers are often rounded

Sizing a Supply

Determine the amount of CFM (air volume) needed for each supply outlet. This should be done by room heating and cooling load requirements from various design manuals (ACCA Man J, ASHRAE Fundamentals Hndbk) and then followed by the duct design and layout.

Face Velocity - H&C recommends sizing a supply outlet in the range of 500 to 800 fpm face velocity (700 being a common target). The upper end of this range will create better mixing of room air and longer throws, which is what the typical forced air system is intended to do. However, the Pressure resistance and Noise must be taken into consideration depending upon the application. In some instances, greater face velocity is allowed because the pressure and noise can be accommodated.

Pressure Loss (inches of w.c.) – the selection of the face velocity must consider the associated pressure loss that deals with each relative model. An increase in face velocity creates more pressure resistance against the blower's delivery of air volume. The velocity ranges given previously will, in most cases, have minor effect on the blower's overall performance given the entire duct system losses that it will encounter.

Noise – an increase in face velocity will create more noise. The tables below show NC design guidelines and also face velocity ranges if NC values have not been tabulated.

Application	Recommended Face Velocities
Broadcasting Studios	<500 FPM
Residences	500 to 750 FPM
Apartments	500 to 750 FPM
Churches	500 to 750 FPM
Hotel Guestrooms	500 to 750 FPM
Legitimate Theaters	500 to 1000 FPM
Private Offices, acoustically treated	500 to 1000 FPM
Private Offices, not treated	1000 to 1250 FPM
Motion Picture Theaters	1000 to 1250 FPM
General Offices	1250 to 1500 FPM
Stores, upper floors	1500 FPM
Stores, main floors	1500 FPM
Industrial Buildings	1500 to 2000 FPM

	Communication Environment	Typical Occupancy
< NC 25	Extremely quiet environment; suppressed speech is quite audible; suitable for acute pickup of all sounds.	Broadcasting studios, concert halls, music rooms.
NC 30	Very quiet office; suitable for large conferences; telephone use satisfactory.	Residences, theaters, libraries, executive offices, directors rooms.
NC 35	Quiet office; satisfactory for conference at a 15-foot table; normal voice 10 to 30 feet; telephone use satisfactory.	Private offices, schools, hotel guestrooms, courtrooms, churches, hospital rooms.
NC 40	Satisfactory for conferences at a 6-to 8-foot table; normal voice 6 to 12 feet; telephone use satisfactory.	General office, labs, dining rooms.
NC 45	Satisfactory for conferences at a 4- to 5-foot table; normal voice 3 to 6 feet; raised voice 6 to 12 feet; telephone use occasionally difficult.	Retail stores, cafeterias, lobby areas, large drafting and engineering offices, reception areas.
> NC 50	Unsatisfactory for conference of more than two or three persons; normal voice 1 to 2 feet; raised voice 3 to 6 feet; telephone use slightly difficult.	Computer rooms, stenographic pools, print machine rooms, process areas.

Sizing a Return

Air volume going back to the air handler (fan) must equal what is supplied from the air handler. Therefore the total CFM capacity of the return grilles must equal or exceed the total CFM capacity of all the supply diffusers.

Recommended Noise Criteria and Face Velocity Ranges are on page 77

Engineering Data

Keeping face velocity low
• Returns should be at 400-600 fpm maximum
• Filter Returns should be at 450 fpm maximum
*ACCA recommends 300 max for filter grilles and 500 max for non-filter grilles.
• The rule of thumb is 2 cfm per square inch of filter size. See table below.
• Low velocity reduces noise, especially on stamped face grilles (672/673); fixed-bar grilles can handle more velocity without noise (94A/96AFB/RH45/RHF45/RCB).
• A single point return cannot be oversized like a supply. The system will not be affected adversely, only improved. *This does not apply to multiple return locations where balancing is more critical to pull in relevant amounts from each room.
• Static pressure is also reduced. Pressure works against & reduces blower delivery volume (cfm)
• Noise is not expected from a return.

Location

Filter Size		Area (in^2)	Ton (cfm)	Filter Size		Area (in^2)	Ton (cfm)
12	12	144	n/a	20	20	400	2 (800)
12	20	240	1 (400)	20	25	500	2.5 (1000)
12	24	288	1.5 (600)	20	30	600	3 (1200)
12	30	360	1.5 (600)	20	36	720	3 (1200)
14	14	196	1 (400)	24	24	576	3 (1200)
14	20	280	1.5 (600)	24	30	720	3 (1200)
14	24	336	1.5 (600)	24	36	864	4 (1600)
14	30	420	2 (800)	25	25	625	3 (1200)
16	20	320	1.5 (600)	30	30	900	4 (1600)
16	24	384	2 (800)	30	36	1080	5 (2000)

• Returns should be put in stagnant air locations that need to be reconditioned.
- High for cooling mode (hot air rises)
- Low for heating mode (cold air falls)
- Both modes, choose a primary season

• Returns should not be near a supply register's throw range. If at all possible place the return at an opposite corner of the room.

Room Air Movement

• Returns do NOT have much effect on a room's air movement, regardless of face velocity. They only grab air about a duct diameter away from the face. Most of the room air movement is done by the supplies.

Unlisted Sizes–Engineering Data

When a size is not listed there are a couple ways to do an engineered estimate. Airflow principles permit you to utilize existing sizes to determine sizes not shown.

Method 1: Use nearest nominal size table entry. If a 14x14 is not given, but a 20x10 is, since the these two sizes have an approximate equal core area (196 and 200) the table entry for a 20x10 can be used to approximate what the 14x14 grille would perform to.

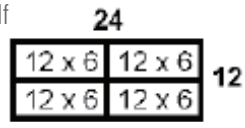
Method 2: A more exact method would be to do interpolation process between two listed sizes. If 14x14 is not given, but 18x10 and 20x10 are, then this equation will get more exact 14x14 data. Y = Y1 + [{(X - X1) * (Y2-Y1)} / (X2 - X1)] where:
Y = unknown CFM or throw that is being computed for 14x14
Y1 = CFM or throw of listed 18x10 (for ex 600 cfm)
Y2 = CFM or throw of listed 20x10 (for ex 640 cfm)
X = 196 in^2 (nominal area of 14x14)
X1 = 180 in^2 (nominal area of 18x10)
X2 = 200 in^2 (nominal area of 20x10)

Using equation above computes Y = 600 + [{(196 – 180) * (640 – 600)} / (200 – 180)] =
600 + [{16 * 40} / 20] = 600 + 32 = 632 cfm for Y

Method 3: Sizes beyond the table (smaller or larger) can have their CFM or Throw determined by using listed sizes by the following:

CFM for larger sizes:

If looking for 24x6 or 24x12 cfm that is not listed, using the listed 12x6 cfm and doubling it or quadrupling it will give the answer for the 24x6 and 24x12, respectively.



CFM for smaller sizes:
If looking for a 6x6 cfm that is not listed, using the listed 12x6 cfm and halving it will give the answer for a 6x6.

Throw:
Double the size and CFM, multiply the throw by 1.5
Quadruple the size and CFM, multiply the throw by 2
Half the size and CFM, multiply the throw by .67
One quarter the size and CFM, multiply the throw by .5

*Pressure loss, face velocity and noise criteria will all remain the same relative to the listed size used to determine the larger or smaller sizes not shown.

Recommended Noise Criteria and Face Velocity Ranges are on page 77

HART COOLEY

821, 831, 92 Series and 98VOH (Page 6-8, 11)

Deflection A

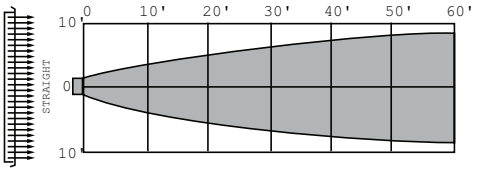
Face Velocity		400	500	600	700	800	900	1000	1100	1200	1300	1400	1600	1800	2000
Pressure Loss		.010	.016	.022	.031	.040	.050	.062	.075	.090	.105	.122	.160	.202	.249
8 x 4	CFM	65	80	100	110	130	145	160	175	190	210	225	255	290	320
Ak .160	Throw	6.5	8.0	10.0	11.0	13.0	15.0	16.0	18.0	19.0	21.0	23.0	26.0	29.0	32.0
10 x 4	CFM	80	100	120	140	160	180	200	220	240	265	285	325	365	405
Ak .202	Throw	7.0	9.0	11.0	13.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	29.0	33.0	36.0
12 x 4	CFM	100	120	145	170	195	220	245	270	295	315	340	390	440	490
Ak .244	Throw	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	28.0	32.0	36.0	40.0
14 x 4	CFM	115	145	170	200	230	255	285	315	345	370	400	460	515	570
Ak .286	Throw	8.5	11.0	13.0	15.0	17.0	19.0	22.0	24.0	26.0	28.0	30.0	35.0	39.0	43.0
12 x 5	CFM	125	155	190	220	250	280	310	345	375	405	435	500	560	625
Ak .312	Throw	9.0	11.0	14.0	16.0	18.0	20.0	22.0	25.0	27.0	29.0	31.0	36.0	41.0	45.0
10 x 6	CFM	125	155	190	220	250	285	315	345	375	410	440	500	565	630
Ak .314	Throw	9.0	11.0	14.0	16.0	18.0	21.0	23.0	25.0	27.0	30.0	32.0	36.0	41.0	45.0
14 x 5	CFM	145	185	220	255	295	330	365	405	440	475	510	585	660	730
Ak .366	Throw	10.0	12.0	15.0	17.0	20.0	22.0	24.0	27.0	29.0	32.0	34.0	39.0	44.0	49.0
12 x 6	CFM	150	190	225	265	305	340	380	415	455	495	530	605	680	760
Ak .379	Throw	10.0	12.0	15.0	17.0	20.0	22.0	25.0	27.0	30.0	33.0	35.0	40.0	45.0	50.0
16 x 5	CFM	170	210	250	295	335	380	420	460	505	545	585	670	755	840
Ak .419	Throw	11.0	13.0	16.0	18.0	21.0	24.0	26.0	29.0	32.0	34.0	37.0	42.0	47.0	53.0
14 x 6	CFM	180	220	265	310	355	400	445	490	535	575	620	710	800	890
Ak .444	Throw	11.0	13.0	16.0	19.0	22.0	24.0	27.0	30.0	32.0	35.0	38.0	43.0	49.0	54.0
16 x 6	CFM	205	255	305	355	410	460	510	560	610	665	715	815	920	1020
Ak .510	Throw	12.0	15.0	17.0	20.0	23.0	26.0	29.0	32.0	35.0	38.0	41.0	47.0	53.0	58.0
20 x 5	CFM	210	265	315	370	420	475	525	580	630	685	735	840	945	1050
Ak .526	Throw	12.0	15.0	18.0	21.0	23.0	27.0	29.0	32.0	35.0	38.0	41.0	47.0	53.0	59.0
24 x 5	CFM	255	315	380	445	505	570	635	695	760	825	890	1015	1140	1270
Ak .634	Throw	13.0	16.0	19.0	23.0	26.0	29.0	32.0	35.0	39.0	42.0	45.0	52.0	58.0	65.0
20 x 6	CFM	255	320	385	445	510	575	640	705	770	830	895	1015	1140	1270
Ak .640	Throw	13.0	16.0	19.0	23.0	26.0	29.0	32.0	36.0	39.0	42.0	45.0	52.0	58.0	65.0
24 x 6	CFM	310	385	465	540	615	695	770	850	925	1000	1080	1235	1390	1540
Ak .771	Throw	14.0	18.0	21.0	25.0	28.0	32.0	35.0	39.0	43.0	46.0	50.0	57.0	64.0	71.0
20 x 8	CFM	345	435	520	610	695	780	870	955	1040	1130	1215	1390	1560	1735
Ak .868	Throw	15.0	19.0	23.0	26.0	30.0	34.0	38.0	41.0	45.0	49.0	53.0	60.0	68.0	75.0
30 x 6	CFM	385	485	580	675	775	870	965	1065	1160	1255	1355	1545	1740	1935
Ak .967	Throw	16.0	20.0	24.0	28.0	32.0	36.0	40.0	44.0	48.0	51.0	56.0	63.0	71.0	79.0
24 x 8	CFM	420	525	625	730	835	940	1045	1150	1255	1360	1465	1670	1880	2090
Ak 1.045	Throw	17.0	21.0	25.0	29.0	33.0	37.0	41.0	46.0	50.0	54.0	58.0	66.0	74.0	83.0
30 x 8	CFM	525	655	785	915	1050	1180	1310	1440	1570	1705	1835	2095	2360	2620
Ak 1.310	Throw	19.0	23.0	28.0	32.0	37.0	42.0	46.0	51.0	56.0	60.0	65.0	74.0	84.0	93.0
24 x 10	CFM	530	660	790	925	1055	1185	1320	1450	1585	1715	1845	2110	2375	2640
Ak 1.319	Throw	19.0	23.0	28.0	33.0	37.0	42.0	46.0	51.0	56.0	60.0	65.0	74.0	84.0	93.0
36 x 8	CFM	630	790	945	1105	1260	1420	1575	1735	1890	2050	2205	2520	2835	3150
Ak 1.576	Throw	20.0	25.0	30.0	36.0	41.0	46.0	51.0	56.0	61.0	66.0	71.0	81.0	91.0	101.0
24 x 12	CFM	635	795	995	1115	1275	1435	1595	1750	1910	2070	2230	2550	2865	3185
Ak 1.593	Throw	20.0	25.0	31.0	36.0	41.0	47.0	51.0	56.0	61.0	66.0	71.0	82.0	92.0	102.0
30 x 10	CFM	660	825	990	1160	1325	1490	1655	1820	1985	2150	2315	2645	2975	3310
Ak 1.654	Throw	21.0	26.0	31.0	37.0	42.0	47.0	52.0	57.0	63.0	68.0	73.0	83.0	94.0	104.0
36 x 10	CFM	795	995	1195	1390	1590	1790	1990	2190	2385	2585	2785	3180	3580	3980
Ak 1.989	Throw	23.0	29.0	34.0	40.0	46.0	51.0	57.0	63.0	68.0	74.0	80.0	91.0	103.0	114.0
30 x 12	CFM	800	1000	1200	1400	1600	1800	2000	2200	2395	2595	2795	3195	3595	3995
Ak 1.997	Throw	23.0	29.0	34.0	40.0	45.0	51.0	57.0	63.0	68.0	74.0	80.0	91.0	103.0	114.0
36 x 12	CFM	960	1200	1440	1680	1920	2160	2400	2640	2880	3120	3365	3845	4325	4805
Ak 2.402	Throw	25.0	31.0	38.0	44.0	50.0	56.0	63.0	69.0	75.0	81.0	88.0	100.0	113.0	125.0

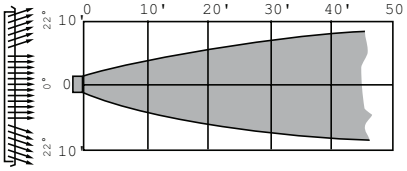
Terminal Velocity of 75 FPM

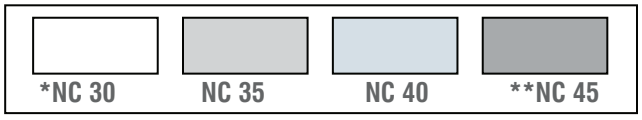
Deflection C

Face Velocity		400	500	600	700	800	900	1000	1100	1200	1300	1400	1600	1800	2000
Pressure Loss		.010	.016	.022	.031	.040	.050	.062	.075	.090	.105	.122	.160	.202	.249
8 x 4	CFM	55	70	85	100	110	125	140	155	170	180	195	225	250	280
Ak .140	Throw	5.0	6.0	7.5	8.5	9.5	11.0	12.0	14.0	15.0	16.0	17.0	20.0	22.0	24.0
10 x 4	CFM	70	90	105	125	140	160	180	195	215	230	250	285	320	355
Ak .178	Throw	5.0	7.0	8.0	9.5	11.0	12.0	14.0	15.0	17.0	18.0	19.0	22.0	25.0	28.0
12 x 4	CFM	85	110	130	150	170	195	215	235	260	280	300	345	385	430
Ak .215	Throw	6.0	8.0	9.0	11.0	12.0	14.0	15.0	17.0	18.0	20.0	21.0	24.0	27.0	30.0
14 x 4	CFM	100	125	150	175	200	225	250	275	300	330	355	405	455	505
Ak .252	Throw	6.5	8.0	10.0	11.0	13.0	15.0	16.0	18.0	20.0	22.0	23.0	26.0	30.0	33.0
12 x 5	CFM	110	135	165	190	220	245	275	300	330	355	385	440	495	550
Ak .274	Throw	7.0	8.5	10.0	12.0	14.0	15.0	17.0	19.0	21.0	22.0	24.0	28.0	31.0	34.0
10 x 6	CFM	110	140	165	195	220	245	275	305	330	360	385	440	495	550
Ak .276	Throw	7.0	8.5	10.0	12.0	14.0	15.0	17.0	19.0	21.0	22.0	24.0	27.0	31.0	34.0
14 x 5	CFM	130	160	195	225	255	290	320	355	385	415	450	515	580	645
Ak .321	Throw	7.5	9.0	11.0	13.0	15.0	17.0	18.0	21.0	22.0	24.0	26.0	30.0	34.0	37.0
12 x 6	CFM	135	165	200	235	265	300	335	365	400	435	465	535	600	665
Ak .333	Throw	7.5	9.5	11.0	13.0	15.0	17.0	19.0	21.0	23.0	25.0	26.0	30.0	34.0	38.0
16 x 5	CFM	150	185	220	260	295	330	370	405	445	480	515	590	665	740
Ak .369	Throw	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	28.0	32.0	36.0	40.0
14 x 6	CFM	155	195	235	275	315	350	390	430	470	510	545	625	705	780
Ak .391	Throw	8.0	10.0	12.0	14.0	17.0	18.0	20.0	23.0	25.0	27.0	29.0	33.0	37.0	41.0
16 x 6	CFM	180	225	270	315	360	405	450	495	540	580	625	715	805	895
Ak .448	Throw	9.0	11.0	13.0	15.0	18.0	20.0	22.0	24.0	26.0	28.0	31.0	35.0	39.0	44.0
20 x 5	CFM	185	230	280	325	370	415	465	510	555	600	650	740	835	925
Ak .463	Throw	9.0	11.0	13.0	16.0	18.0	20.0	22.0	25.0	27.0	29.0	31.0	36.0	40.0	44.0
24 x 5	CFM	225	280	335	390	445	500	555	615	670	725	780	890	1005	1115
Ak .557	Throw	10.0	12.0	15.0	17.0	19.0	22.0	24.0	27.0	29.0	32.0	34.0	40.0	44.0	49.0
20 x 6	CFM	225	280	340	395	450	505	565	620	675	730	790	900	1015	1125
Ak .563	Throw	10.0	12.0	15.0	17.0	20.0	22.0	25.0	27.0	29.0	32.0	34.0	39.0	44.0	49.0
24 x 6	CFM	270	340	405	475	540	610	680	745	815	880	950	1085	1220	1355
Ak .678	Throw	11.0	14.0	16.0	19.0	21.0	24.0	27.0	30.0	32.0	35.0	38.0	43.0	49.0	54.0
20 x 8	CFM	305	380	460	535	610	685	765	840	915	990	1070	1220	1375	1525
Ak .763	Throw	11.0	14.0	17.0	20.0	23.0	26.0	29.0	32.0	34.0	37.0	40.0	46.0	52.0	57.0
30 x 6	CFM	340	425	510	595	680	765	850	935	1020	1105	1190	1360	1530	1700
Ak .850	Throw	12.0	15.0	18.0	21.0	24.0	27.0	30.0	33.0	36.0	39.0	42.0	48.0	54.0	60.0
24 x 8	CFM	370	460	550	645	735	825	920	1010	1105	1195	1285	1470	1655	1840
Ak .919	Throw	13.0	16.0	19.0	22.0	25.0	28.0	31.0	35.0	38.0	41.0	44.0	50.0	57.0	63.0
30 x 8	CFM	460	575	690	805	920	1035	1150	1265	1380	1500	1615	1845	2075	2305
Ak 1.152	Throw	14.0	15.0	21.0	25.0	28.0	32.0	35.0	39.0	42.0	46.0	49.0	56.0	63.0	70.0
24 x 10	CFM	465	580	695	810	930	1045	1160	1275	1390	1510	1625	1855	2090	2320
Ak 1.160	Throw	14.0	18.0	21.0	25.0	28.0	32.0	35.0	39.0	42.0	46.0	49.0	56.0	64.0	71.0
36 x 8	CFM	555	695	830	970	1110	1245	1385	1525	1665	1800	1940	2220	2495	2770
Ak 1.386	Throw	15.0	19.0	19.0	27.0	31.0	35.0	39.0	42.0	46.0	50.0	54.0	62.0	69.0	77.0
24 x 12	CFM	560	700	840	980	1120	1260	1400	1540	1680	1820	1960	2240	2520	2800
Ak 1.401	Throw	16.0	19.0	23.0	27.0	31.0	35.0	39.0	43.0	47.0	50.0	54.0	62.0	70.0	78.0
30 x 10	CFM	580	725	870	1020	1165	1310	1455	1600	1745	1890	2035	2325	2615	2910
Ak 1.454	Throw	16.0	20.0	24.0	28.0	32.0	36.0	39.0	43.0	47.0	51.0	55.0	63.0	71.0	79.0
36 x 10	CFM	700	875	1050	1225	1400	1575	1750	1925	2100	2275	2450	2800	3150	3500
Ak 1.749	Throw	17.0	22.0	26.0	30.0	35.0	39.0	43.0	48.0	52.0	56.0	61.0	69.0	78.0	87.0
30 x 12	CFM	700	880	1055	1230	1405	1580	1755	1930	2110	2285	2460	2810	3160	3510
Ak 1.756	Throw	17.0	22.0	26.0	30.0	35.0	39.0	43.0	48.0	52.0	56.0	61.0	69.0	78.0	87.0
36 x 12	CFM	845	1055	1265	1480	1690	1990	2110	2325	2535	2745	2955	3380	3800	4225
Ak 2.112	Throw	19.0	24.0	28.0	33.0	38.0	43.0	47.0	52.0	57.0	62.0	66.0	76.0	86.0	95.0

Terminal Velocity of 75 FPM







* less than or equal to

** greater than or equal to

Recommended Noise Criteria and Face Velocity Ranges are on page 77

Engineering Data

821, 831, 92 Series and 98VOH (Page 6-8, 11)

Deflection E

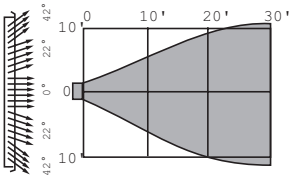
Face Velocity		400	500	600	700	800	900	1000	1100	1200	1300	1400	1600	1800	2000
Pressure Loss		.010	.016	.022	.031	.040	.050	.062	.075	.090	.105	.122	.160	.202	.249
8 x 4	CFM	50	60	75	85	100	110	125	135	150	160	175	200	225	250
Ak .124	Throw	3.5	4.5	5.5	6.0	7.5	8.0	9.0	10.0	11.0	12.0	13.0	15.0	16.0	18.0
10 x 4	CFM	65	80	95	110	125	140	155	175	190	205	220	250	285	315
Ak .157	Throw	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	16.0	19.0	20.0
12 x 4	CFM	75	95	115	135	150	170	190	210	230	245	265	305	340	380
Ak .190	Throw	4.5	5.5	7.0	8.0	9.0	10.0	11.0	12.0	14.0	15.0	16.0	18.0	20.0	22.0
14 x 4	CFM	90	110	135	155	180	200	220	245	265	290	310	355	400	445
Ak .222	Throw	5.0	6.0	7.5	8.5	10.0	11.0	12.0	13.0	14.0	16.0	17.0	19.0	22.0	24.0
12 x 5	CFM	95	120	145	170	195	220	240	265	290	315	340	385	435	485
Ak .242	Throw	5.0	6.5	7.5	9.0	10.0	12.0	13.0	14.0	15.0	17.0	18.0	20.0	23.0	25.0
10 x 6	CFM	100	120	145	170	195	220	245	270	295	315	340	390	440	490
Ak .244	Throw	5.0	6.5	7.5	9.0	10.0	11.0	13.0	14.0	15.0	16.0	18.0	20.0	23.0	26.0
14 x 5	CFM	115	140	170	200	225	255	285	310	340	370	400	455	510	570
Ak .284	Throw	5.5	7.0	8.0	9.5	11.0	12.0	14.0	15.0	16.0	18.0	19.0	22.0	25.0	28.0
12 x 6	CFM	120	145	175	205	235	265	295	325	355	380	410	470	530	590
Ak .294	Throw	5.5	7.0	8.5	9.5	11.0	13.0	14.0	15.0	17.0	18.0	19.0	22.0	25.0	28.0
16 x 5	CFM	130	165	195	230	260	295	325	360	390	425	455	520	585	650
Ak .325	Throw	6.0	7.5	9.0	10.0	12.0	13.0	15.0	16.0	18.0	19.0	21.0	24.0	26.0	29.0
14 x 6	CFM	140	175	205	240	275	310	345	380	415	450	485	550	620	690
Ak .345	Throw	6.0	7.5	9.0	11.0	12.0	14.0	15.0	17.0	18.0	20.0	21.0	24.0	27.0	30.0
16 x 6	CFM	16	200	240	275	315	355	395	435	475	515	555	635	715	790
Ak .396	Throw	6.5	8.0	10.0	11.0	13.0	15.0	16.0	18.0	19.0	21.0	23.0	26.0	29.0	32.0
20 x 5	CFM	165	205	245	285	325	365	410	450	490	530	570	655	735	815
Ak .408	Throw	6.5	8.5	10.0	11.0	13.0	15.0	17.0	18.0	20.0	21.0	23.0	26.0	30.0	33.0
24 x 5	CFM	195	245	295	345	395	445	490	540	590	640	690	785	885	965
Ak .492	Throw	7.0	9.0	11.0	13.0	14.0	16.0	18.0	20.0	22.0	23.0	25.0	29.0	32.0	36.0
20 x 6	CFM	200	250	300	350	400	445	495	545	595	645	695	795	895	995
Ak .497	Throw	7.5	9.0	11.0	13.0	15.0	16.0	18.0	20.0	22.0	24.0	25.0	29.0	33.0	36.0
24 x 6	CFM	240	300	360	420	480	540	600	660	720	775	835	955	1075	1195
Ak .598	Throw	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	28.0	32.0	36.0	40.0
20 x 8	CFM	270	335	405	470	540	605	675	740	810	875	940	1075	1210	1345
Ak .673	Throw	8.5	11.0	13.0	15.0	17.0	19.0	21.0	23.0	25.0	27.0	30.0	34.0	38.0	42.0
30 x 6	CFM	300	375	450	525	600	675	750	825	900	975	1050	1200	1350	1500
Ak .750	Throw	9.0	11.0	13.0	16.0	18.0	20.0	22.0	25.0	27.0	29.0	31.0	36.0	40.0	45.0
24 x 8	CFM	325	405	485	570	650	730	810	890	975	1055	1135	1300	1460	1620
Ak .811	Throw	9.5	12.0	14.0	16.0	19.0	21.0	23.0	25.0	28.0	30.0	32.0	37.0	42.0	46.0
30 x 8	CFM	405	510	610	710	815	915	1015	1120	1220	1320	1425	1625	1830	2035
Ak 1.017	Throw	11.0	13.0	16.0	18.0	21.0	23.0	26.0	29.0	31.0	34.0	36.0	42.0	47.0	52.0
24 x 10	CFM	410	510	615	715	820	920	1025	1125	1230	1330	1430	1635	1840	2045
Ak 1.023	Throw	10.0	13.0	16.0	18.0	21.0	23.0	26.0	29.0	31.0	34.0	36.0	42.0	47.0	52.0
36 x 8	CFM	490	610	735	855	980	1100	1220	1345	1465	1590	1710	1955	2200	2445
Ak 1.222	Throw	11.0	14.0	17.0	20.0	23.0	26.0	28.0	31.0	34.0	37.0	40.0	46.0	51.0	57.0
24 x 12	CFM	495	620	740	865	990	1110	1235	1360	1485	1605	1730	1975	2225	2470
Ak 1.236	Throw	11.0	14.0	17.0	20.0	23.0	26.0	29.0	32.0	34.0	37.0	40.0	46.0	52.0	57.0
30 x 10	CFM	515	640	770	900	1025	1155	1285	1410	1540	1670	1795	2055	2310	2565
Ak 1.283	Throw	12.0	15.0	17.0	20.0	23.0	26.0	29.0	32.0	35.0	38.0	42.0	46.0	52.0	58.0
36 x 10	CFM	615	770	925	1080	1235	1390	1545	1700	1850	2005	2160	2470	2775	3085
Ak 1.543	Throw	13.0	16.0	19.0	22.0	26.0	29.0	32.0	35.0	38.0	42.0	45.0	51.0	57.0	64.0
30 x 12	CFM	620	775	930	1085	1240	1395	1550	1705	1860	2015	2170	2480	2790	3100
Ak 1.550	Throw	13.0	16.0	19.0	22.0	26.0	29.0	32.0	35.0	39.0	42.0	45.0	51.0	58.0	64.0
36 x 12	CFM	745	930	1120	1305	1490	1680	1865	2050	2235	2425	2610	2980	3355	3730
Ak 1.864	Throw	14.0	18.0	21.0	25.0	28.0	32.0	35.0	39.0	42.0	46.0	49.0	56.0	63.0	70.0

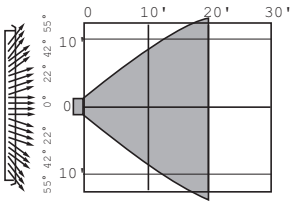
Terminal Velocity of 75 FPM

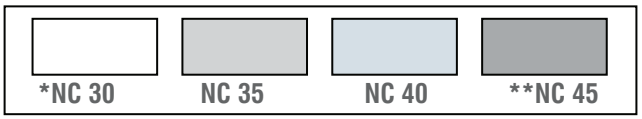
Deflection G

Face Velocity		400	500	600	700	800	900	1000	1100	1200	1300	1400	1600	1800	2000
Pressure Loss		.010	.016	.022	.031	.040	.050	.062	.075	.090	.105	.122	.160	.202	.249
8 x 4	CFM	50	60	70	85	95	105	120	130	145	155	165	190	215	240
Ak .119	Throw	2.5	3.0	4.0	4.5	5.0	5.5	6.5	7.0	8.0	8.5	9.0	10.0	12.0	13.0
10 x 4	CFM	55	70	85	100	115	130	145	155	170	185	200	230	255	285
Ak .143	Throw	2.5	3.5	4.0	5.0	5.5	6.5	7.0	7.5	8.0	9.0	9.5	11.0	12.0	14.0
12 x 4	CFM	70	85	105	120	140	155	175	190	210	225	240	275	310	345
Ak .173	Throw	3.0	3.5	4.5	5.5	6.0	7.0	7.5	8.5	9.0	10.0	11.0	12.0	14.0	15.0
14 x 4	CFM	80	100	120	140	160	180	200	220	240	265	285	325	365	405
Ak .202	Throw	3.0	4.0	5.0	5.5	6.5	7.5	8.0	9.0	9.5	11.0	12.0	13.0	15.0	16.0
12 x 5	CFM	90	110	130	155	175	200	220	240	265	285	310	350	395	440
Ak .220	Throw	3.5	4.5	5.0	6.0	7.0	8.0	8.5	9.5	10.0	11.0	12.0	14.0	15.0	17.0
10 x 6	CFM	90	110	135	155	180	200	220	245	265	290	310	355	400	445
Ak .222	Throw	3.5	4.5	5.0	6.0	7.0	7.5	8.5	9.5	10.0	11.0	12.0	14.0	15.0	17.0
14 x 5	CFM	105	130	155	180	205	230	260	285	310	335	360	415	465	515
Ak .258	Throw	4.0	4.5	5.5	6.5	7.5	8.5	9.5	10.0	11.0	12.0	13.0	15.0	17.0	18.0
12 x 6	CFM	105	135	160	190	215	240	270	295	320	350	375	430	480	535
Ak .268	Throw	4.0	5.0	5.5	6.5	7.5	8.5	9.5	10.0	11.0	12.0	13.0	15.0	17.0	19.0
16 x 5	CFM	120	150	180	205	235	265	295	325	355	385	415	475	535	590
Ak .296	Throw	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	16.0	18.0	20.0
14 x 6	CFM	125	155	190	220	250	285	315	345	375	410	440	500	565	630
Ak .314	Throw	4.0	5.0	6.0	7.0	8.0	9.5	10.0	11.0	12.0	13.0	14.0	16.0	18.0	20.0
16 x 6	CFM	145	180	215	250	290	325	360	395	430	470	505	575	650	720
Ak .360	Throw	4.5	5.5	6.5	7.5	9.0	10.0	11.0	12.0	13.0	14.0	15.0	17.0	20.0	22.0
20 x 5	CFM	150	185	225	260	300	335	370	410	445	485	520	595	670	745
Ak .372	Throw	4.5	5.5	6.5	7.5	9.0	10.0	11.0	12.0	13.0	14.0	15.0	18.0	20.0	22.0
24 x 5	CFM	180	225	270	315	360	405	450	495	540	580	625	715	805	895
Ak .448	Throw	5.0	7.5	7.5	8.5	10.0	11.0	12.0	13.0	15.0	16.0	17.0	19.0	22.0	24.0
20 x 6	CFM	180	225	270	315	360	410	455	500	545	590	635	725	815	905
Ak .453	Throw	5.0	6.0	7.5	8.5	10.0	11.0	12.0	14.0	15.0	16.0	17.0	20.0	22.0	25.0
24 x 6	CFM	220	275	325	380	435	490	545	600	655	710	765	870	980	1090
Ak .545	Throw	5.5	7.0	8.0	9.5	11.0	12.0	13.0	15.0	16.0	18.0	19.0	21.0	24.0	27.0
20 x 8	CFM	245	305	370	430	490	555	615	675	735	800	860	980	1105	1230
Ak .614	Throw	5.5	7.0	8.5	10.0	11.0	13.0	14.0	16.0	17.0	19.0	20.0	23.0	26.0	29.0
30 x 6	CFM	275	340	410	480	545	615	685	750	820	890	955	1095	1230	1365
Ak .683	Throw	6.0	7.5	9.0	11.0	12.0	14.0	15.0	17.0	18.0	20.0	21.0	24.0	27.0	30.0
24 x 8	CFM	295	370	445	515	590	665	740	815	885	960	1035	1180	1330	1480
Ak .739	Throw	6.5	8.0	9.5	11.0	13.0	14.0	16.0	17.0	19.0	20.0	22.0	25.0	28.0	31.0
30 x 8	CFM	370	465	555	650	740	835	925	1020	1110	1205	1295	1480	1665	1850
Ak .926	Throw	7.0	9.0	10.0	12.0	14.0	16.0	17.0	19.0	21.0	23.0	24.0	28.0	31.0	35.0
24 x 10	CFM	375	465	560	650	745	840	930	1025	1120	1210	1305	1490	1675	1865
Ak .932	Throw	7.0	9.0	11.0	12.0	14.0	16.0	18.0	19.0	21.0	23.0	25.0	28.0	32.0	35.0
36 x 8	CFM	445	555	670	780	890	1005	1115	1225	1335	1450	1560	1780	2005	2230
Ak 1.114	Throw	7.5	9.5	12.0	13.0	15.0	17.0	19.0	21.0	23.0	25.0	27.0	31.0	35.0	39.0
24 x 12	CFM	450	565	675	790	900	1015	1125	1240	1350	1465	1575	1800	2025	2250
Ak 1.126	Throw	7.5	9.5	12.0	14.0	15.0	17.0	19.0	21.0	23.0	25.0	27.0	31.0	35.0	39.0
30 x 10	CFM	470	585	700	820	935	1050	1170	1285	1405	1520	1635	1870	2105	2340
Ak 1.169	Throw	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	27.0	31.0	35.0	39.0
36 x 10	CFM	560	705	845	985	1125	1265	1405	1545	1685	1830	1970	2250	2530	2810
Ak 1.406	Throw	8.5	11.0	13.0	15.0	17.0	19.0	22.0	24.0	26.0	28.0	30.0	35.0	39.0	43.0
30 x 12	CFM	565	705	845	990	1130	1270	1410	1555	1695	1835	1975	2260	2540	2825
Ak 1.412	Throw	8.5	11.0	13.0	15.0	17.0	19.0	22.0	24.0	26.0	28.0	30.0	35.0	39.0	43.0
36 x 12	CFM	680	850	1020	1190	1360	1530	1700	1870	2040	2210	2375	2715	3055	3395
Ak 1.698	Throw	9.5	12.0	14.0	17.0	19.0	21.0	24.0	26.0	29.0	31.0	33.0	38.0	43.0	48.0

Terminal Velocity of 75 FPM







* less than or equal to ** greater than or equal to

Recommended Noise Criteria and Face Velocity Ranges are on page 77

94/94A Series Return Air Grilles & Registers (Page 9-10)
96AFB Steel Fixed-Bar Filter Grille (Page 10)

Face Velocity		300	400	500	600	700	800	900	1000
6 x 6	CFM	45	60	75	90	105	120	135	150
Ak .150	Ps	.010	.019	.029	.046	.060	.075	.100	.130
8 x 8	CFM	84	112	140	169	197	225	253	281
Ak .280	Ps	.010	.019	.029	.046	.060	.075	.100	.130
10 x 10	CFM	135	180	225	270	315	360	405	450
Ak .450	Ps	.011	.019	.030	.042	.057	.072	.094	.119
12 x 6	CFM	96	127	159	191	223	255	287	318
Ak .320	Ps	.011	.019	.029	.045	.059	.074	.099	.128
14 x 6	CFM	112	150	187	225	262	300	337	375
Ak .370	Ps	.011	.019	.029	.044	.058	.074	.097	.124
14 x 8	CFM	152	203	254	304	355	406	456	507
Ak .510	Ps	.011	.019	.030	.041	.056	.072	.093	.116
12 x 12	CFM	198	264	330	395	461	527	593	659
Ak .660	Ps	.011	.019	.030	.039	.054	.070	.089	.109
24 x 8	CFM	267	355	444	533	622	711	800	888
Ak .890	Ps	.011	.020	.031	.040	.055	.074	.091	.111
18 x 12	CFM	301	401	502	602	703	803	903	1004
Ak 1.000	Ps	.011	.020	.031	.041	.056	.076	.092	.112
30 x 8	CFM	336	448	560	672	784	895	1007	1119
Ak 1.120	Ps	.011	.020	.031	.041	.056	.078	.093	.114
24 x 12	CFM	406	541	676	811	946	1082	1217	1352
Ak 1.350	Ps	.011	.020	.031	.043	.058	.081	.095	.116
18 x 18	CFM	458	611	764	917	1069	1222	1375	1528
Ak 1.530	Ps	.011	.020	.032	.043	.058	.083	.096	.117
30 x 12	CFM	511	682	852	1023	1193	1364	1534	1704
Ak 1.700	Ps	.011	.020	.032	.044	.059	.084	.097	.118
20 x 20	CFM	571	761	951	1141	1331	1522	1712	1902
Ak 1.900	Ps	.011	.020	.032	.044	.059	.086	.098	.119
36 x 12	CFM	618	824	1030	1236	1442	1649	1855	2061
Ak 2.060	Ps	.011	.020	.032	.045	.060	.087	.099	.120
24 x 20	CFM	690	920	1150	1380	1610	1840	2070	2300
Ak 2.300	Ps	.011	.020	.032	.045	.060	.089	.100	.120
30 x 18	CFM	781	1041	1301	1561	1822	2082	2342	2602
Ak 2.600	Ps	.011	.020	.032	.045	.060	.090	.100	.121
24 x 24	CFM	835	1114	1392	1671	1949	2228	2506	2785
Ak 2.780	Ps	.011	.020	.031	.046	.060	.090	.100	.121
36 x 18	CFM	946	1261	1576	1892	2207	2522	2838	3153
Ak 3.150	Ps	.011	.019	.031	.045	.059	.090	.099	.120
30 x 24	CFM	1057	1410	1762	2115	2467	2820	3172	3525
Ak 3.520	Ps	.011	.019	.030	.045	.058	.089	.098	.119
36 x 24	CFM	1284	1712	2140	2568	2996	3424	3852	4280
Ak 4.280	Ps	.011	.018	.028	.043	.055	.085	.092	.114
30 x 30	CFM	1341	1789	2236	2683	3130	3577	4024	4471
Ak 4.470	Ps	.011	.017	.028	.042	.054	.083	.091	.112
36 x 30	CFM	1633	2177	2721	3265	3810	4354	4898	5442
Ak 5.440	Ps	.010	.015	.024	.037	.047	.070	.079	.100
48 x 24	CFM	1751	2335	2919	3503	4086	4670	5254	5838
Ak 5.840	Ps	.009	.014	.022	.035	.043	.064	.073	.095
36 x 36	CFM	1992	2656	3320	3984	4648	5312	5976	6640
Ak 6.640	Ps	.008	.012	.017	.029	.034	.048	.059	.081
48 x 36	CFM	2742	3656	4570	5484	6398	7312	8226	9140
Ak 9.140	Ps	.008	.012	.017	.029	.034	.048	.059	.081
48 x 48	CFM	3808	5077	6346	7615	8884	10154	11423	12692
Ak 12.700	Ps	.008	.012	.017	.029	.034	.048	.059	.081

For sizes not listed and sizing tips see page(s) 78

PFG Perforated Face Grille (Page 11)

Return Air Grille Balancing Data
To Determine CFM:
1. Use an ALNOR Velometer with No. 2220 or 2220A Tip or a 4" rotating vane anemometer. If a 4" rotating vane anemometer is used, place dial face against perforated plate, and sample in a random manner for at least 1 minute.
2. Select proper Ak from Table by unit size and instrument used for measuring velocity.
3. Determine CFM by the following equation: CFM = Ak x Average Velocity.

