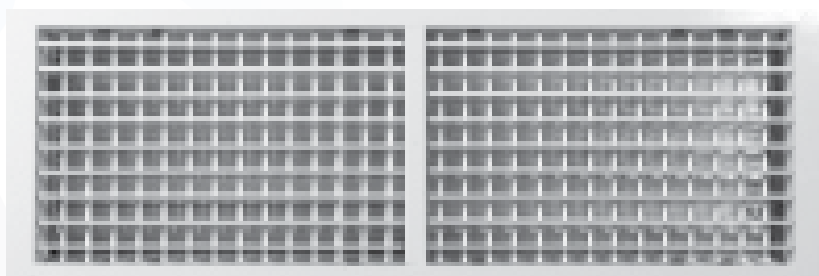
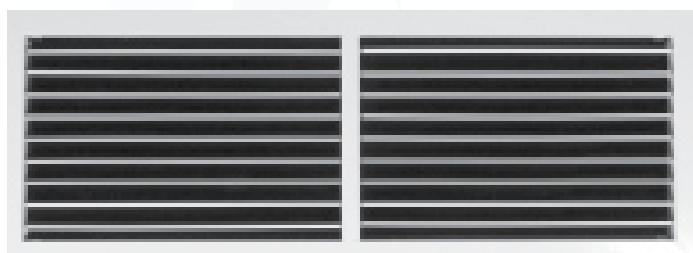


G R I L L E S AND REGISTERS



CHAPTER 2



تكنو فاب
TECHNO FAB
الهندسية ENGINEERING

GRILLES AND REGISTERS

CONTENTS

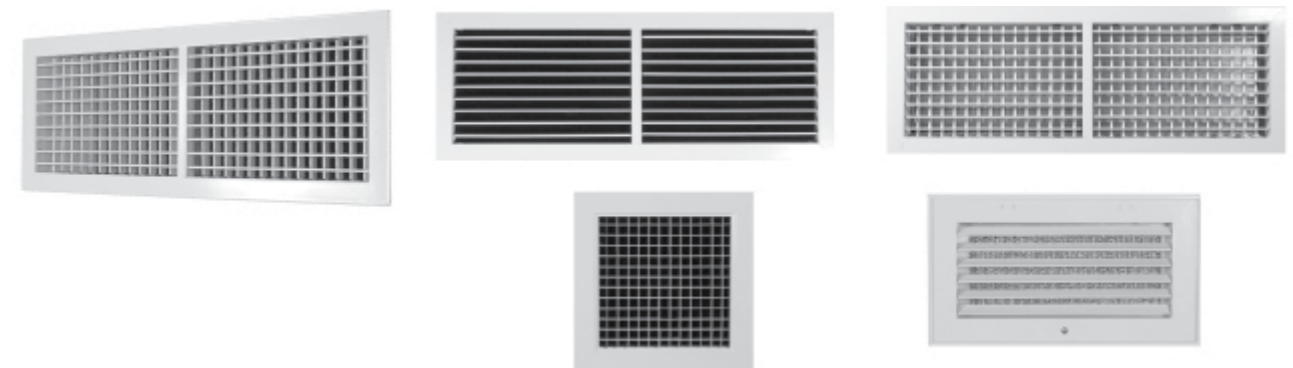
01	Introduction, Features & Characteristics, Models Available.
02	Operating Range, Recommended Outlet Velocities.
03	Engineering Notes, Influence of Blades Deflection on Outlet Performance.
04	Models, Double Deflection Registers.
05	Models, Double Deflection Grilles.
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07	Models, Single Deflection Registers.
08	Models, Single Deflection Grilles.
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13	Profiles used In Grilles and Registers, Available Fixing Mounting.
14	Effective Area Values for Double Deflection Grilles and Registers.
15	Effective Area Values for Single Deflection Grilles and Registers.
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➔ These types of air outlets are the most desirable for the side wall locations. Since they are available with both horizontal and vertical adjustable blades, minor air motion problems can be simply corrected by adjusting the vanes. They are distinguished by their high construction quality, low pressure drops and continued sound levels. Blades can be singularly oriented.