Sample Problem
Determine Return Airflow Rate (CFM) through a 10 x 10, using an ALNOR Velometer with Tip No. 2220 or 2220A.
Solution
1. Assume the average of 6 velocity readings taken with an ALNOR Velometer is 2000 FPM.
2. From Table, the Area Factor for a 10 x 10 using an ALNOR Velometer is Ak = .39 sq. ft.
3. CFM = Ak x Average Velocity = .39 sq. ft. x 2000 FPM = 780 CFM

Neck Velocity			200	300	400	500	600	650	700	750	800	900
S.P. Drop w/OBD			.012	.027	.049	.078	.110	.130	.150	.170	.190	.240
Size	Ak ALNOR	Ak 4" ROT. Vane	Air Capacities - CFM									
10 x 10	.39	.55	140	210	285	350	415	450	485	520	555	625
12 x12	.46	.79	200	300	400	500	600	650	700	750	800	900
14 x 14	.62	1.07	270	410	545	680	815	885	955	1020	1090	1225
10 x 22	.71	1.21	305	460	610	765	915	995	1070	1150	1220	1375
16 x 16	.82	1.40	355	530	710	890	1065	1155	1245	1335	1425	1600
18 x 18	1.05	1.77	450	675	900	1125	1350	1460	1575	1690	1800	2030
20 x 20	1.28	2.25	555	835	1110	1390	1665	1805	1945	2080	2220	2500
22 x 22	1.55	2.70	670	1010	1345	1680	2020	2180	2350	2520	2690	3020

Recommended Noise Criteria and Face Velocity Ranges are on page 77

HART COOLEY

H and V Series (Page 12-16)

Deflection A

Face Velocity		400	500	600	700	800	900	1000	1100	1200	1300	1400	1600	1800	2000
Pressure Loss		.010	.016	.022	.031	.040	.050	.062	.075	.090	.105	.122	.160	.202	.249
8 x 4	CFM	60	80	95	110	125	140	155	170	185	205	220	250	280	310
Ak .156	Throw	6.5	8.0	10.0	12.0	13.0	15.0	16.0	18.0	19.0	22.0	23.0	26.0	29.0	33.0
10 x 4	CFM	80	100	120	140	160	180	200	220	240	260	275	315	355	395
Ak .198	Throw	7.5	9.5	12.0	13.0	15.0	17.0	19.0	20.0	22.0	24.0	26.0	29.0	33.0	37.0
12 x 4	CFM	95	120	145	170	190	215	240	265	290	310	335	385	430	480
Ak .240	Throw	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	25.0	26.0	28.0	33.0	36.0	41.0
14 x 4	CFM	115	140	170	195	225	255	280	310	340	365	395	450	510	565
Ak .282	Throw	9.0	11.0	13.0	15.0	18.0	20.0	22.0	24.0	27.0	29.0	31.0	35.0	40.0	44.0
12 x 5	CFM	125	155	185	215	250	280	310	340	370	405	435	495	560	620
Ak .310	Throw	9.0	12.0	14.0	16.0	19.0	21.0	23.0	25.0	28.0	30.0	32.0	37.0	42.0	46.0
10 x 6	CFM	125	155	190	220	250	280	315	345	375	405	440	500	565	625
Ak .313	Throw	9.0	12.0	14.0	16.0	19.0	21.0	23.0	26.0	28.0	30.0	33.0	37.0	42.0	46.0
14 x 5	CFM	145	180	220	255	290	330	365	400	435	475	510	580	655	730
Ak .364	Throw	10.0	12.0	15.0	18.0	20.0	23.0	25.0	28.0	30.0	33.0	35.0	40.0	45.0	50.0
12 x 6	CFM	150	190	225	265	305	340	380	415	455	495	530	605	680	760
Ak .379	Throw	10.0	13.0	15.0	18.0	21.0	23.0	26.0	28.0	31.0	33.0	36.0	41.0	46.0	51.0
16 x 5	CFM	165	210	250	295	335	375	420	460	500	545	585	670	750	835
Ak .418	Throw	11.0	13.0	16.0	19.0	22.0	24.0	27.0	30.0	32.0	35.0	38.0	43.0	48.0	54.0
14 x 6	CFM	180	225	270	310	355	400	445	490	535	580	625	715	805	890
Ak .446	Throw	11.0	14.0	17.0	19.0	22.0	25.0	28.0	30.0	33.0	36.0	39.0	44.0	50.0	55.0
16 x 6	CFM	205	255	305	360	410	460	510	565	615	665	715	820	920	1025
Ak .512	Throw	11.0	14.0	17.0	20.0	22.0	25.0	28.0	31.0	34.0	36.0	39.0	45.0	50.0	56.0
20 x 5	CFM	210	265	315	370	420	475	525	580	630	685	735	840	945	1050
Ak .526	Throw	12.0	15.0	18.0	21.0	24.0	27.0	30.0	33.0	36.0	39.0	42.0	48.0	54.0	60.0
24 x 5	CFM	255	315	380	445	505	570	635	695	760	825	890	1015	1140	1270
Ak .634	Throw	13.0	16.0	20.0	23.0	26.0	30.0	33.0	36.0	40.0	43.0	46.0	53.0	59.0	66.0
20 x 6	CFM	260	325	385	450	515	580	645	710	775	840	905	1030	1160	1290
Ak .645	Throw	13.0	17.0	20.0	23.0	27.0	30.0	33.0	37.0	40.0	43.0	47.0	53.0	60.0	67.0
24 x 6	CFM	310	390	465	545	620	700	775	855	930	1010	1090	1245	1400	1555
Ak .777	Throw	15.0	18.0	22.0	26.0	29.0	33.0	37.0	40.0	44.0	48.0	51.0	59.0	66.0	73.0
20 x 8	CFM	355	440	530	615	705	795	880	970	1060	1145	1235	1410	1590	1765
Ak .882	Throw	16.0	19.0	23.0	27.0	31.0	35.0	39.0	43.0	47.0	51.0	55.0	62.0	70.0	78.0
30 x 6	CFM	390	490	585	685	780	880	975	1075	1170	1270	1365	1560	1755	1950
Ak .976	Throw	16.0	21.0	25.0	29.0	33.0	37.0	41.0	45.0	49.0	53.0	57.0	66.0	74.0	82.0
24 x 8	CFM	425	530	635	740	850	955	1060	1165	1270	1380	1485	1695	1910	2120
Ak 1.060	Throw	17.0	21.0	23.0	30.0	34.0	38.0	43.0	47.0	51.0	56.0	60.0	68.0	77.0	85.0
30 x 8	CFM	535	670	805	940	1070	1205	1340	1475	1610	1740	1875	2145	2410	2680
Ak 1.340	Throw	19.0	24.0	29.0	34.0	38.0	43.0	48.0	53.0	58.0	62.0	67.0	77.0	87.0	96.0
24 x 10	CFM	540	675	810	945	1080	1215	1350	1485	1620	1755	1890	2160	2430	2700
Ak 1.350	Throw	19.0	24.0	29.0	34.0	39.0	43.0	48.0	53.0	58.0	63.0	68.0	77.0	87.0	97.0
36 x 8	CFM	645	805	965	1125	1290	1450	1610	1770	1930	2095	2255	2575	2900	3220
Ak 1.610	Throw	21.0	26.0	32.0	37.0	42.0	47.0	52.0	58.0	63.0	68.0	73.0	84.0	94.0	105.0
24 x 12	CFM	655	820	985	1150	1310	1475	1640	1805	1970	2130	2295	2625	2950	3280
Ak 1.640	Throw	21.0	27.0	32.0	37.0	43.0	48.0	53.0	59.0	64.0	69.0	75.0	85.0	96.0	107.0
30 x 10	CFM	675	845	1015	1185	1350	1520	1690	1860	2030	2195	2365	2705	3040	3380
Ak 1.690	Throw	21.0	27.0	32.0	38.0	43.0	48.0	54.0	59.0	65.0	70.0	75.0	86.0	97.0	108.0
36 x 10	CFM	815	1020	1225	1430	1630	1835	2040	2245	2450	2650	2855	3265	3670	4080
Ak 2.040	Throw	24.0	30.0	36.0	42.0	47.0	53.0	59.0	65.0	71.0	77.0	83.0	95.0	107.0	119.0
30 x 12	CFM	820	1025	1230	1435	1640	1845	2050	2255	2460	2665	2870	3280	3690	4100
Ak 2.050	Throw	24.0	30.0	36.0	42.0	48.0	54.0	59.0	65.0	71.0	77.0	83.0	95.0	107.0	119.0
36 x 12	CFM	990	1235	1480	1730	1975	2225	2470	2715	2965	3210	3460	3950	4451	4940
Ak 2.470	Throw	26.0	33.0	39.0	46.0	52.0	59.0	65.0	72.0	78.0	85.0	91.0	104.0	114.0	130.0

For sizes not listed and sizing tips see page 78

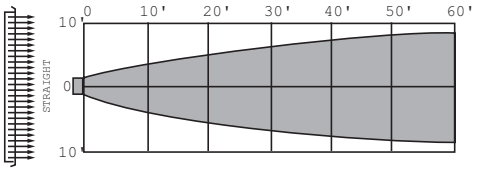
Terminal Velocity of 75 FPM

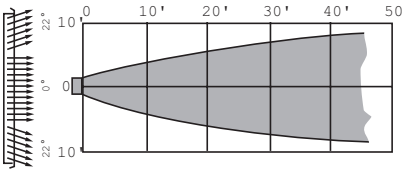
Deflection C

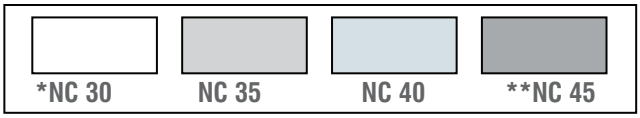
Face Velocity		400	500	600	700	800	900	1000	1100	1200	1300	1400	1600	1800	2000
Pressure Loss		.010	.016	.022	.031	.040	.050	.062	.075	.090	.105	.122	.160	.202	.249
8 x 4	CFM	55	70	85	100	115	125	140	155	170	185	195	225	255	280
Ak .141	Throw	5.0	6.5	7.5	9.0	10.0	11.0	13.0	14.0	15.0	17.0	18.0	20.0	23.0	25.0
10 x 4	CFM	70	90	105	125	140	160	180	195	215	230	250	285	320	355
Ak .178	Throw	5.5	7.0	8.5	10.0	11.0	13.0	14.0	16.0	17.0	18.0	20.0	23.0	26.0	29.0
12 x 4	CFM	85	110	130	150	175	195	215	240	260	280	300	345	390	430
Ak .216	Throw	6.0	8.0	9.5	11.0	13.0	14.0	16.0	18.0	19.0	20.0	22.0	25.0	28.0	31.0
14 x 4	CFM	100	125	150	180	205	230	255	280	305	330	355	405	455	510
Ak .254	Throw	7.0	8.5	10.0	12.0	14.0	16.0	17.0	19.0	21.0	22.0	24.0	27.0	31.0	34.0
12 x 5	CFM	110	140	165	195	225	250	280	305	335	365	390	445	500	560
Ak .279	Throw	7.0	9.0	11.0	13.0	14.0	16.0	18.0	20.0	22.0	23.0	25.0	29.0	32.0	36.0
10 x 6	CFM	115	140	170	195	225	255	280	310	340	365	395	450	510	565
Ak .282	Throw	7.5	9.0	11.0	12.0	14.0	16.0	18.0	20.0	22.0	23.0	25.0	29.0	33.0	36.0
14 x 5	CFM	130	165	195	230	260	295	330	360	395	425	460	525	590	655
Ak .328	Throw	7.5	10.0	12.0	14.0	15.0	17.0	20.0	21.0	23.0	25.0	27.0	31.0	35.0	39.0
12 x 6	CFM	135	170	205	240	275	310	340	375	410	445	480	545	615	685
Ak .342	Throw	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	28.0	32.0	36.0	40.0
16 x 5	CFM	150	190	225	265	300	340	375	415	450	490	525	605	680	755
Ak .377	Throw	8.5	11.0	12.0	15.0	17.0	19.0	21.0	23.0	25.0	27.0	29.0	34.0	38.0	41.0
14 x 6	CFM	165	205	245	290	330	370	410	455	495	535	575	660	740	825
Ak .412	Throw	9.0	11.0	13.0	16.0	18.0	20.0	22.0	24.0	27.0	28.0	31.0	35.0	40.0	44.0
16 x 6	CFM	185	230	275	325	370	415	460	510	555	600	645	740	830	925
Ak .462	Throw	9.0	11.0	13.0	15.0	18.0	20.0	22.0	24.0	26.0	28.0	31.0	35.0	39.0	44.0
20 x 5	CFM	190	235	285	330	380	425	475	520	570	615	665	760	855	950
Ak .474	Throw	9.5	12.0	14.0	16.0	19.0	21.0	23.0	26.0	28.0	30.0	33.0	38.0	42.0	47.0
24 x 5	CFM	230	285	345	400	460	515	570	630	685	745	800	915	1030	1145
Ak .572	Throw	10.0	13.0	15.0	18.0	21.0	23.0	26.0	28.0	33.0	33.0	36.0	41.0	46.0	51.0
20 x 6	CFM	230	290	350	405	465	525	580	640	695	755	815	930	1045	1160
Ak .581	Throw	10.0	13.0	16.0	18.0	21.0	23.0	26.0	29.0	31.0	34.0	36.0	41.0	47.0	52.0
24 x 6	CFM	280	350	420	490	560	630	700	770	840	910	980	1120	1260	1400
Ak .701	Throw	11.0	14.0	17.0	20.0	23.0	26.0	28.0	31.0	34.0	37.0	40.0	45.0	51.0	57.0
20 x 8	CFM	320	400	475	555	635	715	795	875	955	1035	1115	1270	1430	1590
Ak .795	Throw	12.0	15.0	18.0	21.0	24.0	27.0	30.0	33.0	36.0	39.0	42.0	48.0	54.0	61.0
30 x 6	CFM	350	440	530	615	705	790	880	970	1055	1145	1230	1410	1585	1760
Ak .880	Throw	13.0	16.0	19.0	22.0	26.0	29.0	32.0	35.0	38.0	41.0	46.0	51.0	57.0	64.0
24 x 8	CFM	385	480	575	670	765	865	960	1055	1150	1245	1345	1535	1725	1920
Ak .959	Throw	13.0	17.0	20.0	23.0	27.0	30.0	33.0	37.0	40.0	43.0	47.0	53.0	60.0	67.0
30 x 8	CFM	480	600	720	840	960	1080	1200	1320	1440	1560	1680	1920	2160	2400
Ak 1.200	Throw	15.0	19.0	22.0	26.0	30.0	33.0	37.0	41.0	45.0	48.0	52.0	60.0	67.0	74.0
24 x 10	CFM	490	610	730	855	975	1100	1220	1340	1465	1585	1710	1950	2200	2440
Ak 1.220	Throw	15.0	19.0	22.0	26.0	30.0	34.0	38.0	41.0	45.0	49.0	53.0	60.0	68.0	75.0
36 x 8	CFM	580	725	870	1015	1160	1305	1450	1595	1740	1885	2030	2320	2610	2900
Ak 1.450	Throw	16.0	20.0	25.0	29.0	33.0	37.0	41.0	45.0	49.0	53.0	57.0	65.0	74.0	82.0
24 x 12	CFM	590	735	880	1030	1175	1325	1470	1615	1765	1910	2060	2350	2645	2940
Ak 1.470	Throw	17.0	21.0	25.0	29.0	33.0	37.0	41.0	45.0	49.0	53.0	58.0	66.0	74.0	82.0
30 x 10	CFM	610	765	920	1070	1225	1375	1530	1685	1835	1990	2140	2450	2755	3060
Ak 1.530	Throw	17.0	21.0	25.0	29.0	34.0	38.0	42.0	46.0	50.0	55.0	59.0	67.0	76.0	84.0
36 x 10	CFM	735	920	1105	1290	1470	1655	1840	2025	2210	2390	2575	2945	3310	3680
Ak 1.840	Throw	18.0	23.0	28.0	32.0	37.0	42.0	46.0	51.0	55.0	60.0	65.0	74.0	83.0	92.0
30 x 12	CFM	740	925	1110	1295	1400	1665	1850	2035	2220	2405	2590	2960	3330	3700
Ak 1.850	Throw	19.0	23.0	28.0	32.0	37.0	42.0	46.0	51.0	56.0	60.0	65.0	74.0	83.0	93.0
36 x 12	CFM	890	115	1340	1560	1785	2000	2230	2455	2675	2900	3120	3570	4015	4460
Ak 2.230	Throw	20.0	25.0	31.0	36.0	41.0	46.0	51.0	56.0	61.0	66.0	71.0	81.0	92.0	102.0

For sizes not listed and sizing tips see page 78

Terminal Velocity of 75 FPM







* less than or equal to

** greater than or equal to

Recommended Noise Criteria and Face Velocity Ranges are on page 77

HART COOLEY

H and V Series (Page 12-16)

Deflection E

Face Velocity		400	500	600	700	800	900	1000	1100	1200	1300	1400	1600	1800	2000
Pressure Loss		.010	.016	.022	.031	.040	.050	.062	.075	.090	.105	.122	.160	.202	.249
8 x 4	CFM	45	60	70	85	95	105	120	130	140	155	165	190	210	235
Ak .127	Throw	2.5	3.5	4.0	5.0	5.5	6.0	6.5	7.5	8.0	8.5	9.5	11.0	12.0	13.0
10 x 4	CFM	60	75	90	105	120	135	150	165	180	195	210	240	270	300
Ak .162	Throw	3.0	3.5	4.5	5.0	6.0	6.5	7.5	8.0	9.0	9.5	10.0	12.0	13.0	15.0
12 x 4	CFM	80	100	120	140	160	175	195	215	235	255	275	315	355	395
Ak .197	Throw	4.5	6.0	7.5	8.5	10.0	11.0	12.0	13.0	14.0	16.0	17.0	19.0	22.0	24.0
14 x 4	CFM	90	115	140	160	185	210	230	255	275	300	325	370	415	460
Ak .231	Throw	5.0	6.5	8.0	9.0	11.0	12.0	13.0	14.0	16.0	17.0	18.0	21.0	23.0	26.0
12 x 5	CFM	100	125	150	180	205	230	255	280	305	330	355	405	455	510
Ak .254	Throw	5.5	6.5	8.0	9.5	12.0	12.0	14.0	15.0	16.0	18.0	19.0	22.0	25.0	27.0
10 x 6	CFM	105	130	155	180	205	230	255	285	310	335	360	410	465	515
Ak .257	Throw	5.5	7.5	8.5	9.5	11.0	12.0	14.0	15.0	17.0	18.0	19.0	22.0	25.0	28.0
14 x 5	CFM	120	150	180	210	240	270	300	330	360	385	415	475	535	595
Ak .291	Throw	6.0	7.5	9.0	10.0	12.0	13.0	15.0	16.0	18.0	19.0	21.0	24.0	27.0	30.0
12 x 6	CFM	125	155	185	220	250	280	310	340	375	405	435	500	560	620
Ak .311	Throw	6.0	7.5	9.0	11.0	12.0	14.0	15.0	17.0	18.0	20.0	21.0	24.0	28.0	30.0
16 x 5	CFM	135	170	205	240	275	310	345	375	410	445	480	550	615	685
Ak .343	Throw	6.5	8.0	9.5	11.0	13.0	14.0	16.0	17.0	19.0	21.0	22.0	26.0	29.0	32.0
14 x 6	CFM	145	185	220	255	290	330	365	400	440	475	510	585	655	730
Ak .365	Throw	6.5	8.5	10.0	11.0	13.0	15.0	16.0	18.0	20.0	21.0	23.0	26.0	29.0	33.0
16 x 6	CFM	170	215	240	300	345	390	430	475	545	560	605	690	775	860
Ak .431	Throw	7.0	9.0	11.0	12.0	14.0	16.0	18.0	20.0	21.0	23.0	25.0	28.0	32.0	36.0
20 x 5	CFM	190	235	280	330	375	425	470	515	565	610	660	750	845	940
Ak .470	Throw	7.5	9.5	11.0	13.0	15.0	17.0	19.0	20.0	22.0	24.0	26.0	30.0	33.0	37.0
24 x 5	CFM	210	260	310	365	415	470	520	570	625	675	730	830	935	1040
Ak .520	Throw	8.0	10.0	12.0	14.0	16.0	18.0	20.0	21.0	24.0	25.0	27.0	31.0	35.0	39.0
20 x 6	CFM	210	265	315	370	420	475	530	580	635	685	740	845	950	1055
Ak .528	Throw	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	28.0	32.0	35.0	39.0
24 x 6	CFM	255	320	380	445	510	575	635	700	765	830	890	1020	1145	1275
Ak .637	Throw	8.5	11.0	13.0	15.0	17.0	20.0	22.0	24.0	26.0	28.0	30.0	35.0	39.0	43.0
20 x 8	CFM	290	360	435	505	580	650	725	795	870	940	1010	1155	1300	1445
Ak .723	Throw	9.0	12.0	14.0	16.0	19.0	21.0	23.0	25.0	28.0	30.0	32.0	37.0	42.0	46.0
30 x 6	CFM	320	400	480	560	640	720	800	880	960	1040	1120	1280	1440	1600
Ak .800	Throw	10.0	12.0	15.0	17.0	19.0	22.0	24.0	27.0	29.0	32.0	34.0	39.0	44.0	49.0
24 x 8	CFM	350	435	525	610	700	785	870	960	1045	1135	1220	1400	1570	1745
Ak .872	Throw	10.0	13.0	15.0	18.0	20.0	23.0	25.0	28.0	30.0	33.0	36.0	41.0	48.0	51.0
30 x 8	CFM	435	545	655	765	870	980	1090	1200	1310	1415	1525	1745	1960	2180
Ak 1.090	Throw	11.0	14.0	17.0	20.0	23.0	25.0	28.0	31.0	34.0	37.0	40.0	45.0	51.0	57.0
24 x 10	CFM	445	555	665	775	890	1000	1110	1220	1330	1445	1555	1775	2000	2220
Ak 1.110	Throw	11.0	14.0	17.0	20.0	23.0	26.0	29.0	31.0	34.0	37.0	40.0	46.0	52.0	57.0
36 x 8	CFM	530	660	790	925	1055	1190	1320	1450	1585	1715	1850	2110	2375	2640
Ak 1.320	Throw	14.0	17.0	21.0	24.0	27.0	31.0	34.0	38.0	41.0	45.0	48.0	55.0	62.0	69.0
24 x 12	CFM	535	670	805	940	1070	1205	1340	1475	1610	1740	1875	2145	2410	2680
Ak 1.340	Throw	13.0	16.0	19.0	22.0	25.0	28.0	31.0	35.0	38.0	41.0	44.0	50.0	57.0	63.0
30 x 10	CFM	555	695	835	975	1110	1250	1390	1530	1670	1805	1945	2225	2500	2780
Ak 1.390	Throw	13.0	16.0	19.0	22.0	26.0	29.0	32.0	38.0	38.0	42.0	45.0	51.0	58.0	64.0
36 x 10	CFM	670	835	1000	1170	1335	1505	1670	1835	2005	2170	2340	2670	3005	3340
Ak 1.670	Throw	14.0	18.0	21.0	25.0	28.0	32.0	35.0	39.0	42.0	46.0	49.0	56.0	63.0	70.0
30 x 12	CFM	670	840	1010	1175	1345	1510	1680	1850	2015	2185	2350	2690	3025	3360
Ak 1.680	Throw	14.0	16.0	21.0	25.0	28.0	32.0	35.0	39.0	42.0	46.0	49.0	56.0	63.0	70.0
36 x 12	CFM	810	1015	1220	1420	1625	1825	2030	2235	2435	2640	2840	3250	3655	4060
Ak 2.030	Throw	15.0	19.0	23.0	27.0	31.0	35.0	39.0	43.0	46.0	50.0	54.0	62.0	70.0	78.0

For sizes not listed and sizing tips see page 78

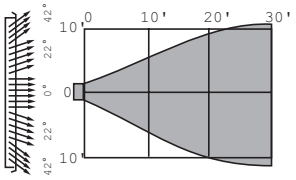
Terminal Velocity of 75 FPM

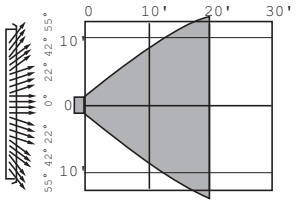
Deflection G

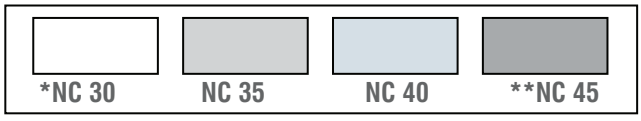
Face Velocity		400	500	600	700	800	900	1000	1100	1200	1300	1400	1600	1800	2000
Pressure Loss		.010	.016	.022	.031	.040	.050	.062	.075	.090	.105	.122	.160	.202	.249
8 x 4	CFM	45	670	70	85	95	105	120	130	140	155	165	190	210	235
Ak .118	Throw	2.5	3.5	4.0	5.0	5.5	6.0	6.5	7.5	8.0	8.5	9.5	11.0	12.0	13.0
10 x 4	CFM	60	75	90	105	120	135	150	165	180	195	210	240	270	300
Ak .149	Throw	3.0	3.5	4.5	5.0	6.0	6.5	7.5	8.0	9.0	9.5	10.0	12.0	13.0	15.0
12 x 4	CFM	70	90	110	125	145	165	180	200	215	235	255	290	325	360
Ak .181	Throw	3.0	4.0	5.0	5.5	6.5	7.5	8.0	9.0	10.0	11.0	12.0	13.0	15.0	16.0
14 x 4	CFM	85	105	125	150	170	190	210	235	255	275	300	340	380	425
Ak .212	Throw	3.5	4.5	5.0	6.5	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	16.0	18.0
12 x 5	CFM	95	115	140	165	185	210	235	255	280	305	325	375	420	465
Ak .233	Throw	4.0	4.5	5.5	6.5	7.5	8.5	9.5	10.0	11.0	12.0	13.0	15.0	17.0	19.0
10 x 6	CFM	95	120	140	165	190	210	235	260	285	305	330	380	425	470
Ak .236	Throw	4.0	5.0	5.5	6.5	7.5	8.5	9.5	10.0	11.0	12.0	13.0	15.0	17.0	19.0
14 x 5	CFM	110	135	165	190	220	245	275	300	330	355	385	440	495	550
Ak .274	Throw	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	16.0	18.0	20.0
12 x 6	CFM	115	145	170	200	230	255	285	315	345	370	400	460	515	570
Ak .286	Throw	4.0	5.0	6.0	7.0	8.5	9.0	10.0	11.0	12.0	13.0	14.0	17.0	19.0	21.0
16 x 5	CFM	125	160	190	220	250	285	315	345	380	410	440	505	565	630
Ak .315	Throw	4.5	5.5	6.5	7.5	8.5	10.0	11.0	12.0	13.0	14.0	15.0	17.0	19.0	22.0
14 x 6	CFM	135	170	200	235	270	300	335	370	405	435	470	540	605	670
Ak .336	Throw	4.5	5.5	6.5	8.0	9.0	10.0	11.0	12.0	13.0	13.0	16.0	18.0	20.0	22.0
16 x 6	CFM	155	195	230	270	310	345	385	425	465	500	540	620	695	770
Ak .386	Throw	4.5	5.5	6.5	8.0	9.0	10.0	11.0	12.0	14.0	15.0	16.0	18.0	20.0	23.0
20 x 5	CFM	160	200	240	280	320	355	395	435	475	515	555	635	715	795
Ak .397	Throw	5.0	6.0	7.5	8.5	10.0	11.0	12.0	13.0	15.0	16.0	17.0	19.0	22.0	24.0
24 x 5	CFM	190	240	285	335	380	430	480	525	575	620	670	765	860	955
Ak .478	Throw	5.5	6.5	8.0	9.5	11.0	12.0	13.0	15.0	16.0	17.0	19.0	21.0	24.0	27.0
20 x 6	CFM	195	245	290	340	390	435	485	535	585	630	680	780	875	970
Ak .486	Throw	5.5	7.0	8.0	9.5	11.0	12.0	13.0	15.0	16.0	17.0	19.0	22.0	24.0	27.0
24 x 6	CFM	235	295	350	410	470	525	585	645	705	760	820	940	1055	1170
Ak .586	Throw	6.0	7.5	9.0	10.0	12.0	13.0	15.0	16.0	18.0	19.0	21.0	24.0	27.0	29.0
20 x 8	CFM	265	335	400	465	530	600	665	730	800	865	930	1065	1195	1330
Ak .665	Throw	6.5	8.0	9.5	11.0	13.0	14.0	16.0	17.0	19.0	21.0	22.0	25.0	28.0	32.0
30 x 6	CFM	295	370	440	515	590	660	735	810	885	955	1030	1180	1325	1470
Ak .736	Throw	6.5	8.5	10.0	12.0	13.0	15.0	17.0	18.0	20.0	21.0	23.0	27.0	30.0	33.0
24 x 8	CFM	320	400	480	560	640	720	800	880	960	1045	1125	1285	1445	1605
Ak .802	Throw	7.0	8.5	10.0	12.0	14.0	15.0	17.0	19.0	21.0	22.0	24.0	28.0	31.0	35.0
30 x 8	CFM	405	505	605	705	810	910	1010	1110	1210	1315	1415	1615	1820	2020
Ak 1.010	Throw	8.0	9.5	12.0	14.0	16.0	17.0	19.0	21.0	23.0	25.0	27.0	31.0	35.0	39.0
24 x 10	CFM	410	510	610	715	815	920	1020	1120	1225	1325	1430	1630	1835	2040
Ak 1.020	Throw	8.0	9.5	12.0	14.0	16.0	18.0	19.0	21.0	23.0	25.0	27.0	31.0	35.0	40.0
36 x 8	CFM	485	605	725	845	970	1090	1210	1330	1450	1575	1695	1935	2180	2420
Ak 1.210	Throw	8.5	11.0	13.0	15.0	17.0	19.0	21.0	23.0	25.0	28.0	30.0	34.0	38.0	42.0
24 x 12	CFM	490	615	740	860	985	1105	1230	1355	1475	1600	1720	1970	2215	2460
Ak 1.230	Throw	8.5	11.0	13.0	15.0	17.0	19.0	21.0	24.0	26.0	28.0	30.0	34.0	39.0	43.0
30 x 10	CFM	510	640	770	900	1025	1150	1280	1410	1535	1665	1790	2050	2305	2560
Ak 1.280	Throw	8.5	11.0	13.0	15.0	18.0	20.0	22.0	24.0	26.0	28.0	31.0	35.0	39.0	44.0
36 x 10	CFM	615	770	925	1080	1230	1385	1540	1695	1850	2000	2155	2465	2770	3080
Ak 1.540	Throw	9.5	12.0	14.0	17.0	19.0	22.0	24.0	26.0	29.0	31.0	34.0	38.0	43.0	48.0
30 x 12	CFM	620	775	930	1085	1240	1395	1550	1705	1860	2015	2170	2480	2790	3100
Ak 1.550	Throw	9.5	12.0	14.0	17.0	19.0	22.0	24.0	26.0	29.0	31.0	34.0	38.0	43.0	48.0
36 x 12	CFM	745	930	1115	1300	1490	1675	1860	2045	2230	2420	2605	2975	3350	3720
Ak 1.860	Throw	11.0	13.0	16.0	18.0	21.0	24.0	26.0	29.0	31.0	34.0	37.0	42.0	47.0	52.0

For sizes not listed and sizing tips see page 78

Terminal Velocity of 75 FPM







* less than or equal to

** greater than or equal to

Recommended Noise Criteria and Face Velocity Ranges are on page 77

C Series Curved-Blade Diffusers Selection Procedure

1. Determine the diffuser air pattern best suited to the duct layout and room area to be served.

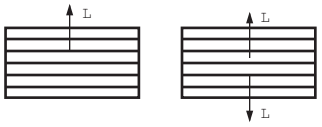
2. Select the air pattern type and CFM per outlet. The tables give the recommended limits of air volume per outlet for various ceiling heights. Choose the correct table for the style diffuser selected. Outlets are assumed to be mounted flush on the ceiling and no obstruction to the air stream.

3. Turn to the proper SIZE SELECTION TABLE for the air pattern desired.

4. Determine the appropriate size based on the CFM, Throw, Pressure Loss, and Face Velocity requirements.

C Series Curved-Blade Diffusers (Page 17-21)

One-Way, Two-Way



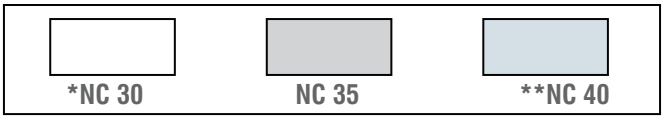
Face Velocity		400	500	600	700	800	900	1000	1100	1200
Pressure Loss		.010	.016	.022	.031	.040	.050	.062	.075	.090
6 x 6	CFM	35	45	55	65	70	80	90	100	110
Ak .090	Throw 1/2	3.5/2.5	5.0/3.5	6.0/4.0	7.0/5.0	7.5/5.5	8.5/6.0	9.5/7.0	11.0/7.5	11.5/8.5
8 x 6	CFM	40	50	60	70	80	90	100	110	120
Ak .100	Throw 1/2	3.5/2.5	4.5/3.0	5.5/4.0	6.5/4.5	7.0/5.0	8.0/6.0	9.0/6.5	10.0/7.0	11.0/7.5
10 x 6	CFM	60	75	90	105	120	135	150	165	180
Ak .150	Throw 1/2	5.0/3.5	6.0/4.5	7.0/5.0	8.5/6.0	9.5/7.0	11.0/7.5	12.0/8.5	13.0/9.5	14.0/10.0
8 x 8	CFM	65	80	95	110	130	145	160	175	190
Ak .160	Throw 1/2	5.0/3.5	6.0/4.5	7.5/5.0	8.5/6.0	10.0/7.0	11.0/8.0	12.0/9.0	14.0/9.5	15.0/10.0
12 x 6	CFM	70	90	110	125	145	160	180	200	215
Ak .180	Throw 1/2	5.0/3.5	6.5/4.5	8.0/5.5	9.0/6.5	11.0/7.5	12.0/8.5	13.0/9.5	15.0/10.0	16.0/11.0
14 x 6	CFM	85	105	125	145	170	190	210	230	250
Ak .210	Throw 1/2	5.5/4.0	7.0/5.0	8.5/6.0	10.0/7.0	11.0/8.0	13.0/9.0	14.0/10.0	16.0/11.0	17.0/12.0
10 x 10	CFM	95	120	145	170	190	215	240	265	290
Ak .240	Throw 1/2	6.0/4.0	7.5/5.0	9.0/6.5	10.0/7.5	12.0/8.0	13.0/9.5	15.0/10.0	16.0/11.0	18.0/13.0
12 x 10	CFM	115	145	175	205	230	260	290	320	350
Ak .290	Throw 1/2	6.5/4.5	8.0/5.5	9.5/7.0	11.0/8.0	13.0/9.0	14.0/10.0	16.0/11.0	18.0/13.0	19.0/14.0
16 x 8	CFM	125	155	185	215	250	280	310	340	370
Ak .310	Throw 1/2	6.5/5.0	8.5/6.0	10.0/7.0	12.0/8.0	13.0/9.5	15.0/11.0	17.0/12.0	18.0/13.0	20.0/14.0
12 x 12	CFM	140	175	210	245	280	315	350	385	420
Ak .350	Throw 1/2	7.0/5.0	9.0/6.0	11.0/7.5	12.0/8.5	14.0/10.0	16.0/11.0	18.0/12.0	19.0/14.0	21.0/15.0
16 x 12	CFM	185	230	275	320	370	415	460	505	550
Ak .460	Throw 1/2	8.0/5.5	10.0/7.5	12.0/9.0	14.0/10.0	16.0/11.0	18.0/13.0	20.0/14.0	22.0/16.0	24.0/17.0
14 x 14	CFM	190	240	290	335	385	430	480	530	575
Ak .480	Throw 1/2	8.0/5.5	10.0/7.5	12.0/9.0	14.0/10.0	17.0/12.0	18.0/13.0	21.0/15.0	23.0/16.0	25.0/17.0
16 x 16	CFM	250	315	380	440	505	565	630	695	755
Ak .630	Throw 1/2	9.5/6.5	12.0/8.5	14.0/10.0	16.0/12.0	19.0/13.0	21.0/15.0	23.0/17.0	26.0/18.0	28.0/20.0
20 x 14	CFM	270	340	410	475	545	610	680	750	815
Ak .680	Throw 1/2	9.5/7.0	12.0/8.5	15.0/10.0	17.0/12.0	19.0/14.0	22.0/15.0	24.0/17.0	27.0/19.0	29.0/21.0
24 x 12	CFM	280	350	420	490	560	630	700	770	840
Ak. 700	Throw 1/2	10.0/7.0	12.0/8.5	15.0/10.0	17.0/12.0	20.0/14.0	22.0/16.0	25.0/17.0	27.0/19.0	30.0/21.0
30 x 10	CFM	290	365	440	510	585	655	730	805	875
Ak .730	Throw 1/2	10.0/7.0	13.0.9.0	15.0/11.0	18.0/12.0	20.0/14.0	23.0/16.0	25.0/18.0	28.0/20.0	30.0/21.0
36 x 10	CFM	350	440	530	615	705	790	880	970	1055
Ak .880	Throw 1/2	11.0/8.0	14.0/10.0	17.0/12.0	19.0/14.0	22.0/16.0	25.0/18.0	28.0/20.0	31.0/22.0	33.0/24.0
36 x 12	CFM	420	525	630	735	840	945	1050	1155	1260
Ak 1.050	Throw 1/2	12.0/8.5	15.0/11.0	18.0/13.0	21.0/15.0	24.0/17.0	27.0/19.0	30.0/21.0	33.0/23.0	36.0/25.0
30 x 16	CFM	460	575	690	805	920	1035	1150	1265	1380
Ak 1.150	Throw 1/2	12.0/9.0	16.0/11.0	19.0/13.0	22.0/15.0	25.0/18.0	28.0/20.0	31.0/22.0	34.0/24.0	37.0/26.0
36 x 16	CFM	560	700	840	980	1120	1260	1400	1540	1680
Ak 1.400	Throw 1/2	14.0/9.5	17.0/12.0	21.0/15.0	24.0/17.0	27.0/19.0	31.0/22.0	34.0/24.0	38.0/27.0	41.0/29.0

For sizes not listed and sizing tips see page(s) 78

Terminal Velocity of 75 FPM

Curved-Blade – C Series

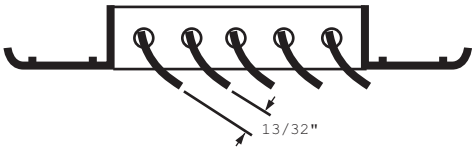
Ceiling Height In Feet	Maximum Cooling Temperature Differential (°F)	Maximum CFM per outlet			
		1 way	2 way	3 way	4 way
7	15°	75	150	225	300
8	18°	100	200	300	400
9	20°	200	400	600	800
10	22°	300	600	900	1200
11	25°	400	800	1200	1600
12	25°	500	1000	1500	2000
14	25°	700	1400	2100	2800
16	25°	900	1800	2700	3600



* less than or equal to

** greater than or equal to

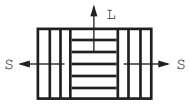
The Face Bars on the Curved-Blade Diffuser should be pre-set to the dimension shown below.



Recommended Noise Criteria and Face Velocity Ranges are on page 77

HART COOLEY

C Series Three-Way

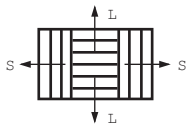


Face Velocity		400	500	600	700	800	900	1000	1100	1200
Pressure Loss		.010	.016	.022	.031	.040	.050	.062	.075	.090
6 x 6 Ak .090	Total CFM	35	45	55	65	70	80	90	100	110
	CFM L/S	9/13	11/17	15/20	17/24	18/26	22/29	24/33	26/37	30/40
	Throw L/S	2.0/2.0	2.5/3.0	3.0/3.5	3.5/4.0	4.0/4.5	4.5/5.0	5.0/6.0	5.5/6.5	6.0/7.0
8 x 6 Ak .100	Total CFM	40	50	60	70	80	90	100	110	120
	CFM L/S	18/11	24/13	28/16	32/19	36/22	42/24	46/27	50/30	56/32
	Throw L/S	2.5/2.0	3.0/2.5	3.5/3.0	4.5/3.5	5.0/4.0	5.5/4.5	6.0/5.0	7.0/5.0	7.5/5.5
10 x 6 Ak .150	Total CFM	60	75	90	105	120	135	150	165	180
	CFM L/S	22/19	27/24	32/29	39/33	44/38	49/43	54/48	61/52	66/57
	Throw L/S	3.0/2.5	3.5/3.0	4.5/4.0	5.0/4.5	6.0/5.0	6.5/5.5	7.0/6.5	8.0/7.0	9.0/7.5
8 x 8 Ak .160	Total CFM	65	80	95	110	130	145	160	175	190
	CFM L/S	31/17	36/22	43/26	50/30	60/35	67/39	74/43	81/47	88/51
	Throw L/S	3.5/2.5	4.0/3.5	5.0/4.0	5.5/4.5	7.0/5.0	7.5/6.0	8.5/6.5	9.0/7.0	10.0/7.5
12 x 6 Ak .180	Total CFM	70	90	110	125	145	160	180	200	215
	CFM L/S	20/25	26/32	32/39	37/44	43/51	48/56	54/63	60/70	65/75
	Throw L/S	2.5/3.0	3.5/4.0	4.5/5.0	5.0.5.5	5.5/6.5	6.5/7.0	7.0/8.0	8.0/8.5	8.5/9.5
14 x 6 Ak .210	Total CFM	85	105	125	145	170	190	210	230	250
	CFM L/S	21/32	27/39	31/47	37/54	44/63	48/71	54/78	58/86	64/93
	Throw L/S	2.5/3.5	3.5/4.5	4.0/5.0	5.0/6.0	6.0/7.0	6.5/8.0	7.0/8.5	8.0/9.5	17.0/12.0
10 x 10 Ak .240	Total CFM	95	120	145	170	190	215	240	265	290
	CFM L/S	35/30	44/38	53/46	62/54	70/60	79/68	88/76	97/84	106/92
	Throw L/S	3.5/3.0	4.5/4.0	5.5/5.0	6.0/6.0	7.0/6.5	8.0/7.5	9.0/8.0	10.0/9.0	11.0/10.0
12 x 10 Ak .290	Total CFM	115	145	175	205	230	260	290	320	350
	CFM L/S	35/40	44/51	53/61	62/72	70/80	78/91	88/101	96/112	106/122
	Throw L/S	3.5/4.0	4.5/5.0	5.5/5.5	6.5/7.0	7.0/7.5	8.0/8.5	9.0/9.5	9.5/11.0	11.0/11.0
16 x 8 Ak .310	Total CFM	125	155	185	215	250	280	310	340	370
	CFM L/S	43/41	55/50	65/60	75/70	88/81	98/91	108/101	120/110	130/120
	Throw L/S	4.0/4.0	5.0/4.5	6.0/5.5	7.0/6.5	8.0/7.5	9.0/8.5	10.0/9.5	11.0/10.0	12.0/11.0
12 x 12 Ak .350	Total CFM	140	175	210	245	280	315	350	385	420
	CFM L/S	42/49	53/61	62/74	73/86	84/98	95/110	105/123	115/135	126/147
	Throw L/S	4.0/4.0	5.0/5.0	6.0/6.5	6.5/7.5	7.5/8.5	8.5/9.5	9.5/10.0	11.0/11.0	13.0/13.0
16 x 12 Ak .460	Total CFM	185	230	275	320	370	415	460	505	550
	CFM L/S	65/60	80/75	97/89	113/104	130/120	146/134	162/149	178/164	194/178
	Throw L/S	4.5/4.5	6.0/5.5	7.0/7.0	8.5/8.0	9.5/9.0	11.0/10.0	12.0/11.0	13.0/12.0	14.0/14.0
14 x 14 Ak .480	Total CFM	190	240	290	335	385	430	480	530	575
	CFM L/S	48/71	62/89	74/108	86/125	99/143	110/160	123/179	136/197	147/214
	Throw L/S	4.0/5.0	5.0/6.5	6.5/7.5	7.5/9.0	8.5/10.0	9.5/11.0	10.0/13.0	12.0/14.0	13.0/15.0
16 x 16 Ak .630	Total CFM	250	315	380	440	505	565	630	695	755
	CFM L/S	88/81	111/102	134/123	155/143	178/164	199/183	222/204	245/225	266/245
	Throw L/S	5.5/5.5	7.0/7.0	8.5/8.0	9.5/9.5	11.0/11.0	13.0/12.0	14.0/13.0	15.0/15.0	17.0/16.0
20 x 14 Ak .680	Total CFM	270	340	410	475	545	610	680	750	815
	CFM L/S	76/97	95/122	115/148	133/171	153/196	171/220	190/245	210/270	228/293
	Throw L/S	5.0/6.0	6.5/7.0	7.5/9.0	9.0/10.0	10.0/12.0	12.0/13.0	13.0/15.0	14.0/16.0	15.0/17.0
24 x 12 Ak. 700	Total CFM	280	350	420	490	560	630	700	770	840
	CFM L/S	90/95	112/119	134/143	156/167	178/191	200/215	222/239	244/263	268/286
	Throw L/S	5.5/5.5	7.0/7.0	8.5/8.5	9.5/10.0	11.0/12.0	12.0/13.0	14.0/14.0	15.0/16.0	17.0/17.0
30 x 10 Ak .730	Total CFM	290	365	440	510	585	655	730	805	875
	CFM L/S	92/99	117/124	140/150	164/173	187/199	210/223	234/248	258/274	280/298
	Throw L/S	5.5/6.0	7.0/7.5	8.5/9.0	10.0/10.0	11.0/12.0	13.0/13.0	14.0/15.0	16.0/16.0	17.0/18.0
36 x 10 Ak .880	Total CFM	350	440	530	615	705	790	880	970	1055
	CFM L/S	113/118	143/149	172/179	199/208	228/238	256/267	285/297	314/328	342/357
	Throw L/S	6.5/6.5	8.0/8.0	9.5/9.5	11.0/11.0	13.0/13.0	14.0/14.0	16.0/16.0	17.0/18.0	19.0/19.0
36 x 12 Ak 1.050	Total CFM	420	525	630	735	840	945	1050	1155	1260
	CFM L/S	135/142	169/178	203/214	237/249	270/285	304/320	338/356	372/392	406/427
	Throw L/S	7.0/7.0	8.5/9.0	10.0/11.0	12.0/12.0	14.0/14.0	15.0/16.0	17.0/18.0	19.0/19.0	20.0/21.0
30 x 16 Ak 1.150	Total CFM	460	575	690	805	920	1035	1150	1265	1380
	CFM L/S	148/156	183/196	220/235	258/274	294/313	331/352	368/391	405/430	442/469
	Throw L/S	7.0/7.0	9.0/9.0	10.0/11.0	12.0/13.0	14.0/15.0	16.0/16.0	18.0/18.0	19.0/20.0	21.0/22.0
36 x 16 Ak 1.400	Total CFM	560	700	840	980	1120	1260	1400	1540	1680
	CFM L/S	180/190	226/237	270/285	316/332	360/380	406/427	450/475	496/522	540/570
	Throw L/S	8.0/8.0	10.0/10.0	12.0/12.0	14.0/14.0	16.0/16.0	18.0/18.0	19.0/20.0	21.0/22.0	23.0/24.0

For sizes not listed and sizing tips see page(s) 78

Terminal Velocity of 75 FPM

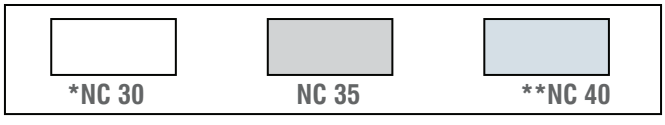
C Series Four-Way



Face Velocity		400	500	600	700	800	900	1000	1100	1200
Pressure Loss		.010	.016	.022	.031	.040	.050	.062	.075	.090
6 x 6 Ak .090	Total CFM	35	45	55	65	70	80	90	100	110
	CFM L/S	5/13	6/17	7/20	9/24	9/26	11/29	12/33	13/37	15/40
	Throw L/S	1.5/2.0	1.5/3.0	2.0/3.5	2.5/4.0	2.5/4.5	3.0/5.0	3.5/6.0	4.0/6.5	4.5/7.0
8 x 6 Ak .100	Total CFM	40	50	60	70	80	90	100	110	120
	CFM L/S	9/11	12/13	14/16	16/19	18/22	21/24	23/27	25/30	28/32
	Throw L/S	1.5/1.5	2.5/2.0	2.5/2.5	3.0/2.5	3.5/3.0	4.0/3.5	4.5/4.0	4.5/4.5	5.5/4.5
10 x 6 Ak .150	Total CFM	60	75	90	105	120	135	150	165	180
	CFM L/S	11/19	14/24	16/29	19/33	22/38	25/43	27/48	30/52	33/57
	Throw L/S	2.0/2.5	2.5/3.5	3.0/4.0	3.5/4.5	4.0/5.5	4.5/6.0	5.0/7.0	5.5/7.5	6.0/8.0
8 x 8 Ak .160	Total CFM	65	80	95	110	130	145	160	175	190
	CFM L/S	15/17	18/22	22/26	25/30	30/35	33/39	37/43	40/47	44/51
	Throw L/S	2.5/2.0	3.0/2.5	3.5/3.0	4.0/3.5	5.0/4.5	3.5/5.0	6.0/5.5	6.5/6.0	7.0/6.5
12 x 6 Ak .180	Total CFM	70	90	110	125	145	160	180	200	215
	CFM L/S	10/25	13/32	16/39	19/44	22/51	24/56	27/63	30/70	32/75
	Throw L/S	2.0/3.0	2.5/4.0	3.0/5.0	3.5/5.5	4.0/6.5	4.5/7.0	5.0/8.0	5.5/8.5	6.0/9.5
14 x 6 Ak .210	Total CFM	85	105	125	145	170	190	210	230	250
	CFM L/S	11/32	13/39	16/47	18/54	22/63	24/71	27/78	29/86	32/93
	Throw L/S	2.0/3.5	2.5/4.5	3.0/5.0	3.5/6.0	4.0/7.0	4.5/8.0	5.0/8.5	5.5/9.5	6.0/10.0
10 x 10 Ak .240	Total CFM	95	120	145	170	190	215	240	265	290
	CFM L/S	17/30	22/38	26/46	31/54	35/60	39/68	44/76	48/84	53/92
	Throw L/S	2.5/3.0	3.0/4.0	3.5/5.0	4.5/6.0	5.0/6.5	5.5/7.5	6.5/8.0	7.0/9.0	7.5/10.0
12 x 10 Ak .290	Total CFM	115	145	175	205	230	260	290	320	350
	CFM L/S	17/40	22/51	26/61	31/72	35/80	39/91	44/101	48/112	53/122
	Throw L/S	2.5/4.0	3.0/5.0	3.5/5.5	4.5/7.0	5.0/7.5	5.5/8.5	6.5/9.5	7.0/11.0	7.5/11.0
16 x 8 Ak .310	Total CFM	125	155	185	215	250	280	310	340	370
	CFM L/S	22/41	27/50	33/60	38/70	44/81	49/91	55/100	60/110	65/120
	Throw L/S	3.0/4.0	3.5/4.5	4.0/5.5	5.0/6.5	5.5/7.5	6.5/8.5	7.0/9.5	7.5/10.0	8.5/11.0
12 x 12 Ak .350	Total CFM	140	175	210	245	280	315	350	385	420
	CFM L/S	21/49	26/61	31/74	37/86	42/98	47/110	52/123	58/135	63/147
	Throw L/S	2.5/4.0	3.5/5.0	4.0/6.5	5.0/7.5	5.5/8.5	6.0/9.5	7.0/10.0	7.5/11.0	8.0/13.0
16 x 12 Ak .460	Total CFM	185	230	275	320	370	415	460	505	550
	CFM L/S	33/60	40/75	48/89	56/104	65/120	73/135	81/149	89/164	97/178
	Throw L/S	3.5/4.5	4.0/5.5	5.0/7.0	6.0/8.0	7.0/9.0	7.5/10.0	8.5/11.0	9.0/12.0	10.0/14.0
14 x 14 Ak .480	Total CFM	190	240	290	335	385	430	480	530	575
	CFM L/S	24/71	31/89	37/108	43/125	49/143	55/160	61/179	68/197	74/214
	Throw L/S	3.0/5.0	3.5/6.5	4.5/7.5	5.0/9.0	6.0/10.0	6.5/11.0	7.5/13.0	8.0/14.0	9.0/15.0
16 x 16 Ak .630	Total CFM	250	315	380	440	505	565	630	695	755
	CFM L/S	44/81	55/102	67/123	77/143	89/164	99/183	111/204	122/225	133/245
	Throw L/S	4.0/5.5	5.0/6.5	6.0/8.0	7.0/9.5	8.0/11.0	9.0/12.0	10.0/13.0	11.0/15.0	12.0/16.0
20 x 14 Ak .680	Total CFM	270	340	410	475	545	610	680	750	815
	CFM L/S	38/97	48/122	57/148	67/171	76/196	85/220	95/245	105/270	114/293
	Throw L/S	3.5/6.0	4.5/7.0	5.5/9.0	6.5/10.0	7.0/12.0	8.0/13.0	9.0/15.0	10.0/16.0	11.0/17.0
24 x 12 Ak. 700	Total CFM	280	350	420	490	560	630	700	770	840
	CFM L/S	45/95	56/119	67/143	78/167	89/191	100/215	111/239	122/263	134/286
	Throw L/S	4.0/5.5	5.0/7.0	6.0/8.5	7.0/10.0	8.0/12.0	9.0/13.0	10.0/14.0	11.0/16.0	12.0/17.0
30 x 10 Ak .730	Total CFM	290	365	440	510	585	655	730	805	875
	CFM L/S	46/99	58/124	70/150	82/173	94/199	105/223	117/248	129/274	140/298
	Throw L/S	4.0/6.0	5.0/7.5	6.0/9.0	7.0/10.0	8.0/12.0	9.0/13.0	10.0/15.0	11.0/16.0	12.0/18.0
36 x 10 Ak .880	Total CFM	350	440	530	615	705	790	880	970	1055
	CFM L/S	57/118	71/149	86/179	100/208	114/238	128/267	143/297	157/328	171/357
	Throw L/S	4.5/6.5	5.5/8.0	6.5/9.5	8.0/11.0	9.0/13.0	10.0/14.0	11.0/16.0	12.0/18.0	13.0/19.0
36 x 12 Ak 1.050	Total CFM	420	525	630	735	840	945	1050	1155	1260
	CFM L/S	67/142	85/178	101/214	118/249	135/285	152/320	169/356	186/392	203/427
	Throw L/S	5.0/7.0	6.0/9.0	7.0/11.0	8.5/12.0	9.5/14.0	11.0/16.0	12.0/18.0	13.0/19.0	14.0/21.0
30 x 16 Ak 1.150	Total CFM	460	575	690	805	920	1035	1150	1265	1380
	CFM L/S	74/156	92/196	110/235	129/274	147/313	166/352	184/391	202/430	221/469
	Throw L/S	5.0/7.0	6.0/9.0	7.5/11.0	8.5/13.0	10.0/15.0	11.0/16.0	12.0/18.0	14.0/20.0	15.0/22.0
36 x 16 Ak 1.400	Total CFM	560	700	840	980	1120	1260	1400	1540	1680
	CFM L/S	90/190	113/237	135/285	158/332	180/380	203/427	225/475	248/522	270/570
	Throw L/S	5.5/8.0	7.0/10.0	8.5/12.0	9.5/14.0	11.0/16.0	12.0/18.0	14.0/20.0	15.0/22.0	17.0/24.0

For sizes not listed and sizing tips see page(s) 78

Terminal Velocity of 75 FPM



* less than or equal to

** greater than or equal to

Recommended Noise Criteria and Face Velocity Ranges are on page 77

HART COOLEY

RH45, RHD45, RHF45 Registers and Grilles (Page 25)

Face Velocity		400	500	600	700	800	900	1000
6 x 6	CFM	40	60	70	80	90	100	110
Ak .110	Ps	.037	.058	.083	.113	.148	.189	.232
8 x 8	CFM	100	120	140	170	190	220	240
Ak .240	Ps	.032	.050	.072	.098	.128	.163	.200
12 x 6	CFM	110	140	170	190	220	250	280
Ak .280	Ps	.031	.048	.069	.094	.122	.155	.191
14 x 6	CFM	30	170	200	230	270	300	330
Ak .330	Ps	.029	.045	.065	.088	.114	.145	.179
14 x 8	CFM	190	230	280	330	370	420	460
Ak .460	Ps	.025	.039	.055	.075	.097	.123	.152
12 x 12	CFM	250	310	370	430	490	550	610
Ak .610	Ps	.021	.032	.046	.062	.079	.100	.125
24 x 8	CFM	340	420	500	590	670	760	840
Ak .840	Ps	.020	.032	.046	.061	.079	.100	.124
18 x 12	CFM	380	480	570	670	760	860	950
Ak .950	Ps	.020	.032	.046	.061	.080	.101	.124
30 x 8	CFM	430	530	640	750	850	960	1100
Ak 1.070	Ps	.020	.032	.046	.061	.080	.101	.124
24 x 12	CFM	520	650	780	900	1000	1200	1300
Ak 1.290	Ps	.020	.032	.046	.062	.081	.102	.124
18 x 18	CFM	580	730	880	1000	1200	1300	1500
Ak 1.460	Ps	.020	.032	.046	.062	.081	.102	.124
30 x 12	CFM	650	820	980	1100	1300	1500	1600
Ak 1.630	Ps	.021	.032	.046	.062	.082	.103	.124
20 x 20	CFM	730	910	1100	1300	1500	1600	1800
Ak 1.820	Ps	.021	.032	.046	.063	.083	.104	.124
36 x 12	CFM	790	990	1200	1400	1600	1800	2000
Ak 1.980	Ps	.021	.032	.046	.063	.084	.105	.125
24 x 20	CFM	880	1100	1300	1500	1800	2000	2200
Ak 2.210	Ps	.021	.032	.047	.064	.085	.107	.126
30 x 18	CFM	1000	1200	1500	1700	2000	2200	2500
Ak 2.500	Ps	.021	.033	.048	.065	.087	.109	.128
24 x 24	CFM	1100	1300	1600	1900	2100	2400	2700
Ak 2.670	Ps	.022	.033	.048	.066	.088	.110	.130
36 x 18	CFM	1200	1500	1800	2100	2400	2700	3000
Ak 3.020	Ps	.023	.035	.051	.069	.092	.116	.137
30 x 24	CFM	1300	1700	2000	2400	2700	3000	3400
Ak 3.370	Ps	.024	.037	.053	.074	.096	.121	.144
36 x 24	CFM	1600	2000	2400	2900	3300	3700	4100
Ak 4.080	Ps	.027	.040	.058	.080	.105	.132	.158
30 x 30	CFM	1700	2100	2600	3000	3400	3800	4300
Ak 4.260	Ps	.027	.041	.060	.081	.107	.135	.162
36 x 30	CFM	2100	2600	3100	3600	4100	4600	5200
Ak 5.150	Ps	.030	.045	.066	.090	.117	.149	.179
48 x 24	CFM	2200	2800	3300	3900	4400	5000	5500
Ak 5.510	Ps	.031	.047	.069	.093	.122	.154	.186
36 x 36	CFM	2500	3100	3700	4400	5000	5600	6200
Ak 6.240	Ps	.034	.051	.074	.100	.130	.165	.200
48 x 36	CFM	3400	4200	5100	5900	6800	7600	8500
Ak 8.480	Ps	.025	.038	.055	.075	.098	.124	.153
48 x 48	CFM	4600	5800	6900	8100	9200	10000	12000
Ak 11.600	Ps	.022	.034	.048	.066	.086	.109	.134

For sizes not listed and sizing tips see page(s) 78

RCB Series Return Air Registers and Grilles (Page 22)

Face Velocity		200	300	400	500	600	700	800	900	1000
6 x 6	CFM	25	37	50	62	75	87	100	112	124
Ak .120	Ps	.005	.014	.024	.037	.053	.084	.113	.150	.180
8 x 8	CFM	49	74	99	124	148	173	198	223	247
Ak .250	Ps	.006	.014	.024	.037	.054	.085	.114	.150	.181
12 x 6	CFM	56	85	113	141	169	198	226	254	282
Ak .280	Ps	.006	.014	.024	.038	.054	.085	.114	.150	.181
14 x 6	CFM	67	101	134	168	201	235	268	302	335
Ak .340	Ps	.006	.014	.024	.038	.054	.085	.114	.150	.182
14 x 8	CFM	92	138	184	230	276	322	368	414	460
Ak .460	Ps	.006	.015	.025	.039	.056	.086	.115	.150	.183
12 x 12	CFM	121	181	241	301	362	422	482	542	603
Ak .600	Ps	.006	.015	.025	.039	.057	.087	.115	.150	.184
24 x 8	CFM	164	246	328	409	491	573	655	737	819
Ak .820	Ps	.006	.015	.026	.040	.059	.089	.116	.151	.186
18 x 12	CFM	186	278	371	464	557	649	742	835	928
Ak .930	Ps	.006	.016	.026	.041	.059	.089	.117	.151	.187
30 x 8	CFM	207	311	415	519	622	726	830	934	1037
Ak 1.040	Ps	.006	.016	.026	.042	.060	.090	.117	.152	.188
24 x 12	CFM	252	377	503	629	755	881	1007	1132	1258
Ak 1.260	Ps	.006	.016	.027	.043	.062	.092	.119	.152	.191
18 x 18	CFM	285	428	570	713	855	998	1140	1283	1426
Ak 1.430	Ps	.006	.017	.027	.043	.063	.093	.119	.153	.192
30 x 12	CFM	319	478	638	797	956	1116	1275	1435	1594
Ak 1.590	Ps	.006	.017	.028	.044	.064	.094	.120	.154	.194
20 x 20	CFM	357	535	713	891	1070	1248	1426	1605	1783
Ak 1.780	Ps	.007	.018	.028	.045	.065	.095	.121	.155	.196
36 x 12	CFM	387	581	774	968	1161	1355	1548	1742	1935
Ak 1.940	Ps	.007	.018	.028	.046	.066	.096	.122	.156	.197
24 x 20	CFM	433	650	866	1083	1299	1516	1732	1949	2165
Ak 2.170	Ps	.007	.018	.029	.046	.067	.098	.124	.157	.200
30 x 18	CFM	491	737	983	1228	1474	1720	1965	2211	2456
Ak 2.460	Ps	.007	.019	.029	.047	.069	.099	.126	.159	.203
24 x 24	CFM	527	790	1053	1316	1580	1843	2106	2370	2633
Ak 2.630	Ps	.007	.019	.030	.048	.069	.101	.127	.160	.205
36 x 18	CFM	598	897	1196	1495	1794	2093	2392	2691	2990
Ak 2.990	Ps	.007	.020	.030	.049	.071	.103	.129	.163	.208
30 x 24	CFM	670	1006	1341	1676	2011	2346	2681	3017	3352
Ak 3.350	Ps	.007	.021	.031	.050	.072	.105	.132	.166	.212
36 x 24	CFM	818	1227	1637	2046	2455	2864	3273	3682	4092
Ak 4.090	Ps	.008	.023	.032	.052	.074	.110	.137	.172	.220
30 x 30	CFM	856	1284	1712	2140	2568	2996	3424	3852	4280
Ak 4.280	Ps	.008	.023	.032	.052	.074	.111	.139	.174	.222
36 x 30	CFM	1048	1572	2096	2620	3144	3668	4192	4717	5241
Ak 5.240	Ps	.008	.026	.033	.054	.075	.117	.147	.185	.233
48 x 24	CFM	1127	1690	2254	2817	3380	3944	4507	5071	5634
Ak 5.630	Ps	.009	.027	.033	.054	.075	.120	.150	.190	.237
36 x 36	CFM	1287	1931	2575	3218	3862	4506	5150	5793	6437
Ak 6.440	Ps	.009	.029	.034	.055	.074	.125	.158	.200	.247
48 x 36	CFM	1794	2691	3589	4486	5383	6280	7177	8074	8971
Ak 8.970	Ps	.009	.029	.034	.055	.068	.125	.158	.200	.247
48 x 48	CFM	2529	3793	5058	6322	7587	8851	10116	11380	12645
Ak 12.600	Ps	.009	.029	.034	.055	.068	.125	.158	.200	.247

For sizes not listed and sizing tips see page(s) 78

Recommended Noise Criteria and Face Velocity Ranges are on page 77

RH90 Registers and Grilles (Page 26)

Face Velocity		400	500	600	700	800	900	1000
6 x 6	CFM	50	63	76	88	101	113	126
Ak .130	Ps	.012	.019	.029	.038	.048	.055	.065
8 x 8	CFM	103	129	155	181	207	233	259
Ak .260	Ps	.011	.018	.028	.037	.046	.053	.063
12 x 6	CFM	119	148	178	208	237	267	297
Ak .300	Ps	.011	.018	.027	.036	.046	.053	.063
14 x 6	CFM	141	177	212	248	283	318	354
Ak .350	Ps	.011	.018	.027	.036	.045	.052	.062
14 x 8	CFM	195	244	292	341	390	438	487
Ak .490	Ps	.011	.018	.026	.035	.044	.051	.061
12 x 12	CFM	256	320	384	448	512	576	640
Ak .640	Ps	.011	.017	.025	.033	.042	.049	.059
24 x 8	CFM	348	435	523	610	697	784	871
Ak .870	Ps	.010	.017	.024	.032	.040	.047	.057
18 x 12	CFM	395	493	592	691	789	888	987
Ak .990	Ps	.010	.016	.023	.031	.039	.046	.056
30 x 8	CFM	441	552	662	772	882	993	1103
Ak 1.100	Ps	.010	.016	.023	.030	.038	.045	.055
24 x 12	CFM	535	668	802	936	1069	1203	1337
Ak 1.340	Ps	.010	.016	.021	.028	.036	.043	.053
18 x 18	CFM	605	756	907	1059	1210	1361	1512
Ak 1.510	Ps	.010	.016	.021	.027	.035	.042	.052
30 x 12	CFM	676	845	1014	1182	1351	1520	1689
Ak 1.690	Ps	.010	.016	.020	.026	.034	.041	.051
20 x 20	CFM	755	943	1132	1321	1509	1698	1887
Ak 1.890	Ps	.010	.016	.019	.026	.033	.040	.050
36 x 12	CFM	818	1023	1227	1432	1636	1841	2045
Ak 2.050	Ps	.010	.015	.019	.025	.032	.039	.049
24 x 20	CFM	914	1142	1370	1599	1827	2055	2284
Ak 2.280	Ps	.010	.015	.018	.024	.031	.038	.048
30 x 18	CFM	1034	1292	1551	1809	2068	2326	2584
Ak 2.580	Ps	.010	.015	.017	.023	.030	.037	.047
24 x 24	CFM	1106	1383	1659	1936	2213	2489	2766
Ak 2.770	Ps	.009	.015	.017	.023	.030	.037	.047
36 x 18	CFM	1252	1565	1878	2191	2505	2818	3131
Ak 3.130	Ps	.009	.015	.016	.022	.029	.036	.046
30 x 24	CFM	1399	1749	2099	2449	2799	3149	3499
Ak 3.500	Ps	.009	.015	.016	.022	.029	.036	.046
36 x 24	CFM	1697	2122	2546	2971	3395	3819	4244
Ak 4.240	Ps	.009	.014	.016	.023	.031	.038	.048
30 x 30	CFM	1773	2216	2659	3102	3546	3989	4432
Ak 4.430	Ps	.009	.014	.016	.023	.031	.038	.048
36 x 30	CFM	2154	2692	3231	3769	4307	4846	5384
Ak 5.380	Ps	.009	.014	.018	.026	.036	.043	.053
48 x 24	CFM	2308	2885	3462	4039	4616	5193	5771
Ak 5.770	Ps	.009	.014	.020	.028	.039	.046	.056
36 x 36	CFM	2621	3276	3931	4587	5242	5897	6552
Ak 6.550	Ps	.009	.014	.023	.033	.045	.052	.062
48 x 36	CFM	3588	4485	5382	6279	7176	8073	8971
Ak 8.970	Ps	.009	.014	.023	.033	.045	.052	.062
48 x 48	CFM	4946	6183	7419	8656	9893	11129	12366
Ak 12.400	Ps	.008	.013	.023	.033	.045	.052	.062

For sizes not listed and sizing tips see page(s) 78

RE5 Series Return Air Registers and Grilles (Page 23)

Face Velocity		400	500	600	700	800	900	1000
6 x 6	CFM	30	37	44	52	59	67	74
Ak .070	Ps	.010	.013	.018	.023	.030	.038	.049
8 x 8	CFM	87	108	130	152	174	195	217
Ak .220	Ps	.010	.013	.018	.023	.031	.039	.049
10 x 10	CFM	160	200	240	280	320	360	400
Ak .400	Ps	.010	.014	.018	.024	.031	.040	.050
12 x 6	CFM	103	129	155	180	206	232	258
Ak .260	Ps	.010	.014	.018	.024	.031	.039	.049
14 x 6	CFM	127	159	191	223	255	287	319
Ak .320	Ps	.010	.014	.018	.024	.031	.040	.050
14 x 8	CFM	184	230	276	322	368	414	460
Ak .460	Ps	.011	.014	.018	.024	.032	.040	.050
12 x 12	CFM	249	311	373	435	497	559	622
Ak .620	Ps	.011	.014	.018	.025	.032	.041	.051
24 x 8	CFM	345	431	517	603	689	775	862
Ak .860	Ps	.011	.014	.019	.025	.032	.041	.052
18 x 12	CFM	392	490	589	687	785	883	981
Ak .980	Ps	.012	.014	.019	.025	.033	.041	.052
30 x 8	CFM	440	550	660	770	880	990	1100
Ak 1.100	Ps	.012	.015	.019	.025	.033	.042	.052
24 x 12	CFM	534	668	801	935	1068	1202	1336
Ak 1.340	Ps	.012	.015	.019	.026	.033	.042	.053
18 x 18	CFM	604	756	907	1058	1209	1360	1511
Ak 1.510	Ps	.013	.015	.019	.026	.033	.042	.054
30 x 12	CFM	674	843	1011	1180	1348	1517	1685
Ak 1.690	Ps	.013	.015	.019	.026	.034	.042	.054
20 x 20	CFM	751	939	1127	1315	1502	1690	1878
Ak 1.880	Ps	.013	.015	.019	.026	.034	.043	.055
36 x 12	CFM	812	1015	1218	1422	1625	1828	2031
Ak 2.030	Ps	.014	.015	.019	.026	.034	.043	.055
24 x 20	CFM	903	1129	1355	1581	1807	2033	2258
Ak 2.260	Ps	.014	.016	.019	.026	.034	.043	.055
30 x 18	CFM	1016	1270	1524	1778	2032	2286	2540
Ak 2.540	Ps	.014	.016	.020	.027	.034	.043	.056
24 x 24	CFM	1083	1354	1625	1895	2166	2437	2708
Ak 2.710	Ps	.014	.016	.020	.027	.034	.043	.056
36 x 18	CFM	1216	1519	1823	2127	2431	2735	3039
Ak 3.040	Ps	.014	.016	.020	.027	.035	.043	.056
30 x 24	CFM	1346	1683	2019	2356	2692	3029	3366
Ak 3.370	Ps	.015	.016	.020	.027	.035	.044	.057
36 x 24	CFM	1602	2003	2403	2804	3204	3605	4005
Ak 4.010	Ps	.014	.016	.020	.027	.035	.044	.057
30 x 30	CFM	1665	2081	2497	2913	3330	3746	4162
Ak 4.160	Ps	.014	.016	.020	.027	.035	.044	.057
36 x 30	CFM	1972	2465	2958	3451	3944	4437	4929
Ak 4.930	Ps	.014	.016	.021	.028	.035	.044	.056
48 x 24	CFM	2091	2614	3137	3660	4183	4705	5228
Ak 5.230	Ps	.013	.016	.021	.028	.036	.045	.055
36 x 36	CFM	2325	2906	3487	4068	4650	5231	5812
Ak 5.810	Ps	.012	.016	.021	.028	.036	.045	.053
48 x 36	CFM	2981	3726	4471	5216	5961	6706	7452
Ak 7.450	Ps	.012	.013	.021	.028	.036	.045	.044
48 x 48	CFM	3751	4689	5626	6564	7502	8439	9377
Ak 9.380	Ps	.012	.013	.021	.029	.037	.046	.044

For sizes not listed and sizing tips see page(s) 78

Recommended Noise Criteria and Face Velocity Ranges are on page 77

TG, TGF Transfer Grilles (Page 27)

Face Velocity*		200	300	400	500	600	700	800
8 x 8	CFM	90	130	180	220	265	310	350
Ak .440	Ps	.08	.17	.30	.47	.68	.93	1.20
14 x 6	CFM	110	165	220	275	330	385	440
Ak .550	Ps	.07	.16	.30	.46	.65	.90	1.20
12 x 8	CFM	130	190	255	320	385	450	510
Ak .640	Ps	.07	.16	.29	.45	.64	.88	1.10
14 x 8	CFM	150	220	295	370	445	520	590
Ak .740	Ps	.07	.16	.28	.44	.63	.87	1.10
20 x 6	CFM	155	235	310	390	470	545	625
Ak .780	Ps	.07	.16	.28	.44	.62	.86	1.10
12 x 12	CFM	185	280	370	465	560	650	745
Ak .930	Ps	.07	.15	.27	.43	.61	.84	1.10
30 x 6	CFM	225	335	450	560	670	785	895
Ak 1.120	Ps	.07	.15	.26	.42	.60	.82	1.10
16 x 12	CFM	240	360	475	595	715	835	950
Ak 1.190	Ps	.07	.15	.26	.41	.59	.81	1.10
18 x 12	CFM	265	400	530	665	800	930	1065
Ak 1.330	Ps	.07	.15	.26	.41	.58	.88	1.00
20 x 12	CFM	290	440	585	730	875	1020	1170
Ak 1.460	Ps	.06	.15	.26	.40	.58	.79	1.00
16 x 16	CFM	310	460	615	770	925	1080	1230
Ak 1.540	Ps	.06	.14	.25	.40	.57	.78	1.00
24 x 12	CFM	350	525	700	875	1050	1225	1400
Ak 1.750	Ps	.06	.14	.25	.39	.56	.77	1.00
18 x 18	CFM	390	585	780	975	1170	1365	1560
Ak 1.950	Ps	.06	.14	.25	.39	.55	.76	.99
30 x 12	CFM	435	650	870	1085	1300	1520	1740
Ak 2.170	Ps	.06	.14	.25	.38	.54	.75	.98
20 x 20	CFM	485	730	970	1210	1450	1690	1940
Ak 2.420	Ps	.06	.14	.24	.38	.54	.74	.97
24 x 18	CFM	510	765	1020	1275	1530	1785	2040
Ak 2.550	Ps	.06	.14	.24	.37	.53	.73	.96
30 x 18	CFM	650	970	1290	1620	1940	2260	2580
Ak 3.230	Ps	.06	.13	.23	.36	.51	.71	.93
24 x 24	CFM	680	1020	1360	1700	2040	2380	2720
Ak 3.400	Ps	.06	.13	.23	.36	.51	.70	.92
30 x 24	CFM	840	1250	1670	2090	2510	2930	3340
Ak 4.180	Ps	.06	.13	.22	.35	.50	.68	.89
30 x 30	CFM	1030	1550	2060	2580	3090	3610	4120
Ak 5.150	Ps	.05	.12	.22	.34	.48	.66	.86

*Velocity measured 1" from face.

24 Square Ceiling Diffuser (Page 29)

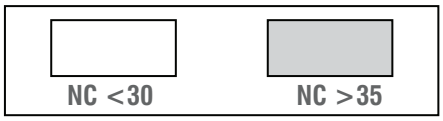
Face Velocity		300	400	500	600	700	800	900	1000
Pressure Loss		.006	.010	.016	.022	.031	.040	.050	.062
Neck Size 6"	CFM	50	65	85	100	115	130	150	165
Ak .165	Throw	3.5	4.5	5.5	6.5	8.0	9.0	10.0	11.0
Neck Size 8"	CFM	85	110	140	170	195	225	250	280
Ak .280	Throw	4.5	5.5	7.0	8.5	10.0	11.0	12.0	14.0
Neck Size 10"	CFM	125	170	210	250	295	335	380	420
Ak .420	Throw	5.0	6.5	8.0	9.5	11.5	13.0	15.0	16.0
Neck Size 12"	CFM	180	240	300	355	415	475	535	595
Ak .595	Throw	6.0	8.0	10.0	11.5	13.5	15.5	17.5	19.0
Neck Size 14"	CFM	245	330	410	490	575	655	740	820
Ak .820	Throw	7.0	9.0	11.5	13.5	16.0	18.0	20.0	22.5
Neck Size 16"	CFM	310	410	515	620	720	825	925	1030
Ak 1.030	Throw	7.5	10.0	12.5	15.0	18.0	20.0	22.0	25.0
Neck Size 18"	CFM	400	530	665	800	930	1065	1200	1330
Ak 1.330	Throw	8.5	11.0	14.0	17.0	20.0	23.0	26.0	28.0
Neck Size 20"	CFM	480	640	800	960	1120	1280	1440	1600
Ak 1.600	Throw	9.5	12.0	16.0	18.0	22.0	25.0	28.0	31.0
Neck Size 22"	CFM	570	760	950	1140	1330	1520	1710	1900
Ak 1.900	Throw	10.5	13.5	17.0	19.0	24.0	27.0	30.0	33.0
Neck Size 24"	CFM	690	920	1150	1380	1610	1840	2070	2300
Ak 2.300	Throw	11.0	14.5	18.5	22.0	26.0	30.0	33.0	36.0

Terminal Velocity of 50 FPM

20 Round Diffuser (Page 28)

Neck Velocity		400	500	600	700	800	900	1000	1200	1400
6"	CFM	80	100	120	140	160	180	200	235	275
Ak .160	Ps	<.010	<.010	<.010	<.010	0.014	0.02	0.02	0.03	0.03
	Throw	2.00	2.00	2.0	3.0	3.0	4.0	4.0	5.0	6.0
8"	CFM	140	175	210	245	280	315	350	420	490
Ak .280	Ps	<.010	<.010	<.010	<.010	0.01	0.02	0.02	0.03	0.04
	Throw	3.5	3.0	3.0	4.0	4.0	5.0	5.0	7.0	8.0
10"	CFM	218	273	327	382	436	491	545	654	763
Ak .440	Ps	<.010	<.010	<.010	0.01	0.01	0.02	0.02	0.03	0.04
	Throw	3.0	3.0	4.0	5.0	5.0	6.0	7.0	8.0	10.0
12"	CFM	315	390	470	550	630	705	785	940	1100
Ak .660	Ps	<.010	<.010	<.010	0.01	0.01	0.02	0.02	0.03	0.04
	Throw	3.0	4.0	5.0	6.0	7.0	7.0	8.0	10.0	11.0
14"	CFM	425	530	635	745	850	955	1060	1270	1490
Ak .910	Ps	<.010	<.010	<.010	0.01	0.01	0.02	0.02	0.03	0.04
	Throw	4.0	5.0	6.0	7.0	8.0	8.0	9.0	11.0	13.0
16"	CFM	560	700	840	980	1120	1260	1400	1680	1960
Ak 1.200	Ps	<.010	<.010	<.010	0.01	0.01	0.02	0.02	0.03	0.04
	Throw	4.0	5.0	7.0	8.0	9.0	10.0	11.0	13.0	15.0
18"	CFM	710	885	1060	1240	1420	1590	1770	2120	2480
Ak 1.500	Ps	<.010	<.010	<.010	0.01	0.01	0.02	0.02	0.03	0.04
	Throw	5.0	6.0	7.0	9.0	10.0	11.0	12.0	15.0	17.0

NOTE: The use of a balancing hood is recommended to balance the system.
Ak = Effective Area in square feet
Ps = Static Pressure Loss in inches of water
NC = Noise Criteria, based on a 10dB room attenuation (Re: 10^{-12} watts) ASHRAE 36-72.
Terminal Velocity of 100 fpm
Product tested with core in "out" position.
When diffusers are used on an exposed duct, multiply throw by 0.7



Recommended Noise Criteria and Face Velocity Ranges are on page 77

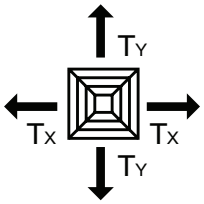
HART COOLEY

SR/AR Square & Rectangular Ceiling Diffusers — Steel/Aluminum (Page 30-33)

Four-Way Square

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
6 x 6	CFM	50	60	70	80	90	100	120	140	160	180	200
Ak .100	Throw X/Y	2-3/2-3	2-3/2-3	2-4/2-4	2-4/2-4	3-5/3-5	3-5/3-5	4-6/4-6	4-8/4-8	5-8/5-8	5-9/5-9	6-11/6-11
9 x 9	CFM	110	135	155	180	205	225	270	315	360	410	450
Ak .220	Throw X/Y	2-4/2-4	2-4/2-4	3-5/3-5	3-5/3-5	4-6/4-6	5-8/5-8	5-9/5-9	6-11/6-11	6-12/6-12	7-13/7-13	8-14/8-14
12 x 12	CFM	200	240	280	320	360	400	480	560	640	725	800
Ak .400	Throw X/Y	3-5/3-5	4-6/4-6	4-8/4-8	5-8/5-8	5-9/5-9	6-11/6-11	6-12/6-12	7-13/7-13	8-15/8-15	9-17/9-17	10-19/10-19
15 x 15	CFM	310	375	440	500	565	625	750	875	1000	1125	1250
Ak .620	Throw X/Y	4-6/4-6	4-8/4-8	5-9/5-9	6-11/6-11	6-11/6-11	6-12/6-12	8-15/8-15	10-18/10-18	10-19/10-19	12-21/12-21	13-23/13-23
18 x 18	CFM	450	540	630	720	810	900	1080	1260	1440	1620	1800
Ak .900	Throw X/Y	4-8/4-8	5-9/5-9	5-11/5-11	6-12/6-12	7-13/7-13	8-15/8-15	10-17/10-17	11-20/11-20	13-23/13-23	15-27/15-27	16-30/16-30
21 x 21	CFM	615	740	860	985	1110	1230	1475	1725	1970	2220	2460
Ak 1.230	Throw X/Y	5-9/5-9	6-11/6-11	7-13/7-13	8-14/8-14	9-15/9-15	9-17/9-17	11-21/11-21	13-25/13-25	15-29/15-29	17-31/17-31	19-35/19-35
24 x 24	CFM	800	960	1120	1275	1440	1600	1925	2240	2570	2890	3200
Ak 1.600	Throw X/Y	5-11/5-11	7-13/7-13	7-14/7-14	8-15/8-15	9-17/9-17	10-19/10-19	12-23/12-23	14-29/14-29	16-31/16-31	18-35/18-35	20-39/20-39
27 x 27	CFM	1010	1215	1420	1615	1820	2020	2430	2840	3240	3650	4040
Ak 2.020	Throw X/Y	6-12/6-12	7-13/7-13	8-15/8-15	10-18/10-18	10-19/10-19	12-22/12-22	14-27/14-27	16-32/16-32	18-35/18-35	20-38/20-38	23-42/23-42
33 x 33	CFM	1370	1650	1925	2200	2470	2750	3300	3850	4400	4950	5500
Ak 2.750	Throw X/Y	7-13/7-13	9-16/9-16	10-18/10-18	21-21/12-21	14-24/14-24	16-27/16-27	18-33/18-33	19-37/19-37	23-41/23-41	27-46/27-46	31-50/31-50

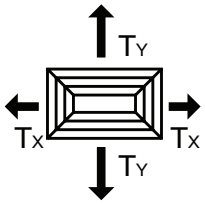
4-WAY SQUARE



Four-Way Rectangular

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
9 x 6	CFM	75	90	105	120	135	150	180	210	240	270	300
Ak .150	Throw X/Y	1-3/2-4	1-3/3-5	2-4/3-5	2-4/4-6	3-5/4-6	3-5/4-8	4-6/5-9	4-6/5-9	4-8/7-13	5-9/8-15	6-11/8-15
12 x 6	CFM	100	120	140	160	180	200	240	280	320	360	400
Ak .200	Throw X/Y	1-3/3-5	1-3/4-6	2-4/4-8	2-4/4-8	2-4/5-9	3-5/6-11	4-6/7-13	4-8/8-15	4-8/8-15	5-9/10-18	6-11/11-21
12 x 9	CFM	150	180	210	240	270	300	360	420	480	540	600
Ak .300	Throw X/Y	2-4/3-5	2-4/3-5	3-5/4-6	4-6/4-8	4-7/5-10	4-8/6-11	5-9/6-12	6-11/7-13	7-13/9-17	7-13/10-18	8-14/11-19
15 x 9	CFM	185	225	265	300	340	375	450	525	600	675	750
Ak .370	Throw X/Y	2-4/4-6	2-4/4-6	3-5/5-9	4-6/6-11	4-6/6-12	4-8/8-14	5-9/8-15	5-9/9-17	6-12/11-21	7-13/13-25	7-13/13-25
18 x 9	CFM	225	270	315	360	405	450	540	630	720	810	900
Ak .450	Throw X/Y	2-4/4-6	2-4/5-9	3-5/6-11	4-6/6-12	4-6/8-14	4-8/8-15	5-9/10-19	5-10/11-23	6-12/13-25	8-14/15-29	10-17/17-32
21 x 9	CFM	265	320	370	425	475	530	635	740	850	955	1060
Ak .530	Throw X/Y	2-4/5-9	2-4/6-11	3-5/8-14	4-6/8-15	4-8/10-18	4-8/10-19	5-9/11-21	6-17/13-25	8-13/16-31	9-15/19-35	10-17/21-38
15 x 12	CFM	250	300	350	400	450	500	600	700	800	900	1000
Ak .500	Throw X/Y	3-5/4-6	3-5/4-8	4-6/5-9	4-8/6-11	5-9/6-12	6-11/7-13	6-12/8-15	7-13/10-18	8-15/11-21	10-18/13-23	12-21/14-27
18 x 12	CFM	295	355	415	475	535	595	715	835	950	1070	1190
Ak .590	Throw X/Y	2-4/4-8	3-5/5-9	4-6/6-11	4-8/7-13	5-9/8-14	6-11/8-15	6-12/10-18	8-14/11-21	9-16/13-23	10-18/15-27	12-21/17-31
21 x 12	CFM	345	415	485	555	625	690	830	970	1100	1240	1375
Ak .690	Throw X/Y	3-5/5-9	3-5/6-11	4-6/7-13	4-8/8-14	4-8/8-15	5-9/10-18	6-11/11-21	7-13/14-26	8-15/16-29	9-17/17-31	10-19/19-35
24 x 12	CFM	400	480	560	640	720	800	960	1140	1280	1440	1600
Ak .800	Throw X/Y	2-4/6-11	4-6/7-13	4-6/8-14	4-8/9-16	4-8/10-18	5-9/11-21	6-12/14-26	8-14/15-29	9-17/17-31	10-19/19-35	10-19/21-39
18 x 15	CFM	375	450	525	600	675	750	900	1050	1200	1350	1500
Ak .75	Throw X/Y	4-6/4-8	4-8/5-9	5-9/6-11	6-11/6-12	6-12/8-14	7-13/8-15	8-15/10-18	9-17/10-19	10-19/13-23	12-22/15-26	14-25/17-29
24 x 15	CFM	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Ak 1.000	Throw X/Y	4-6/6-11	4-8/6-12	5-9/8-14	6-11/9-17	6-12/10-18	7-13/11-21	8-15/13-25	10-18/15-29	11-21/17-32	13-23/20-36	15-27/22-39
24 x 18	CFM	600	720	840	960	1080	1200	1440	1680	1920	2160	2400
Ak 1.200	Throw X/Y	4-8/6-11	5-9/6-12	6-11/7-14	6-12/8-15	7-14/10-19	8-15/11-21	10-18/13-23	11-21/15-27	13-25/18-34	15-30/21-37	16-32/23-41
33 x 21	CFM	960	1150	1340	1530	1725	1920	2300	2690	3070	3450	3840
Ak 1.920	Throw X/Y	4-8/8-15	6-11/10-18	7-13/12-22	8-14/13-25	8-15/15-29	10-18/17-31	12-21/21-35	14-26/24-39	16-29/26-43	17-31/29-47	21-39/35-56
30 x 24	CFM	1000	1200	1400	1600	1800	2000	2400	2800	3200	3600	4000
Ak 2.000	Throw X/Y	6-11/7-13	6-12/8-15	8-14/10-18	8-15/11-21	10-18/13-23	10-19/14-26	12-23/16-29	15-28/19-35	16-31/21-39	19-35/24-43	22-40/29-51

4-WAY RECTANGULAR



Note 1: The minimum Throw Dimension is based on a terminal velocity of 200 fpm. The maximum Throw Dimension is based on a terminal velocity of 100 fpm.