Features & Characteristics:

- Construction: Frame & Blades are made of high quality Extruded Aluminum Profiles of 6063 Alloy.
- Frame Flange width: 30 mm
- Blades: Aerofoil design by punching its four corners by means of G.I. Angles which together create a very robust construction.
- Available in wide variety of standard neck sizes ranging from 300 X 150 up to 1200 X 300 mm in 50 mm increments (other Non-Standard sizes are available on request).

- Both the Grilles and Registers are available in single or double blades deflection which provides air deflection in horizontal and / or vertical planes.
- Blades are individually adjustable to any degree of deflection by hand without the use of any special tools.
- Maximum effective areas can be obtained when the blades are set at 0 degree deflection.
- Blades are separated from their frame by nylon bushes. This method of assembly provides maximum rattle-free performance and eliminates corrosion.
- Large free effective area grilles can be obtained by using an Eggcrate core with 90% Free Area, see page No. GR-09.
- Grilles combined with Opposed Blade Dampers are called Registers.
- Accessories: see page No. GR-10&11
- Available Fixing Mounting: see page No. GR-12.
- Surface Finishes: see page No. GR-34.



Grilles / Registers Model	Single Deflection Blades	Double Deflection Blades	Horizontal or Vertical Blades	Horizontal or Vertical Front Blades	Opposed Blade Damper	Fixed Blades at 45° Angle
SAR		•		•	•	
SAG		•		•		
RAR , EAR	•		•		•	
RAG , EAG	•		•			•

OPERATING RANGE & QUICK SELECTION TABLE FOR DOUBLE DEFLECTION GRILLES/REGISTERS

Nominal Size		CFM Range		Nominal Size		CFM Range	
Inch	mm			Inch	mm		
12" x 6"	300 X 150	190	460	12"x10"	300 X 250	315	725
16" x 6"	400 X 150	270	625	16"x10"	400 X 250	425	970
18" x 6"	450 X 150	300	650	18"x10"	450 X 250	480	1060
20" x 6"	500 X 150	315	725	20"x10"	500 X 250	540	1200
24" x 6"	600 X 150	400	900	24"x10"	600 X 250	610	1400
30" x 6"	750 X 150	450	1025	30"x10"	750 X 250	850	2050
36" x 6"	900 X 150	550	1250	36"x10"	900 X 250	1000	2200
40" x 6"	1000X150	610	1400	40"x10"	1000X 250	1090	2350
48" x 6"	1200X150	700	1600	48"x10"	1200X250	1200	2500
12" x 8"	300 X 200	325	725	12"x12"	300 X 300	390	850
16" x 8"	400 X 200	350	760	16"x12"	400 X 300	525	1160
18" x 8"	450 X 200	390	850	18"x12"	450 X 300	560	1250
20" x 8"	500 X 200	425	950	20"x12"	500 X 300	640	1440
24" x 8"	600 X 200	500	1100	24"x12"	600 X 300	675	1550
30" x 8"	750 X 200	610	1400	30"x12"	750 X 300	870	2000
36" x 8"	900 X 200	675	1550	36"x12"	900 X 300	1070	2350
40" x 8"	1000 X200	800	1900	40"x12"	1000 X300	1200	2500
48" x 8"	1200X 200	900	2150	48"x12"	1200 X300	1350	3100

• CFM Values are based on Noise Level ranging from 15-35 (db)

• Tabulated data are for Double Deflection Grilles / Registers of Horizontal or Vertical Front Blades

RECOMMENDED OUTLET VELOCITIES

APPLICATION	TERMINAL VELOCITY	
	FPM	m/s
Broadcast studios	300-500	1.5-2.5
Residences	500-750	2.5-3.7
Apartments	500-750	2.5-3.7
Mosques and Churches	500-750	2.5-3.7
Hotel bedrooms	500-750	2.5-3.7
Theaters	500-750	2.5-3.7
Private offices, acoustically treated	500-750	2.5-3.7
Private offices, not treated	500-800	2.5-4.0
Motion picture theaters	1000	5.0
General offices	1000-1250	5.0-6.2
Dept. stores, upper floors	1500	7.5
Dept. stores, main floors	2000	10