Ceiling Height in Feet	Maximum Recommended Cooling Temperature Differential	Maximum Recommended CFM Per Diffuser			
		SR/AR/ASR	SR/AR		
		Four-Way	Three-Way	Two-Way	One-Way
7	15°	400	300	200	100
8	20°	600	450	300	150
9	25°	1200	900	600	300
10	25°	1800	1350	900	450
12	30°	3200	2400	1600	800
14	30°	4800	3600	2400	1200
16	30°	6000	4500	3000	1500

NC<30 NC30 NC35 NC40 NC≥45

Recommended Noise Criteria and Face Velocity Ranges are on page 77

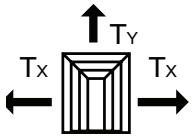
HART COOLEY

SR/AR Square & Rectangular Ceiling Diffusers — Steel/Aluminum (Page 30-33)

Three-Way Style 3

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
6 x 6	CFM	50	60	70	80	90	100	120	140	160	180	200
Ak .100	Throw X/Y	2-4/1-2	2-4/1-2	3-5/2-3	3-5/2-3	4-7/2-4	4-7/2-4	5-9/3-6	6-10/3-6	6-11/4-7	6-11/4-7	7-13/4-8
9 x 9	CFM	110	135	155	180	205	225	270	315	360	410	450
Ak .220	Throw X/Y	2-4/2-3	3-6/2-3	4-7/2-4	4-8/2-4	5-9/3-6	5-9/3-6	6-12/4-7	7-13/5-9	9-15/6-10	10-18/6-11	11-20/7-12
12 x 12	CFM	200	240	280	320	360	400	480	560	640	725	800
Ak .400	Throw X/Y	4-7/2-5	5-9/3-6	6-10/4-7	6-10/4-7	6-11/4-8	7-13/5-9	9-16/6-10	12-21/7-12	13-22/8-13	14-24/8-14	16-27/9-15
15 x 15	CFM	310	375	440	500	565	625	750	875	1000	1125	1250
Ak .620	Throw X/Y	4-8/2-4	6-11/4-7	7-13/4-7	8-14/4-8	8-15/5-9	9-16/6-10	11-19/7-12	13-23/9-15	15-26/10-18	17-29/11-20	19-33/12-21
18 x 18	CFM	450	540	630	720	810	900	1080	1260	1440	1620	1800
Ak .900	Throw X/Y	4-9/3-5	6-11/4-7	7-13/5-9	9-15/6-10	10-18/6-11	11-20/7-12	13-24/9-15	15-26/10-18	18-32/11-20	20-35/12-22	23-40/14-25
21 x 21	CFM	615	740	860	985	1110	1230	1475	1725	1970	2220	2460
Ak 1.230	Throw X/Y	5-11/3-6	7-13/4-8	11-19/6-11	11-20/7-12	12-21/8-13	13-23-8-14	16-29/10-17	19-34/11-20	21-39/14-23	24-42/16-25	27-45/18-29
24 x 24	CFM	800	960	1120	1275	1440	1600	1925	2240	2570	2890	3200
Ak 1.600	Throw X/Y	7-14/5-9	9-16/6-11	11-19/7-13	13-21/8-14	14-24/9-15	16-27/9-16	17-31/11-19	21-35/14-24	25-39/16-27	28-43/18-31	32-47/20-33
27 x 27	CFM	1010	1215	1420	1615	1820	2020	2430	2840	3240	3650	4040
Ak 2.020	Throw X/Y	7-13/4-9	9-16/6-11	11-20/7-13	13-23/9-15	14-25/9-16	15-27/10-18	18-31/12-21	22-37/14-25	25-41/18-30	28-46/19-33	31-50/21-36

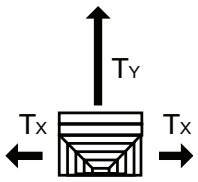
3-WAY STYLE 3



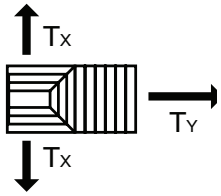
Three-Way Style 31S and Style 31L*

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
9 x 6	CFM	75	90	105	120	135	150	180	210	240	270	300
Ak .150	Throw X/Y	2-3/4-7	2-3/4-7	2-3/4-7	2-4/4-8	3-5/5-8	3-6/5-9	4-7/6-11	4-8/7-12	6-10/9-15	6-11/10-17	6-11/11-19
9 x 9*	CFM	115	135	155	180	200	225	270	315	360	405	450
Ak .220	Throw X/Y	1-3/4-7	2-3/5-9	2-3/6-11	2-4/7-12	3-6/8-14	3-6/9-16	4-7/10-18	4-8/12-21	5-9/14-24	6-10/16-28	6-11/18-32
12 x 9	CFM	150	180	210	240	210	300	360	420	480	540	600
Ak .300	Throw X/Y	2-3/4-8	2-4/5-9	3-6/6-10	4-7/7-12	4-8/8-14	4-8/8-14	5-9/9-16	6-10/11-20	7-12/14-24	8-13/15-26	9-15/16-28
12 x 12*	CFM	200	240	280	320	360	400	480	560	640	720	800
Ak .40	Throw X/Y	2-3/5-11	2-4/7-13	3-6/9-15	3-6/10-17	4-7/11-19	4-8/12-21	6-10/15-26	6-11/18-32	7-12/20-34	7-13/21-36	8-14/24-42
15 x 15*	CFM	310	375	440	500	565	625	750	875	1000	1125	1250
Ak .620	Throw X/Y	2-4/7-13	3-6/10-18	4-7/11-20	4-8/12-21	5-9/14-25	5-9/14-25	6-11/19-34	7-13/22-38	8-14/25-43	9-16/27-44	10-18/30-45
18 x 15	CFM	375	450	525	600	675	750	900	1050	1200	1350	1500
Ak .750	Throw X/Y	3-6/7-13	4-7/9-15	4-8/9-16	5-9/11-20	6-10/13-23	6-11/15-26	7-13/17-30	9-16/19-35	10-18/22-39	11-20/27-40	13-25/30-46
21 x 18	CFM	525	630	735	840	945	1050	1260	1475	1680	1890	2100
Ak 1.050	Throw X/Y	4-7/8-14	4-8/10-18	5-9/11-20	6-10/18-23	6-11/14-25	7-12/16-28	9-15/19-34	10-18/22-39	11-20/27-40	13-23/29-46	15-26/33-51
21 x 21*	CFM	615	740	860	985	1110	1230	1475	1725	1970	2210	2460
Ak 1.230	Throw X/Y	3-6/9-17	4-8/12-21	5-9/16-27	6-10/17-30	7-11/19-32	7-12/21-36	9-15/26-40	11-19/30-45	13-22/34-51	15-25/39-56	17-28/43-60
27 x 21	CFM	780	940	1080	1250	1400	1560	1870	2180	2500	2800	3120
Ak 1.560	Throw X/Y	5-9/10-18	5-9/11-20	6-10/13-22	7-12/15-26	8-14/18-32	9-16/21-36	11-19/23-40	13-21/25-43	15-24/29-47	17-29/34-53	19-33/38-59
30 x 24	CFM	1000	1200	1400	1600	1800	2000	2400	2800	3200	3500	4000
Ak 2.000	Throw X/Y	5-9/11-20	6-11/13-23	7-13/16-27	8-14/17-31	9-16/20-35	10-18/22-40	12-21/25-44	14-25/31-48	16-29/34-53	18-32/38-57	20-35/43-61
33 x 27	CFM	1230	1475	1725	1970	2220	2460	2950	3450	3925	4425	4920
Ak 2.460	Throw X/Y	6-10/13-23	7-13/17-28	8-14/19-33	9-16/21-35	11-18/23-39	12-20/25-44	14-25/29-47	16-29/33-51	18-33/37-56	22-37/42-59	25-41/47-64

3-WAY STYLE 31S

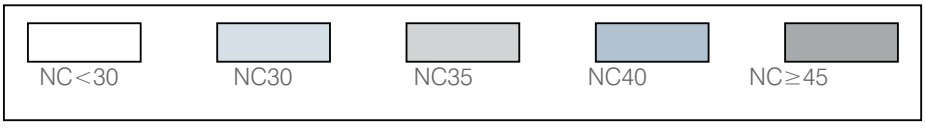


3-WAY STYLE 31L*



Note 2: The minimum Throw Dimension is based on a terminal velocity of 170 fpm. The maximum Throw Dimension is based on a terminal velocity of 85 fpm.
*Style 31L not available in square configuration

Ceiling Height in Feet	Maximum Recommended Cooling Temperature Differential	Maximum Recommended CFM Per Diffuser			
		SR/AR/ASR	SR/AR		
		Four-Way	Three-Way	Two-Way	One-Way
7	15°	400	300	200	100
8	20°	600	450	300	150
9	25°	1200	900	600	300
10	25°	1800	1350	900	450
12	30°	3200	2400	1600	800
14	30°	4800	3600	2400	1200
16	30°	6000	4500	3000	1500

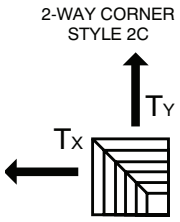


Recommended Noise Criteria and Face Velocity Ranges are on page 77

SR/AR Square & Rectangular Ceiling Diffusers — Steel/Aluminum (Page 30-33)

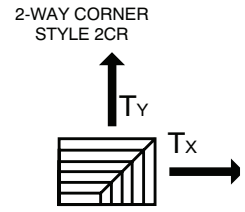
Two-Way Corner Style 2C

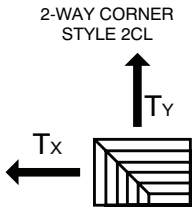
Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
6 x 6	CFM	45	55	60	70	80	90	105	125	140	160	180
Ak .090	Throw X/Y	1-3/1-3	2-5/2-5	2-5/2-5	3-7/3-7	3-7/3-7	5-8/5-8	5-8/5-8	6-11/6-11	7-12/7-12	8-13/8-13	9-14/9-14
9 x 9	CFM	95	115	135	155	175	195	235	275	315	350	390
Ak .190	Throw X/Y	4-6/4-6	4-6/4-6	5-7/5-7	5-8/5-8	6-10/6-10	6-11/6-11	8-13/8-13	9-14/9-14	10-16/10-16	13-20/13-20	14-22/14-22
12 x 12	CFM	175	210	245	280	315	350	420	480	560	635	700
Ak .350	Throw X/Y	5-7/5-7	5-8/5-8	6-11/6-11	8-13/8-13	8-13/8-13	9-14/9-14	10-16/10-16	13-19/13-19	14-22/14-22	16-26/16-26	19-29/19-29
15 x 15	CFM	275	330	385	440	495	550	660	775	885	995	1100
Ak .550	Throw X/Y	5-9/5-9	7-12/7-12	8-13/8-13	9-14/9-14	10-16/10-16	11-18/11-18	13-21/13-21	15-25/15-25	19-29/19-29	21-33/21-33	23-36/23-36
18 x 18	CFM	390	470	545	625	700	780	935	1090	1250	1410	1560
Ak .780	Throw X/Y	7-12/7-12	9-14/9-14	10-15/10-15	10-16/10-16	12-19/12-19	14-22/14-22	16-25/16-25	18-29/18-29	21-33/21-33	25-38/25-38	28-42/28-42
21 x 21	CFM	540	650	760	865	975	1080	1300	1515	1730	1945	2160
Ak 1.080	Throw X/Y	8-13/8-13	10-15/10-15	12-18/12-18	13-21/13-21	15-23/15-23	17-28/17-28	20-32/20-32	22-35/22-35	25-39/25-39	29-43/29-43	32-47/32-47
24 x 24	CFM	705	845	990	1130	1270	1410	1690	1950	2250	2540	2820
Ak 1.410	Throw X/Y	9-16/9-16	11-18/11-18	13-21/13-21	15-24/15-24	17-27/17-27	19-29/19-29	22-34/22-34	25-38/25-38	29-42/29-42	33-47/33-47	37-51/37-51
27 x 27	CFM	880	1055	1230	1410	1585	1760	2110	2470	2820	3170	3520
Ak 1.760	Throw X/Y	10-17/10-17	12-19/12-19	14-22/14-22	16-26/16-26	19-29/19-29	21-33/21-33	24-37/24-37	28-41/28-41	32-46/32-46	35-50/35-50	39-55/39-55



Two-Way Corner Style 2CR

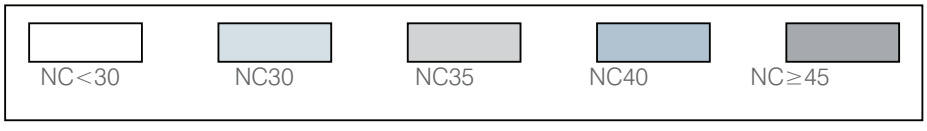
Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
9 x 6	CFM	65	80	95	105	120	130	160	185	210	240	260
Ak .130	Throw X/Y	2-4/3-5	3-5/4-7	4-6/5-8	4-6/5-8	5-7/6-11	5-7/6-11	6-9/8-13	6-10/9-14	7-12/11-16	8-13/13-21	10-16/16-25
12 x 6	CFM	90	105	120	140	160	175	210	245	280	315	350
Ak .170	Throw X/Y	2-4/3-6	3-5/5-8	3-5/6-11	4-6/7-12	5-7/8-13	5-7/9-14	5-8/10-15	6-11/13-20	7-12/15-24	8-13/17-26	10-15/19-29
15 x 6	CFM	110	130	155	175	200	220	265	310	350	395	440
Ak .220	Throw X/Y	2-4/5-8	3-5/6-10	3-5/7-12	4-6/8-13	5-7/10-15	5-8/11-17	6-9/13-20	6-10/15-24	8-12/17-27	10-14/20-30	11-17/22-34
12 x 9	CFM	130	155	180	210	235	260	310	365	415	470	520
Ak .260	Throw X/Y	4-6/5-7	4-6/5-8	5-7/6-10	5-8/6-11	6-10/8-12	6-11/9-14	8-13/10-16	11-17/14-21	19-19-16/24	13-20/17-26	14-23/19-30
15 x 9	CFM	165	195	230	260	295	325	390	460	525	590	650
Ak .320	Throw X/Y	4-6/6-10	5-7/6-11	6-8/8-12	6-9/10-14	6-11/10-16	7-12/12-19	9-14/14-22	10-15/16-25	12-17/19-29	13-20/21-33	14-22/23-35
18 x 9	CFM	195	235	275	310	350	390	470	545	625	700	780
Ak .390	Throw X/Y	4-6/6-11	5-7/8-13	5-7/9-14	5-8/10-15	6-10/11-18	7-12/13-21	8-13/16-25	9-15/19-29	11-17/22-33	12-20/23-35	14-22/26-39
21 x 9	CFM	230	275	320	365	410	455	545	635	730	820	910
Ak .450	Throw X/Y	4-6/8-13	5-7/10-15	6-8/11-17	6-9/12-19	6-10/13-21	6-11/15-24	8-13/18-29	10-15/22-34	12-18/24-38	13-21/26-42	15-25/30-47
15 x 12	CFM	220	260	305	350	390	435	525	610	700	785	870
Ak .430	Throw X/Y	5-7/5-8	5-8/6-11	6-10/8-13	7-12/9-14	8-13/10-16	9-14/12-19	11-18/14-22	13-20/16-25	15-24/19-29	16-26/21-32	18-29/24-37
18 x 12	CFM	260	315	370	420	475	525	630	735	840	945	1050
Ak .520	Throw X/Y	4-7/6-11	5-8/8-13	6-10/9-14	7-12/11-17	9-14/13-21	10-15/14-22	12-18/17-26	14-20/21-30	16-24/23-34	18-27/27-38	21-31/29-42
21 x 15	CFM	380	455	530	605	685	760	915	1060	1220	1370	1520
Ak .760	Throw X/Y	6-10/8-13	6-11/9-14	8-13/11-18	9-14/13-20	10-16/15-24	12-19/16-26	13-21/19-29	15-26/22-33	18-29/25-38	21-33/29-44	25-38/32-49
24 x 15	CFM	440	525	615	700	790	875	1050	1225	1400	1575	1750
Ak .870	Throw X/Y	4-9/8-14	6-11/10-16	8-13/13-20	9-14/15-24	10-16/16-26	12-19/19-29	14-22/22-34	16-25/25-38	19-29/29-44	21-32/33-48	25-37/37-52
21 x 18	CFM	460	550	640	735	825	915	1100	1280	1465	1645	1830
Ak .980	Throw X/Y	6-11/8-13	8-13/10-15	10-15/11-18	11-17/12-20	12-19/14-22	13-21/16-25	16-26/19-29	19-30/22-34	22-34/26-39	25-38/29-43	27-42/32-48
27 x 21	CFM	690	830	965	1100	1245	1380	1655	1935	2210	2490	2760
Ak 1.380	Throw X/Y	8-13/10-17	10-15/13-20	12-19/15-24	14-21/17-27	15-23/19-30	16-26/21-33	20-30/25-37	24-36/29-42	28-41/33-46	30-46/37-51	34-51/42-56





Note 3: The minimum Throw Dimension is based on a terminal velocity of 135 fpm. The maximum Throw Dimension is based on a terminal velocity of 65 fpm.

Ceiling Height in Feet	Maximum Recommended Cooling Temperature Differential	Maximum Recommended CFM Per Diffuser			
		SR/AR/ASR	SR/AR		
		Four-Way	Three-Way	Two-Way	One-Way
7	15°	400	300	200	100
8	20°	600	450	300	150
9	25°	1200	900	600	300
10	25°	1800	1350	900	450
12	30°	3200	2400	1600	800
14	30°	4800	3600	2400	1200
16	30°	6000	4500	3000	1500



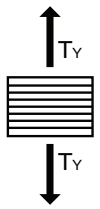
Recommended Noise Criteria and Face Velocity Ranges are on page 77

SR/AR Square & Rectangular Ceiling Diffusers — Steel/Aluminum (Page 30-33)

Two-Way Style 2L

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
9 x 6	CFM	65	80	95	105	120	130	160	185	210	240	260
Ak .130	Throw Y	3-5	3-5	5-7	6-8	7-10	7-10	8-12	10-14	11-17	14-20	16-23
12 x 6	CFM	90	105	120	140	160	175	210	245	280	315	350
Ak .170	Throw Y	3-5	5-7	6-8	6-9	7-10	8-12	10-14	12-18	15-21	16-23	17-25
15 x 6	CFM	110	130	155	175	200	220	265	310	350	395	440
Ak .220	Throw Y	4-6	6-8	6-9	7-10	9-13	10-14	10-15	13-19	15-21	18-26	21-30
12 x 9	CFM	130	155	180	210	235	260	310	365	415	470	520
Ak .260	Throw Y	5-7	6-8	6-9	8-12	10-14	10-14	11-17	14-21	16-24	19-27	20-31
15 x 9	CFM	165	195	230	260	295	325	390	460	525	590	650
Ak .320	Throw Y	6-8	7-10	8-12	9-13	10-15	12-18	14-20	16-24	18-26	21-31	24-35
18 x 9	CFM	195	235	275	310	350	390	470	545	625	700	780
Ak .390	Throw Y	6-9	8-12	9-13	10-14	11-17	13-19	15-21	17-25	19-29	22-33	25-39
21 x 9	CFM	230	275	320	365	410	455	545	635	730	820	910
Ak .450	Throw Y	7-10	8-12	9-13	11-16	12-18	14-20	16-24	19-27	22-32	25-36	29-41
15 x 12	CFM	220	260	305	350	390	435	525	610	700	785	870
Ak .430	Throw Y	6-9	8-12	10-14	10-15	12-18	14-20	15-24	18-27	22-32	24-36	28-41
18 x 12	CFM	260	315	370	420	475	525	630	735	840	945	1050
Ak .520	Throw Y	7-11	9-13	11-15	12-18	13-19	15-21	18-26	20-29	23-34	27-39	31-42
21 x 15	CFM	380	455	530	605	685	760	915	1060	1220	1370	1520
Ak .760	Throw Y	9-13	10-15	12-18	14-20	15-23	17-25	20-30	23-34	27-40	31-44	34-48
24 x 15	CFM	440	525	615	700	790	875	1050	1225	1400	1575	1750
Ak .870	Throw Y	8-14	11-16	13-19	15-21	17-25	19-29	22-33	25-38	29-42	33-48	38-54
21 x 18	CFM	460	550	640	735	825	915	1100	1280	1465	1645	1830
Ak .910	Throw Y	10-15	11-17	13-19	16-22	19-25	20-28	23-33	26-38	29-42	34-46	38-51
27 x 21	CFM	690	830	965	1100	1245	1380	1655	1935	2210	2490	2760
Ak 1.300	Throw Y	11-17	14-20	17-24	19-27	21-31	23-35	27-40	34-46	38-51	42-56	47-61

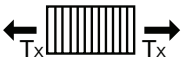
2-WAY STYLE 2L



Two-Way Style 2S

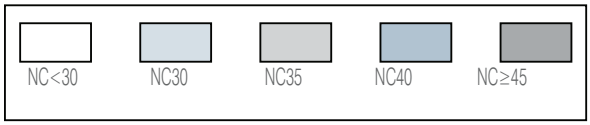
Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
9 x 6	CFM	65	80	95	105	120	130	160	185	210	240	265
Ak .130	Throw X	3-6	4-7	5-8	6-9	8-12	9-13	10-14	11-17	13-19	15-23	17-26
12 x 6	CFM	90	105	120	140	160	175	210	245	280	315	350
Ak .170	Throw X	4-7	6-8	7-10	8-12	9-13	10-14	11-17	14-20	15-23	17-25	19-29
15 x 6	CFM	110	130	155	175	200	220	265	310	350	395	440
Ak .220	Throw X	5-7	6-9	7-10	9-13	10-15	11-17	13-19	15-23	18-26	21-30	23-34
12 x 9	CFM	130	155	180	210	235	260	310	365	415	470	520
Ak .260	Throw X	6-8	6-9	7-10	9-13	9-13	10-15	13-19	15-21	17-25	19-29	21-31
15 x 9	CFM	165	195	230	260	295	325	390	460	525	590	650
Ak .320	Throw X	7-10	8-12	9-13	10-14	12-18	14-20	16-24	18-26	19-29	23-33	27-39
18 x 9	CFM	195	235	275	310	350	390	470	545	625	700	780
Ak .390	Throw X	7-10	9-13	11-17	12-18	13-19	15-23	18-27	20-30	-22-32	25-38	29-43
21 x 9	CFM	230	275	320	365	410	455	545	635	730	820	910
Ak .450	Throw X	9-13	9-14	10-15	12-18	15-21	16-24	19-29	22-33	26-38	29-42	32-47
15 x 12	CFM	220	260	305	350	390	435	525	610	700	785	870
Ak .430	Throw X	7-10	8-12	10-14	11-17	13-19	15-21	16-24	19-27	22-33	25-38	29-42
18 x 12	CFM	260	315	370	420	475	525	630	735	840	945	1050
Ak .520	Throw X	8-11	10-14	10-15	12-18	14-20	15-23	18-27	23-33	-25-37	29-42	32-47
21 x 15	CFM	380	455	530	605	685	760	915	1060	1220	1370	1520
Ak .760	Throw X	10-15	11-17	14-20	15-23	18-26	20-29	22-33	26-38	29-42	35-46	39-51
24 x 15	CFM	440	525	615	700	790	875	1050	1225	1400	1575	1750
Ak .870	Throw X	9-14	11-17	15-21	17-25	19-29	22-32	25-37	28-41	33-45	38-51	43-56
21 x 18	CFM	460	550	640	735	825	915	1100	1280	1465	1645	1830
Ak .910	Throw X	11-17	12-18	14-20	16-24	19-27	20-29	23-34	27-40	32-45	37-49	40-55
27 x 21	CFM	690	830	965	1100	1245	1380	1655	1935	2210	2490	2760
Ak 1.300	Throw X	12-18	15-21	18-25	21-29	23-33	25-37	29-43	33-48	38-53	43-59	49-63

2-WAY STYLE 2S



Note 3: The minimum Throw Dimension is based on a terminal velocity of 135 fpm. The maximum Throw Dimension is based on a terminal velocity of 65 fpm.

Ceiling Height in Feet	Maximum Recommended Cooling Temperature Differential	Maximum Recommended CFM Per Diffuser			
		SR/AR/ASR	SR/AR		
		Four-Way	Three-Way	Two-Way	One-Way
7	15°	400	300	200	100
8	20°	600	450	300	150
9	25°	1200	900	600	300
10	25°	1800	1350	900	450
12	30°	3200	2400	1600	800
14	30°	4800	3600	2400	1200
16	30°	6000	4500	3000	1500



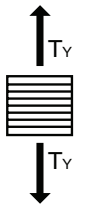
Recommended Noise Criteria and Face Velocity Ranges are on page 77

SR/AR Square & Rectangular Ceiling Diffusers — Steel/Aluminum (Page 30-33)

Two-Way Style 2

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
6 x 6	CFM	45	55	60	70	80	90	105	125	140	160	180
Ak .090	Throw Y	3-5	3-5	4-7	4-7	5-8	5-8	6-9	9-13	10-15	11-17	12-18
9 x 9	CFM	95	115	135	155	175	195	235	275	315	350	390
Ak .190	Throw Y	5-7	6-8	6-8	6-9	8-12	9-13	11-17	12-18	14-20	16-24	18-26
12 x 12	CFM	175	210	245	280	315	350	420	480	560	635	700
Ak .350	Throw Y	4-7	6-9	9-13	10-15	11-17	12-18	14-20	17-23	18-27	21-31	23-35
15 x 15	CFM	275	330	385	440	495	550	660	775	885	995	1100
Ak .550	Throw Y	8-12	10-14	10-15	12-18	14-20	15-23	18-27	22-32	24-36	26-39	29-43
18 x 18	CFM	390	470	545	625	700	780	935	1090	1250	1410	1560
Ak .780	Throw Y	9-15	11-17	12-18	14-20	15-23	18-26	20-30	-24-36	27-42	31-45	36-51
21 x 21	CFM	540	650	760	865	975	1080	1300	1515	1730	1945	2160
Ak 1.080	Throw Y	11-17	14-20	15-23	18-26	19-29	23-35	26-40	29-44	34-49	38-54	43-59
24 x 24	CFM	705	845	990	1130	1270	1410	1690	1950	2250	2540	2820
Ak 1.410	Throw Y	12-19	14-22	17-25	20-30	21-33	23-35	27-40	34-46	39-51	42-56	46-60
27 x 27	CFM	880	1055	1230	1410	1585	1760	2110	2470	2820	3170	3520
Ak 1.760	Throw Y	12-20	15-23	18-26	21-31	24-36	26-40	30-45	35-50	39-56	43-61	48-66

2-WAY STYLE 2



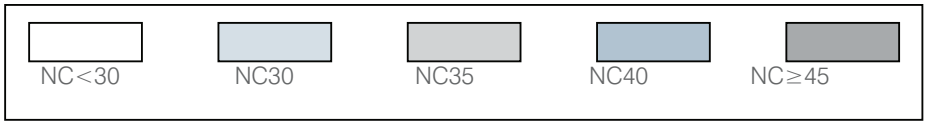
One-Way Style

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
6 x 6	CFM	45	55	60	70	80	90	105	125	140	160	180
Ak .090	Throw	3-5	4-7	5-8	6-9	8-10	9-12	10-14	12-18	14-20	15-22	16-24
9 x 9	CFM	95	115	135	155	175	195	235	275	315	350	390
Ak .190	Throw	6-9	7-10	9-13	10-14	11-17	13-19	15-21	18-26	19-29	22-33	25-38
12 x 12	CFM	175	210	245	280	315	350	420	480	560	635	700
Ak .350	Throw	8-12	10-14	12-18	13-19	15-21	18-26	21-31	24-36	27-40	30-43	33-45
15 x 15	CFM	275	330	385	440	495	550	660	775	885	995	1100
Ak .550	Throw	10-16	13-19	14-22	18-26	19-29	21-31	25-37	30-43	35-46	38-50	42-56
18 x 18	CFM	390	470	545	625	700	780	935	1090	1250	1410	1560
Ak .780	Throw	13-21	15-23	18-26	19-29	22-33	25-38	29-42	35-46	42-49	44-52	49-56
21 x 21	CFM	540	650	760	865	975	1080	1300	1515	1730	1945	2160
Ak 1.080	Throw	14-23	17-25	21-30	24-36	27-40	30-43	34-48	39-54	44-60	48-64	53-68
24 x 24	CFM	705	845	990	1130	1270	1410	1690	1950	2250	2540	2820
Ak 1.410	Throw	20-29	23-33	24-36	27-40	30-44	35-48	39-54	43-60	48-65	52-69	56-74
27 x 27	CFM	880	1055	1230	1410	1585	1760	2110	2470	2820	3170	3520
Ak 1.760	Throw	19-27	22-31	25-38	28-42	33-47	36-53	43-58	49-63	54-68	60-73	65-77

1-WAY STYLE

Note 3: The minimum Throw Dimension is based on a terminal velocity of 135 fpm. The maximum Throw Dimension is based on a terminal velocity of 65 fpm.

Ceiling Height in Feet	Maximum Recommended Cooling Temperature Differential	Maximum Recommended CFM Per Diffuser			
		SR/AR/ASR	SR/AR		
		Four-Way	Three-Way	Two-Way	One-Way
7	15°	400	300	200	100
8	20°	600	450	300	150
9	25°	1200	900	600	300
10	25°	1800	1350	900	450
12	30°	3200	2400	1600	800
14	30°	4800	3600	2400	1200
16	30°	6000	4500	3000	1500



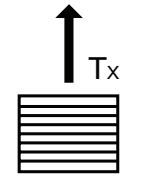
Recommended Noise Criteria and Face Velocity Ranges are on page 77

SR/AR Square & Rectangular Ceiling Diffusers — Steel/Aluminum (Page 30-33)

One-Way Style 1L

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
9 x 6	CFM	65	80	95	105	120	130	160	185	210	240	265
Ak .130	Throw	5-8	6-9	7-11	8-12	9-13	10-15	12-18	15-21	16-24	19-29	21-32
12 x 6	CFM	90	105	120	140	160	175	210	245	280	315	350
Ak .170	Throw	5-8	6-9	6-13	9-14	10-15	12-18	14-20	17-25	18-27	20-30	23-35
15 x 6	CFM	110	130	155	175	200	220	265	310	350	395	440
Ak .220	Throw	5-8	7-10	9-13	10-15	12-18	14-20	16-24	18-27	21-31	24-36	28-41
12 x 9	CFM	130	155	180	210	235	260	310	365	415	470	520
Ak .260	Throw	7-10	8-12	10-14	11-17	12-18	14-20	17-25	19-29	22-23	25-37	28-41
15 x 9	CFM	165	195	230	260	295	325	390	460	525	590	650
Ak .320	Throw	9-13	10-14	11-17	12-18	15-23	17-25	20-30	22-33	25-37	29-42	32-45
18 x 9	CFM	195	235	275	310	350	390	470	545	625	700	780
Ak .390	Throw	9-13	10-15	12-18	14-20	16-24	18-26	20-30	25-37	27-40	31-44	36-48
15 x 12	CFM	220	260	305	350	390	435	525	610	700	785	870
Ak .430	Throw	10-14	11-17	13-19	15-23	18-26	19-29	22-32	26-39	30-43	35-48	39-54
18 x 12	CFM	260	315	370	420	475	525	630	735	840	945	1050
Ak .520	Throw	10-15	12-18	14-20	17-25	19-27	21-30	25-36	28-41	32-45	36-49	42-54
21 x 15	CFM	380	455	530	605	685	760	915	1060	1220	1370	1520
Ak .760	Throw	13-19	15-21	18-26	19-29	22-34	25-38	29-42	34-46	38-51	43-56	48-61
24 x 15	CFM	440	525	615	700	790	875	1050	1225	1400	1575	1750
Ak .870	Throw	14-22	16-24	18-27	21-31	24-36	27-40	30-43	35-47	41-52	46-57	53-61
21 x 18	CFM	460	550	640	735	825	915	1100	1280	1465	1645	1830
Ak .910	Throw	14-20	16-24	19-29	22-32	24-36	26-39	30-43	35-47	41-51	45-56	49-62
27 x 21	CFM	690	830	965	1100	1245	1380	1655	1935	2210	2490	2760
Ak 1.380	Throw	17-27	19-29	23-35	26-40	30-45	34-49	38-54	43-60	48-67	54-72	59-80

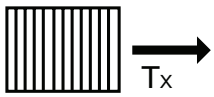
1-WAY STYLE 1L



One-Way Style 1S

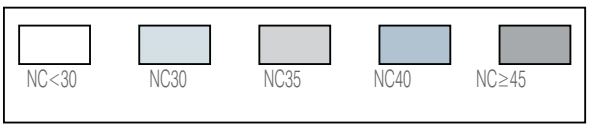
Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
9 x 6	CFM	65	80	95	105	120	130	160	185	210	240	265
Ak .130	Throw	4-7	5-9	7-11	9-13	11-17	13-19	15-21	16-24	18-27	21-32	23-35
12 x 6	CFM	90	105	120	140	160	175	210	245	280	315	350
Ak .170	Throw	6-10	8-12	10-15	12-17	14-19	15-21	17-25	21-31	23-35	25-37	29-44
15 x 6	CFM	110	130	155	175	200	220	265	310	350	395	440
Ak .220	Throw	9-12	10-14	12-18	14-20	16-24	18-26	21-31	23-35	27-40	31-45	35-51
12 x 9	CFM	130	155	180	210	235	260	310	365	415	470	520
Ak .260	Throw	8-12	10-14	10-15	12-18	14-20	16-24	18-27	23-33	24-37	28-42	30-44
15 x 9	CFM	165	195	230	260	295	325	390	460	525	590	650
Ak .320	Throw	10-15	12-18	13-19	15-21	18-26	22-32	23-35	26-39	30-43	35-46	38-47
18 x 9	CFM	195	235	275	310	350	390	470	545	625	700	780
Ak .390	Throw	11-17	13-19	15-23	17-25	20-30	22-33	25-38	31-44	34-45	38-47	42-51
15 x 12	CFM	220	260	305	350	390	435	525	610	700	785	870
Ak .430	Throw	11-16	12-18	15-21	17-25	19-29	22-32	25-38	28-44	33-45	36-49	42-54
18 x 12	CFM	260	315	370	420	475	525	630	735	840	945	1050
Ak .520	Throw	12-18	14-20	16-24	19-27	21-31	22-33	27-40	32-45	37-47	42-50	45-56
21 x 15	CFM	380	455	530	605	685	760	915	1060	1220	1370	1520
Ak .760	Throw	14-20	16-24	19-29	22-32	24-37	28-41	33-45	39-48	43-52	48-58	54-63
24 x 15	CFM	440	525	615	700	790	875	1050	1225	1400	1575	1750
Ak .870	Throw	16-23	18-26	22-32	25-37	28-41	32-45	37-47	44-54	49-59	54-66	59-71
21 x 18	CFM	460	550	640	735	825	915	1100	1280	1465	1645	1830
Ak .910	Throw	18-24	18-26	21-31	24-33	26-38	28-41	33-47	39-53	44-58	48-63	54-69
27 x 21	CFM	690	830	965	1100	1245	1380	1655	1935	2210	2490	2760
Ak 1.380	Throw	19-29	21-32	25-38	31-44	37-49	40-51	42-55	46-61	51-66	56-71	61-77

1-WAY STYLE 1S



Note 3: The minimum Throw Dimension is based on a terminal velocity of 135 fpm. The maximum Throw Dimension is based on a terminal velocity of 65 fpm.

Ceiling Height in Feet	Maximum Recommended Cooling Temperature Differential	Maximum Recommended CFM Per Diffuser			
		SR/AR/ASR	SR/AR		
		Four-Way	Three-Way	Two-Way	One-Way
7	15°	400	300	200	100
8	20°	600	450	300	150
9	25°	1200	900	600	300
10	25°	1800	1350	900	450
12	30°	3200	2400	1600	800
14	30°	4800	3600	2400	1200
16	30°	6000	4500	3000	1500



Recommended Noise Criteria and Face Velocity Ranges are on page 77

ASR Square Supply Return Diffuser — Aluminum (Page 35)

Four-Way Square

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
Supply Performance Data												
	CFM	90	105	120	140	155	175	210	250	280	315	350
12 x 12	Ps	.01	.02	.02	.03	.04	.05	.07	.10	.13	.16	.20
Ak .180	Throw X/Y	2-4/2-4	2-4/2-4	3-5/3-5	3-5/3-5	4-6/4-6	5-8/5-8	5-9/5-9	6-4/6-4	6-12/6-12	7-13/7-13	8-14/8-14
	NC	<30	<30	<30	<30	<30	<30	<35	<40	<45	<45	<45
Return Performance Data												
9 x 9	CFM	65	80	90	105	115	130	160	190	210	235	260
Grid Core	-Ps	<.01	<.01	<.01	<.01	<.01	<.01	.01	.02	.02	.03	.04
Ak .340	NC	<30	<30	<30	<30	<30	<30	35	40	>45	>45	>45

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
Supply Performance Data												
	CFM	200	240	280	320	360	400	480	560	640	720	800
15 x 15	Ps	.01	.02	.02	.03	.04	.05	.07	.10	.13	.16	.20
Ak .400	Throw X/Y	3-5/3-5	4-6/4-6	4-8/4-8	5-8/5-8	5-9/5-9	6-11/6-11	6-12/6-12	7-13/7-13	8-15/8-15	9-17/9-17	10-19/10-19
	NC	<30	<30	<30	<30	<30	<30	35	40	>45	>45	>45
Return Performance Data												
9 x 9	CFM	150	180	210	240	270	300	360	420	480	540	600
Grid Core	-Ps	.01	.02	.02	.03	.04	.05	.07	.09	.12	.16	.19
Ak .340	NC	<30	<30	<30	<30	<30	<30	35	40	>45	>45	>45

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
Supply Performance Data												
	CFM	250	300	350	400	450	500	600	700	800	900	1000
18 x 18	Ps	.01	.02	.02	.03	.04	.05	.07	.10	.13	.16	.20
Ak .500	Throw X/Y	3-5/3-5	4-6/4-6	4-8/4-8	5-8/5-8	5-9/5-9	6-11/6-11	6-12/6-12	7-13/7-13	8-15/8-15	9-17/9-17	10-19/10-19
	NC	<30	<30	<30	<30	<30	<30	35	40	>45	>45	>45
Return Performance Data												
12 x 12	CFM	190	225	265	300	340	375	450	525	600	675	750
Grid Core	-Ps	<.01	<.01	.01	.01	.02	.02	.03	.04	.06	.07	.09
Ak .640	NC	<30	<30	<30	<30	<30	<30	35	40	>45	>45	>45

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
Supply Performance Data												
	CFM	300	360	420	480	540	600	720	845	960	1075	1200
21 x 21	Ps	.01	.02	.02	.03	.04	.05	.07	.10	.13	.16	.20
Ak .600	Throw X/Y	3-5/3-5	3-7/3-7	4-7/4-7	4-8/4-8	5-9/5-9	5-11/5-11	6-12/6-12	7-14/7-14	8-16/8-16	19-18/9-18	11-21/11-21
	NC	<30	<30	<30	<30	<30	<30	35	40	>45	>45	>45
Return Performance Data												
15 x 15	CFM	225	270	315	360	405	450	540	635	720	810	900
Grid Core	-Ps	<.01	<.01	<.01	<.01	.01	.01	.02	.03	.03	.04	.05
Ak 1.000	NC	<30	<30	<30	<30	<30	<30	35	40	>45	>45	>45

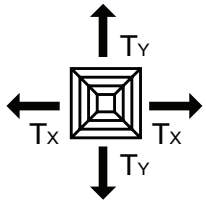
Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
Supply Performance Data												
	CFM	350	420	490	560	630	700	840	980	1120	1260	1400
24 x 24	Ps	.01	.02	.02	.03	.04	.05	.07	.10	.13	.16	.20
Ak .700	Throw X/Y	3-5/3-5	3-7/3-7	4-7/4-7	4-9/4-9	5-11/5-11	5-11/5-11	6-12/6-12	7-15/7-15	9-17/9-17	11-21/11-21	13-25/13-25
	NC	<30	<30	<30	<30	<30	<30	35	40	>45	>45	>45
Return Performance Data												
18 x 18	CFM	260	315	365	420	470	525	630	735	840	945	1050
Grid Core	-Ps	<.01	<.01	<.01	<.01	<.01	<.01	.01	.01	.01	.02	.03
Ak 1.600	NC	<30	<30	<30	<30	<30	<30	35	40	>45	>45	>45

Return CFM listed is 75% of supply.
NC re 8db room Attenuation

NOTES: The minimum Throw Dimension is based on a terminal velocity of 200 FPM. The maximum Throw Dimension is based on a terminal velocity of 100 FPM.

The minimum Throw Dimension in feet is based on a V_T of 200 FPM with V_R of 65 FPM.
The maximum Throw Dimension in feet is based on a V_T of 100 FPM with V_R of 35 FPM.

4-WAY SQUARE



Recommended Noise Criteria and Face Velocity Ranges are on page 77

ASR Square Supply Return Diffuser — Aluminum (Page 35)

Four-Way Square

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
Supply Performance Data												
	CFM	560	675	785	900	1020	1120	1345	1570	1790	2020	2240
27 x 27	Ps	.01	.02	.02	.03	.04	.05	.07	.10	.13	.16	.20
Ak 1.100	Throw X/Y	3-5/3-5	3-5/3-5	4-8/4-8	5-11/5-11	6-14/6-14	7-15/7-15	8-17/8-17	9-18/9-18	11-21/11-21	13-25/13-25	15-29/15-29
	NC	<30	<30	<30	<30	<30	<30	<35	<40	<45	<45	<45
Return Performance Data												
18 x 18	CFM	345	505	590	675	765	840	1020	1180	1340	1520	1680
Grid Core	-Ps	<.01	<.01	<.01	.01	.02	.02	.03	.04	.05	.06	.07
Ak 1.600	NC	<30	<30	<30	<30	<30	<30	35	40	>45	>45	>45

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
Supply Performance Data												
	CFM	635	765	890	1015	1140	1270	1520	1775	2030	2290	2540
30 x 30	Ps	.01	.02	.02	.03	.04	.05	.07	.10	.13	.16	.20
Ak 1.300	Throw X/Y	3-7/3-7	4-8/4-8	4-10/4-10	5-12/5-12	6-14/6-14	7-16/7-16	9-17/9-17	10-19/10-29	12-23/12-23	14-27/14-27	16-31/16-31
	NC	<30	<30	<30	<30	<30	<30	35	40	>45	>45	>45
Return Performance Data												
21 x 21	CFM	475	575	665	760	855	955	1140	1330	1520	1720	1900
Grid Core	-Ps	<.01	<.01	<.01	<.01	.01	.01	.02	.03	.03	.04	.05
Ak 2.100	NC	<30	<30	<30	<30	<30	<35	40	45	>45	>45	>45

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
Supply Performance Data												
	CFM	900	1080	1260	1440	1620	1800	2160	2520	2880	3250	3600
33 x 33	Ps	.01	.02	.02	.03	.04	.05	.07	.10	.13	.16	.20
Ak 1.800	Throw X/Y	4-8/4-8	5-10/5-10	6-12/6-12	6-13/6-13	7-15/7-15	8-17/8-17	11-23/11-23	14-29/14-29	16-31/16-31	18-35/18-35	20-39/20-39
	NC	<30	<30	<30	<30	<30	<30	35	45	>45	>45	>45
Return Performance Data												
21 x 21	CFM	675	810	945	1080	1210	1350	1620	1885	2160	2440	2700
Grid Core	-Ps	<.01	<.01	.01	.02	.02	.03	.04	.05	.07	.09	.10
Ak 2.100	NC	<30	<30	<30	<30	<30	<35	40	45	>45	>45	>45

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
Supply Performance Data												
	CFM	1000	1200	1400	1600	1800	2000	2400	2800	3200	3600	4000
36 x 36	Ps	.01	.02	.02	.03	.04	.05	.07	.10	.13	.16	.20
Ak 2.000	Throw X/Y	3-8/3-8	4-11/4-11	5-12/5-12	6-14/6-14	7-16/7-16	9-19/9-19	12-23/12-23	14-27/14-27	16-31/16-31	18-35/18-35	22-39/22-39
	NC	<30	<30	<30	<30	<30	<30	40	45	>45	>45	>45
Return Performance Data												
24 x 24	CFM	750	900	1050	1200	1350	1500	1800	2100	2400	2700	3000
Grid Core	-Ps	<.01	<.01	<.01	.01	.01	.02	.03	.03	.05	.06	.07
Ak 2.800	NC	<30	<30	<30	<30	<30	<35	40	45	>45	>45	>45

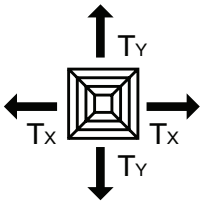
Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
Supply Performance Data												
	CFM	1450	1740	2030	2320	2610	2900	3480	4060	4640	5225	5800
42 x 42	Ps	.01	.02	.02	.03	.04	.05	.07	.10	.13	.16	.20
Ak 2.900	Throw X/Y	4-11/4-11	5-13/5-13	7-16/7-16	10-21/10-21	12-25/12-25	15-29/15-29	17-33/17-33	19-36/19-36	22-41/22-41	25-48/25-48	29-54/29-54
	NC	<30	<30	<30	<30	<30	<40	45	45	>45	>45	>45
Return Performance Data												
27 x 27	CFM	1085	1300	1520	1735	1950	2170	2600	3040	3470	3900	4340
Grid Core	-Ps	<.01	<.01	.01	.01	.02	.02	.03	.04	.06	.07	.09
Ak 3.600	NC	<30	<30	<30	<30	<35	<40	40	45	>45	>45	>45

Return CFM listed is 75% of supply.
NC re 8db room Attenuation

NOTES: The minimum Throw Dimension is based on a terminal velocity of 200 FPM. The maximum Throw Dimension is based on a terminal velocity of 100 FPM.

The minimum Throw Dimension in feet is based on a V_T of 200 FPM with V_R of 65 FPM.
The maximum Throw Dimension in feet is based on a V_T of 100 FPM with V_R of 35 FPM.

4-WAY SQUARE

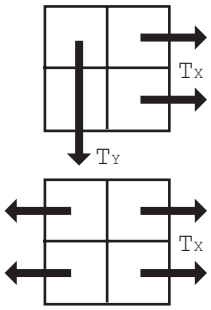


Recommended Noise Criteria and Face Velocity Ranges are on page 77

MCD Modular Ceiling Diffuser — Aluminum (Page 36, 37, 71)

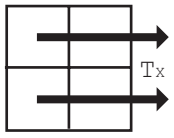
Two Way

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
6 x 6 Ak .090	CFM	45	55	65	70	80	90	110	125	145	160	180
	Throw X/Y	2-5/2-5	3-5/3-5	3-6/3-6	3-6/3-6	5-8/5-8	5-9/5-9	5-11/5-11	6-12/6-12	6-14/6-14	8-15/8-15	9-17/9-17
	NC	<20	<20	<20	<20	<20	<20	21	24	28	31	34
8 x 8 Ak .150	CFM	80	95	110	130	145	160	190	225	255	290	320
	Throw X/Y	3-6/3-6	3-6/3-6	5-8/5-8	5-9/5-9	5-11/5-11	6-11/6-11	6-14/6-14	8-15/8-15	9-17/9-17	11-18/11-18	11-20/11-20
	NC	<20	<20	<20	<20	<20	<20	22	26	29	32	35
10 x 10 Ak .250	CFM	130	155	180	210	235	260	310	365	415	470	520
	Throw X/Y	3-8/3-8	5-9/5-9	5-11/5-11	6-11/6-11	6-12/6-12	8-12/8-12	9-15/9-15	11-17/11-17	12-20/12-20	14-21/14-21	15-23/15-23
	NC	<20	<20	<20	<20	<20	<20	23	27	30	33	36
12 x 12 Ak .370	CFM	190	230	265	305	340	380	455	530	610	685	760
	Throw X/Y	5-9/5-9	5-11/5-11	6-12/6-12	8-14/8-14	8-15/8-15	9-17/9-17	11-18/11-18	12-21/12-21	14-23/14-23	15-24/15-24	17-26/17-26
	NC	<20	<20	<20	<20	<20	20	24	28	31	35	37
14 x 14 Ak .520	CFM	260	310	365	415	470	520	625	730	830	935	1040
	Throw X/Y	5-11/5-11	6-12/6-12	8-14/8-14	8-17/8-17	9-18/9-18	11-20/11-20	12-21/12-21	14-23/14-23	17-24/17-24	18-27/18-27	20-29/20-29
	NC	<20	<20	<20	<20	<20	20	25	29	32	35	38
16 x 16 Ak .700	CFM	350	420	490	560	630	700	840	980	1120	1260	1400
	Throw X/Y	6-12/6-12	8-14/8-14	8-17/8-17	9-18/9-18	11-21/11-21	12-23/12-23	14-26/14-26	17-29/17-29	18-30/18-30	21-32/21-32	24-33/24-33
	NC	<20	<20	<20	<20	<20	21	26	30	33	36	39
18 x 18 Ak .900	CFM	450	540	630	720	810	900	1080	1260	1440	1620	1800
	Throw X/Y	6-14/6-14	8-17/8-17	9-18/9-18	11-21/11-21	12-23/12-23	14-24/14-24	17-27/17-27	18-30/18-30	21-33/21-33	24-35/24-35	27-36/27-36
	NC	<20	<20	<20	<20	20	22	27	31	34	37	40
20 x 20 Ak 1.100	CFM	555	665	775	890	1000	1110	1330	1555	1775	2000	2220
	Throw X/Y	8-15/8-15	9-18/9-18	11-21/11-21	12-24/12-24	14-26/14-26	15-29/15-29	18-32/18-32	21-35/21-35	24-38/24-38	27-39/27-39	30-41/30-41
	NC	<20	<20	<20	<20	21	24	28	32	36	39	42
22 x 22 Ak 1.330	CFM	665	800	930	1065	1195	1330	1595	1860	2130	2395	2660
	Throw X/Y	8-17/8-17	9-20/9-20	12-23/12-23	14-26/14-26	15-27/15-27	17-30/17-30	20-35/20-35	23-38/23-38	27-41/27-41	29-44/29-44	33-45/33-45
	NC	<20	<20	<20	22	25	28	32	36	40	43	46



One-Way

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
6 x 6 Ak .090	CFM	45	55	65	70	80	90	110	125	145	160	180
	Throw	2-6	4-6	4-8	4-8	6-10	6-12	6-14	8-16	8-18	10-20	12-22
	NC	<20	<20	<20	<20	<20	<20	21	24	28	31	34
8 x 8 Ak .150	CFM	80	95	110	130	145	160	190	225	255	290	320
	Throw	4-8	4-8	6-10	6-12	6-14	8-14	8-18	10-20	12-22	14-24	14-26
	NC	<20	<20	<20	<20	<20	<20	22	26	29	32	35
10 x 10 Ak .250	CFM	130	155	180	210	235	260	310	365	415	470	520
	Throw	4-10	6-12	6-14	8-14	8-16	10-16	12-20	14-22	16-26	18-28	20-30
	NC	<20	<20	<20	<20	<20	<20	23	27	30	33	36
12 x 12 Ak .370	CFM	190	230	265	305	340	380	455	530	610	685	760
	Throw	6-12	6-14	8-16	10-18	10-20	12-20	12-22	14-24	16-28	18-30	20-30
	NC	<20	<20	<20	<20	<20	20	24	28	31	35	37
14 x 14 Ak .520	CFM	260	310	365	415	470	520	625	730	830	935	1040
	Throw	6-14	8-16	10-18	10-22	12-24	14-26	16-28	18-30	22-32	24-36	26-38
	NC	<20	<20	<20	<20	<20	20	25	29	32	35	38
16 x 16 Ak .700	CFM	350	420	490	560	630	700	840	980	1120	1260	1400
	Throw	8-16	10-18	10-22	12-24	14-28	16-30	18-34	22-38	24-40	28-42	32-44
	NC	<20	<20	<20	<20	<20	21	26	30	33	36	39
18 x 18 Ak .900	CFM	450	540	630	720	810	900	1080	1260	1440	1620	1800
	Throw	8-18	10-22	12-24	14-28	16-30	18-36	22-36	24-40	28-44	32-46	35-48
	NC	<20	<20	<20	<20	20	22	27	31	34	37	40
20 x 20 Ak 1.100	CFM	555	665	775	890	1000	1110	1330	1555	1775	2000	2220
	Throw	10-20	12-24	14-28	16-32	18-34	20-38	24-42	28-46	32-50	36-52	40-54
	NC	<20	<20	<20	<20	21	24	28	32	36	39	42
22 x 22 Ak 1.330	CFM	665	800	930	1065	1195	1330	1595	1860	2130	2395	2660
	Throw	10-22	12-26	16-30	18-34	20-36	22-40	26-46	30-50	36-54	38-58	44-60
	NC	<20	<20	<20	20	23	26	30	34	38	41	44



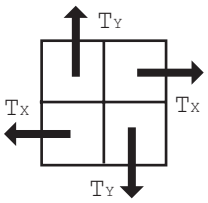
NOTES: The minimum Throw Dimension is based on a terminal velocity of 250 FPM. The maximum Throw Dimension is based on a terminal velocity of 125 FPM.
NC re 10db room Attenuation ($LW10^{-12}W$)

Recommended Noise Criteria and Face Velocity Ranges are on page 77

MCD Modular Ceiling Diffuser — Aluminum (Page 36, 37, 71)

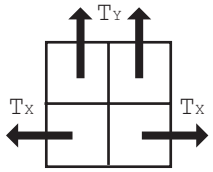
Four-Way

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
6 x 6 Ak .090	CFM	45	55	65	70	80	90	110	125	145	160	180
	Throw X/Y	1-3/1-3	2-3/2-3	2-4/2-4	2-4/2-4	3-5/3-5	3-6/3-6	3-7/3-7	4-8/4-8	4-9/4-9	5-10/5-10	6-11/6-11
	NC	<20	<20	<20	<20	<20	<20	21	24	28	31	34
8 x 8 Ak .150	CFM	80	95	110	130	145	160	190	225	255	290	320
	Throw X/Y	2-4/2-4	2-4/2-4	3-5/3-5	3-6/3-6	3-7/3-7	4-7/4-7	4-9/4-9	5-10/5-10	6-11/6-11	7-12/7-12	7-13/7-13
	NC	<20	<20	<20	<20	<20	<20	22	26	29	32	35
10 x 10 Ak .250	CFM	130	155	180	210	235	260	310	365	415	470	520
	Throw X/Y	2-5/2-5	3-6/3-6	3-7/3-7	4-7/4-7	4-8/4-8	5-8/5-8	6-10/6-10	7-11/7-11	8-13/8-13	9-14/9-14	10-15/10-15
	NC	<20	<20	<20	<20	<20	<20	23	27	30	33	36
12 x 12 Ak .370	CFM	190	230	265	305	340	380	455	530	610	685	760
	Throw X/Y	3-6/3-6	3-7/3-7	4-8/4-8	5-9/5-9	5-10/5-10	6-11/6-11	7-12/7-12	8-14/8-14	8-15/8-15	10-16/10-16	11-17/11-17
	NC	<20	<20	<20	<20	<20	20	24	28	31	35	37
14 x 14 Ak .520	CFM	260	310	365	415	470	520	625	730	830	935	1040
	Throw X/Y	3-7/3-7	4-8/4-8	5-9/5-9	5-11/5-11	6-12/6-12	7-13/7-13	8-14/8-14	9-15/9-15	11-16/11-16	12-18/12-18	13-19/13-19
	NC	<20	<20	<20	<20	<20	20	25	29	32	35	38
16 x 16 Ak .700	CFM	350	420	490	560	630	700	840	980	1120	1260	1400
	Throw X/Y	4-8/4-8	5-9/5-9	5-11/5-11	6-12/6-12	7-14/7-14	8-15/8-15	9-17/9-17	11-19/11-19	12-20/12-20	14-21/14-21	16-22/16-22
	NC	<20	<20	<20	<20	<20	21	26	30	33	36	39
18 x 18 Ak .900	CFM	450	540	630	720	810	900	1080	1260	1440	1620	1800
	Throw X/Y	4-9/4-9	5-11/5-11	6-12/6-12	7-14/7-14	8-15/8-15	9-16/9-16	11-18/11-18	12-20/12-20	14-22/14-22	16-23/16-23	18-24/18-24
	NC	<20	<20	<20	<20	20	22	27	31	34	37	40
20 x 20 Ak 1.100	CFM	555	665	775	890	1000	1110	1330	1555	1775	2000	2220
	Throw X/Y	5-10/5-10	6-12/6-12	7-14/7-14	8-16/8-16	9-17/9-17	10-19/10-19	12-21/12-21	14-23/14-23	16-25/16-25	18-26/18-26	20-27/20-27
	NC	<20	<20	<20	<20	21	24	28	32	36	39	42
22 x 22 Ak 1.330	CFM	665	800	930	1065	1195	1330	1595	1860	2130	2395	2660
	Throw X/Y	5-11/5-11	6-13/6-13	8-15/8-15	9-17/9-17	10-18/10-18	11-20/11-20	13-23/13-23	15-25/15-25	18-27/18-27	19-29/19-29	22-30/22-30
	NC	<20	<20	<20	20	23	26	30	34	38	41	44



Three-Way

Face Velocity		500	600	700	800	900	1000	1200	1400	1600	1800	2000
Pressure Loss		.020	.020	.030	.040	.050	.060	.090	.120	.160	.200	.250
6 x 6 Ak .090	CFM	45	55	65	70	80	90	110	125	145	160	180
	Throw	1-3/2-5	2-3/3-5	2-4/3-6	2-4/3-6	3-5/5-8	3-6/5-9	3-7/5-11	4-8/6-12	4-9/6-14	5-10/8-15	6-11/9-17
	NC	<20	<20	<20	<20	<20	<20	21	24	28	31	34
8 x 8 Ak .150	CFM	80	95	110	130	145	160	190	225	255	290	320
	Throw	2-4/3-6	2-4/3-6	3-5/5-8	3-6/5-9	3-7/5-11	4-7/6-11	4-9/6-14	5-10/8-15	6-11/9-17	7-12/11-18	7-13/11-20
	NC	<20	<20	<20	<20	<20	<20	<20	22	26	29	32	35
10 x 10 Ak .250	CFM	130	155	180	210	235	260	310	365	415	470	520
	Throw	2-5/3-8	3-6/5-9	3-7/5-11	4-7/6-11	4-8/6-12	5-8/8-12	6-10/9-15	7-11/11-17	8-13/12-20	9-14/14-21	10-15/15-23
	NC	<20	<20	<20	<20	<20	<20	23	27	30	33	36
12 x 12 Ak .370	CFM	190	230	265	305	340	380	455	530	610	685	760
	Throw	3-6/5-9	3-7/5-11	4-8/6-12	5-9/8-14	5-10/8-15	6-11/9-17	7-12/11-18	8-14/12-21	9-15/14-23	10-16/15-24	11-17/17-26
	NC	<20	<20	<20	<20	<20	20	24	28	31	35	37
14 x 14 Ak .520	CFM	260	310	365	415	470	520	625	730	830	935	1040
	Throw	3-7/5-11	4-8/6-12	5-9/8-14	5-11/8-17	6-12/9-18	7-13/11-20	8-14/12-21	9-15/14-23	11-16/17-24	12-18/18-27	13-19/20-29
	NC	<20	<20	<20	<20	<20	20	25	29	32	35	38
16 x 16 Ak .700	CFM	350	420	490	560	630	700	840	980	1120	1260	1400
	Throw	4-8/6-12	5-9/8-14	5-11/8-17	6-12/9-18	7-14/11-21	8-15/12-23	9-17/14-26	11-19/17-29	12-20/18-30	14-21/21-32	16-22/24-33
	NC	<20	<20	<20	<20	<20	21	26	30	33	36	39
18 x 18 Ak .900	CFM	450	540	630	720	810	900	1080	1260	1440	1620	1800
	Throw	4-9/6-14	5-11/8-17	6-12/9-18	7-14/11-21	8-15/12-23	9-16/14-24	11-18/17-27	12-20/18-30	14-22/21-33	16-23/24-35	18-24/27-36
	NC	<20	<20	<20	<20	20	22	27	31	34	37	40
20 x 20 Ak 1.100	CFM	555	665	775	890	1000	1110	1330	1555	1775	2000	2220
	Throw	5-10/8-15	6-12/9-18	7-14/11-21	8-16/12-24	9-17/14-26	10-19/15-29	12-21/18-32	14-23/21-35	16-25/24-38	18-26/27-39	20-27/30-41
	NC	<20	<20	<20	<20	21	24	28	32	36	39	42
22 x 22 Ak 1.330	CFM	665	800	930	1065	1195	1330	1595	1860	2130	2395	2660
	Throw	5-11/8-17	6-113/9-20	8-15/12-23	9-17/14-26	10-18/15-27	11-20/17-30	13-23/20-35	15-25/23-38	18-27/27-41	19-29/29-44	22-30/33-45
	NC	<20	<20	<20	20	23	26	30	34	38	41	44



NOTES: The minimum Throw Dimension is based on a terminal velocity of 250 FPM. The maximum Throw Dimension is based on a terminal velocity of 125 FPM.
NC re 10db room Attenuation (LW10-12W)

ECBXT (Page 72)

Neck Velocity		400	500	600	700	800	900	1000	1200	1400	1600	1800	2000
22 x 22	CFM	537	537	672	806	940	1074	1209	1343	1612	1880	2149	2417
Ak 1.343	Pt	.028	.042	.059	.077	.098	.121	.146	.203	.267	.339	.419	.505

NOTES:
1. ECBXT diffuser boxes Tested with all valves fully open.
2. Pt = Total Pressure is the sum of static pressure and velocity pressure.
3. Ak is the effective area of the diffuser face.
4. Tests conducted in accordance with ASHRAE 70-1991.

Recommended Noise Criteria and Face Velocity Ranges are on page 77

SS Spiral Diffuser (Page 39)

1/2" wide slot–nonducted

See notes on next page and see page 39 for min. duct diameter.

1-Slot	Airflow Rate (CFM/Linear Foot)	7	10	13	17	20	23	27	30	33	37
	Static Pressure	.002	.003	.006	.009	.016	.018	.024	.030	.037	.045
	Horizontal Throw	7-4-2	11-6-4	15-7-5	19-9-6	22-11-7	26-13-9	30-15-10	33-17-11	37-19-12	41-20-14
	Noise Criteria	<15	<15	<15	<15	<15	<15	19	21	23	25

2-Slot	Airflow Rate (CFM/Linear Foot)	10	17	23	30	37	43	50	57	63	70
	Static Pressure	.001	.002	.004	.007	.011	.015	.020	.026	.032	.039
	Horizontal Throw	6-3-2	9-5-3	13-6-4	17-8-6	20-10-7	24-12-8	28-14-9	31-16-10	35-18-12	39-19-13
	Noise Criteria	<15	<15	<15	<15	<15	<15	19	23	27	31

3-Slot	Airflow Rate (CFM/Linear Foot)	13	23	33	43	53	63	73	83	93	103
	Static Pressure	.001	.002	.004	.006	.009	.012	.017	.021	.027	.033
	Horizontal Throw	5-3-2	10-5-3	14-7-5	18-9-6	22-11-7	26-13-9	30-15-10	34-17-11	38-19-13	42-21-14
	Noise Criteria	<15	<15	<15	<15	<15	18	21	25	30	33

4-Slot	Airflow Rate (CFM/Linear Foot)	17	30	43	57	70	83	97	110	123	137
	Static Pressure	.001	.002	.003	.005	.008	.012	.016	.020	.025	.031
	Horizontal Throw	6-3-2	10-5-3	15-8-5	20-10-7	24-12-8	29-14-10	31-17-11	38-19-13	43-21-14	47-24-16
	Noise Criteria	<15	<15	<15	<15	18	20	22	27	32	34

3/4" wide slot–nonducted

See notes on next page and see page 39 for min. duct diameter.

1-Slot	Airflow Rate (CFM/Linear Foot)	10	15	20	25	30	35	40	45	50	55
	Static Pressure	.002	.004	.007	.011	.015	.020	.027	.034	.042	.050
	Horizontal Throw	6-3-2	9-5-3	12-6-4	15-8-5	18-9-6	22-11-7	25-12-8	28-14-9	31-15-10	34-17-11
	Noise Criteria	<15	<15	<15	<15	19	21	25	30	34	39

2-Slot	Airflow Rate (CFM/Linear Foot)	15	25	35	45	55	65	75	85	95	105
	Static Pressure	.001	.003	.005	.008	.012	.017	.022	.029	.036	.044
	Horizontal Throw	5-2-2	8-4-3	11-5-4	14-7-5	17-8-6	20-10-7	23-12-8	26-13-9	29-15-10	32-16-11
	Noise Criteria	<15	<15	<15	<15	19	26	32	35	38	41

3-Slot	Airflow Rate (CFM/Linear Foot)	20	35	50	65	80	95	110	125	140	155
	Static Pressure	.001	.002	.004	.007	.010	.014	.019	.024	.030	.037
	Horizontal Throw	5-2-2	8-4-3	11-6-4	15-7-5	18-9-6	22-11-7	25-12-8	28-14-9	32-16-11	35-18-12
	Noise Criteria	<15	<15	<15	18	23	28	33	37	40	43

4-Slot	Airflow Rate (CFM/Linear Foot)	25	45	65	85	105	125	145	165	185	205
	Static Pressure	.001	.002	.004	.006	.009	.013	.017	.023	.028	.035
	Horizontal Throw	5-2-2	9-4-3	13-6-4	16-8-5	20-10-7	24-12-8	28-14-9	32-16-11	38-19-12	40-20-13
	Noise Criteria	<15	<15	17	22	25	29	33	37	40	43

1" wide slot–nonducted

See notes on next page and see page 39 for min. duct diameter.

1-Slot	Airflow Rate (CFM/Linear Foot)	13	20	27	33	40	47	53	60	67	73
	Static Pressure	.002	.005	.009	.014	.020	.027	.036	.045	.056	.067
	Horizontal Throw	5-2-2	7-4-2	10-5-3	12-6-4	15-7-5	17-9-6	20-10-7	22-11-7	25-12-8	27-14-9
	Noise Criteria	<15	<15	<15	20	25	31	37	41	43	45

2-Slot	Airflow Rate (CFM/Linear Foot)	20	33	47	60	79	87	100	113	127	140
	Static Pressure	.001	.003	.007	.011	.016	.023	.030	.038	.048	.059
	Horizontal Throw	4-2-1	6-3-2	9-4-3	11-6-4	14-7-5	16-8-5	19-9-6	21-10-7	23-12-8	26-13-9
	Noise Criteria	<15	<15	<15	23	32	35	40	44	48	51

3-Slot	Airflow Rate (CFM/Linear Foot)	27	47	67	87	107	127	147	167	187	207
	Static Pressure	.001	.003	.005	.009	.013	.019	.025	.032	.040	.049
	Horizontal Throw	4-2-1	6-3-2	9-5-3	12-6-4	15-7-5	17-9-6	20-10-7	23-11-8	25-13-8	28-14-9
	Noise Criteria	<15	<15	<15	23	32	35	40	44	48	51

4-Slot	Airflow Rate (CFM/Linear Foot)	33	60	87	113	140	167	193	220	247	273
	Static Pressure	.001	.002	.005	.008	.012	.017	.023	.030	.038	.046
	Horizontal Throw	4-2-1	7-3-2	10-5-3	13-7-4	16-8-5	19-10-8	22-11-7	25-13-8	29-14-10	32-16-11
	Noise Criteria	<15	16	22	27	31	37	42	46	50	54

Recommended Noise Criteria and Face Velocity Ranges are on page 77

SS Spiral Diffuser (Page 39)

Notes:

1. Tests conducted in accordance with ANSI/ASHRAE 70-1991 at isothermal conditions.

2. Engineering Units: Airflow Rate = CFM/linear foot
   Static Pressure = in. w.c.
   Throw = ft. at 50, 100, and 150 FPM terminal velocity

3. Noice Criteria is based on 10 dB room absorption (Re: 10^{12} watts) evaluated at 125 through 4000 Hz octave bands.

4. Throw data are based on a horizontal discharge in one direction only. For two-way discharge pattern, the throw is determined from the published engineering data based on the number of slots and CFM/linear feet discharging in each direction.

5. Throw data are for 4-foot active diffuser lengths. For other active lengths, throw may be determined by applying the following multiplication factors.

Diffuser Length (Feet)	Multiplication Factor
1	0.50
2	0.85
3	0.95
4	1.00

6. Sound data are for 4-foot active diffuser lengths. For other lengths, add or deduct the following values to or from the reported NC level.

Diffuser Length (Feet)	NC Correction
1	-2
2	-2
3	-1
4	0

Recommended Noise Criteria and Face Velocity Ranges are on page 77

SV and SVH Spiral Diffusers
USV, USVH Universal Spiral Diffusers
(Page 38-39)

See page 39 for min. duct diameter.

Face Velocity		300	400	500	600	700	800	1000	1200
Total Pressure		.016	.029	.046	.066	.090	.117	.183	.263
10 x 3 Ak .14	CFM	42	56	70	84	98	112	140	168
	Horizontal Throw	7-3	8-4	9-5	10-6	11-7	12-8	13-9	14-10
	Noise Criteria	-	-	-	-	-	23	29	35
12 x 3 Ak .18	CFM	54	72	90	108	126	144	180	216
	Horizontal Throw	8-5	9-6	10-7	11-8	12-8	13-9	14-10	16-11
	Noise Criteria	-	-	-	-	20	24	31	36
10 x 4 14 x 3 Ak .21	CFM	63	84	105	126	147	168	210	252
	Horizontal Throw	8-5	10-7	11-8	12-8	13-9	14-10	16-11	17-12
	Noise Criteria	-	-	-	-	21	25	31	37
16 x 3 12 x 4 Ak .25	CFM	75	100	125	150	175	200	250	300
	Horizontal Throw	9-5	11-7	12-8	13-9	14-10	15-11	17-12	19-13
	Noise Criteria	-	-	-	-	21	25	32	37
24 x 3 12 x 6 Ak .39	CFM	117	156	195	234	273	312	390	468
	Horizontal Throw	12-7	13-9	15-10	17-11	18-12	19-13	21-15	24-16
	Noise Criteria	-	-	-	-	23	27	34	39
24 x 4 16 x 6 Ak .52	CFM	156	208	260	312	364	416	520	624
	Horizontal Throw	13-8	16-11	18-12	19-13	21-14	22-15	25-17	27-19
	Noise Criteria	-	-	-	20	24	28	35	40
14 x 8 18 x 6 Ak .63	CFM	189	252	315	378	441	504	630	756
	Horizontal Throw	15-8	17-12	19-13	21-14	23-16	24-17	27-19	30-20
	Noise Criteria	-	-	-	20	25	29	36	41
20 x 6 Ak .66	CFM	198	264	330	396	462	528	660	792
	Horizontal Throw	15-9	18-12	20-13	22-15	24-16	25-17	28-19	31-21
	Noise Criteria	-	-	-	21	25	29	36	41
16 x 8 Ak .71	CFM	213	284	355	426	497	568	710	852
	Horizontal Throw	16-9	18-13	20-14	23-15	24-17	26-18	30-20	35-22
	Noise Criteria	-	-	-	21	26	30	36	42
24 x 6 18 x 8 Ak .88	CFM	264	352	440	528	616	704	880	1056
	Horizontal Throw	18-10	20-14	23-16	25-17	27-18	29-20	32-22	36-24
	Noise Criteria	-	-	-	22	26	30	37	43
20 x 8 16 x 10 Ak .98	CFM	294	392	490	588	686	784	980	1176
	Horizontal Throw	19-10	21-15	24-17	26-18	28-19	30-21	34-23	38-25
	Noise Criteria	-	-	-	23	27	31	38	44
18 x 10 Ak 1.11	CFM	333	444	555	666	777	888	1110	1332
	Horizontal Throw	20-11	23-16	25-18	28-19	30-21	32-22	36-25	40-27
	Noise Criteria	-	-	-	23	27	31	38	44
36 x 6 18 x 12 Ak 1.35	CFM	405	540	675	810	945	1080	1350	1620
	Horizontal Throw	22-12	25-17	28-19	31-21	34-23	36-24	40-27	44-30
	Noise Criteria	-	-	-	24	28	32	39	44
24 x 10 20 x 12 Ak 1.49	CFM	447	596	745	894	1043	1192	1490	1788
	Horizontal Throw	23-13	26-18	30-20	32-22	35-24	37-26	42-29	46-31
	Noise Criteria	-	-	-	24	29	33	39	45
24 x 12 Ak 1.82	CFM	546	728	910	1092	1274	1456	1820	2184
	Horizontal Throw	25-14	30-20	33-22	36-25	39-27	42-28	47-32	51-35
	Noise Criteria	-	-	-	25	30	34	40	46
36 x 10 30 x 12 Ak 2.29	CFM	687	916	1145	1374	1603	1832	2290	2748
	Horizontal Throw	29-16	33-22	37-25	41-28	44-30	47-32	53-36	61-42
	Noise Criteria	-	-	20	26	30	34	41	47
36 x 12 Ak 2.75	CFM	825	1100	1375	1650	1925	2200	2750	3300
	Horizontal Throw	31-18	36-25	41-28	44-30	48-33	51-35	57-39	63-43
	Noise Criteria	-	-	21	27	31	35	42	47

Terminal Velocity of 75 and 150 FPM, respectively

NOTES:
1. Total Pressure in inches water column.
2. Throw data are in feet at terminal velocities of 75 and 150 FPM, respectively.
3. Noice Criteria based on a 10 dB room attenuation (Re: 10^{-12} watts).

Recommended Noise Criteria and Face Velocity Ranges are on page 77

Engineering Data

HART COOLEY

L Series (Page 40-42)

NOTES:

1. Table 1 based on up to 4-foot grille length. For longer lengths, correct throw and NC per **Table 2**.
2. When using continuous grille lengths with alternate active and inactive sections, a reduction in throw can be obtained by omitting the factors contained in **Table 2**.
3. Bar style 30 and 0
   Increase **Table 1** NC + 5 NC
4. Supply air temperature effect on horizontal throw is shown in Table 3. vertical down-throw at varying supply temperatures is shown in Table 4.
5. When spreading the air path with a horizontal deflection of 22º per side in grille lengths up to 4 feet:
   Multiply **Table 1** Throw x .75
   Increase **Table 1** NC + 5 NC
   Multiply **Table 1** P_S x 1.20
   Multiply **Table 5** A_k x .90
6. Terminal velocities (V_t) at the minimum and maximum throw (T) values are rated at 125 FPM and 75 FPM respectively with corresponding room velocities (V_r) of 50 FPM and 35 FPM.

Table 1 - Supply Air

CFM/Ft of total Linear length	Listed Width in Inches	Min. P_s in H_20		Face Velocity (V_k) FPM		Throw (T) in Feet		Minimum Ceiling Height in Feet		
		Bar Style		Bar Style		Sidewall	Sill/Floor			
		00 and 15	30 and 01	00 and 15	30 and 01	Min.-Max.	Min.-Max.	@ -18F T	@ -25F T	NC
20	1½	.01	.01	500	575	6-9	1-2	8	9	<20
30	1½	.03	.04	750	865	7-10	2-3	9	10	25
	2	.01	.01	475	545	6-9	1-2			20
40	1½	.05	.07	1000	1150	9-13	3-5	9	11	30
	2	.02	.03	635	730	8-11	2-4			25
	2½	.01	.01	460	530	7-10	2-3			20
50	1½	.03	.12	1250	1440	11-16	4-9	9½	11	30
	2	.03	.04	790	910	10-14	3-7			25
	2½	.02	.03	575	660	9-13	2-6			20
	3	<.01	.01	440	505	8-12	2-5			<20
60	2	.05	.07	950	1090	12-18	5-11	9½	12	30
	2½	.02	.03	690	795	11-16	4-9			25
	3	.01	.01	530	610	10-14	3-7			20
	4	<.01	.01	370	425	8-12	2-5			<20
70	2	.06	.08	1110	1275	14-20	7-13	10	12	30
	2½	.03	.04	810	935	13-19	6-12			30
	3	.02	.03	660	760	11-16	4-9			25
	4	<.01	.01	435	500	10-14	3-7			<20
80	2	.08	.10	1275	1450	16-23	9-16	10½	12½	30
	2½	.04	.05	920	1060	15-21	8-14			30
	3	.03	.04	700	805	13-18	6-11			25
	4	.01	.01	495	570	11-16	4-9			20
90	2½	.05	.07	1030	1185	17-24	10-17	11	13	30
	3	.04	.05	785	905	15-21	8-14			30
	4	.01	.02	550	635	13-18	6-11			25
	5	<.01	.01	450	520	11-16	4-9			20
100	2½	.06	.08	1150	1325	19-27	12-20	11	13	30
	3	.04	.05	875	1010	16-23	9-16			30
	4	.02	.03	620	715	14-20	7-13			25
	5	.01	.01	500	575	12-18	5-11			20
120	3	.06	.08	1050	1210	19-28	11-20	11½	13	30
	4	.03	.04	745	855	17-24	9-16			30
	5	.02	.03	600	680	15-22	7-14			25
	6	<.01	.01	480	550	13-19	5-11			20
140	3	.08	.11	1220	1410	22-32	14-24	11½	14	35
	4	.04	.05	870	1000	19-28	11-20			30
	5	.02	.03	700	810	17-25	9-17			25
	6	.01	.01	560	645	15-22	7-14			20
160	4	.05	.07	990	1140	22-32	13-23	12	15	35
	5	.03	.04	800	925	19-29	10-20			30
	6	.02	.03	640	735	18-26	9-17			25
	8	.01	.01	460	530	15-22	6-13			20
180	4	.07	.09	1110	1275	25-36	16-27	12	15	35
	5	.04	.05	900	1035	22-33	13-24			30
	6	.03	.04	725	835	20-30	11-21			25
	8	.02	.03	520	600	17-25	8-16			20
200	4	.08	.11	1240	1425	28-41	-	12	15	40
	5	.05	.07	1000	1150	24-36	-			35
	6	.04	.05	800	925	23-33	-			30
	8	.02	.03	575	665	20-28	-			25
250	5	.08	.11	1250	1440	30-46	-	13	15	40
	6	.05	.07	1000	1150	27-39	-			35
	8	.03	.04	720	830	25-35	-			30
	10	.01	.01	550	625	21-32	-			25
300	6	.07	.09	1200	1375	33-48	-	13	15	40
	8	.04	.05	865	1000	29-42	-			35
	10	.02	.03	665	765	25-39	-			30
	12	.01	.01	545	630	23-33	-			25
350	8	.05	.08	1020	1175	34-48	-	13	15	40
	10	.03	.04	780	900	29-45	-			35
	12	.02	.03	640	735	26-38	-			30
400	8	.08	.11	1170	1350	40-55	-	14	16	45
	10	.04	.05	890	1025	33-50	-			40
	12	.03	.04	730	845	33-44	-			35

Symbols:

V_t Terminal Velocity in FPM
V_r Room Velocity in FPM
V_k Face Velocity in FPM
A_k Outlet Area in Square Feet
A_n Neck Area in Square Feet
P_S Static Pressure in H2O
NC 18dB Room Attenuation
T Throw in Feet: see Note 6.
ΔT Temperature Differential

Recommended Noise Criteria and Face Velocity Ranges are on page 77

L Series (Page 40-42)

Table 2 - Continuous Grille Length Factors

Modify **Table 1** by listed values for grille lengths above 4 feet.			
Grille Length in Feet	**Throw (T)**		
	Sidewall Min.-Max.	**Sill/Floor Min.-Max.**	**NC**
4-6	No Change		+0
7-20	T x 1.10		+5
21-100	T x 1.15		+10

Table 3 - Supply Air Temperature Factors

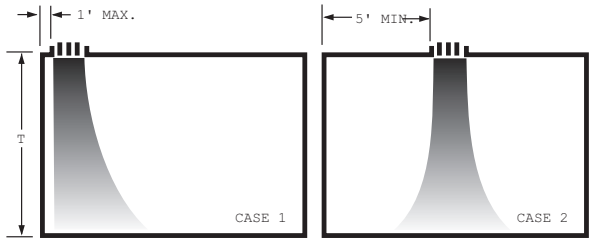
Multiply Throw in **Table 1** (or factor in **Table 2** if used) by listed value.			
Sidewall Sill/Floor	**@-20F T**	**@ 0F T**	**@+25F T**
	T x 1.00	T x 1.10	T x 1.20

Table 4 - Vertical Down-Throw and Supply Air Temperature Factors

Multiply Throw-Sidewall in **Table 1** (or factor in **Table 2** if used) by listed value.			
Case	**@-20F T Cooling**	**@ 0F T Ventilating**	**@+25F T Heating**
Case 1	T x 1.00	T x .90	T x .60
Case 2	T x .70	T x .60	T x .40

Table 5 - Supply Grille Areas (per foot of length)

	Listed Width in Inches																
	1½	**2**	**2½**	**3**	**4**	**5**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**	**24**	**30**	**36**
A_n	.13	.17	.21	.25	.33	.42	.50	.67	.84	1.00	1.20	1.30	1.50	1.70	2.00	2.50	3.00
00 and 15 Bar Styles																	
A_k	.04	.06	.09	.11	.16	.20	.25	.35	.45	.55	.68	.79	.90	1.00	1.30	1.60	2.10
30 and 01 Bar Styles																	
A_k	.03	.05	.08	.09	.14	.17	.21	.30	.38	.47	.58	.67	.77	.85	1.10	1.40	1.80



Return Air CFM per Foot of Length

Listed Width in Inches	A_k Area	Bar Style	NC 20-25 Nonducted		NC 30 Ducted		NC 35-40 Ducted	
			-.02" P_s CFM	-.03" P_s CFM	-.08" P_s CFM	-.10" P_s CFM	-.15" P_s CFM	-.20" P_s CFM
1½	.13	00 and 15	20	25	40	45	55	65
	.12	01 and 30	15	20	35	40	45	55
2	.18	00 and 15	30	40	65	70	90	100
	.17	01 and 30	25	35	55	60	75	85
2½	.23	00 and 15	45	50	85	95	115	135
	.22	01 and 30	35	45	70	80	100	115
3	.27	00 and 15	55	65	105	120	145	165
	.25	01 and 30	45	55	90	100	120	140
4	.34	00 and 15	75	90	150	165	205	235
	.33	01 and 30	60	75	125	140	170	195
5	.41	00 and 15	95	120	190	215	260	305
	.39	01 and 30	80	100	160	180	220	255
6	.46	00 and 15	120	145	240	265	325	375
	.44	01 and 30	100	120	200	220	270	315
8	.57	00 and 15	160	200	325	360	445	515
	.54	01 and 30	135	165	270	305	370	430
10	.68	00 and 15	210	255	415	465	570	655
	.64	01 and 30	175	215	350	390	475	550
12	.76	00 and 15	255	310	510	565	695	800
	.72	01 and 30	210	260	425	475	580	670
16	.93	00 and 15	350	430	700	785	960	1100
	.86	01 and 30	285	350	570	635	780	900
20	1.10	00 and 15	445	545	885	990	1220	1410
	1.00	01 and 30	365	445	730	815	1000	1160
24	1.25	00 and 15	540	660	1080	1210	1475	1710
	1.15	01 and 30	440	540	880	985	1200	1390

Recommended Noise Criteria and Face Velocity Ranges are on page 77

Engineering Data

HART COOLEY

S Series (Page 43-47)

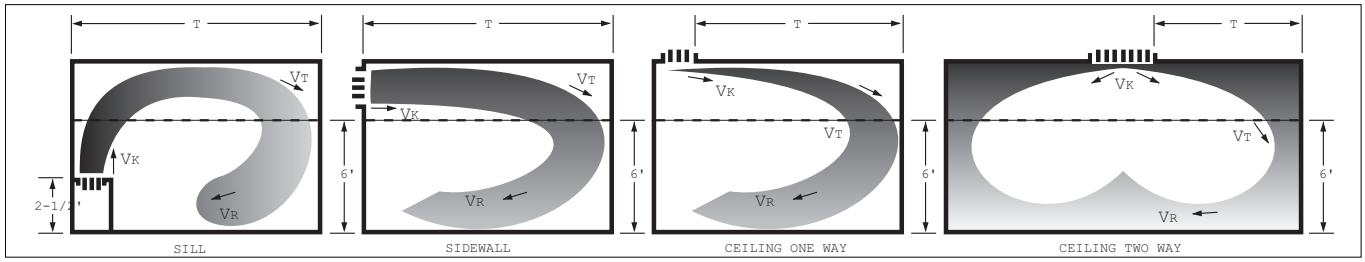


Table 1 - Supply Air

Type 50 (½" Slot)

CFM/Ft of total Slot length	Number of Slots	Min. P_s in H_2O	Outlet Velocity (V_k) FPM	Throw (T) in Feet			Minimum Ceiling Height in Feet		
				Ceiling	Sidewall	Sill			
				Min.-Max.	Min.-Max.	Min.-Max.	@ -18F T	@ -25F T	NC
10	1	.02	500	5-7	3-5	1-2	7½	9	<20
	2	<.01	335	4-6	2-4	1-2			<20
20	1	.08	1000	10-13	8-11	1-3	8	9	20
	2	.02	670	8-11	6-9	2-3			<20
	3	.01	400	6-9	4-7	1-2			<20
30	1	.08	1500	11-16	10-14	4-6	9	10	25
	2	.05	1000	10-14	8-12	3-4			20
	3	.02	600	8-11	6-9	2-3			<20
	4	.01	430	7-9	5-7	1-2			<20
40	2	.08	1330	13-17	11-15	4-6	9	11	25
	3	.04	800	10-14	8-12	3-5			20
	4	.02	570	9-12	7-10	2-3			20
	5	.01	445	8-11	6-9	2-3			<20
50	3	.06	1000	11-15	9-13	4-6	9½	11	25
	4	.03	710	10-14	8-12	3-4			20
	5	.02	560	9-13	7-11	2-4			20
	6	.01	500	8-12	7-10	1-3			<20
60	3	.08	1200	13-17	11-15	5-8	9½	12	25
	4	.05	855	12-16	10-14	4-7			25
	5	.03	670	11-15	9-13	3-6			20
	6	.02	600	10-14	8-12	3-5			<20
	7	.01	500	9-13	7-11	2-4			<20
70	3	.12	1400	15-20	13-18	6-11	10	12	25
	4	.06	1000	13-18	11-16	5-9			25
	5	.04	780	12-16	10-14	4-7			20
	6	.03	700	11-15	9-13	3-6			20
	7	.02	580	10-15	8-13	2-5			20
80	4	.08	1140	14-20	12-18	6-11	10½	12½	25
	5	.05	890	13-19	11-17	5-10			25
	6	.04	800	13-18	11-16	5-9			25
	7	.03	670	13-17	11-15	4-8			20
	8	.02	570	12-16	10-14	3-7			20
90	4	.10	1280	17-24	15-21	8-14	11	13	30
	5	.07	1000	16-22	14-20	7-13			25
	6	.05	900	16-21	14-19	7-12			25
	7	.04	750	15-20	13-18	6-11			25
	8	.03	640	14-18	12-16	5-9			20
	9	.02	600	13-17	11-15	5-8			20
100	5	.09	1120	18-25	16-22	9-15	11	13	25
	6	.06	1000	17-24	15-21	8-14			25
	7	.05	830	16-23	14-20	7-13			25
	8	.03	710	14-20	12-18	6-11			20
	9	.03	670	13-19	11-17	5-10			20
	10	.02	590	12-18	10-16	5-10			<20
120	6	.09	1200	19-27	17-24	10-16	11½	13	30
	7	.07	1000	18-25	16-23	8-15			25
	8	.05	860	17-25	15-22	7-14			25
	9	.04	800	16-24	14-21	6-13			20
	10	.03	705	15-22	13-19	5-11			20
140	7	.10	1170	20-30	18-27	10-19	11½	14	25
	8	.06	1000	19-28	17-25	9-17			25
	9	.05	930	18-27	16-24	8-16			20
	10	.04	825	17-25	15-22	7-14			20
160	8	.08	1140	21-32	19-29	10-20	12	15	25
	9	.07	1070	20-30	18-27	9-18			25
	10	.05	940	19-28	17-25	8-17			20
180	8	.10	1280	24-35	21-31	12-22	12	15	30
	9	.08	1200	23-34	20-30	11-21			25
	10	.07	1060	22-32	19-29	10-20			25
200	9	.10	1335	25-39	22-35	-	12	15	30
	10	.08	1175	24-37	21-33	-			25

Outlet Velocity (V_k) FPM										
500	600	700	800	900	1000	1200	1400	1600	1800	2000
Total Pressure (P_t) inches H_2O										
.02	.02	.03	.04	.05	.06	.09	.12	.16	.20	.25

Symbols:

V_t Terminal Velocity in FPM
V_r Room Velocity in FPM
V_k Face Velocity in FPM
A_k Outlet Area in Square Feet
A_n Neck Area in Square Feet
P_s Static Pressure in H2O
NC 18dB Room Attenuation
T Throw in Feet: see Note 6.
ΔT Temperature Differential

Recommended Noise Criteria and Face Velocity Ranges are on page 77

S Series (Page 43-47)

Table 1 - Supply Air

Type 75 (¾" Slot)