Important Principles to Know

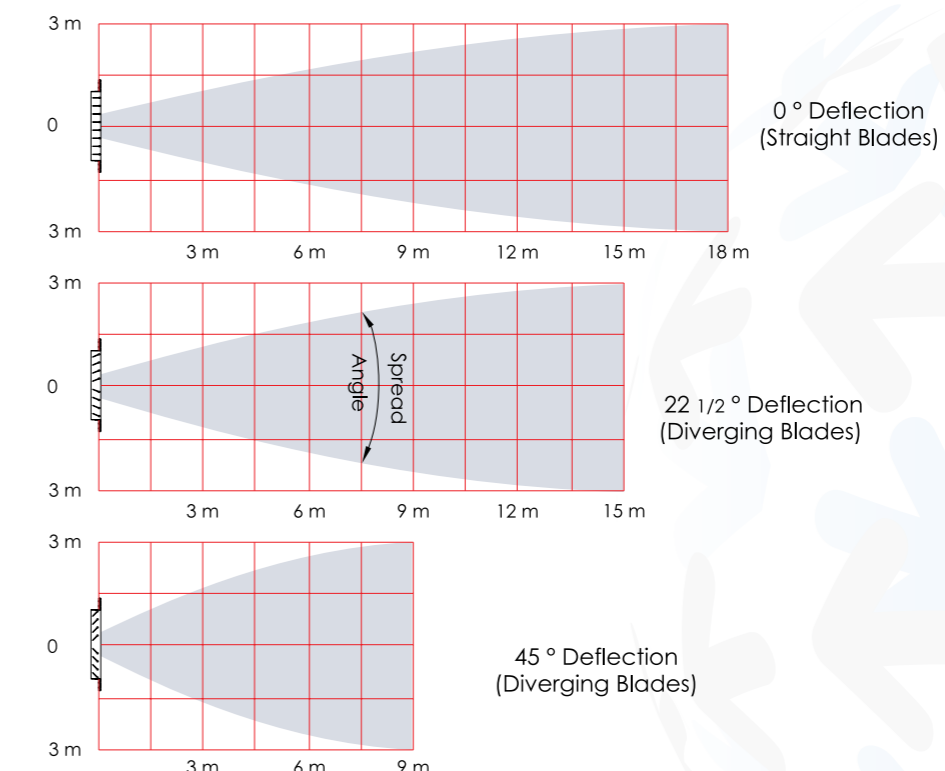
- **Throw:** is the horizontal distance that an air stream travels on leaving an outlet. This distance is measured from the outlet to a point at which the velocity of the air stream has reached a definite minimum value.
- **Drop:** is the vertical distance the air moves between the time it leaves the outlet and the time it reaches the end of its throw.

- **Spread:** is the angle of divergent of the air stream after it leaves the outlet. Horizontal spread is divergence in the horizontal plane and vertical spread is divergent in the vertical plane. Spread is the included angle measured in degrees.

Engineering Notes:

- From the selection diagrams/tables the size of the Grille I Register can be selected taking into consideration the throw, velocity, pressure loss and noise level for it.
- Generally, to prevent over blow, throw should be selected 75% of the distance to the wall opposite, or if the outlets are opposed to one another this should be one third of the distance between them.
- When the throw is more than 75 % of the distance to the wall opposite, divide the air flow over several outlets to reduce the throw.
- The minimum Grille I Register height from the floor level is determined by the drop of the selected outlet +1.8 mtr.
- Air passing through a properly selected Grille I Register will not add any appreciable noise to the sound level of the existing system.
- To obtain long throw and narrow air pattern, use a blades deflection between 0 degree & 15 degree angle. And for shorter throw and wide air pattern use up to 45 angle of deflection.
- Outlets with blades set at a straight angle result in a spread of approximately 19° in both the horizontal and vertical plane.
- Outlets with converging blades set to direct the discharge air result in approximately the same spread as when the blades are set straight. However the resulting throw is approximately 15% longer than the same for straight blades setting.
- Diverging blades into 22 and half degree angle as shown below result in a throw with approximately 20% less than the throw of straight blades setting. Also diverging blades into 45 degree angle as shown result in spread included angle of approximately 60 degrees and a throw with approximately 50% less than the throw of straight blades setting.
- To obtain better air mixing, decrease the throw and increase the spread and induction by deflecting the blades toward maximum recommended angle of deflection (45°).
- The spread in Double Deflection Grilles I Registers can be adjusted in horizontal and vertical planes.
- If the Opposed Blade Damper is used with the grille outlet, the effective area will be reduced approximately by 5% and its effect on throw & pressure drop is negligible.

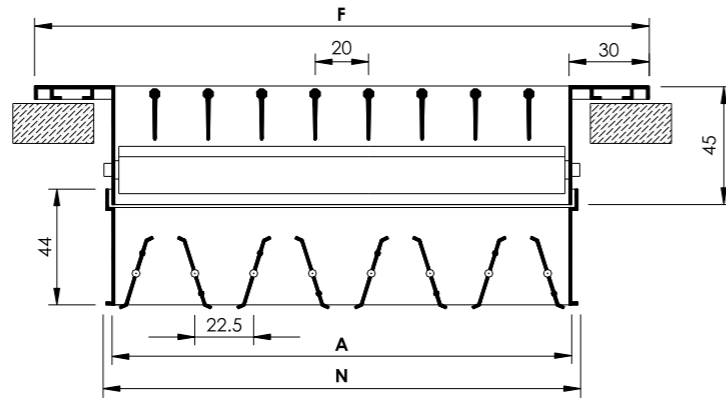
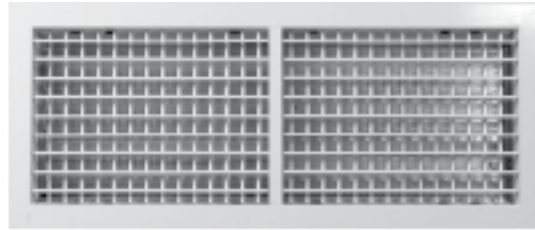
Influence of Blades Deflection on Outlet Performance:



Double Deflection Grilles

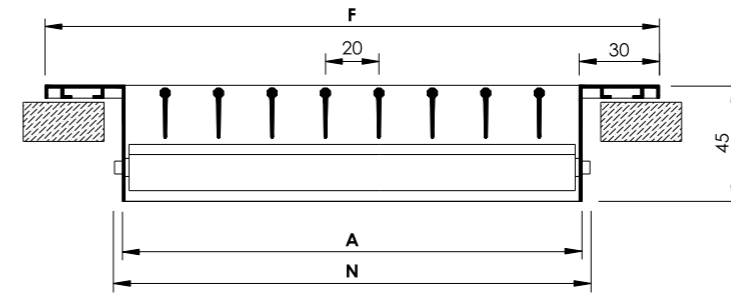
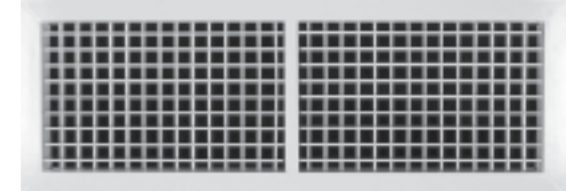
Construction and Dimensional Details