CFM per Foot	Number of Slots	Min. P_s in H_2O	Outlet Velocity (V_k) FPM	Throw (T) in Feet			Minimum Ceiling Height in Feet		NC
				Ceiling	Sidewall	Sill			
				Min.-Max.	Min.-Max.	Min.-Max.	@ -18F T	@ -25F T	
10	1	.01	335	4-6	2-4	1-2	7½	9	<20
20	1	.04	670	8-11	6-9	2-3	8	9	20
	2	<.01	400	6-9	4-7	1-2			<20
30	1	.09	1000	10-14	8-12	3-4	9	10	25
	2	.02	600	8-11	6-9	2-3			20
	3	<.01	430	7-9	5-7	1-2			<20
40	1	.16	1340	13-17	11-15	4-6	9	11	30
	2	.04	800	10-14	8-12	3-4			25
	3	.02	575	9-12	7-10	2-3			20
	4	.01	445	8-11	6-9	2-3			<20
50	2	.06	1000	11-15	9-13	4-6	9½	11	25
	3	.03	715	10-14	8-12	3-4			20
	4	.02	555	9-13	7-11	2-4			<20
	5	<.01	415	7-12	6-10	2-3			<20
60	2	.09	1200	13-17	11-15	5-8	9½	12	30
	3	.04	860	12-16	10-14	4-7			25
	4	.02	665	11-15	9-13	3-6			20
	5	.01	500	9-13	7-11	3-4			<20
70	2	.13	1400	15-20	13-18	6-11	10	12	30
	3	.06	1000	13-18	11-16	5-9			25
	4	.03	775	12-16	10-14	4-7			20
	5	.02	585	10-15	8-13	3-5			<20
	6	.01	500	9-14	7-12	2-5			<20
80	3	.07	1140	14-20	12-18	6-11	10½	12½	30
	4	.04	885	13-19	11-17	5-10			25
	5	.03	665	13-17	11-15	4-8			20
	6	.02	575	12-16	10-14	3-7			<20
	7	<.01	500	11-15	9-13	3-6			<20
90	3	.09	1290	17-24	15-21	8-14	11	13	30
	4	.05	1000	16-22	14-20	7-13			25
	5	.03	750	15-20	13-18	6-11			20
	6	.02	645	14-18	12-16	5-9			20
	7	.01	560	13-17	11-15	4-8			<20
100	3	.13	1430	19-26	17-23	10-16	11	13	35
	4	.06	1110	18-25	16-22	9-15			30
	5	.04	830	16-23	14-20	7-13			25
	6	.03	715	14-20	12-18	6-11			20
	7	.02	630	13-19	11-17	5-10			<20
120	4	.09	1330	19-27	17-24	10-16	11½	13	30
	5	.06	1000	18-26	16-23	8-15			25
	6	.04	860	17-25	15-22	7-14			20
	7	.03	750	16-23	14-20	6-12			20
	8	.02	630	15-20	13-18	5-10			<20
140	5	.08	1170	20-30	18-27	10-19	11½	14	30
	6	.06	1000	19-28	17-25	9-17			25
	7	.04	875	18-26	16-23	8-15			25
	8	.03	740	16-24	14-21	6-13			20
	9	.02	665	15-21	13-19	5-11			<20
160	6	.07	1150	21-32	19-29	10-20	12	15	25
	7	.05	1000	20-30	18-27	9-18			25
	8	.04	840	18-27	16-24	8-16			20
	9	.03	760	17-26	15-23	6-14			<20
	10	.02	695	16-25	14-22	5-13			<20
180	6	.09	1290	24-35	21-31	12-22	12	15	30
	7	.07	1130	23-34	20-30	11-21			30
	8	.05	950	20-31	18-28	9-19			25
	9	.04	860	19-30	17-27	8-18			20
	10	.03	780	18-29	16-26	7-17			<20
200	6	.11	1440	26-40	23-36	-	12	15	30
	7	.08	1250	25-38	22-34	-			30
	8	.06	1110	24-36	21-32	-			25
	9	.05	955	22-33	20-30	-			25
	10	.04	870	21-31	19-28	-			20
250	8	.10	1315	26-46	23-41	-	13	15	35
	9	.07	1190	25-42	22-38	-			30
	10	.06	1085	24-39	21-35	-			25

Recommended Noise Criteria and Face Velocity Ranges are on page 77

HART COOLEY

S Series (Page 43-47)

Table 1 - Supply Air

Type 10 (1" Slot)

CFM per Foot	Number of Slots	Min. P_s in H_2O	Outlet Velocity (V_k) FPM	Throw (T) in Feet			Minimum Ceiling Height in Feet		NC
				Ceiling	Sidewall	Sill			
				Min.-Max.	Min.-Max.	Min.-Max.	@ -18F T	@ -25F T	
20	1	.02	500	6-8	4-7	1-2	8	9	20
30	1	.03	750	9-13	7-10	2-3	9	10	20
	2	.02	500	7-9	5-7	1-2			20
40	1	.06	1000	10-14	9-14	4-6	9	11	25
	2	.03	670	8-10	6-9	2-3			20
50	1	.09	1250	12-15	10-14	3-5	9½	11	30
	2	.04	835	10-14	8-12	3-4			20
	3	.02	555	9-11	7-10	2-3			20
60	2	.06	1000	13-15	9-13	4-6	9½	12	30
	3	.03	665	10-13	7-11	2-4			20
	4	.02	500	8-11	6-9	2-3			20
70	2	.09	1165	13-17	11-15	5-8	10	12	30
	3	.04	780	11-16	9-14	4-6			25
	4	.02	585	10-14	7-11	3-4			20
80	2	.11	1335	15-19	14-17	6-10	10½	12½	35
	3	.05	890	12-17	10-14	4-7			25
	4	.03	665	10-14	8-12	3-5			20
	5	.02	533	9-13	7-11	2-4			20
90	3	.06	1000	14-19	11-17	5-10	11	13	30
	4	.04	750	13-18	11-15	4-8			20
	5	.02	600	12-16	10-14	3-7			20
	6	.02	500	11-15	9-13	3-6			20
100	3	.08	1110	16-21	14-20	7-12	11	13	30
	4	.04	835	15-20	13-28	6-11			25
	5	.03	665	14-18	12-16	5-9			20
	6	.02	555	13-17	11-15	4-8			20
120	3	.11	1335	18-25	16-22	8-13	11½	13	35
	4	.06	1000	17-24	15-20	7-13			30
	5	.04	800	16-23	14-21	6-12			25
	6	.03	665	15-21	13-19	5-11			20
	7	.02	570	14-20	12-17	4-10			20
140	4	.09	1165	18-25	16-21	8-15	11½	14	30
	5	.05	935	18-26	16-22	8-14			30
	6	.04	780	17-25	15-22	7-14			25
	7	.03	665	16-23	14-20	6-12			20
	8	.02	585	15-20	13-20	5-10			20
160	4	.11	1335	19-27	17-24	10-16	12	15	35
	5	.07	1065	18-26	16-23	8-15			30
	6	.05	890	17-25	15-22	7-14			25
	7	.04	760	16-23	14-20	6-12			25
	8	.03	665	15-20	13-18	5-10			20
	9	.02	590	14-19	12-17	4-9			20
180	5	.09	1200	20-30	18-27	10-19	12	15	35
	6	.06	1000	19-28	17-25	9-17			30
	7	.05	850	18-26	16-23	8-15			25
	8	.04	750	16-24	14-21	6-13			20
	9	.03	665	15-21	13-19	5-11			20
	10	.02	600	14-19	12-18	4-10			20
200	5	.11	1335	23-33	20-30	12-21	12	15	35
	6	.08	1110	21-32	19-29	10-20			30
	7	.06	950	20-31	18-27	9-18			30
	8	.04	835	18-27	16-24	8-16			25
	9	.03	740	17-26	15-23	6-14			20
	10	.03	665	16-25	14-22	5-10			20
250	6	.12	1390	24-35	21-31	-	13	15	35
	7	.09	1190	23-34	20-30	-			35
	8	.07	1040	21-32	19-28	-			30
	9	.05	925	20-31	18-27	-			25
	10	.04	833	19-30	17-26	-			25
300	7	.13	1430	25-40	23-35	-	13	16	35
	8	.10	1250	24-36	22-32	-			35
	9	.08	1110	23-34	20-30	-			30
	10	.06	1000	22-32	19-28	-			30
350	8	.13	1460	27-47	24-43	-	14	16	40
	9	.11	1300	26-45	23-41	-			35
	10	.09	1165	25-42	22-39	-			30

Recommended Noise Criteria and Face Velocity Ranges are on page 77

S Series (Page 43-47)

NOTES:

1. Table 1 based on 4-foot diffuser length. For longer lengths, correct throw and NC per Table 2.
2. For 2-way ceiling throw, proportion cfm and number of slots in each direction of T and select from 1-way data, Table 1.
3. When using continuous diffuser lengths with alternate active and inactive sections, a reduction in throw can be obtained by omitting the factors contained in Table 2.
4. P_S constant for horizontal 1-way, 2-way and vertical pattern adjustment.
5. Supply air temperature effect on horizontal throw is shown in Table 3. Vertical throw at varying supply air temperatures is shown in Table 4.
6. Terminal velocities (Vt) at the minimum and maximum throw (T) positions are rated at 150 FPM and 100 FPM respectively with corresponding room velocities (Vr) of 50 FPM and 35 FPM.

Table 2 - Continuous Diffuser Length Factors

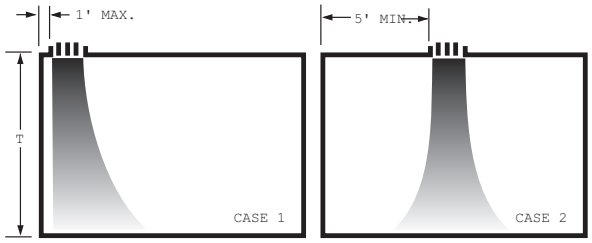
Modify **Table 1** by listed values for diffuser lengths above 4 feet.				
Diffuser Length in Feet	**Throw (T)**			
	Ceiling Min.-Max.	**Sidewall Min.-Max.**	**Sill Min.-Max.**	**NC**
4-6	No change			+ 0
7-20	T x 1.10			+ 5
21-100	T x 1.15			+ 10

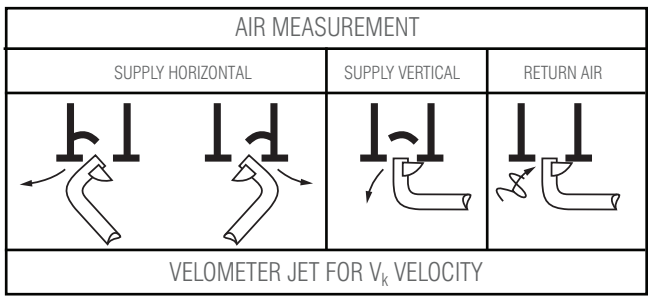
Table 3 - Supply Air Temperature Factors

Multiply Throw in **Table 1** (or factor in **Table 2** if used) by listed value.			
Ceiling Sidewall Sill	**@-20F T**	**@ 0F T**	**@+25F T**
	T x 1.00	T x 1.10	T x 1.20

Table 4 - Vertical Down-Throw and Supply Air Temperature Factors

Multiply Throw-Sidewall in **Table 1** (or factor in **Table 2** if used) by listed value.			
Case	**@-20F T Cooling**	**@ 0F T Ventilating**	**@+25F T Heating**
Case 1	T x 1.00	T x .90	T x .60
Case 2	T x .70	T x .60	T x .40





Type 50 Supply Diffuser Areas per Foot of Length

	No. of Slots									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
A_k Area	.02	.03	.05	.07	.09	.10	.12	.14	.15	.17
A_n Area	.08	.17	.25	.33	.42	.50	.58	.67	.75	.84

Type 75 Supply Diffuser Areas per Foot of Length

	No. of Slots									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
A_k Area	.03	.05	.07	.09	.12	.14	.16	.19	.21	.23
A_n Area	.12	.24	.36	.48	.60	.72	.84	.96	1.10	1.20

Type 10 Supply Diffuser Areas per Foot of Length

	No. of Slots									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
A_k Area	.04	.06	.09	.12	.15	.18	.21	.24	.27	.30
A_n Area	.17	.33	.50	.67	.83	1.00	1.17	1.33	1.50	1.67

A_k constant for horizontal 1-way, 2-way, and vertical pattern.
CFM = A_k x length in feet x V_k

Type 50 Return Air CFM per Foot of Length*

No. of Slots	**A_k Area**	**NC 20-25 Application Nonducted**		**NC 30 Application Ducted**		**NC 35-40 Application Ducted**	
		-.02" P_s CFM	**-.03" P_s CFM**	**-.08" P_s CFM**	**-.10" P_s CFM**	**-.15" P_s CFM**	**-.20" P_s CFM**
1	.03	15	20	30	35	40	45
2	.06	35	45	70	80	95	110
3	.08	55	70	110	125	150	175
4	.11	70	85	140	155	190	220
5	.14	90	110	180	200	245	285
6	.16	110	135	220	245	300	345
7	.20	130	160	260	290	355	410
8	.22	140	170	280	310	385	440
9	.25	165	200	330	370	450	520
10	.28	185	225	370	415	505	585

Type 75 Return Air CFM per Foot of Length*

No. of Slots	**A_k Area**	**NC 20-25 Application Nonducted**		**NC 30 Application Ducted**		**NC 35-40 Application Ducted**	
		-.02" P_s CFM	**-.03" P_s CFM**	**-.08" P_s CFM**	**-.10" P_s CFM**	**-.15" P_s CFM**	**-.20" P_s CFM**
1	.04	25	35	50	65	75	90
2	.08	50	60	100	110	135	160
3	.12	80	100	160	180	220	250
4	.16	100	120	200	225	275	320
5	.20	130	160	260	295	360	420
6	.24	160	195	320	360	440	510
7	.28	175	215	350	390	475	550
8	.32	200	245	400	445	545	630
9	.36	235	290	470	525	640	740
10	.40	260	320	520	580	710	820

Type 10 Return Air CFM per Foot of Length*

No. of Slots	**A_k Area**	**NC 20-25 Application Nonducted**		**NC 30 Application Ducted**		**NC 35-40 Application Ducted**	
		-.02" P_s CFM	**-.03" P_s CFM**	**-.08" P_s CFM**	**-.10" P_s CFM**	**-.15" P_s CFM**	**-.20" P_s CFM**
1	.06	35	43	70	80	95	110
2	.11	70	85	140	155	190	220
3	.17	105	130	210	235	285	330
4	.23	140	170	280	310	380	440
5	.28	175	215	350	390	475	550
6	.33	210	255	420	465	570	660
7	.39	245	300	490	545	665	770
8	.44	280	340	560	620	760	880
9	.50	315	385	630	700	855	990
10	.55	350	425	700	775	950	1100

* Capacity based on diffuser without pattern controller. When pattern controller is used, CFM capacities are reduced by 65% at listed P_s, NC, and A_k.

Recommended Noise Criteria and Face Velocity Ranges are on page 77

DL Drum Louver (Page 48)

6-Inch

Size (H x W)	A_k Area	Neck Area (Ft^2)	Outlet* Velocity	800	1000	1200	1400	1600	1800	2100
			Static Pressure	.007	.010	.015	.025	.030	.040	.052
			Total Pressure	.039	.065	.100	.147	.194	.254	.330
6 x 9	.16	.375	CFM	128	160	192	224	256	228	336
			Throw	6-7-13	8-11-14	10-14-23	12-17-26	4-19-29	16-21-32	17-23-35
6 x 12	.21	.500	CFM	168	210	252	294	336	378	441
			Throw	8-10-18	10-15-24	12-17-27	14-18-30	15-20-33	17-22-37	18-23-41
6 x 18	.32	.750	CFM	256	320	384	448	512	576	672
			Throw	10-14-23	13-18-30	15-20-34	18-23-38	20-26-43	23-30-48	25-32-52
6 x 24	.41	1.000	CFM	328	410	492	574	656	738	861
			Throw	12-17-28	16-21-35	19-25-40	22-29-45	24-33-51	27-36-56	30-38-61
6 x 30	.52	1.250	CFM	416	520	624	728	832	936	1092
			Throw	15-20-33	18-24-39	22-28-44	25-32-50	27-37-56	30-40-61	33-43-66
6 x 36	.62	1.500	CFM	496	620	744	868	992	1116	1302
			Throw	17-23-37	20-26-43	24-30-47	28-35-54	31-40-60	34-44-65	37-46-72
6 x 48	.83	2.000	CFM	664	830	996	1162	1328	1494	1743
			Throw	20-26-41	23-29-47	26-35-55	32-41-62	36-45-66	40-49-72	44-53-78
6 x 60	1.05	2.500	CFM	840	1000	1260	1470	1680	1890	2205
			Throw	22-29-45	25-32-52	29-39-61	36-46-70	41-50-79	46-54-86	49-59-96

Data based on 8dB room atenuation

10-Inch

Size (H x W)	A_k Area	Neck Area (Ft^2)	Outlet* Velocity	800	1000	1200	1400	1600	1800	2100
			Static Pressure	.007	.010	.015	.025	.030	.040	.052
			Total Pressure	.039	.065	.100	.147	.194	.254	.330
10 x 10	.60	1.390	CFM	480	600	720	840	960	1080	1260
			Throw	19-23-33	23-27-40	26-31-46	29-35-53	32-39-58	35-42-64	38-46-69
10 x 25	.75	1.740	CFM	600	750	900	1050	1200	1350	1575
			Throw	21-24-38	25-29-46	28-34-53	32-38-60	35-42-66	38-46-73	41-50-79
10 x 30	.90	1.080	CFM	720	900	1080	1260	1440	1620	1890
			Throw	22-25-41	27-31-51	31-36-58	35-41-66	39-46-74	42-50-81	46-54-88
10 x 35	1.05	2.440	CFM	840	1050	1260	1470	1680	1890	2205
			Throw	22-27-43	27-33-53	32-39-62	37-45-71	41-50-81	45-54-89	49-59-98
10 x 40	1.20	2.780	CFM	960	1200	1440	1680	1920	2160	2520
			Throw	23-28-47	28-34-58	34-41-59	39-48-79	44-59-88	48-59-96	53-65-105
10 x 50	1.50	3.470	CFM	1200	1500	1800	2100	2400	2700	3150
			Throw	25-31-52	31-39-63	37-46-74	44-53-82	48-59-91	54-65-100	60-72-110
10 x 60	1.85	4.170	CFM	1480	1850	2220	2590	2960	3330	3885
			Throw	25-33-59	33-42-73	40-50-84	47-58-95	54-55-108	61-74-118	68-81-128
10 x 70	2.15	4.860	CFM	1720	2150	2580	3010	3440	3870	4515
			Throw	28-36-62	35-46-78	43-54-93	50-63-108	58-71-123	65-79-135	72-87-147

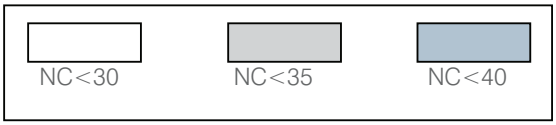
Data based on 8dB room atenuation

*Outlet velocity and Ak based on 15° deflection

Throw data is based on Terminal Velocities of 150 FPM, 100 FPM, and 50 FPM respectively.

THROW-NC-TOTAL PRESSURE are based on 15° blade deflection. For 0° or 30° deflection the following correction factors should be applied to the table values.

	Throw	Total Pressure	NC
0°	1.2	0.795	-4
30°	0.8	1.430	+5



Recommended Noise Criteria and Face Velocity Ranges are on page 77

DL Drum Louver (Page 48)

12-Inch

Size (H x W)	A_k Area	Neck Area (Ft^2)	Outlet* Velocity	800	1000	1200	1400	1600	1800	2100
			Static Pressure	.007	.010	.015	.025	.030	.040	.052
			Total Pressure	.039	.065	.100	.147	.194	.254	.330
12 x 20	.70	1.670	CFM	560	700	840	980	1120	1260	1470
			Throw	10-20-35	18-25-43	23-31-51	26-35-58	29-39-64	33-44-71	36-49-78
12 x 30	1.05	2.500	CFM	840	1050	1260	1470	1680	1890	2205
			Throw	17-25-42	24-32-53	28-38-63	33-43-72	38-49-81	43-55-90	48-60-99
12 x 40	1.40	3.330	CFM	1120	1400	1680	1960	2240	2520	2940
			Throw	20-28-49	27-36-62	32-43-74	38-50-86	44-57-97	49-64-107	55-61-120
12 x 50	1.75	4.160	CFM	1400	1750	2100	2450	2800	3150	3675
			Throw	22-29-56	29-39-71	37-48-85	44-56-99	51-64-117	58-73-127	64-81-138
12 x 60	2.15	5.000	CFM	1720	2150	2580	3010	3440	3870	4515
			Throw	25-33-61	33-44-78	42-53-94	49-63-110	58-74-125	66-83-140	75-92-155
12 x 70	2.50	5.830	CFM	2000	2500	3000	3500	4000	4500	5250
			Throw	28-37-68	37-49-87	47-61-107	57-73-125	67-86-142	76-97-160	86-110-180

Data based on 8dB room atenuation

15-Inch

Size (H x W)	A_k Area	Neck Area (Ft^2)	Outlet* Velocity	800	1000	1200	1400	1600	1800	2100
			Static Pressure	.007	.010	.015	.025	.030	.040	.052
			Total Pressure	.039	.065	.100	.147	.194	.254	.330
15 x 15	.75	1.560	CFM	600	750	900	1050	1200	1350	1575
			Throw	3-10-28	9-18-36	14-24-36	21-27-50	24-30-56	25-32-58	29-38-69
15 x 20	1.00	2.080	CFM	800	1000	1200	1400	1600	1800	2100
			Throw	9-17-35	17-24-43	22-28-52	25-32-60	29-37-68	31-40-72	35-44-80
15 x 25	1.25	2.600	CFM	1000	1250	1500	1750	2000	2250	2625
			Throw	13-21-38	21-26-48	25-32-58	29-38-68	34-43-77	38-48-86	42-54-95
15 x 30	1.55	3.120	CFM	1240	1550	1860	2170	2480	2790	3255
			Throw	14-23-42	22-28-54	27-35-65	32-41-76	37-47-86	41-54-97	46-59-107
15 x 40	2.05	4.170	CFM	1640	2050	2460	2870	3280	3690	4305
			Throw	19-25-48	27-35-66	35-43-79	39-50-93	45-58-105	51-65-118	57-72-130
15 x 50	2.55	5.210	CFM	2040	2550	3060	3570	4080	4590	5355
			Throw	24-30-61	31-40-78	38-48-96	45-58-114	52-66-130	58-75-145	65-83-163
15 x 60	3.00	6.250	CFM	2400	3000	3600	4200	4800	5400	6300
			Throw	27-34-68	35-46-88	43-58-106	52-68-125	60-79-143	68-89-160	76-100-176
15 x 70	3.50	7.300	CFM	2800	3500	4200	4900	5600	6300	7350
			Throw	29-38-72	40-51-95	50-64-118	60-76-140	71-89-160	81-101-184	90-112-195

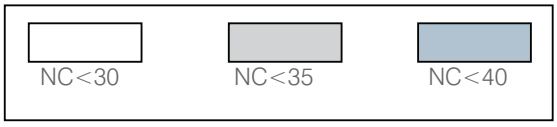
Data based on 8dB room atenuation

*Outlet velocity and Ak based on 15° deflection

Throw data is based on Terminal Velocities of 150 FPM, 100 FPM, and 50 FPM respectively.

THROW-NC-TOTAL PRESSURE are based on 15° blade deflection. For 0° or 30° deflection the following correction factors should be applied to the table values.

	Throw	Total Pressure	NC
0°	1.2	0.795	-4
30°	0.8	1.430	+5



Recommended Noise Criteria and Face Velocity Ranges are on page 77

HART COOLEY

Stationary Louvers

1530ZC, 1530ZF (Page 50)

Free Area in Square Feet

HEIGHT \ WIDTH	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96
12	0.37	0.58	0.80	0.98	1.19	1.41	1.62	1.80	2.02	2.23	2.45	2.63	2.84	3.06	3.27
18	0.60	0.96	1.31	1.60	1.96	2.31	2.66	2.95	3.31	3.66	4.01	4.31	4.66	5.01	5.37
24	0.84	1.33	1.82	2.23	2.72	3.21	3.70	4.11	4.60	5.09	5.58	5.99	6.48	6.97	7.46
30	1.07	1.70	2.33	2.85	3.48	4.11	4.73	5.26	5.89	6.51	7.14	7.66	8.29	8.92	9.55
36	1.31	2.07	2.84	3.48	4.24	5.01	5.77	6.41	7.18	7.94	8.71	9.34	10.11	10.87	11.64
42	1.54	2.45	3.35	4.10	5.00	5.91	6.81	7.56	8.46	9.37	10.27	11.02	11.92	12.83	13.73
48	1.78	2.82	3.86	4.72	5.77	6.81	7.85	8.71	9.75	10.79	11.83	12.70	13.74	14.78	15.82
54	2.01	3.19	4.37	5.35	6.53	7.70	8.88	9.86	11.04	12.22	13.40	14.38	15.56	16.74	17.91
60	2.25	3.56	4.88	5.97	7.29	8.60	9.92	11.02	12.33	13.65	14.96	16.06	17.37	18.69	20.00
66	2.48	3.93	5.39	6.60	8.05	9.50	10.96	12.17	13.62	15.07	16.53	17.74	19.19	20.64	22.10
72	2.72	4.31	5.90	7.22	8.81	10.40	11.99	13.32	14.91	16.50	18.09	19.42	21.01	22.60	24.19
78	2.95	4.68	6.41	7.85	9.58	11.30	13.03	14.47	16.20	17.93	19.65	21.09	22.82	24.55	26.28
84	3.19	5.05	6.92	8.47	10.34	12.20	14.07	15.62	17.49	19.35	21.22	22.77	24.64	26.50	28.37
90	3.42	5.42	7.43	9.10	11.10	13.10	15.10	16.77	18.78	20.78	22.78	24.45	26.45	28.46	30.46

245ZC, 245ZF (Page 51)

Free Area in Square Feet

HEIGHT \ WIDTH	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96
12	0.26	0.41	0.56	0.71	0.86	1.01	1.16	1.31	1.46	1.61	1.76	1.91	2.06	2.21	2.36
18	0.45	0.71	0.96	1.22	1.48	1.73	1.99	2.25	2.50	2.76	3.02	3.27	3.53	3.79	4.05
24	0.76	1.20	1.63	2.07	2.50	2.94	3.37	3.81	4.24	4.68	5.11	5.55	5.98	6.42	6.86
30	0.95	1.49	2.03	2.57	3.12	3.66	4.20	4.74	5.29	5.83	6.37	6.91	7.45	8.00	8.54
36	1.14	1.78	2.43	3.08	3.73	4.38	5.03	5.68	6.33	6.98	7.62	8.27	8.92	9.57	10.22
42	1.32	2.08	2.83	3.59	4.35	5.10	5.86	6.61	7.37	8.12	8.88	9.64	10.39	11.15	11.90
48	1.51	2.37	3.23	4.10	4.96	5.82	6.69	7.55	8.41	9.27	10.14	11.00	11.86	12.72	13.59
54	1.70	2.67	3.64	4.60	5.57	6.54	7.51	8.48	9.45	10.42	11.39	12.36	13.33	14.30	15.27
60	1.88	2.96	4.04	5.11	6.19	7.26	8.34	9.42	10.49	11.57	12.65	13.72	14.80	15.87	16.95
66	2.20	3.45	4.71	5.96	7.21	8.47	9.72	10.98	12.23	13.49	14.74	16.00	17.25	18.51	19.76
72	2.38	3.74	5.11	6.47	7.83	9.19	10.55	11.91	13.27	14.64	16.00	17.36	18.72	20.08	21.44
78	2.57	4.04	5.51	6.97	8.44	9.91	11.38	12.85	14.32	15.78	17.25	18.72	20.19	21.66	23.13
84	2.76	4.33	5.91	7.48	9.06	10.63	12.21	13.78	15.36	16.93	18.51	20.08	21.66	23.23	24.81
90	2.94	4.63	6.31	7.99	9.67	11.35	13.04	14.72	16.40	18.08	19.76	21.45	23.13	24.81	26.49

1545ZC, 1545ZF (Page 50)

Free Area in Square Feet

HEIGHT \ WIDTH	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96
12	0.30	0.47	0.64	0.79	0.96	1.14	1.31	1.45	1.63	1.80	1.97	2.12	2.29	2.47	2.64
18	0.50	0.79	1.08	1.32	1.61	1.90	2.20	2.44	2.73	3.02	3.31	3.55	3.85	4.14	4.43
24	0.70	1.11	1.52	1.86	2.26	2.67	3.08	3.42	3.83	4.24	4.65	4.99	5.40	5.81	6.21
30	0.90	1.42	1.95	2.39	2.92	3.44	3.97	4.41	4.93	5.46	5.98	6.42	6.95	7.48	8.00
36	1.10	1.74	2.39	2.92	3.57	4.21	4.85	5.39	6.03	6.68	7.32	7.86	8.50	9.14	9.79
42	1.30	2.06	2.82	3.46	4.22	4.98	5.74	6.37	7.14	7.90	8.66	9.29	10.05	10.81	11.58
48	1.50	2.38	3.26	3.99	4.87	5.75	6.63	7.36	8.24	9.12	9.99	10.73	11.61	12.48	13.36
54	1.70	2.70	3.69	4.52	5.52	6.52	7.51	8.34	9.34	10.33	11.33	12.16	13.16	14.15	15.15
60	1.90	3.02	4.13	5.06	6.17	7.28	8.40	9.33	10.44	11.55	12.67	13.60	14.71	15.82	16.94
66	2.10	3.33	4.57	5.59	6.82	8.05	9.28	10.31	11.54	12.77	14.00	15.03	16.26	17.49	18.72
72	2.30	3.65	5.00	6.13	7.47	8.82	10.17	11.29	12.64	13.99	15.34	16.46	17.81	19.16	20.51
78	2.50	3.97	5.44	6.66	8.12	9.59	11.06	12.28	13.74	15.21	16.68	17.90	19.37	20.83	22.30
84	2.71	4.29	5.87	7.19	8.78	10.36	11.94	13.26	14.85	16.43	18.01	19.33	20.92	22.50	24.08
90	2.91	4.61	6.31	7.73	9.43	11.13	12.83	14.25	15.95	17.65	19.35	20.77	22.47	24.17	25.87

445ZC, 445ZF (Page 51)

Free Area in Square Feet

HEIGHT \ WIDTH	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96
12	0.33	0.53	0.73	0.93	1.13	1.34	1.54	1.74	1.94	2.07	2.28	2.48	2.68	2.88	3.08
18	0.55	0.89	1.22	1.56	1.90	2.23	2.57	2.91	3.25	3.47	3.81	4.25	4.48	4.82	5.16
24	0.82	1.32	1.82	2.32	2.82	3.32	3.82	4.32	4.83	5.16	5.66	6.16	6.66	7.16	7.67
30	1.04	1.67	2.31	2.95	3.58	4.22	4.86	5.49	6.13	6.56	7.19	7.83	8.47	9.10	9.74
36	1.30	2.10	2.90	3.71	4.51	5.31	6.11	6.91	7.71	8.24	9.05	9.85	10.65	11.45	12.25
42	1.52	2.46	3.40	4.33	5.27	6.21	7.14	8.08	9.02	9.64	10.58	11.51	12.45	13.39	14.32
48	1.79	2.89	3.99	5.09	6.19	7.29	8.39	9.49	10.60	11.33	12.43	13.53	14.63	15.73	16.83
54	2.01	3.25	4.48	5.72	6.96	8.19	9.43	10.66	11.90	12.73	13.96	15.20	16.45	17.67	18.91
60	2.28	3.68	5.08	6.48	7.88	9.28	10.68	12.08	13.48	14.41	15.81	17.22	18.62	20.02	21.42
66	2.50	4.03	5.57	7.10	8.64	10.18	11.71	13.25	14.79	15.81	17.35	18.88	20.42	21.95	23.49
72	2.76	4.46	6.16	7.86	9.56	11.26	12.97	14.67	16.37	17.50	19.20	20.99	22.60	24.30	26.00
78	2.98	4.82	6.66	8.49	10.33	12.16	14.00	15.84	17.67	18.90	20.73	22.57	24.40	26.24	28.07
84	3.25	5.25	7.25	9.25	11.25	13.25	15.25	17.25	19.25	20.58	22.58	24.48	26.58	28.58	30.58
90	3.47	5.61	7.74	9.88	12.01	14.15	16.28	18.42	20.56	21.98	24.12	26.25	28.39	30.52	32.66

Adjustable Louvers

4ABC (Page 50)

Free Area in Square Feet

HEIGHT \ WIDTH	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96
12	0.24	0.38	0.53	0.67	0.82	0.96	1.11	1.25	1.40	1.54	1.68	1.83	1.97	2.12	2.26
18	0.42	0.68	0.93	1.19	1.45	1.17	1.96	2.22	2.48	2.73	2.99	3.25	3.51	3.76	4.02
24	0.55	0.88	1.22	1.55	1.88	2.22	2.55	2.89	3.22	3.56	3.89	4.23	4.56	4.89	5.23
30	0.76	1.23	1.69	2.16	2.62	3.09	3.55	4.02	4.48	4.95	5.41	5.88	6.34	6.81	7.27
36	0.93	1.49	2.06	2.62	3.19	3.76	4.32	4.89	5.45	6.02	6.58	7.15	7.72	8.28	8.85
42	1.11	1.79	2.47	3.15	3.83	4.51	5.19	5.87	6.55	7.23	7.91	8.59	9.27	9.95	10.63
48	1.30	2.09	2.88	3.67	4.46	5.26	6.05	6.84	7.63	8.42	9.22	10.01	10.80	11.59	12.38
54	1.42	2.29	3.16	4.03	4.90	5.77	6.64	7.51	8.38	9.25	10.11	10.98	11.85	12.73	13.59
60	1.64	2.64	3.64	4.64	5.64	6.64	7.64	8.64	9.64	10.64	11.64	12.64	13.64	14.64	15.64
66	1.80	2.90	4.00	5.10	6.20	7.30	8.40	9.51	10.61	11.71	12.81	13.91	15.01	16.11	17.21
72	1.99	3.20	4.42	5.63	6.84	8.06	9.27	10.49	11.70	12.92	14.15	15.34	16.56	17.77	18.99
78	2.17	3.50	4.82	6.15	7.48	8.80	10.13	11.46	12.78	14.11	15.44	16.76	18.09	19.42	20.74
84	2.30	3.70	5.11	6.51	7.91	9.32	10.72	12.13	13.53	14.93	16.34	17.74	19.14	20.55	21.95
90	2.51	4.05	5.58	7.12	8.65	10.19	11.72	13.25	14.79	16.32	17.86	19.39	20.93	22.46	24.00
96	2.68	4.31	5.95	7.58	9.22	10.85	12.49	14.12	15.76	17.39	19.03	20.67	22.30	23.94	25.57

645ZC, 6545ZF (Page 51)

Free Area in Square Feet

HEIGHT \ WIDTH	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96
12	0.13	0.21	0.29	0.37	0.45	0.53	0.61	0.69	0.76	0.84	0.92	1.00	1.08	1.16	1.24
18	0.39	0.63	0.86	1.10	1.33	1.57	1.80	2.04	2.27	2.51	2.74	2.98	3.22	3.45	3.96
24	0.65	1.04	1.44	1.83	2.22	2.61	3.00	3.39	3.78	4.18	4.57	4.96	5.35	5.74	6.13
30	0.91	1.46	2.01	2.56	3.10	3.65	4.20	4.75	5.29	5.84	6.39	6.94	7.48	8.03	8.58
36	1.17	1.88	2.58	3.28	3.99	4.69	5.40	6.10	6.80	7.51	8.21	8.91	9.62	10.32	11.03
42	1.43	2.29	3.15	4.01	4.87	5.73	6.59	7.45	8.31	9.17	10.03	10.89	11.75	12.61	13.47
48	1.69	2.71	3.73	4.74	5.76	6.77	7.79	8.81	9.82	10.84	11.85	12.87	13.89	14.90	15.92
54	1.95	3.13	4.30	5.47	6.64	7.82	8.99	10.16	11.33	12.50	13.68	14.85	16.02	17.19	18.37
60	2.21	3.53	4.87	6.20	7.53	8.86	10.18	11.51	12.84	14.17	15.50	16.83	18.16	19.48	20.81
66	2.47	3.96	5.44	6.93	8.41	9.90	11.38	12.87	14.35	15.84	17.32	18.80	20.29	21.77	23.26
72	2.73	4.38	6.02	7.66	9.30	10.94	12.58	14.22	15.86	17.50	19.14	20.78	22.42	24.06	25.71
78	2.99	4.79	6.59	8.39	10.18	11.98	13.78	15.57	17.37	19.17	20.96	22.76	24.56	26.35	28.15
84	3.26	5.21	7.16	9.11	11.07	13.02	14.97	16.93	18.88	20.83	22.79	24.74	26.69	28.65	30.60
90	3.52	5.62	7.73	9.84	11.95	14.06	16.17	18.26	20.39	22.50	24.61	26.72	28.83	30.94	33.04
96	3.78	6.04	8.31	10.57	12.84	15.10	17.37	19.63	21.90	25.16	26.43	28.70	30.96	33.23	35.49

Recommended Velocity:
Exhaust: 400-500 fpm
Intake: 300-400 fpm
CFM=Free area (ft^2) x Velocity (FPM)

Recommended Noise Criteria and Face Velocity Ranges are on page 77

4-Way Rezzin TBar Diffuser (Page 60)

		Neck Velocity FPM									
		400	500	600	700	800	900	1000	1200	1400	1600
6"	CFM	79	98	118	137	157	177	196	236	275	314
	Static Pressure	.003	.005	.006	.008	.011	.013	.016	.023	.031	.041
	Total Pressure	.015	.024	.034	.046	.060	.076	.094	.134	.183	.238
	NC	-	-	-	-	-	-	15	22	26	31
8"	CFM	140	175	209	244	279	314	349	419	489	559
	Static Pressure	.009	.014	.021	.028	.037	.046	.057	.082	.111	.145
	Total Pressure	.019	.030	.043	.058	.076	.096	.118	.170	.231	.301
	NC	-	-	-	-	18	22	23	31	35	39
10"	CFM	218	273	327	382	436	491	545	654	764	873
	Static Pressure	.009	.014	.021	.028	.037	.047	.058	.083	.113	.148
	Total Pressure	.019	.029	.042	.058	.075	.095	.117	.169	.230	.300
	NC	-	-	-	-	18	22	26	31	36	40
12"	CFM	314	393	471	550	628	707	785	942	1100	1257
	Static Pressure	.015	.022	.032	.044	.059	.076	.095	.142	.198	.264
	Total Pressure	.025	.038	.054	.074	.098	.126	.157	.231	.319	.422
	NC	-	-	-	18	20	26	29	36	41	45
14"	CFM	428	535	641	748	855	962	1069	1283	1497	1710
	Static Pressure	.015	.023	.033	.044	.057	.072	.089	.128	.175	.228
	Total Pressure	.025	.037	.053	.072	.094	.119	.146	.211	.287	.375
	NC	-	-	-	15	21	25	29	35	40	44

Throw Data - Terminal Velocity of 75 FPM

Neck Velocity	400	500	600	700	800	900	1000	1200	1400	1600
CFM	79	98	118	137	157	177	196	236	275	314
6"	3.1	3.9	4.6	5.4	6.2	7.0	7.7	9.3	10.8	12.4
CFM	140	175	209	244	279	314	349	419	489	559
8"	5.3	6.7	8.0	9.3	10.7	12.0	13.3	16.0	18.7	21.3
CFM	218	273	327	382	436	491	545	654	764	873
10"	6.3	7.9	9.4	11.0	12.6	14.1	15.7	18.8	22.0	25.1
CFM	314	393	471	550	628	707	785	942	1100	1257
12"	7.1	8.8	10.6	12.4	14.2	15.9	17.7	21.2	24.8	28.3
CFM	428	535	641	748	855	962	1069	1283	1497	1710
14"	9.1	11.3	13.6	15.9	18.1	20.4	22.7	27.2	31.8	36.3

Throw Data - Terminal Velocity of 150 FPM

Neck Velocity	400	500	600	700	800	900	1000	1200	1400	1600
CFM	79	98	118	137	157	177	196	236	275	314
6"	1.3	1.7	2.0	2.4	2.7	3.0	3.4	4.0	4.7	5.4
CFM	140	175	209	244	279	314	349	419	489	559
8"	2.2	2.7	3.3	3.8	4.4	4.9	5.5	6.6	7.7	8.8
CFM	218	273	327	382	436	491	545	654	764	873
10"	2.5	3.1	3.7	4.4	5.0	5.6	6.2	7.5	8.7	10.0
CFM	314	393	471	550	628	707	785	942	1100	1257
12"	3.8	4.8	5.8	6.7	7.7	8.6	9.6	11.5	13.4	15.3
CFM	428	535	641	748	855	962	1069	1283	1497	1710
14"	4.2	5.2	6.3	7.3	8.3	9.4	10.4	12.5	14.6	16.7

Rezzin Modular Core Tbar Diffuser (Page 60)

		Neck Velocity FPM									
		400	500	600	700	800	900	1000	1200	1400	1600
6"	CFM	79	98	118	137	157	177	196	236	275	314
	Static Pressure	.003	.005	.007	.010	.013	.017	.021	.030	.041	.054
	Total Pressure	.018	.023	.026	.035	.043	.067	.086	.120	.166	.209
	NC	-	-	-	-	-	16	20	24	30	34
8"	CFM	140	175	209	244	279	314	349	419	489	559
	Static Pressure	.004	.006	.008	.011	.014	.017	.020	.028	.036	.045
	Total Pressure	.013	.021	.030	.041	.053	.066	.081	.115	.155	.201
	NC	-	-	-	-	17	22	24	34	37	41
10"	CFM	218	273	327	382	436	491	545	654	764	873
	Static Pressure	.004	.007	.010	.013	.017	.022	.027	.039	.053	.069
	Total Pressure	.014	.021	.031	.042	.055	.070	.086	.124	.170	.222
	NC	-	-	-	17	22	26	34	42	44	48
12"	CFM	314	393	471	550	628	707	785	942	1100	1257
	Static Pressure	.006	.009	.012	.017	.022	.028	.034	.048	.065	.084
	Total Pressure	.015	.024	.035	.047	.061	.077	.095	.137	.186	.242
	NC	-	-	-	20	24	27	35	40	45	49
14"	CFM	428	535	641	748	855	962	1069	1283	1497	1710
	Static Pressure	.008	.013	.018	.024	.031	.040	.048	.069	.093	.120
	Total Pressure	.017	.030	.041	.056	.071	.090	.114	.144	.200	.278
	NC	-	-	15	23	27	34	39	44	48	51
16"	CFM	559	698	838	977	1117	1257	1396	1676	1955	2234
	Static Pressure	.012	.019	.028	.037	.048	.061	.075	.107	.145	.189
	Total Pressure	.022	.034	.049	.066	.086	.108	.134	.192	.260	.339
	NC	-	-	24	27	31	38	40	45	49	51

Recommended Noise Criteria and Face Velocity Ranges are on page 77

Rezzin Modular Core Tbar Diffuser (Page 60)

Throw Data - Terminal Velocity of 75 FPM

	Neck Velocity	400	500	600	700	800	900	1000	1200	1400	1600
	CFM	79	98	118	137	157	177	196	236	275	314
6"	1-direction	3.5	4.4	5.3	6.2	7.1	7.9	8.8	10.6	12.4	14.1
	2-direction	4.5	5.6	6.8	7.9	9.0	10.2	11.3	13.6	15.8	18.1
	3-direction Short	0.9	1.1	1.3	1.5	1.7	2.0	2.2	2.6	3.0	3.5
	3-direction Long	1.2	1.5	1.8	2.1	2.5	2.8	3.1	3.7	4.3	4.9
	4-direction	0.6	0.8	0.9	1.1	1.2	1.4	1.5	1.8	2.1	2.5