Model SAR HFB DD



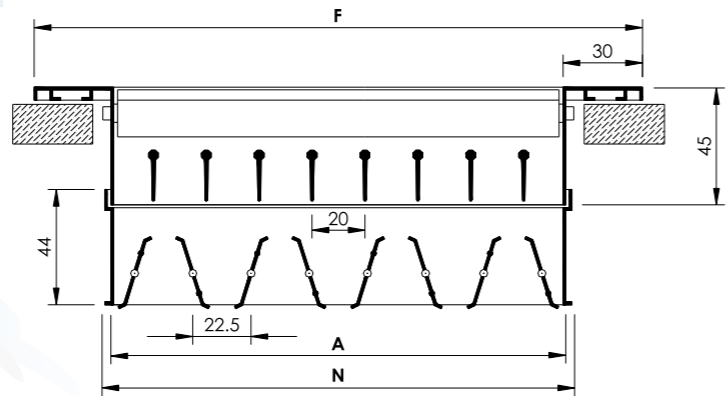
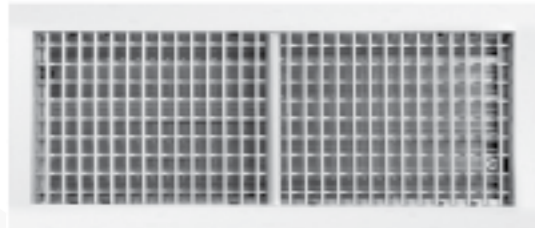
Front Blades Mounting : Horizontal

Model SAG HFB DD



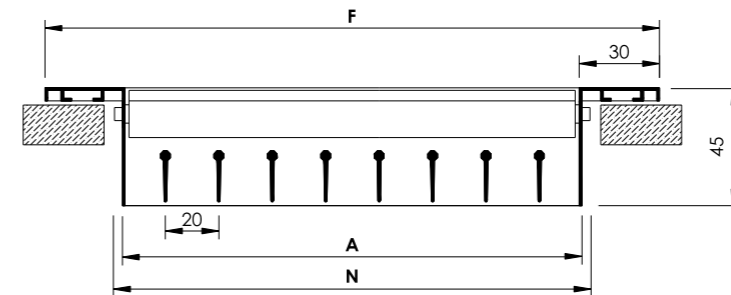
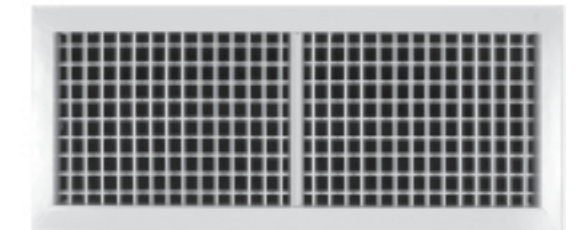
Front Blades Mounting : Horizontal

Model SAG VFB DD



Front Blades Mounting : Vertical

Model SAG VFB DD



Front Blades Mounting : Vertical

- SAR: is Supply Air Register, Double Deflection Blades c/w Opposed Blade Damper.
- Registers called Supply Air Register and coded as SAR are always equipped with Opposed Blade Damper (provided as standard).

N: Nominal/Listed Size = Length (L) X Height (H)
A: Actual Size = (L-10) X (H-10)
F: Face Size = (L+50) X (H+50)

- Registers furnished approximately 10 mm less than the Nominal/Listed Size.
- All dimensions are in mm and subject to ± 1 mm tolerance.

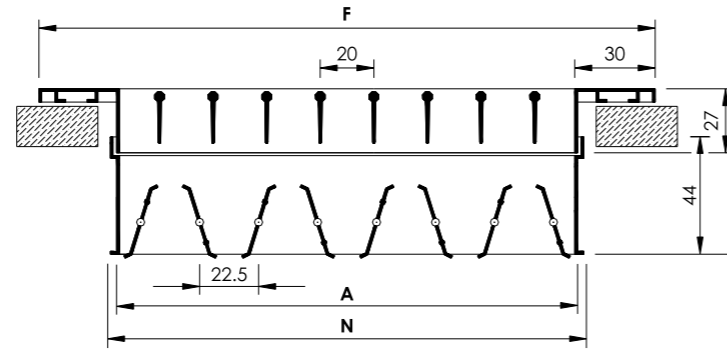
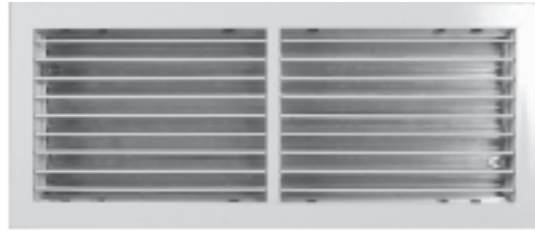
- SAG: is Supply Air Grille, Double Deflection Blades w/o Opposed Blade Damper.
- Grilles called Supply Air Grille and coded as SAG are usually supplied w/o Opposed Blade Damper.

N: Nominal/Listed Size = Length (L) x Height (H)
A: Actual Size = (L-10) x (H-10)
F: Face Size = (L+50) X (H+50)

- Grilles furnished approximately 10 mm less than the Nominal/Listed Size.
- All dimensions are in mm and subject to ± 1 mm tolerance.

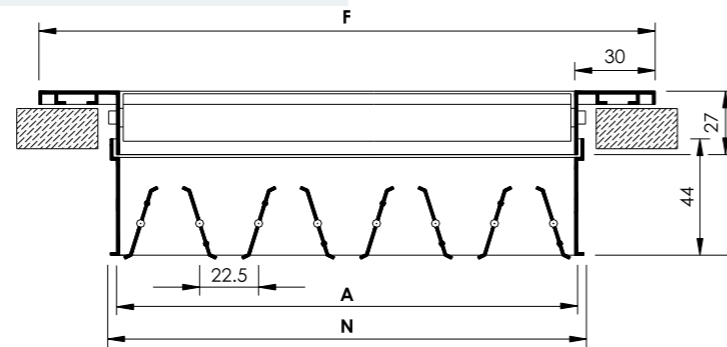
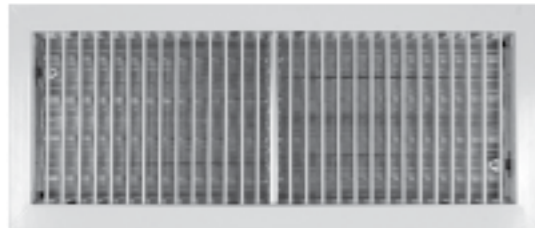
Single Deflection Registers Construction and Dimensional Details

Model RAR HB SD or EAR HB SD



Blades Mounting : Horizontal

Model RAR VB SD or EAR VB SD



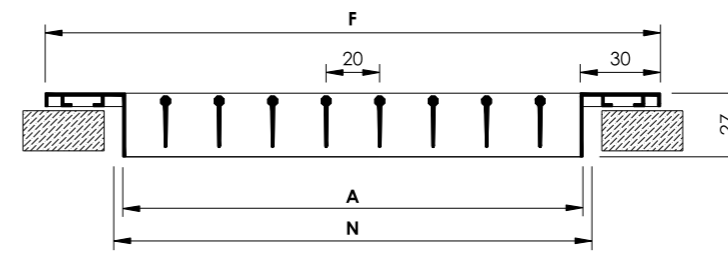
Blades Mounting : Vertical

- RAR I EAR: is Return, Extract or Exhaust Air Register, Single Deflection Blades c/w Opposed Blade Damper.
- Registers called Return, Extract or Exhaust Air Register and coded as RAR I EAR are always equipped with Opposed Blade Damper (provided as standard).
- Blade Damper (provided as standard).

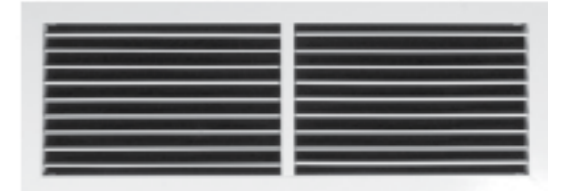
N:	Nominal/Listed Size	= Length (L) x Height (H)
A:	Actual Size	= (L-10) x (H-10)
F:	Face Size	= (L+50) x (H+50)
• Registers furnished approximately 10 mm less than the Nominal/Listed Size.		
• All dimensions are in mm and subject to ± 1 mm tolerance.		