	Neck Velocity	400	500	600	700	800	900	1000	1200	1400	1600
	CFM	140	175	209	244	279	314	349	419	489	559
8"	1-direction	3.1	3.9	4.6	5.4	6.2	7.0	7.7	9.3	10.8	12.4
	2-direction	4.4	5.5	6.6	7.7	8.8	9.9	11.0	13.2	15.4	17.6
	3-direction Short	2.0	2.5	3.0	3.5	4.0	4.5	5.0	6.0	7.1	8.1
	3-direction Long	3.5	4.4	5.3	6.2	7.0	7.9	8.8	10.6	12.3	14.1
	4-direction	1.5	1.9	2.3	2.7	3.1	3.4	3.8	4.6	5.4	6.1

	Neck Velocity	400	500	600	700	800	900	1000	1200	1400	1600
	CFM	218	273	327	382	436	491	545	654	764	873
10"	1-direction	6.1	7.6	9.2	10.7	12.2	13.7	15.3	18.3	21.4	24.4
	2-direction	7.1	8.9	10.7	12.5	14.3	16.1	17.8	21.4	25.0	28.5
	3-direction Short	2.1	2.6	3.1	3.7	4.2	4.7	5.2	6.3	7.3	8.4
	3-direction Long	6.4	8.0	9.6	11.2	12.8	14.4	16.0	19.2	22.4	25.6
	4-direction	2.9	3.6	4.3	5.0	5.7	6.4	7.1	8.6	10.0	11.4

	Neck Velocity	400	500	600	700	800	900	1000	1200	1400	1600
	CFM	314	393	471	550	628	707	785	942	1100	1257
12"	1-direction	9.8	12.2	14.7	17.1	19.6	22.0	24.5	29.3	34.2	39.1
	2-direction	9.1	11.4	13.6	15.9	18.2	20.5	22.7	27.3	31.8	36.4
	3-direction Short	3.6	4.5	5.4	6.3	7.2	8.1	9.0	10.8	12.6	14.4
	3-direction Long	8.0	10.0	12.0	14.0	16.0	18.0	20.1	24.1	28.1	32.1
	4-direction	2.1	2.6	3.1	3.7	4.2	4.7	5.2	6.3	7.3	8.4

	Neck Velocity	400	500	600	700	800	900	1000	1200	1400	1600
	CFM	428	535	641	748	855	962	1069	1283	1497	1710
14"	1-direction	12.1	15.1	18.2	21.2	24.2	27.3	30.3	36.3	42.4	48.5
	2-direction	8.4	10.5	12.6	14.7	16.8	18.9	21.0	25.2	29.4	33.6
	3-direction Short	3.9	4.9	5.9	6.8	7.8	8.8	9.8	11.7	13.7	15.7
	3-direction Long	7.0	8.8	10.5	12.3	14.0	15.8	17.5	21.0	24.5	28.0
	4-direction	2.8	3.5	4.2	4.9	5.6	6.3	7.0	8.4	9.8	11.2

	Neck Velocity	400	500	600	700	800	900	1000	1200	1400	1600
	CFM	559	698	838	977	1117	1257	1396	1676	1955	2234
16"	1-direction	24.3	30.4	36.5	42.5	48.6	54.7	60.8	72.9	85.1	97.2
	2-direction	14.1	17.6	21.1	24.6	28.1	31.7	35.2	42.2	49.3	56.3
	3-direction Short	11.2	14.0	16.8	19.7	22.5	25.3	28.1	33.7	39.3	44.9
	3-direction Long	16.3	20.4	24.5	28.6	32.7	36.7	40.8	49.0	57.1	65.3
	4-direction	3.2	4.0	4.9	5.7	6.5	7.3	8.1	9.7	11.3	12.9

Throw Data - Terminal Velocity of 150 FPM

	Neck Velocity	400	500	600	700	800	900	1000	1200	1400	1600
	CFM	79	98	118	137	157	177	196	236	275	314
6"	1-direction	1.5	1.9	2.3	2.6	3.0	3.4	3.8	4.2	4.5	4.9
	2-direction	1.7	2.1	2.5	3.0	3.4	3.8	4.2	4.7	5.1	5.5
	3-direction Short	0.6	0.7	0.9	1.0	1.2	1.3	1.5	1.6	1.8	1.9
	3-direction Long	0.3	0.4	0.4	0.5	0.6	0.7	0.7	0.8	0.9	0.9
	4-direction	0.6	0.7	0.8	1.0	1.1	1.2	1.4	1.5	1.7	1.8

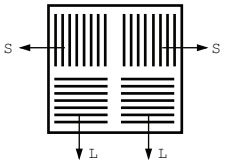
	Neck Velocity	400	500	600	700	800	900	1000	1200	1400	1600
	CFM	140	175	209	244	279	314	349	419	489	559
8"	1-direction	1.6	2.1	2.5	2.9	3.3	3.7	4.1	4.5	4.9	5.4
	2-direction	1.7	2.1	2.5	2.9	3.3	3.8	4.2	4.6	5.0	5.4
	3-direction Short	1.3	1.6	1.9	2.3	2.6	2.9	3.2	3.5	3.9	4.2
	3-direction Long	1.5	1.9	2.2	2.6	3.0	3.3	3.7	4.1	4.5	4.8
	4-direction	1.1	1.4	1.6	1.9	2.2	2.5	2.7	3.0	3.3	3.6

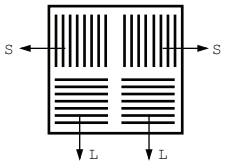
	Neck Velocity	400	500	600	700	800	900	1000	1200	1400	1600
	CFM	218	273	327	382	436	491	545	654	764	873
10"	1-direction	3.0	3.7	4.5	5.2	6.0	6.7	7.5	8.2	9.0	9.7
	2-direction	2.8	3.5	4.1	4.8	5.5	6.2	6.9	7.6	8.3	9.0
	3-direction Short	1.5	1.9	2.2	2.6	3.0	3.4	3.7	4.1	4.5	4.8
	3-direction Long	2.5	3.1	3.7	4.3	5.0	5.6	6.2	6.8	7.4	8.1
	4-direction	2.3	2.9	3.4	4.0	4.6	5.2	5.7	6.3	6.9	7.5

	Neck Velocity	400	500	600	700	800	900	1000	1200	1400	1600
	CFM	314	393	471	550	628	707	785	942	1100	1257
12"	1-direction	3.4	4.3	5.2	6.0	6.9	7.8	8.6	9.5	10.3	11.2
	2-direction	2.1	2.6	3.1	3.6	4.1	4.7	5.2	5.7	6.2	6.7
	3-direction Short	2.4	3.0	3.6	4.2	4.8	5.4	6.0	6.7	7.3	7.9
	3-direction Long	2.1	2.6	3.1	3.6	4.1	4.7	5.2	5.7	6.2	6.7
	4-direction	1.7	2.1	2.5	2.9	3.3	3.8	4.2	4.6	5.0	5.4

	Neck Velocity	400	500	600	700	800	900	1000	1200	1400	1600
	CFM	428	535	641	748	855	962	1069	1283	1497	1710
14"	1-direction	5.3	6.6	7.9	9.3	10.6	11.9	13.2	14.5	15.9	17.2
	2-direction	3.0	3.8	4.6	5.3	6.1	6.8	7.6	8.3	9.1	9.9
	3-direction Short	2.3	2.9	3.5	4.1	4.6	5.2	5.8	6.4	6.9	7.5
	3-direction Long	2.6	3.2	3.9	4.5	5.1	5.8	6.4	7.1	7.7	8.4
	4-direction	2.2	2.7	3.2	3.8	4.3	4.9	5.4	5.9	6.5	7.0

	Neck Velocity	400	500	600	700	800	900	1000	1200	1400	1600
	CFM	559	698	838	977	1117	1257	1396	1676	1955	2234
16"	1-direction	14.9	18.6	22.3	26.0	29.7	33.5	37.2	40.9	44.6	48.3
	2-direction	7.0	8.7	10.4	12.2	13.9	15.6	17.4	19.1	20.9	22.6
	3-direction Short	5.2	6.5	7.8	9.1	10.4	11.7	13.0	14.3	15.6	16.9
	3-direction Long	6.7	8.4	10.0	11.7	13.4	15.1	16.7	18.4	20.1	21.8
	4-direction	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.6





Recommended Noise Criteria and Face Velocity Ranges are on page 77

Rezzin Square Ceiling Diffuser (Page 61)

Rezzin Square (two-way corner)

Neck Velocity			300	400	500	600	700
Neck Size	6"	CFM	60	80	100	120	135
Ak	0.284	Ps	0.002	0.004	0.006	0.008	0.011
Vt	75	Throw	2.5	3.5	4.0	5.0	6.0
Vt	100	Throw	2.5	3.0	4.0	4.5	5.5
Vt	150	Throw	1.5	2.0	2.5	3.0	3.5
Neck size	7"	CFM	82	109	136	164	191
Ak	0.267	Ps	0.009	0.016	0.025	0.037	0.050
Vt	75	Throw	4.0	5.0	6.0	7.5	8.5
Vt	100	Throw	3.5	4.5	5.5	7.0	8.0
Vt	150	Throw	2.5	3.0	4.0	4.5	5.5
Neck size	8"	CFM	105	140	175	209	244
Ak	0.251	Ps	0.016	0.029	0.045	0.065	0.088
Vt	75	Throw	5.0	6.5	8.0	9.5	11.0
Vt	100	Throw	4.5	6.0	7.5	9.0	10.5
Vt	150	Throw	3.0	4.0	5.0	6.0	7.0

Rezzin Square (three-way)

Neck Velocity			300		400		500		600		700	
Neck Size	6"	CFM	60		80		100		120		135	
Ak	0.247	Ps	0.002		0.004		0.006		0.008		0.011	
Vt	75 S/L	Throw	2.0	2.5	3.0	3.5	3.5	4.5	4.5	5.5	5.0	6.0
Vt	100 S/L	Throw	2.0	2.5	3.0	3.5	3.5	4.0	4.0	5.0	5.0	6.0
Vt	150 S/L	Throw	1.5	1.5	2.0	2.0	2.5	3.0	3.0	3.5	3.0	4.0
Neck Size	7"	CFM	80		110		135		165		190	
Ak	0.243	Ps	0.009		0.016		0.026		0.037		0.050	
Vt	75 S/L	Throw	2.5	4.0	3.5	5.5	4.5	7.0	5.5	8.5	6.0	9.5
Vt	100 S/L	Throw	2.5	3.5	3.5	5.3	4.0	6.3	5.0	7.5	5.5	9.0
Vt	150 S/L	Throw	1.8	2.5	2.5	3.5	3.0	4.5	3.5	5.5	4.0	6.0
Neck Size	8"	CFM	105		140		175		210		245	
Ak	0.239	Ps	0.016		0.029		0.046		0.066		0.090	
Vt	75 S/L	Throw	3.0	5.5	4.0	7.5	5.0	9.0	6.0	11.0	7.0	13.0
Vt	100 S/L	Throw	3.0	5.0	3.5	7.0	4.5	8.5	5.5	10.5	6.5	12.0
Vt	150 S/L	Throw	2.0	3.5	2.5	4.5	3.0	6.0	3.5	7.0	4.5	8.0

Rezzin Square (four-way)

Neck Velocity			300	400	500	600	700
Neck Size	6"	CFM	60	80	100	120	135
Ak	0.210	Ps	0.001	0.002	0.003	0.005	0.006
Vt	75	Throw	3.0	3.5	4.5	5.5	6.5
Vt	100	Throw			4.5	5.0	6.0
Vt	150	Throw	1.5	2.5	3.0	3.5	4.0
Neck Size	7"	CFM	80	110	135	165	190
Ak	0.209	Ps	0.003	0.005	0.008	0.011	0.015
Vt	75	Throw			6.0	7.5	8.5
Vt	100	Throw	3.5	4.5	5.5	7.0	8.0
Vt	150	Throw	2.5	3.0	4.0	4.5	5.5
Neck Size	8"	CFM	105	140	175	210	245
Ak	0.209	Ps	0.005	0.008	0.013	0.018	0.025
Vt	75	Throw	4.5	6.0	7.5	9.0	10.5
Vt	100	Throw	4.0	5.5	7.0	8.5	10.0
Vt	150	Throw	3.0	3.5	4.5	5.5	6.5

Rezzin Round Ceiling Diffuser (Page 61)

Face Velocity		300	400	500	600	700	800	900	1000
Neck Size 6" Ak .224	CFM	67	89	112	134	157	179	201	224
	Ps	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
	Throw	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00
Neck Size 7" Ak .229	CFM	69	92	115	137	160	183	206	229
	Ps	0.05	0.09	0.13	0.19	0.26	0.34	0.43	0.53
	Throw	1.75	2.25	2.75	3.25	3.75	4.25	5.00	5.50
Neck Size 8" Ak .235	CFM	70	94	117	141	164	188	211	235
	Ps	0.10	0.17	0.26	0.38	0.52	0.67	0.85	1.05
	Throw	2.00	2.50	3.00	3.50	4.00	4.50	5.50	6.00

Terminal Velocity of 50 FPM

Recommended Noise Criteria and Face Velocity Ranges are on page 77

Engineering Data

659T/659TI/PFT/PFTI Series Performance (Page 53, 56)

Average Face Velocity		300	400	500	600
659T	CFM	730	975	1220	1465
Ak 2.440	-Ps	.017	.030	.047	.067
PFT	CFM	820	1095	1370	1645
Ak 2.740	-Ps	.028	.050	.078	.113
659-TI					
w/12" collar	CFM	670	890	1115	1340
Ak 2.230	-Ps	.084	.147	.230	.330
w/14" collar	CFM	680	905	1130	1355
Ak 2.260	-Ps	.060	.105	.165	.240
w/16" collar	CFM	695	930	1160	1390
Ak 2.320	-Ps	.039	.068	.106	.155
PFTI					
w/12" collar	CFM	770	1025	1280	1535
Ak 2.320	-Ps	.098	.170	.265	.380
w/14" collar	CFM	775	1035	1295	1555
Ak 2.590	-Ps	.076	.125	.200	.283
w/16" collar	CFM	790	1050	1315	1580
Ak 2.630	-Ps	.055	.094	.145	.210

Note: Tested without filters. Typical capacity is 2 CFM per square inch of nominal filter area. Recommended face velocity is 300-450 FPM. Velocities higher will decrease filter performance, increase flow resistance, and possibly be of noise concern. Velocity measured 1" from face.

96AFBT/96AFBTI (Page 54, 55)

Face Velocity		300	400	500	600	700
20 x 20	CFM	675	900	1125	1350	1575
Ak 2.25	Static Pressure (in W.C.)	-0.024	-0.042	-0.065	-0.094	-0.128
	Total Pressure (in W.C.)	-0.018	-0.032	-0.050	-0.072	-0.098

Note: Tested without filters. Typical capacity is 2 CFM per square inch of nominal filter area. Recommended face velocity is 300-450 FPM. Velocities higher will decrease filter performance, increase flow resistance, and possibly be of noise concern. Velocity measured 1" from face.

94AT (Page 57)

Face Velocity*		300	400	500	600
22X22	CFM	684	912	1140	1368
Ak 2.28	Ps	.018	.033	.051	.071
22X46	CFM	2004	2672	3340	4008
Ak 6.68	Ps	.018	.032	.051	.073

RE5T/RE5TI (Page 58)
REF5T/REF5TI (Page 56)
Rezzin Egg Crate (Page 58)
RHF45T (Page 55)

Average Face Velocity		300	400	500	600	700
RE5T/RE5TI						
22 x 22	CFM	725	970	1210	1450	1695
Ak 2.420	-Ps	.004	.006	.010	.014	.020
46 x 22	CFM	1520	2024	2530	3035	3540
Ak 5.060	-Ps	.003	.006	.010	.012	.018
RH45T						
22 x 22	CFM	785	1045	1305	1565	1825
Ak 2.610	-Ps	.015	.030	.043	.062	.084
46 x 22	CFM	1635	2180	2725	3270	3815
Ak 5.460	-Ps	.015	.030	.040	.059	.081
REF5T*/REF5TI*						
20 x 20	CFM	600	800	1000	1200	1400
Ak 2.000	-Ps	.003	.006	.010	.014	.019
44 x 20	CFM	1320	1760	2200	2640	3080
Ak 4.400	-Ps	.003	.006	.009	.013	.018
Rezzin Egg Crate						
20 x 20	CFM	420	560	700	840	980
Ak 1.400	-Ps	.004	.008	.013	.018	.025
RHF45T*						
20 x 20	CFM	650	870	1085	1300	1520
Ak 2.170	-Ps	.015	.025	.040	.060	.080
44 x 20	CFM	1430	1910	2385	2860	3340
Ak 4.770	-Ps	.015	.024	.039	.058	.078

Note: Tested without filters. Typical capacity is 2 CFM per square inch of nominal filter area. Recommended face velocity is 300-450 FPM. Velocities higher will decrease filter performance, increase flow resistance, and possibly be of noise concern. Velocity measured 1" from face.

441 & 445 (Page 59)

Neck Velocity		250	350	450	550	650	750	850	1000	1200
6"	CFM	50	70	90	110	130	145	165	195	235
Diameter	Ps	.004	.009	.014	.021	.029	.036	.046	.065	.092
	NC	<20	<20	<20	<20	<20	22	26	33	36
Ak .370	441 Throw	5.5	7.0	9.5	11.0	14.0	16.0	18.0	22.0	24.0
Ak .430	445 Throw	4.0	5.0	6.5	8.0	10.0	11.0	13.0	15.0	17.0
8"	CFM	85	120	155	190	225	260	295	350	420
Diameter	Ps	.006	.011	.018	.027	.037	.050	.064	.090	.127
	NC	<20	<20	<20	<20	22	27	33	35	38
Ak .450	441 Throw	7.0	10.0	13.0	16.0	18.0	21.0	25.0	29.0	31.0
Ak .530	445 Throw	5.0	7.0	9.5	12.0	13.0	15.0	18.0	21.0	23.0
10"	CFM	135	190	245	300	355	410	465	545	655
Diameter	Ps	.009	.018	.030	.044	.062	.082	.105	.145	.212
	NC	<20	<20	<20	24	31	34	37	42	44
Ak .530	441 Throw	9.0	12.0	16.0	20.0	24.0	27.0	30.0	32.0	34.0
Ak .620	445 Throw	6.5	9.0	11.0	14.0	17.0	19.0	21.0	23.0	24.0
12"	CFM	195	275	355	430	510	590	670	785	940
Diameter	Ps	.013	.026	.044	.064	.090	.120	.155	.215	.300
	NC	<20	<20	26	33	38	42	44	46	48
Ak .590	441 Throw	10.0	13.0	19.0	25.0	30.0	32.0	33.0	34.0	35.0
Ak .700	445 Throw	7.5	9.0	14.0	17.0	21.0	23.0	24.0	25.0	26.0
14"	CFM	265	375	480	590	695	800	910	1070	1285
Diameter	Ps	.018	.036	.059	.089	.125	.165	.210	.295	.410
	NC	<20	22	29	36	42	>45	>45	>45	>45
Ak .640	441 Throw	8.0	13.0	22.0	26.0	28.0	30.0	31.0	32.0	33.0
Ak .750	445 Throw	6.0	10.0	16.0	20.0	22.0	24.0	26.0	28.0	30.0

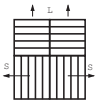
Note: The use of a balancing hood is recommended to balance the system.
NC is based on 10dB room attenuation (Re: 10^{-12} watts) ASHRAE 36-72.
Terminal Velocity of 75 FPM

442, 443 & 444 SurfAire® (Page 59)

Neck Velocity		250	350	450	550	650	750	850	1000	1200
6"	CFM	50	70	90	110	130	145	165	195	235
Diameter	Ps	.004	.009	.014	.021	.029	.036	.046	.065	.094
	NC	<20	<20	<20	<20	<20	23	27	31	35
Ak .430	444 Throw	3.0	3.5	4.5	6.0	7.5	8.0	9.0	11.0	12.0
Ak .430	443 Throw*	3.0/4.0	3.5/5.0	4.5/6.5	6.0/8.0	7.5/10.0	8.0/11.0	9.0/13.0	11.0/15.0	12.0/17.0
Ak .430	442 Throw	4.0	5.0	6.5	8.0	10.0	11.0	13.0	15.0	17.0
8"	CFM	85	120	155	190	225	260	295	350	420
Diameter	Ps	.006	.012	.019	.029	.040	.054	.070	.098	.140
	NC	<20	<20	<20	<20	21	26	31	34	37
Ak .530	444 Throw	4.0	5.0	6.5	8.0	9.5	11.0	13.0	15.0	17.0
Ak .530	443 Throw*	4.0/5.5	5.0/7.0	6.5/9.0	8.0/11.0	9.5/14.0	11.0/16.0	13.0/19.0	15.0/21.0	17.0/23.0
Ak .530	442 Throw	5.5	7.0	9.0	11.0	14.0	16.0	19.0	21.0	23.0
10"	CFM	135	190	245	300	355	410	465	545	655
Diameter	Ps	.009	.017	.028	.043	.069	.078	.102	.140	.205
	NC	<20	<20	<20	22	29	35	38	42	46
Ak .620	444 Throw	4.0	6.0	8.0	10.0	12.0	13.0	15.0	18.0	19.0
Ak .620	443 Throw*	4.0/6.0	6.0/8.0	8.0/11.0	10.0/14.0	12.0/17.0	13.0/19.0	15.0/21.0	18.0/25.0	19.0/26.0
Ak .620	442 Throw	6.0	8.0	11.0	14.0	17.0	19.0	21.0	25.0	26.0
12"	CFM	190	245	355	450	530	590	670	785	940
Diameter	Ps	.012	.024	.040	.059	.082	.110	.142	.195	.275
	NC	<20	<20	22	28	35	39	44	47	52
Ak .700	444 Throw	5.0	7.5	10.0	11.5	14.0	16.0	18.0	19.0	20.0
Ak .700	443 Throw*	5.0/8.5	7.5/11.0	10.0/14.0	11.5/17.0	14.0/19.0	16.0/23.0	18.0/25.0	19.0/26.0	20.0/27.0
Ak .700	442 Throw	8.5	11.0	14.0	17.0	19.0	23.0	25.0	26.0	27.0
14"	CFM	285	375	480	590	695	800	910	1070	1285
Diameter	Ps	.015	.031	.050	.075	.105	.137	.177	.245	.350
	NC	<20	21	27	31	36	40	45	48	53
Ak .750	444 Throw	6.0	9.0	11.0	14.0	17.0	19.0	20.0	22.0	24.0
Ak .750	443 Throw*	6.0/8.5	9.0/13.0	11.0/16.0	14.0/20.0	17.0/24.0	19.0/26.0	20.0/27.0	22.0/28.0	24.0/29.0
Ak .750	442 Throw	8.5	13.0	16.0	20.0	24.0	26.0	27.0	28.0	29.0

Note: The use of a balancing hood is recommended to balance the system.
NC is based on 10dB room attenuation (Re: 10^{-12} watts) ASHRAE 36-72.
Terminal Velocity of 75 FPM

*443 throw S/L



673TPI R6 (Page 54)

6" Diameter Inlet Ak .730	CFM	100	150	200	225	250	275	300
	NC	<20	<20	21	24	27	30	32
	Static Pressure	-.057	-.127	-.226	-.287	-.354	-.428	-.509
8" Diameter Inlet Ak .795	CFM	150	200	250	300	400	500	550
	NC	<20	<20	<20	<20	25	31	36
	Static Pressure	-.040	-.072	-.112	-.161	-.287	-.448	-.542
10" Diameter Inlet Ak .880	CFM	300	400	500	600	700	800	850
	NC	<20	<20	<20	24	28	33	35
	Static Pressure	-.066	-.117	-.183	-.264	-.359	-.469	-.530
12" Diameter Inlet Ak .980	CFM	400	500	600	700	800	1000	1200
	NC	<20	<20	<20	<20	22	28	34
	Static Pressure	-.057	-.088	-.127	-.173	-.226	-.354	-.509
14" Diameter Inlet Ak 1.105	CFM	600	700	800	1000	1200	1400	1600
	NC	<20	<20	<20	20	24	28	34
	Static Pressure	-.069	-.094	-.122	-.191	-.275	-.374	-.489
16" Diameter Inlet Ak 1.240	CFM	800	1000	1200	1600	1800	2000	2200
	NC	<20	<20	<20	25	28	31	36
	Static Pressure	-.072	-.112	-.161	-.287	-.363	-.448	-.542

Recommended Noise Criteria and Face Velocity Ranges are on page 77

HART COOLEY

REN4 (Page 59)

Neck Velocity		180	220	300	350	400	450	500	580	650	700
6" Diameter Ak .430	CFM	35	45	60	70	80	90	100	115	130	135
	Ps	.002	.003	.004	.006	.008	.010	.012	.015	.020	.022
	NC	<20	<20	<20	<20	<20	<20	20	22	26	30
	Throw	3.0	3.5	4.5	5.5	6.5	7.5	8.0	9.0	11.0	11.0
8" Diameter Ak .530	CFM	65	75	105	120	140	155	175	200	225	245
	Ps	.002	.003	.006	.008	.010	.013	.016	.021	.027	.032
	NC	<20	<20	<20	<20	<20	22	25	30	35	38
	Throw	4.0	5.0	6.0	7.0	8.5	9.5	11.0	12.0	13.0	15.0
10" Diameter Ak .620	CFM	100	120	165	190	220	245	275	315	355	380
	Ps	.003	.005	.009	.011	.015	.019	.024	.031	.040	.045
	NC	<20	<20	<20	<20	20	23	27	33	35	39
	Throw	4.0	5.5	7.0	8.0	9.5	11.0	12.0	13.0	15.0	16.0
12" Diameter Ak .700	CFM	140	175	235	275	315	355	395	455	510	550
	Ps	.005	.007	.013	.018	.023	.029	.036	.048	.061	.071
	NC	<20	<20	<20	<20	21	24	27	33	36	40
	Throw	4.5	5.5	7.0	8.0	10.0	11.0	12.0	14.0	15.0	17.0
14" Diameter Ak .750	CFM	190	235	320	375	430	480	535	620	695	750
	Ps	.007	.011	.020	.027	.036	.044	.055	.074	.094	.107
	NC	<20	<20	<20	<20	20	24	28	32	35	40
	Throw	4.5	5.5	7.0	8.5	10.0	11.0	12.0	14.0	16.0	17.0

Note: The use of a balancing hood is recommended to balance the system.
NC is based on 10dB room attenuation (Re: 10^{-12} watts) ASHRAE 36-72.
Terminal Velocity of 75 FPM

RENPS, ARENPS, PDS (Page 65, 68)

Neck Velocity		300	400	500	600	700	800	900	1000	1100
6" Diameter An .200	CFM	60	80	100	120	140	160	180	200	220
	Ps	.008	.011	.017	.024	.032	.042	.054	.066	.080
	NC	<20	<20	<20	<20	24	27	32	36	38
	Throw	1.0	2.0	3.0	3.0	4.0	4.0	5.0	5.0	6.0
8" Diameter An .350	CFM	105	140	175	210	245	280	310	350	385
	Ps	.008	.011	.017	.024	.034	.043	.054	.068	.083
	NC	<20	<20	<20	20	24	27	30	34	38
	Throw	2.0	3.0	4.0	4.0	5.0	6.0	7.0	8.0	8.5
10" Diameter An .540	CFM	165	220	270	325	385	430	490	550	600
	Ps	.008	.012	.017	.024	.032	.043	.056	.068	.082
	NC	<20	<20	20	24	29	33	36	39	42
	Throw	2.0	3.0	4.0	5.0	5.0	6.0	7.0	8.0	9.0
12" Diameter An .780	CFM	230	310	390	470	550	610	700	780	870
	Ps	.009	.016	.026	.037	.050	.065	.080	.100	.125
	NC	<20	<20	20	23	26	31	34	37	40
	Throw	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0
14" Diameter An 1.070	CFM	315	430	535	640	750	855	960	1090	1200
	Ps	.009	.016	.026	.037	.050	.065	.083	.125	.150
	NC	<20	20	25	30	35	39	43	45	48
	Throw	3.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0

Note: The use of a balancing hood is recommended to balance the system.
NC is based on 10dB room attenuation (Re: 10^{-12} watts) ASHRAE 36-72.
Terminal Velocity of 75 FPM An = Neck Area in Sq. Ft.

HVS, HVS R6, FPD, FPD3 (Page 62-63)

Neck Velocity		400	500	600	700	800	900	1000	1200	1400	1600
6" An .200 Ak .780	CFM	80	100	120	135	155	175	195	235	275	315
	Ps	.008	.012	.017	.021	.028	.035	.043	.063	.086	.112
	NC	<20	<20	<20	<20	<20	<20	20	25	30	35
	Throw	2.0	3.0	3.0	3.5	4.0	4.5	5.0	6.0	7.0	8.0
8" An .350 Ak .920	CFM	140	175	210	245	280	315	350	420	490	560
	Ps	.010	.015	.022	.029	.038	.049	.060	.086	.117	.150
	NC	<20	<20	<20	<20	20	25	30	35	35	40
	Throw	3.5	4.5	5.5	6.5	7.0	8.0	9.0	10.5	12.5	14.5
10" An .540 Ak 1.200	CFM	220	270	325	380	435	490	545	655	765	870
	Ps	.014	.021	.030	.041	.054	.068	.084	.122	.167	.212
	NC	<20	<20	<20	20	25	30	35	35	40	45
	Throw	5.5	7.0	8.5	10.0	11.0	12.5	14.0	17.0	19.5	22.0
12" An .780 Ak 1.650	CFM	315	390	470	550	630	705	785	940	1100	1255
	Ps	.015	.023	.033	.045	.060	.072	.094	.132	.180	.230
	NC	<20	<20	20	25	30	35	35	40	45	45
	Throw	6.0	7.5	9.0	10.5	12.0	13.5	15.0	18.0	21.0	24.0
14" An 1.070 Ak 2.060	CFM	430	535	640	750	855	960	1070	1285	1500	1710
	Ps	.023	.036	.051	.071	.093	.115	.140	.205	.277	.350
	NC	<20	<20	20	25	30	35	40	40	45	45
	Throw	6.5	8.0	9.5	11.5	13.0	14.5	16.0	19.0	22.5	25.0

Terminal Velocity of 75 FPM
An = Neck Area in Sq. Ft.

NC = Noise Criteria based on 10dB room absorption (Re: 10^{-12} watts).

PDSD (Page 69)

Neck Velocity		300	400	500	600	700	800	900	1000	1200
6" Diameter An .200	CFM	60	80	100	120	135	155	175	195	235
	Ps	.007	.013	.020	.029	.037	.048	.062	.076	.110
	NC	<20	<20	<20	20	21	24	28	33	37
	1-Way Throw	4.0	6.0	7.0	8.0	10.0	11.0	13.0	14.0	16.0
	2- and 3-Way Throw	3.5	4.5	6.0	7.0	8.0	9.5	10.5	11.5	13.0
	4-Way Throw	2.5	3.5	4.5	5.0	6.0	7.0	7.5	8.0	9.0
8" Diameter An .350	CFM	105	140	175	210	245	280	315	350	420
	Ps	.011	.019	.030	.043	.059	.077	.097	.120	.173
	NC	<20	<20	<20	20	22	27	31	35	40
	1-Way Throw	6.0	8.0	10.0	11.5	13.0	14.5	16.0	18.0	21.0
	2- and 3-Way Throw	5.0	7.0	8.5	10.5	12.0	13.5	14.5	16.0	19.0
	4-Way Throw	4.0	5.0	6.5	7.5	9.0	10.0	11.5	12.5	14.0
10" Diameter An .540	CFM	165	220	275	325	380	435	490	545	655
	Ps	.015	.026	.040	.046	.076	.100	.125	.115	.225
	NC	<20	<20	<20	21	27	33	37	40	45
	1-Way Throw	8.5	11.0	14.0	16.5	19.0	22.0	25.0	27.0	30.0
	2- and 3-Way Throw	7.5	10.0	12.5	14.5	17.0	19.5	22.0	24.0	27.0
	4-Way Throw	5.0	7.0	8.5	10.5	12.0	14.0	15.5	17.0	20.0
12" Diameter An .780	CFM	235	315	395	470	550	630	705	785	940
	Ps	.016	.029	.045	.068	.086	.113	.140	.170	.250
	NC	<20	<20	<20	20	25	32	35	38	44
	1-Way Throw	10.0	13.0	16.5	19.5	22.0	25.0	27.0	30.0	34.0
	2- and 3-Way Throw	8.5	11.5	14.5	17.5	20.0	22.0	25.0	27.0	30.0
	4-Way Throw	6.0	8.0	10.0	12.0	14.0	16.5	18.0	20.0	23.0
14" Diameter An 1.070	CFM	320	430	535	640	750	855	960	1070	1285
	Ps	.021	.037	.057	.082	.112	.145	.180	.225	.320
	NC	<20	<20	20	26	31	36	40	44	49
	1-Way Throw	11.0	15.0	19.0	22.5	26.0	29.0	32.0	35.0	39.0
	2- and 3-Way Throw	10.0	13.5	17.0	20.0	23.0	26.0	28.0	31.0	35.0
	4-Way Throw	7.0	10.0	12.0	14.4	17.0	19.0	21.0	23.0	27.0

Notes: The use of a balancing hood is recommended to balance the system.
NC is based on 10dB room attenuation (Re: 10^{-12} watts) ASHRAE 36-72.
Terminal Velocity of 75 FPM

RFPS (Page 68)

Neck Velocity		300	400	500	600	700	800	900	1000	1200
6" Diameter Ak .200	CFM	60	80	100	120	140	160	180	200	235
	Ps	.005	.009	.015	.021	.027	.037	.047	.058	.080
	NC	<20	<20	<20	<20	21	26	32	34	39
	Throw	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.5	6.5
8" Diameter Ak .350	CFM	105	140	175	210	245	280	315	350	420
	Ps	.007	.012	.019	.027	.037	.049	.060	.074	.110
	NC	<20	<20	<20	<20	22	28	33	36	41
	Throw	2.5	3.5	4.5	5.5	6.5	7.0	8.0	9.0	10.5
10" Diameter Ak .540	CFM	165	220	270	325	380	435	490	545	655
	Ps	.008	.015	.023	.033	.046	.060	.076	.093	.135
	NC	<20	<20	<20	22	27	32	36	39	43
	Throw	3.5	4.5	5.5	6.5	7.5	8.5	9.5	11.0	13.0
12" Diameter Ak .780	CFM	235	315	390	470	550	630	705	785	945
	Ps	.010	.018	.027	.039	.053	.070	.088	.110	.160
	NC	<20	<20	<20	20	27	35	38	41	45
	Throw	3.5	5.0	6.0	7.5	8.5	10.0	11.0	12.5	15.0
14" Diameter Ak 1.070	CFM	320	430	535	640	750	855	960	1070	1285
	Ps	.011	.020	.031	.045	.060	.080	.105	.125	.180
	NC	<20	<20	<20	25	31	34	39	43	49
	Throw	4.0	5.5	7.0	8.5	10.0	11.0	12.5	14.0	16.5

Notes: NC is Noise Criteria based on 10dB room absorption (Re: 10^{-12} watts).
Throw in feet measured at a terminal velocity of 100 FPM.
The change in throw due to pattern selection is not significant.

DPD, DPD R6, ADPD (Page 64)

Neck Velocity		400	500	600	700	800	900	1000	1200	1400	1600
6" An .200 Ak .279	CFM	80	100	120	135	155	175	195	235	275	315
	Ps	.006	.010	.014	.018	.023	.030	.037	.054	.073	.096
	NC	<20	<20	<20	<20	<20	20	25	30	35	40
	Throw	1.0	2.0	2.0	2.5	3.0	3.5	4.0	4.5	5.5	6.5
8" An .350 Ak .354	CFM	140	175	210	245	280	315	350	420	490	560
	Ps	.010	.015	.022	.029	.038	.049	.060	.086	.117	.150
	NC	<20	<20	<20	20	25	30	30	35	40	45
	Throw	2.5	3.5	4.0	4.5	5.0	5.5	6.0	7.0	8.0	9.0
10" An .540 Ak .400	CFM	220	275	325	380	435	490	545	655	765	875
	Ps	.014	.021	.030	.041	.054	.068	.084	.122	.167	.212
	NC	<20	<20	<20	20	25	30	35	40	45	50
	Throw	4.0	5.5	6.5	8.0	9.0	10.5	11.5	14.5	17.0	20.0
12" An .780 Ak .397	CFM	315	395	470	550	630	705	785	945	1100	1260
	Ps	.015	.023	.033	.045	.060	.072	.094	.132	.180	.230
	NC	<20	<20	20	25	30	35	35	40	45	50
	Throw	5.5	7.0	8.5	10.0	11.5	13.0	14.5	17.5	20.5	24.0
14" An 1.070 Ak .393	CFM	430	535	640	750	855	960	1070	1280	1500	1710
	Ps	.023	.036	.051	.071	.093	.115	.140	.205	.277	.350
	NC	<20	<20	25	30	35	35	40	45	50	55
	Throw	7.0	8.5	10.5	12.0	13.5	15.5	17.0	20.5	24.0	24.5

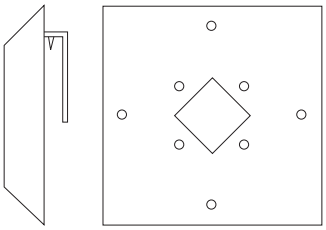
Terminal Velocity of 75 FPM
An = Neck Area in Sq. Ft.

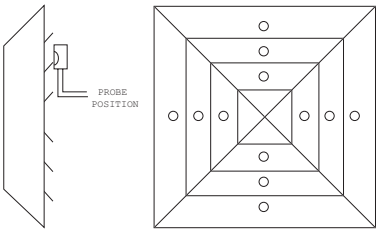
NC = Noise Criteria based on 10dB room absorption (Re: 10^{-12} watts).

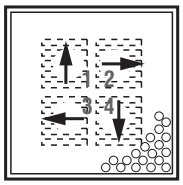
Recommended Noise Criteria and Face Velocity Ranges are on page 77

Engineering Data

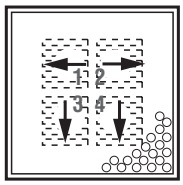
Probe Position: The probe is held 1 inch in from the outer edge of the diffuser, flush with the face.



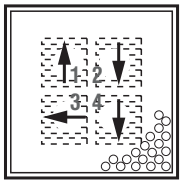




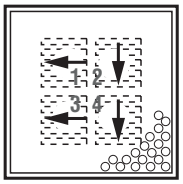
Four-Way (Short Throw)
- For throw in all four directions, use short throw data.



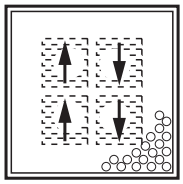
Three-Way (Short Throw)
- For throw in all three directions, use short throw data.



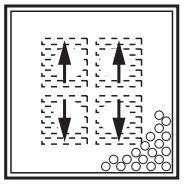
Three-Way (Long & Short)
- For throw in the #2 & #4 direction use long throw data.
- For throw in the #1 & #3 directions, use short throw data.



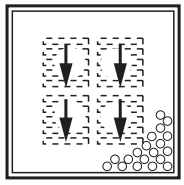
Two-Way Corner (Long & Short)
- For throw in the #2 & #4 direction use long throw data.
- For throw in the #1 & #3 directions, use short throw data.



Two-Way (Long Throw)
- For throw in both directions use long throw data.



Two-Way (Short Throw)
- For throw in both directions use short throw data.



One-Way (Long Throw)
- For throw use long throw data.

SBP (Page 67)

Neck Velocity		300	400	500	600	700	800	900	1000	1200	1400
Velocity Pressure		.006	.010	.016	.022	.031	.040	.051	.062	.090	.122
6" Diameter	CFM	60	80	100	120	140	160	180	200	240	280
	Total Pressure	.005	.008	.013	.025	.025	.032	.041	.050	.027	.098
	Short Horizontal Throw	2-1-1	2-1-1	3-1-1	3-2-1	4-2-1	4-2-1	5-2-2	5-3-2	6-3-2	7-4-2
	Long Horizontal Throw	3-1-1	4-2-1	5-2-2	6-3-2	7-3-2	8-4-3	9-4-3	10-5-3	12-6-4	14-7-5
	Noise Criteria	<20	<20	<20	<20	<20	22	24	26	31	37
8" Diameter	CFM	105	140	175	210	245	280	315	350	420	490
	Total Pressure	.009	.015	.024	.034	.046	.061	.077	.095	.136	.185
	Short Horizontal Throw	3-1-1	4-2-1	5-2-2	6-4-3	7-3-2	8-4-3	9-4-3	10-5-3	12-6-4	14-7-5
	Long Horizontal Throw	5-3-2	7-4-2	9-5-3	11-5-4	13-6-4	15-7-5	16-8-5	18-9-6	22-11-7	25-13-8
	Noise Criteria	<20	<20	<20	<20	20	25	30	34	39	44
10" Diameter	CFM	165	220	275	330	385	440	495	550	660	770
	Total Pressure	.013	.023	.036	.052	.071	.092	.117	.144	.208	.283
	Short Horizontal Throw	5-2-2	6-3-2	8-4-3	10-5-3	11-6-4	13-6-4	14-7-5	16-8-5	19-10-6	23-11-8
	Long Horizontal Throw	9-5-3	12-6-4	15-8-5	18-9-6	21-11-7	24-12-8	27-14-9	30-15-10	36-18-12	42-21-14
	Noise Criteria	<20	<20	<20	22	25	28	33	36	41	47
12" Diameter	CFM	240	320	400	480	560	640	720	800	960	1120
	Total Pressure	.017	.030	.047	.068	.093	.121	.153	.189	.273	.371
	Short Horizontal Throw	7-4-2	10-5-3	12-6-4	15-7-5	17-9-6	20-10-7	22-11-7	25-12-8	30-15-10	35-17-12
	Long Horizontal Throw	14-7-5	19-9-6	23-12-8	28-14-9	33-16-11	37-19-12	42-21-14	47-23-16	56-28-19	65-33-22
	Noise Criteria	<20	<20	21	25	29	32	35	38	44	50
14" Diameter	CFM	330	440	550	660	770	880	990	1100	1320	1540
	Total Pressure	.020	.036	.057	.081	.111	.145	.183	.226	.326	.443
	Short Horizontal Throw	11-6-4	15-7-5	18-9-6	22-11-7	26-13-9	29-15-10	33-17-11	37-18-12	44-22-15	52-26-17
	Long Horizontal Throw	21-10-7	28-14-9	34-17-11	41-21-14	48-24-16	55-28-18	62-31-21	69-34-23	83-41-28	97-48-32
	Noise Criteria	<20	<20	25	31	36	40	43	45	48	53

Notes:

1. Tests conducted in accordance with ANSI/ASHRAE 70-1991 at isothermal conditions.
2. Tests conducted with a straight rigid inlet condition. Other inlet conditions may alter performance.
3. Unit of measure: Neck Velocity = FPM; Velocity Pressure = in. w.c. Air Flow Rate = CFM; Total Pressure = in. w.c. Throw = ft at 50, 100, and 150 fpm terminal velocity
4. Noise Criteria (NC) is based upon 10 dB room absorption (Re: 10^{-12} watts) evaluated at 125 thru 4000 Hz octave bands.
5. Flow hoods are recommended for system balancing.

PD, PDR, RFPR, RENP (Page 65, 68, 69)

Neck Velocity		200	300	400	500	600	700	800
6" Diameter	CFM	40	60	80	100	120	135	155
	-Ps	.003	.007	.012	.019	.027	.034	.044
8" Diameter	CFM	70	105	140	175	210	245	380
	-Ps	.004	.010	.017	.026	.037	.051	.068
10" Diameter	CFM	110	165	220	275	325	380	435
	-Ps	.005	.011	.020	.030	.043	.058	.076
12" Diameter	CFM	155	235	315	395	470	550	630
	-Ps	.005	.012	.021	.033	.046	.063	.083
14" Diameter	CFM	215	320	430	535	640	750	855
	-Ps	.006	.013	.023	.035	.050	.069	.090
16" Diameter	CFM	280	420	560	700	840	975	1115
	-Ps	.008	.018	.031	.048	.070	.094	.120
18" Diameter	CFM	355	530	705	885	1060	1235	1415
	-Ps	.008	.018	.031	.049	.070	.092	.125
24" x 24"	CFM	735	1100	1470	1835	2200	2570	2935
	-Ps	.008	.018	.032	.050	.070	.095	.130

Note: The use of a balancing hood is recommended to balance the system.
NC is based on 10 db room attenuation (Re: 10 - 12 watts) ASHRAE 36-72.
X=less than 20.
Terminal velocity of 75 FPM.