Single Deflection Grilles Construction and Dimensional Details

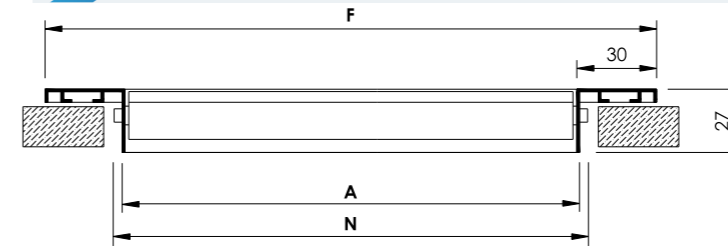
Model RAG HB SD or EAR HB SD



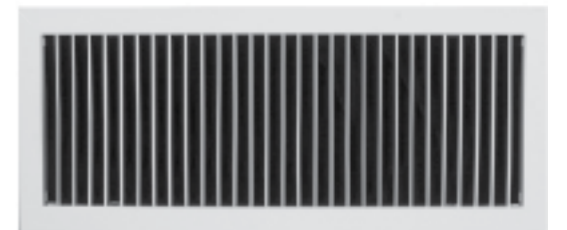
Blades Mounting : Horizontal



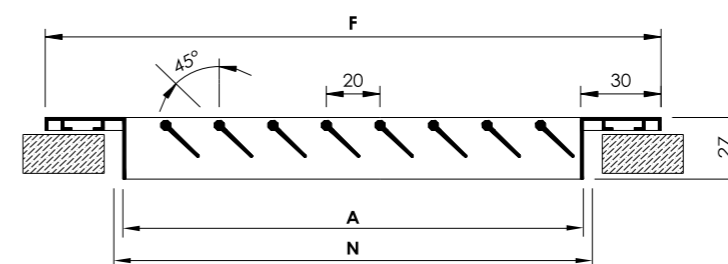
Model RAG VB SD or EAR VB SD



Blades Mounting : Vertical



Model RAG HB SD or EAR HB SD, Fixed Blades 45°



Blades Mounting : Horizontal, set in a fixed position at an angle of 45°



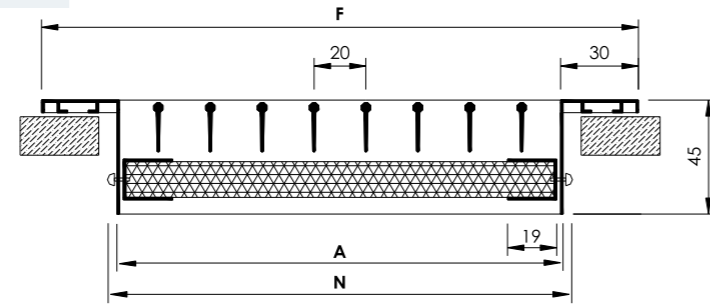
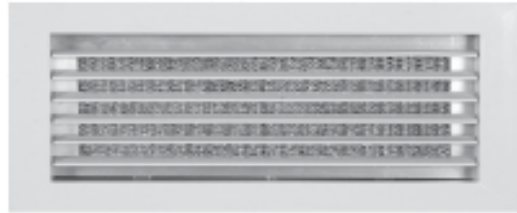
N:	Nominal/Listed Size	= Length (L) x Height (H)
A:	Actual Size	= (L-10) x (H-10)
F:	Face Size	= (L+50) x (H+50)
• Grilles furnished approximately 10 mm less than the Nominal/Listed Size.		
• All dimensions are in mm and subject to ± 1 mm tolerance.		

- RAG I EAG: is Return, Extract or Exhaust Air Grille, Single Deflection Blades w/o Opposed Blade Damper.
- Grilles called Return, Extract or Exhaust Air Grille and coded as RAG I EAG are usually supplied w/o
- Opposed Blade Damper.