Recommended Noise Criteria and Face Velocity Ranges are on page 77

CBPS Supply (Page 66)

One-Way Supply

Neck Size		Neck Velocity - V_N 300	400	500	600	700	800	1000	1200
6"	CFM	60	80	100	120	140	160	200	240
	Ps	.060	.080	.100	.150	.200	.260	.400	.580
	Throw	2.5-4.0-5.0	3.5-5.0-6.0	4.0-6.0-7.0	4.5-7.0-8.5	5.5-8.0-9.5	6.5-9.5-11.5	8.0-12.0-14.5	9.5-14.0-17.0
	NC	<20	<20	<20	22	26	30	40	>45
8"	CFM	105	140	175	210	245	280	350	420
	Ps	.080	.110	.160	.240	.320	.420	.650	.930
	Throw	4.0-6.0-7.0	5.5-8.0-9.5	6.5-10.0-12.0	8.0-12.0-14.5	7.5-14.0-17.0	10.5-10.6-19.0	13.5-20.0-24.0	16.0-24.0-29.0
	NC	<20	<20	21	26	31	39	>45	>45
10"	CFM	165	220	275	325	380	435	545	650
	Ps	.080	.110	.170	.250	.320	.430	.660	.940
	Throw	4.5-7.0-8.5	6.5-9.5-11.5	8.0-12.0-14.5	9.5-14.5-17.5	11.0-16.5-20.0	12.5-19.0-23.0	16.0-24.0-29.0	19.0-28.5-34.0
	NC	<20	<20	23	26	34	40	>45	>45
12"	CFM	235	315	395	470	550	630	790	940
	Ps	.080	.110	.170	.250	.340	.440	.690	.980
	Throw	5.5-8.5-10.0	7.5-11.0-13.5	9.5-14.0-17.0	11.0-16.5-20.0	13.0-19.5-26.5	14.5-22.0-26.5	18.5-27.5-33.0	22.0-33.0-39.5
	NC	<20	20	25	33	40	45	>45	>45
14"	CFM	325	430	535	640	750	860	1075	1275
	Ps	.110	.140	.210	.300	.420	.550	.860	1.200
	Throw	4.5-7.0-8.5	6.5-9.5-11.5	8.0-12.0-14.5	9.5-14.5-17.5	11.5-17.0-20.5	13.0-17.5-23.5	16.5-24.5-29.5	19.5-29.0-35.0
	NC	<20	20	25	30	38	44	>45	>45
16'	CFM	420	560	700	840	980	1120	1400	1680
	Ps	.020	.040	.060	.080	.110	.140	.220	.260
	Throw	5.0-8.0-10.0	7.0-10.0-12.0	10.0-13.0-16.0	12.0-15.0-18.0	13.0-18.0-21.0	14.0-19.0-24.0	18.0-26.0-30.0	20.0-31.0-36.0
	NC	<20	<20	26	34	39	43	>45	>45

Two-Way Supply

Neck Size		Neck Velocity - V_N 300	400	500	600	700	800	1000	1200
6"	CFM	60	80	100	120	140	160	200	240
	Ps	.050	.070	.090	.130	.170	.220	.340	.500
	Throw	2.0-3.0-3.5	2.5-3.5-4.5	3.5-5.0-6.0	4.0-5.5-6.5	4.5-6.5-8.0	5.0-7.5-9.0	6.5-9.5-11.5	7.5-11.5-13.5
	NC	<20	<20	<20	20	24	28	37	44
8"	CFM	105	140	175	210	245	280	350	420
	Ps	.400	.054	.084	.120	.165	.215	.330	.480
	Throw	3.0-4.5-5.5	3.5-5.5-6.5	4.5-7.0-8.5	5.5-8.5-10.0	6.5-9.5-11.5	7.5-11.0-13.0	9.5-14.0-17.0	11.0-16.5-20.0
	NC	<20	<20	<20	23	29	36	43	>45
10"	CFM	165	220	275	325	380	435	545	650
	Ps	.060	.080	.130	.180	.250	.310	.510	.730
	Throw	4.5-6.5-7.5	5.5-8.5-10.0	7.0-10.5-12.5	8.5-12.5-15.0	9.5-14.5-17.5	11.0-16.5-20.0	14.0-21.0-25.0	16.5-25.0-30.0
	NC	<20	<20	<20	25	29	37	45	>45
12"	CFM	235	315	395	470	550	630	790	940
	Ps	.050	.070	.110	.150	.210	.270	.430	.600
	Throw	4.5-6.5-7.5	5.5-8.5-10.0	7.0-10.5-12.5	8.5-12.5-15.0	10.0-15.0-18.0	11.5-17.0-20.5	14.5-21.5-26.0	17.0-25.5-30.5
	NC	<20	<20	23	30	37	43	>45	>45
14"	CFM	325	430	535	640	750	860	1075	1275
	Ps	.050	.070	.100	.150	.200	.260	.410	.570
	Throw	3.5-5.5-6.5	4.5-7.0-8.5	6.0-9.0-11.0	7.0-10.5-12.5	8.5-12.5-15.0	9.5-14.0-17.0	11.5-17.5-21.0	14.0-21.0-25.0
	NC	<20	<20	22	28	35	40	>45	>45
16'	CFM	420	560	700	840	980	1120	1400	1680
	Ps	.020	.040	.060	.080	.110	.140	.220	.260
	Throw	4.0-6.0-8.0	5.0-8.0-9.0	7.0-10.0-12.0	9.0-11.0-13.0	10.0-14.0-16.0	11.0-16.0-19.0	13.0-19.0-24.0	16.0-22.0-27.0
	NC	<20	<20	26	34	39	43	>45	>45

Three-Way Supply

Neck Size		Neck Velocity - V_N 300	400	500	600	700	800	1000	1200
6"	CFM	60	80	100	120	140	160	200	240
	Ps	.020	.030	.040	.060	.080	.100	.150	.230
	Throw	2.5-3.5-4.5	3.0-4.5-5.5	3.5-5.5-6.5	4.5-6.5-8.0	5.0-7.5-9.0	5.5-8.5-10.5	7.5-11.0-13.5	8.5-13.0-15.5
	NC	<20	<20	<20	<20	23	25	34	40
8"	CFM	105	140	175	210	245	280	350	420
	Ps	.020	.030	.040	.060	.080	.100	.160	.220
	Throw	3.0-4.0-5.0	4.0-5.5-6.5	4.5-7.0-8.5	5.5-8.0-9.5	6.5-9.5-11.5	7.5-11.0-13.5	9.0-13.5-16.0	11.0-16.5-20.0
	NC	<20	<20	<20	21	26	33	39	44
10"	CFM	165	220	275	325	380	435	545	650
	Ps	.030	.040	.060	.090	.120	.150	.240	.340
	Throw	4.5-6.5-8.0	5.5-8.5-10.5	7.0-10.5-12.5	8.5-12.5-15.0	9.5-14.5-17.5	11.5-17.0-20.5	14.0-21.0-25.0	17.0-25.0-30.0
	NC	<20	<20	<20	21	26	34	41	>45
12"	CFM	235	315	395	470	550	630	790	940
	Ps	.020	.030	.050	.070	.100	.130	.200	.290
	Throw	4.5-6.5-8.0	5.5-8.5-10.0	7.0-10.5-12.5	8.5-12.5-15.0	10.0-14.5-17.5	11.0-16.5-20.0	13.5-20.5-24.5	16.5-24.5-29.5
	NC	<20	<20	21	27	34	39	44	>45
14"	CFM	325	430	535	640	750	860	1075	1275
	Ps	.020	.030	.050	.070	.100	.130	.200	.280
	Throw	4.0-5.0-7.0	5.5-8.0-9.5	6.0-9.0-11.0	8.0-12.0-14.5	9.5-14.0-17.0	10.5-16.0-19.5	13.5-20.0-24.0	15.5-23.5-28.0
	NC	<20	<20	20	25	32	37	44	>45
16'	CFM	420	560	700	840	980	1120	1400	1680
	Ps	.020	.040	.060	.080	.110	.140	.220	.260
	Throw	5.0-6.0-8.0	6.0-9.0-10.0	7.0-9.0-12.0	9.0-13.0-15.0	10.0-13.0-16.0	11.0-15.0-18.0	12.0-18.0-21.0	15.0-21.0-26.0
	NC	<20	<20	26	34	39	43	>45	>45

NOTES:

1. **Ps** is static Pressure Loss in inches of H_2O
2. **NC** is based on 10db room attenuation (Re: 10^{-12} watts)
3. Throw is iso-thermal air at 150, 100, 75 FPM terminal velocities.
4. The use of a balancing hood is recommended to balance the system.

Recommended Noise Criteria and Face Velocity Ranges are on page 77

Engineering Data

CBPS Supply (Page 66)

Four-Way Supply

Neck Size		Neck Velocity - V_N 300	400	500	600	700	800	1000	1200
6"	CFM	60	80	100	120	140	160	200	240
	Ps	<.010	.010	.020	.030	.040	.050	.080	.120
	Throw	1.5-2.0-2.5	1.5-2.5-3.0	2.0-3.0-4.0	2.5-3.5-4.5	3.0-4.5-5.5	3.5-5.0-6.0	4.0-6.0-7.0	5.0-7.5-9.0
	NC	<20	<20	<20	<20	21	24	32	38
8"	CFM	105	140	175	210	245	280	350	420
	Ps	<.010	.010	.020	.030	.040	.060	.090	.120
	Throw	1.5-2.5-3.0	2.0-3.0-4.0	2.5-4.0-5.0	3.5-5.0-6.0	4.0-5.5-7.0	4.5-6.5-8.0	5.5-8.0-10.0	6.5-9.5-11.5
	NC	<20	<20	<20	<20	25	31	37	42
10"	CFM	165	220	275	325	380	435	545	650
	Ps	0.01	.020	.030	.040	.060	.070	.110	.160
	Throw	3.0-4.0-5.0	3.5-5.5-6.5	4.5-6.5-8.0	5.5-8.0-10.0	6.0-9.0-11.0	7.0-10.5-12.5	9.0-13.0-15.5	10.5-15.5-18.5
	NC	<20	<20	<20	21	27	32	39	44
12"	CFM	235	315	395	470	550	630	790	940
	Ps	.010	.020	.030	.040	.060	.080	.120	.170
	Throw	2.5-3.5-4.0	3.0-4.5-5.5	3.5-5.5-6.5	4.5-7.0-8.5	5.5-8.0-9.5	6.0-7.0-11.0	7.5-11.5-14.0	9.0-13.5-16.0
	NC	<20	<20	20	26	32	37	42	>45
14"	CFM	325	430	535	640	750	860	1075	1275
	Ps	.010	.020	.030	.050	.060	.080	.130	.180
	Throw	2.0-3.0-3.5	2.5-4.0-5.0	3.5-5.0-6.0	4.0-6.0-7.0	4.5-7.0-8.5	5.5-8.0-10.0	6.5-10.0-12.0	7.5-11.5-14.0
	NC	<20	<20	<20	24	30	35	42	>45
16'	CFM	420	560	700	840	980	1120	1400	1680
	Ps	.020	.040	.060	.080	.110	.140	.220	.260
	Throw	3.0-4.0-5.0	4.0-6.0-7.0	5.0-8.0-11.0	6.0-9.0-12.0	8.0-11.0-14.0	9.0-13.0-16.0	10.0-15.0-19.0	12.0-17.0-22.0
	NC	<20	<20	26	34	39	43	>45	>45

NOTES:
1. **Ps** is static Pressure Loss in inches of H_2O
2. **NC** is based on 10db room attenuation (Re: 10^{-12} watts)
3. Throw is iso-thermal air at 150, 100, 75 FPM terminal velocities.
4.The use of a balancing hood is recommended to balance the system.

CBPR Return (Page 66)

Neck Velocity - V_N		200	300	400	500	600	700	800
-Ps		.01	.02	.03	.05	.07	.10	.12
6" Diameter	CFM	40	60	80	100	120	140	160
8" Diameter	CFM	70	105	140	175	210	245	280
10" Diameter	CFM	110	165	220	275	330	385	440
12" Diameter	CFM	160	240	320	395	475	550	630
14" Diameter	CFM	215	320	430	535	640	750	855
16" Diameter	CFM	281	420	563	698	836	975	1114
18" Diameter	CFM	356	531	712	881	1056	1231	1406

SCBPS Diffuser (Page 66)

Neck Velocity - V_N		300	400	500	600	700	800	1000	1200
	CFM	60	80	100	120	135	155	195	235
6"	Ps	.012	.022	.034	.049	.066	.086	.135	.194
An .200	Vt 75 Throw	1.00	1.50	1.50	2.00	2.50	3.00	3.50	4.00
Ak .330	Vt 150 Throw	0.50	1.00	1.00	1.50	1.50	1.50	0.20	2.50
	NC	<20	<20	<20	21	27	30	36	41
	CFM	105	140	175	210	245	280	350	420
8"	Ps	.012	.022	.034	.049	.066	.086	.135	.195
An .350	Vt 75 Throw	2.25	3.00	3.50	4.50	5.25	6.00	7.50	9.00
Ak .450	Vt 150 Throw	1.25	2.00	2.50	3.00	3.50	3.50	4.50	5.50
	NC	<20	<20	20	25	30	34	39	45
	CFM	165	220	275	325	380	435	545	655
10"	Ps	.012	.022	.034	.049	.066	.087	.135	.195
An .550	Vt 75 Throw	3.50	4.50	5.50	7.00	8.00	9.00	11.50	13.50
Ak .570	Vt 150 Throw	2.00	3.00	3.50	4.50	5.00	5.50	7.00	8.50
	NC	<20	<20	20	28	33	37	42	48
	CFM	235	315	395	470	550	630	785	945
12"	Ps	.014	.025	.039	.056	.076	.099	.155	.223
An .790	Vt 75 Throw	5.00	6.00	7.50	9.50	11.00	12.50	15.50	18.50
Ak .700	Vt 150 Throw	3.00	4.00	5.00	6.00	7.00	7.50	9.50	11.50
	NC	<20	<20	21	28	34	38	44	50
	CFM	320	430	535	640	750	855	1070	1285
14"	Ps	.016	.028	.044	.063	.086	.112	.175	.252
An 1.070	Vt 75 Throw	6.00	7.50	9.50	11.50	13.50	15.50	19.00	23.00
Ak .840	Vt 150 Throw	3.50	5.00	6.00	7.00	8.50	9.50	12.00	14.50
	NC	<20	<20	21	28	35	39	46	52

FPD12 (Page 63)

Neck Velocity		400	500	600	700	800	1000	1200	1400	1600
6"	CFM	80	100	120	135	155	195	235	275	315
An .200	Ps	0.008	0.012	0.019	0.025	0.033	0.052	0.074	0.101	0.131
	NC	<20	<20	<20	<20	<20	25	30	35	40
	Throw	4	5	5	6	7	8	9	10	11
7"	CFM	107	134	160	187	214	267	321	374	428
An .275	Ps	0.01	0.015	0.023	0.031	0.041	0.064	0.091	0.125	0.162
	NC	<20	<20	<20	<20	20	30	35	40	45
	Throw	4	5	6	7	8	10	11	12	13
8"	CFM	140	175	210	245	280	350	420	490	560
An .350	Ps	0.012	0.019	0.028	0.038	0.05	0.078	0.112	0.153	0.199
	NC	<20	<20	<20	<20	20	30	35	40	45
	Throw	5	6	7	8	9	11	12	14	15

Terminal Velocity of 75 FPM
An = Neck Area in Sq. Ft.
NC = Noice Criteria based on 10dB room absorption (Re: 10^{-12} watts).

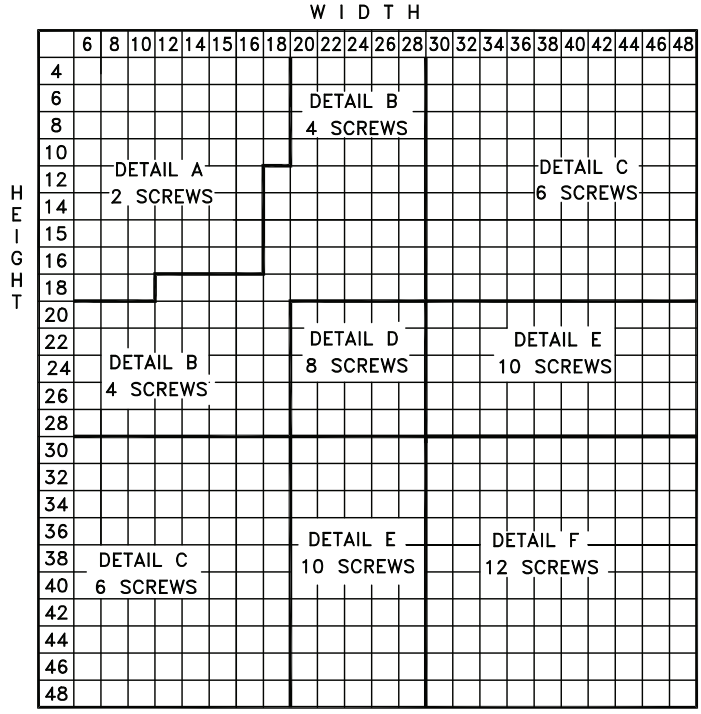
DPD12 (Page 64)

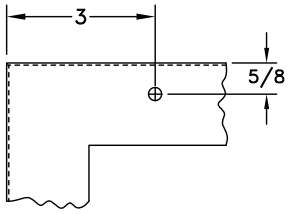
Neck Velocity		400	500	600	700	800	900	1000	1200	1400
6"	CFM	80	100	120	135	155	175	195	235	275
An .200	Ps	.006	.010	.014	.018	.023	.030	.037	.054	.073
Ak .279	NC	<20	<20	<20	<20	<20	20	25	30	35
	Throw	1.0	2.0	2.0	2.5	3.0	3.5	4.0	4.5	5.5
7"	CFM	107	134	160	187	214	240	267	320	374
An .267	Ps	.008	.012	.017	.025	.031	.043	.052	.075	.103
Ak .298	NC	<20	<20	<20	20	25	30	30	35	40
	Throw	2.5	3.5	4.0	4.5	5.0	5.5	6.0	7.0	8.0
8"	CFM	140	175	210	245	280	315	350	420	490
An .350	Ps	.010	.015	.022	.029	.038	.049	.060	.086	.117
Ak .354	NC	<20	<20	<20	20	25	30	30	35	40
	Throw	2.5	3.5	4.0	4.5	5.0	5.5	6.0	7.0	8.0

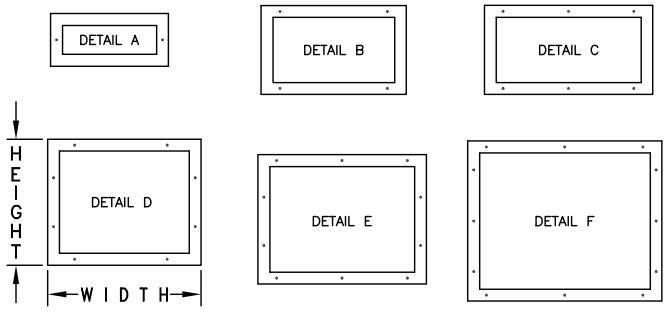
Terminal Velocity of 75 FPM
An = Neck Area in Sq. Ft.
NC = Noise Criteria based on 10dB room absorption (Re: 10^{-12} watts).

Recommended Noise Criteria and Face Velocity Ranges are on page 77

Screw Hole Location Chart
92 Series, 94 Series, 98 Series
821, 831

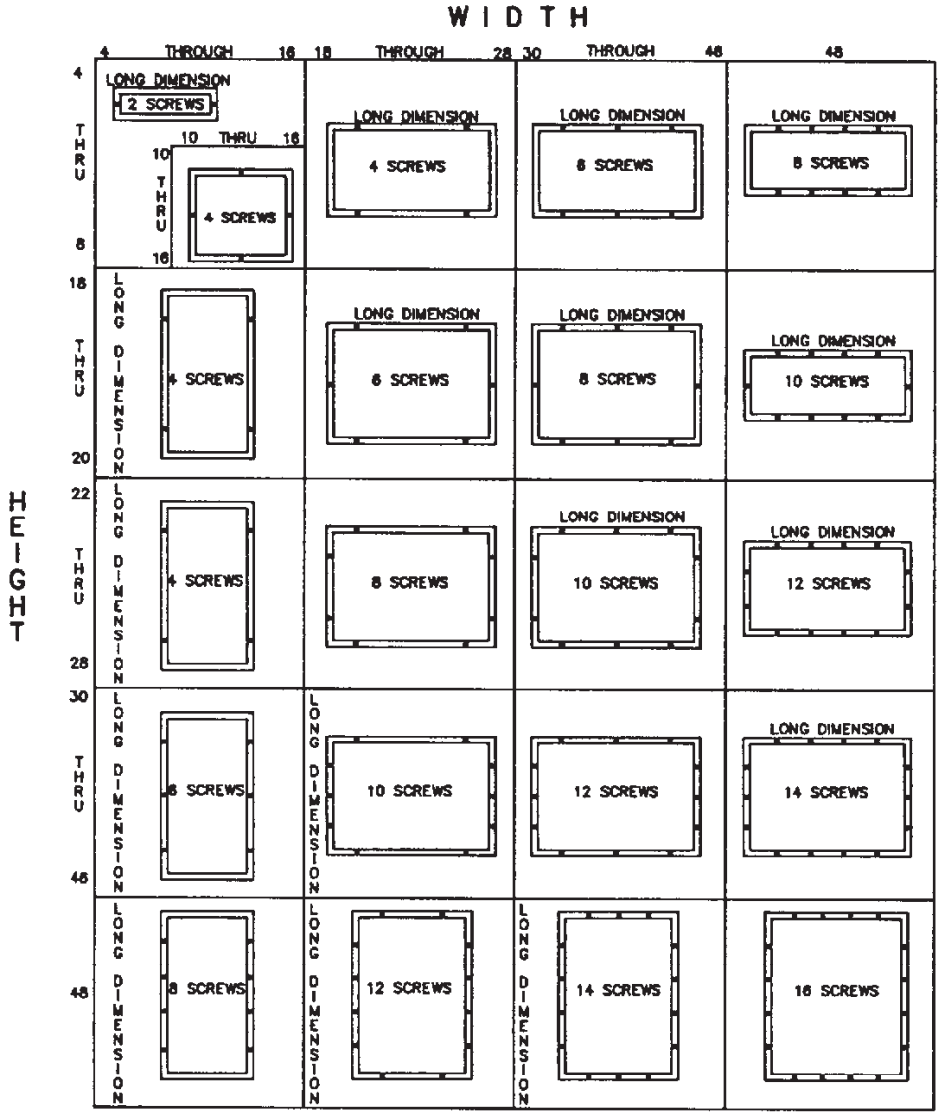


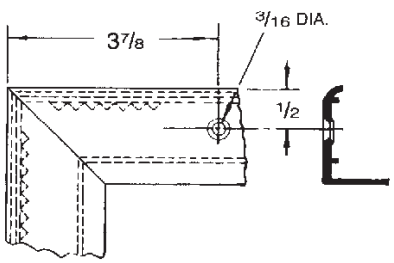




Engineering Data

Screw Hole Chart for Extruded Aluminum Line
V Series, H Series, C Series, RH Series





821, 831, 92 Series, 98VOH, H and V Series Drop Chart, Use with size selection charts

Instructions for use of Drop Chart

The drop of the air stream is determined by using the throw and velocity of the register selected. On the drop chart, lay a straight edge connecting these values. The total drop of the air stream will be the sum of the drop due to temperature (D_t) and the drop due to spread (D_S).

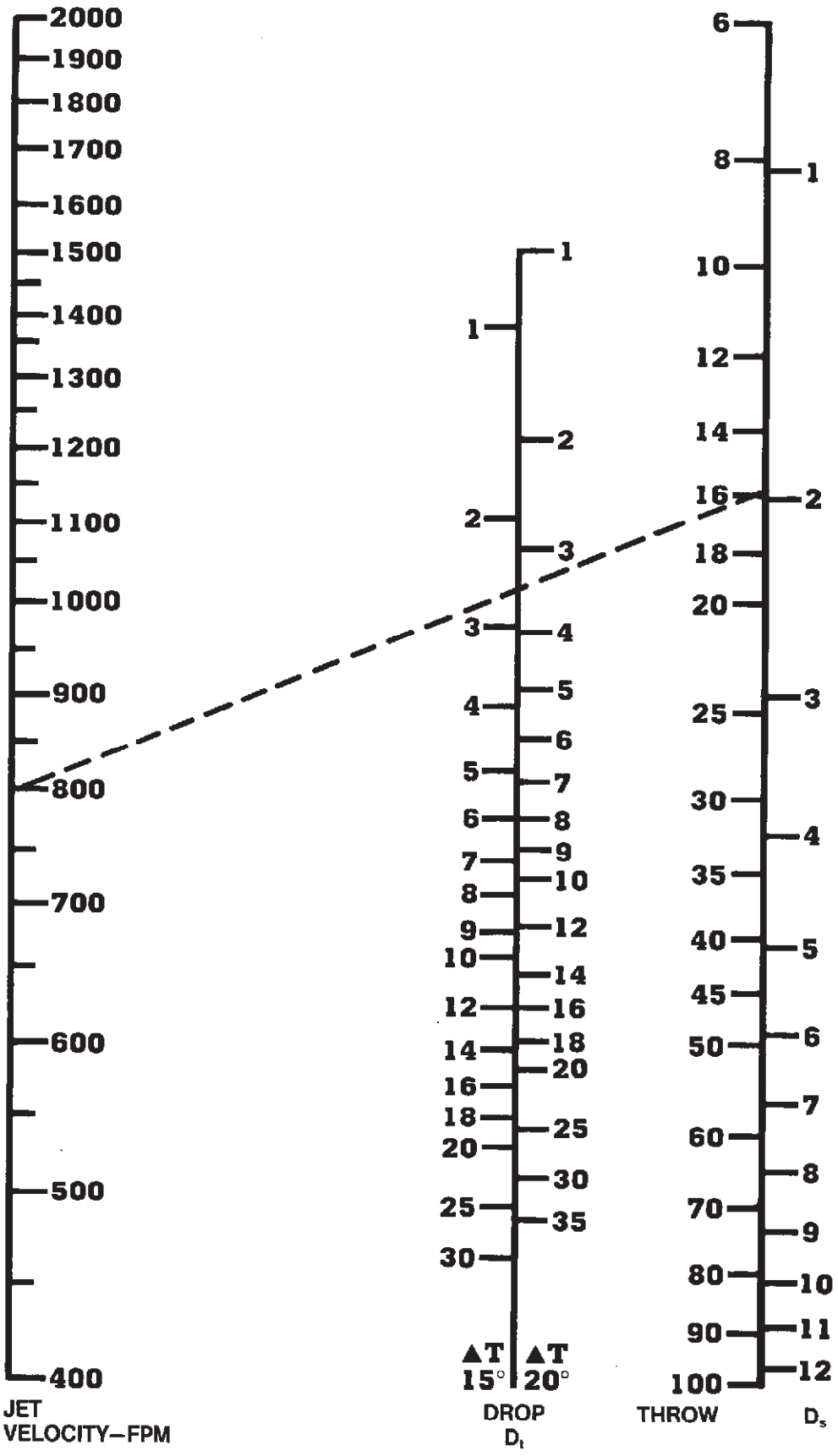
Example: The drop for a 92 Series register "C" deflection 16x5 size has an 800 fpm velocity and a 16 foot throw. Connect these two points on the chart and read the drops as follows:

$D_t = 2.7'$ $D_S = 2'$

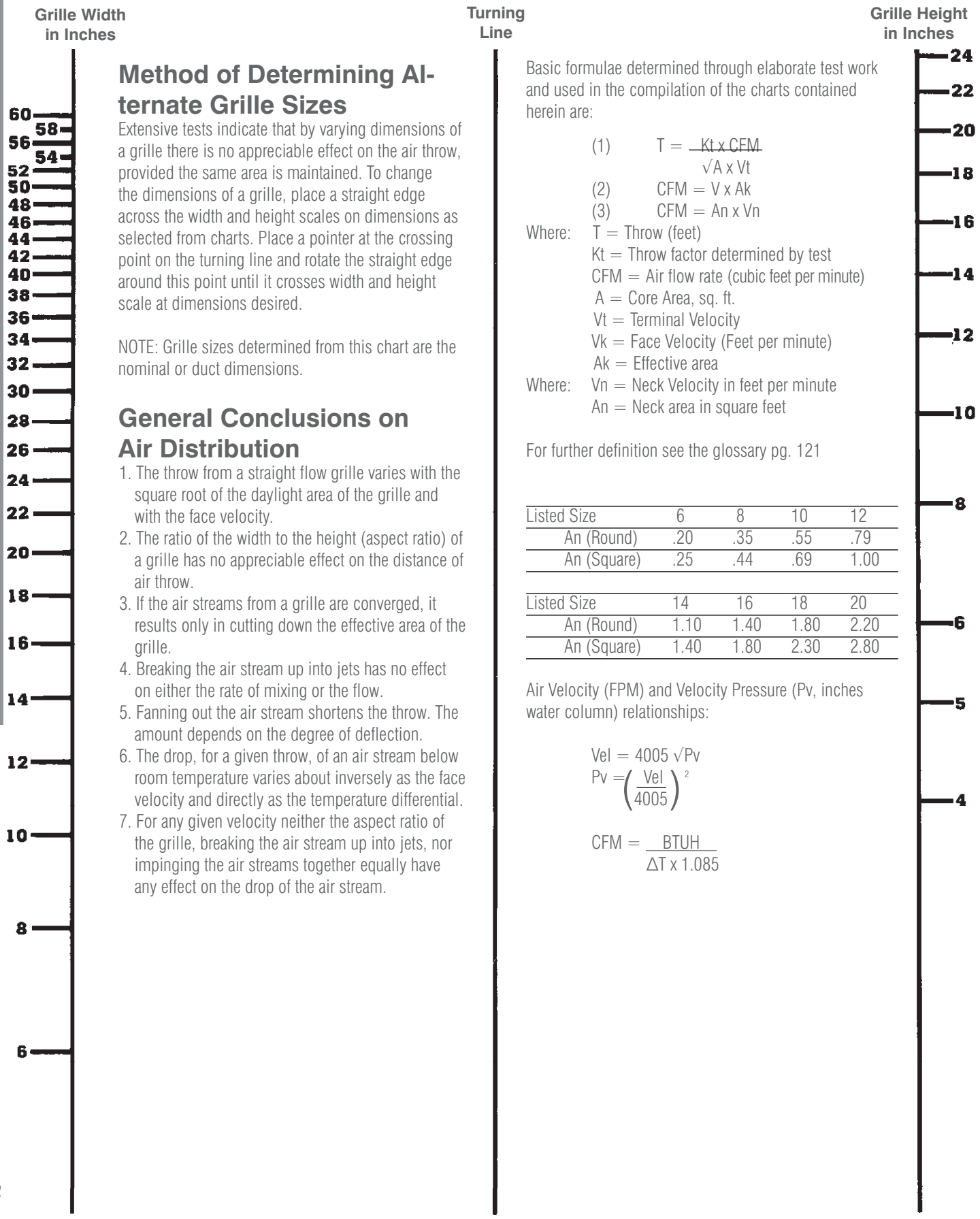
D total = 2.7 + 2 = 4.7'

D_t = Drop along line of throw due to temperature difference.

D_S = Drop resulting from vertical spread.



92 Series, H and V Series Alternate Sizing Graph



Method of Determining Alternate Grille Sizes

Extensive tests indicate that by varying dimensions of a grille there is no appreciable effect on the air throw, provided the same area is maintained. To change the dimensions of a grille, place a straight edge across the width and height scales on dimensions as selected from charts. Place a pointer at the crossing point on the turning line and rotate the straight edge around this point until it crosses width and height scale at dimensions desired.

NOTE: Grille sizes determined from this chart are the nominal or duct dimensions.

General Conclusions on Air Distribution

1. The throw from a straight flow grille varies with the square root of the daylight area of the grille and with the face velocity.
2. The ratio of the width to the height (aspect ratio) of a grille has no appreciable effect on the distance of air throw.
3. If the air streams from a grille are converged, it results only in cutting down the effective area of the grille.
4. Breaking the air stream up into jets has no effect on either the rate of mixing or the flow.
5. Fanning out the air stream shortens the throw. The amount depends on the degree of deflection.
6. The drop, for a given throw, of an air stream below room temperature varies about inversely as the face velocity and directly as the temperature differential.
7. For any given velocity neither the aspect ratio of the grille, breaking the air stream up into jets, nor impinging the air streams together equally have any effect on the drop of the air stream.

Basic formulae determined through elaborate test work and used in the compilation of the charts contained herein are:

$$(1)\quad T = \frac{Kt \times CFM}{\sqrt{A} \times Vt}$$

$$(2)\quad CFM = V \times Ak$$

$$(3)\quad CFM = An \times Vn$$

Where: T = Throw (feet)
Kt = Throw factor determined by test
CFM = Air flow rate (cubic feet per minute)
A = Core Area, sq. ft.
Vt = Terminal Velocity
Vk = Face Velocity (Feet per minute)
Ak = Effective area
Where: Vn = Neck Velocity in feet per minute
An = Neck area in square feet

For further definition see the glossary pg. 121

Listed Size	6	8	10	12
An (Round)	.20	.35	.55	.79
An (Square)	.25	.44	.69	1.00

Listed Size	14	16	18	20
An (Round)	1.10	1.40	1.80	2.20
An (Square)	1.40	1.80	2.30	2.80

Air Velocity (FPM) and Velocity Pressure (Pv, inches water column) relationships:

$$Vel = 4005\sqrt{Pv}$$

$$Pv = \left(\frac{Vel}{4005}\right)^2$$

$$CFM = \frac{BTUH}{\Delta T \times 1.085}$$

Suggested Specifications

Surfaire® T-Bar Diffusers

Furnish and install Hart & Cooley SurfAire® insulated ceiling diffusers as shown on the plans. The diffuser shall be a 2'x2' T-Bar lay-in. Face shall be stucco embossed aluminum with off-white baked enamel finish for ceiling aesthetics, corrosion protection and ease of cleaning. Face will have formed deflector apertures which distribute air in thin layers along the ceiling surface and which provide for optimum dispersion in one, two, three, four-way or two-way corner patterns.

Back panel shall be formed galvanized steel covered with glass fiber insulation and an aluminum foil vapor barrier. Insulation is held securely in place by face margin edge fold over. Insulation will be prescored to accept specified collar sizes.

5400 Series collars will be supplied providing efficient, tight attachment with bayonet fasteners to mating prepunched holes in back panel. Collars will provide flex duct locking tabs and damper mounting slots. Collar damper slots provide for damper attachment or removal at any time.

3800 Series, fully adjustable, butterfly dampers shall be supplied (if specified). Damper adjustment handle is inserted before or after damper is mounted and is removable at any time.

Perforated Insulated T-Bar Diffusers and Return Grilles

Contractor shall furnish and install Hart & Cooley PDS perforated diffuser or PDSD perforated diffuser with deflectors as indicated on the plans. Perforated diffusers shall be 2'x2' T-Bar lay-in. Exposed face will have a minimum 51% free area and be coated with off-white baked enamel finish. Deflectors (if specified) shall be fully adjustable, externally providing one, two, three, four-way or two-way corner air diffusion capability.

Back panel shall be black pre-coated formed steel covered with glass fiber insulation and an aluminum foil vapor barrier. Insulation is held securely in place by face margin edge fold over. Insulation is prescored to accept specified collar sizes.

5400 Series collars will be supplied providing efficient, tight attachment with bayonet fasteners to mating pre-punched holes in back panel. Collars will provide flex duct locking tabs and damper mounting slots. Collar damper slots provide for damper attachment or removal at any time.

3800 Series fully adjustable butterfly dampers shall be supplied (if specified). Damper adjustment handle is inserted before or after damper is mounted and is removable at any time.

Matching Hart & Cooley PDR perforated return air grilles shall be furnished according to the plans.

Removable Face Perforated T-Bar Diffusers and Return Grilles

Contractor shall furnish and install Hart & Cooley RFPS series perforated diffusers as indicated on the plans. Exposed face will be of a removable hinged style with a minimum 51% free area and be coated with white baked enamel finish. Deflectors are to be the patented, directable deflector to ensure proper adjustable air deflection. Back panel shall be black, pre-coated, formed steel to minimize sight into diffuser.

5400 Series collars will be supplied providing efficient, tight attachment with bayonet fasteners to mating pre-punched holes in back panel. Collars will provide flex duct locking tabs and amper mounting slots. Collar damper slots provide for damper attachment or removal at any time.

3800 Series fully adjustable butterfly dampers shall be supplied (if specified). Damper adjustment handle is inserted before or after damper is mounted and is removable at any time.

Matching Hart & Cooley RFPR perforated return air grilles shall be furnished according to the plans.

High Volume Supply T-Bar Diffuser

Contractor shall furnish and install Hart & Cooley HVS high volume supply 2'x2' T-Bar lay-in diffuser as shown on the plans. This diffuser will consist of a formed back panel and three stepdown formed elements, all made of heavy gauge steel. Finish shall be an off-white baked enamel. Interior air diffusion elements are easily removable at any time without tools for access to damper control rod. The air diffusion pattern shall be a full 360°.

The back panel shall be fully insulated with fiberglass having an aluminum foil vapor barrier. Insulation is held rigidly in place with adhesive and will be prescored to accept specified collar sizes.

5400 Series collars will be supplied providing efficient, tight attachment with bayonet fasteners to mating pre-punched holes in back panel. Collars will provide flex duct locking tabs and amper mounting slots. Collar damper slots provide for damper attachment or removal at any time.

3800 Series fully adjustable butterfly dampers shall be supplied (if specified). Damper adjustment handle is inserted before or after damper is mounted and is removable at any time.

Fixed Pattern T-Bar Diffuser

Contractor shall furnish and install Hart & Cooley FPD fixed pattern diffuser 2'x2' T-Bar lay-in as shown on the plans. This diffuser will consist of a formed back panel and two stepdown formed elements, all made of heavy gauge steel. Finish shall be an off-white baked enamel. Interior air diffusion elements are easily removable at any time without tools for access to damper or neck. The air diffusion pattern shall be a full 360°.

3800 Series fully adjustable butterfly dampers shall be supplied (if specified) and can be adjustable through the face.

Glossary of Terms

Ceiling or Wall Effect
The tendency of an air stream moving along a wall or ceiling surface to remain in contact with that surface.

Core Area
The total plane area of that portion of a grille, face, or register bounded by a line tangent to the outer opening through which air can pass. The core area is less than the register size. Example, a 14-in. x 8-in. register may have a core that is 1 in. less than the listed size; so, the core area is 13in. x 7in. – 91 sq. in.

Diffuser
An outlet discharging supply air in a spreading pattern.

Diffusion
Distribution of air within a space by an outlet discharging supply air in a spreading pattern.

Drop
The vertical distance between the base of the outlet and the bottom of the air stream at the end of the horizontal throw.

Effective Area, Ak (Sq. Ft.)
The calculated area of an outlet based on the average measured velocity between the fins.

Envelope
The outer boundary of an air stream moving at a specific velocity (for example, a 50 fpm envelope).

Free Area
The total minimum area of the openings in the air outlet or inlet through which air can pass.

Grille
A louvered covering for an opening through which air passes.

Induction
The process of drawing room air into the projected air stream due to the velocity of the projected air stream (sometimes called aspiration).

Jet Velocity, Fpm (Face Velocity)
The average measured velocity of air passing between the fins.

Natural Convection Currents
Air currents created by a buoyancy effect caused by the difference in temperature between the room air and the air in contact with a warm or cold surface.

Outlet
Any opening through which air is delivered to condition a space.

Outlet Velocity, Fpm
The average velocity of the supply air, measured as it passes through the plane of the opening in the supply outlet.

Pressure Loss, WG
Indicates how much total pressure is required to move air through a register.

Primary Air
The mixture of supply air from the outlet and room air within the 1 50 fpm envelope.

Radius of Diffusion, Ft.
The horizontal distance (throw) from a ceiling diffuser to the point of terminal velocity.

Register
A grille which is equipped with a damper or control valve, and which directs air in a nonspreading jet.

Return
Any opening through which air is removed from a conditioned space.

Spread, Ft.
The maximum width of the total air stream at the point of terminal velocity.

Static Pressure, PS
The outward force of air within a duct measured in inches of water.

Stratification Boundary
The boundary between room air currents moving faster than 1 5 fpm and the stratification zone.

Stratified Zone
A region in which room air velocity is less than 1 5 fpm.

Temperature Differential
The temperature difference between the primary and the room air.

Temperature Variation (ΔT)
The temperature difference between points within the same space.

Terminal Velocity, Fpm
When the velocity of total air drops to 50 or 75 fpm, depending on the particular application, it reaches terminal velocity. Terminal velocity is not sharply defined for all applications.

Throw (Blow), Ft.
The horizontal distance an air stream travels after leaving a horizontal sidewall outlet before maximum velocity is reduced to terminal velocity. For a perimeter outlet, throw is the vertical distance the air stream travels before maximum velocity is reduced to terminal velocity.

Total Air
The mixture of projected air and room air set in motion by the supply air.

Total Pressure, Pt
The sum of the velocity and static pressures measured in inches of water.

Vane Ratio
The ratio showing depth of vane to minimum width between two adjacent vanes.

Velocity Pressure, Pv
The forward-moving force of air within a duct measured in inches of water.

NC Noise Criteria
A single number noise rating system that indicates what Broad Band, continuous sounds are reasonably acceptable.

Alpha-Numeric Index

Recommended Noise Criteria and Face Velocity Ranges are on page 77

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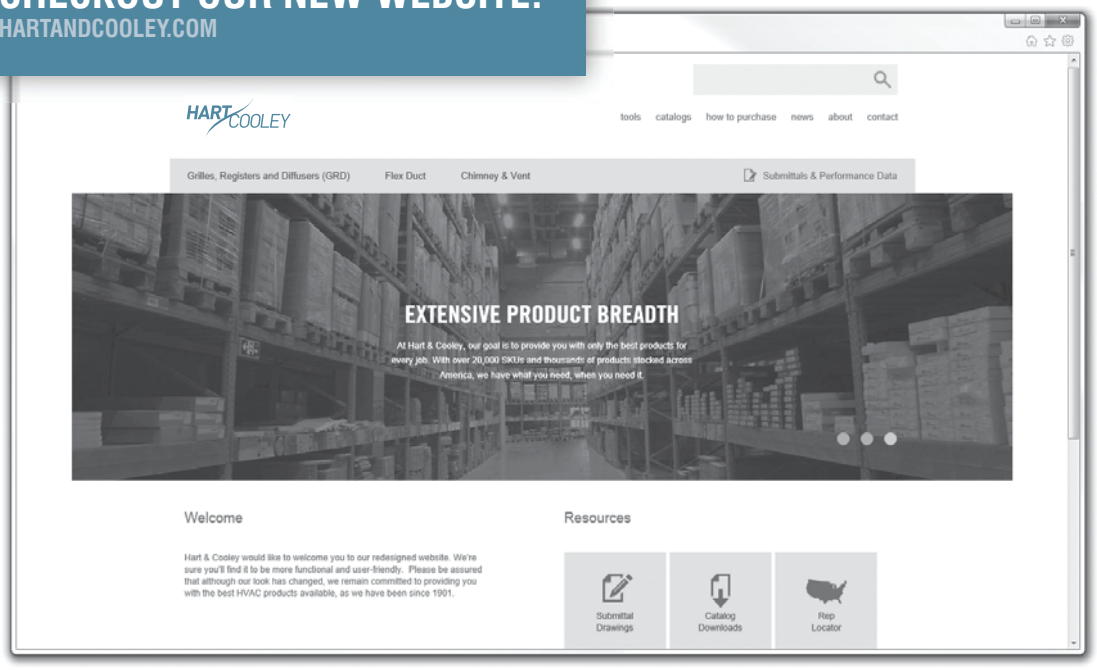

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 Form No. 851531 08/2014