Fresh Air Grilles and Registers

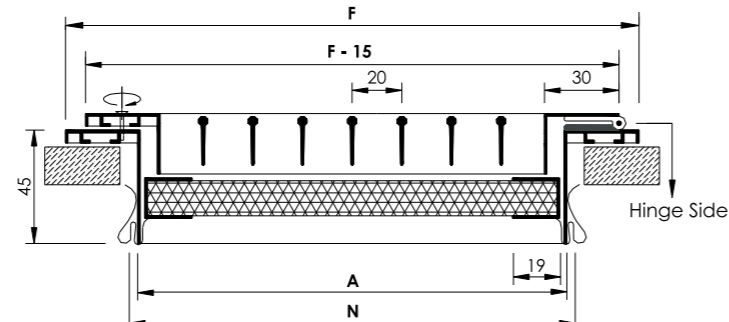
Construction and Dimensional Details

Model FAG C/W FILTER



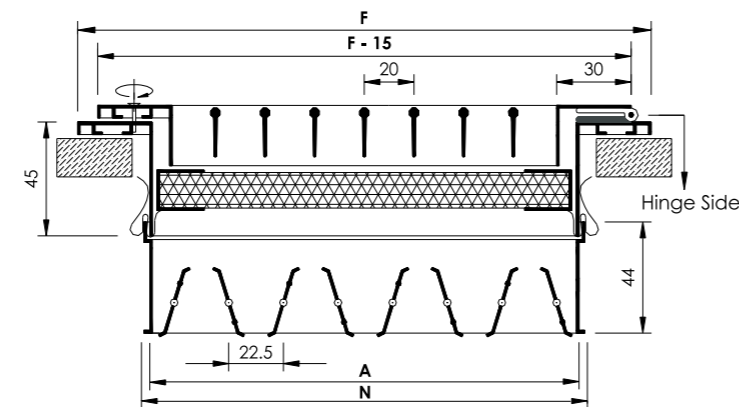
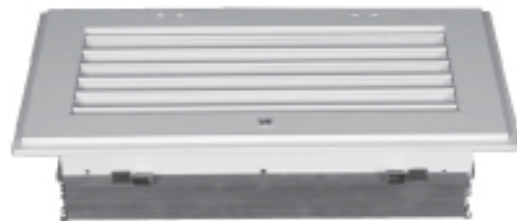
Blades Mounting : Horizontal (Adjustable or Fixed at 45 ° Angle).

Model FAG C/W FILTER (DOUBLE FRAME)



Blades Mounting : Horizontal (Adjustable or Fixed at 45 ° Angle).
Filter : easily removable after the grille fixed.

Model FAG + D C/W FILTER or FAR C/W FILTER (DOUBLE FRAME)



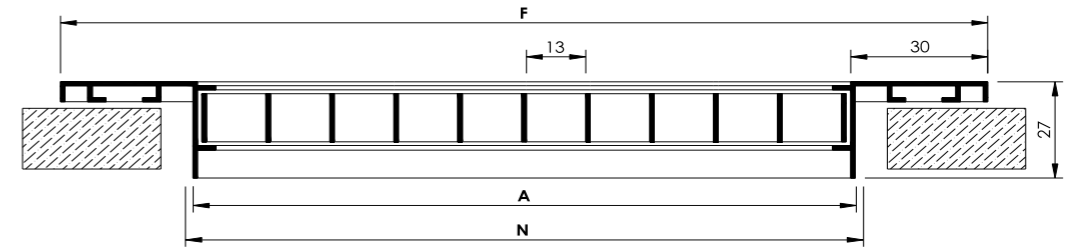
Blades Mounting : Horizontal (Adjustable or Fixed at 45 ° Angle).
Filter : easily removable after the grille fixed.
OBD : adjustable after removal of the filter.

- FAG I FAR: is Fresh Air Grille I Register, Single Deflection Blades c/w Aluminium Washable Filter Media 1/2 thickness.
- Double Frame Grilles I Registers are provided with door hinge from one side and screw from other side allowing the second frame (inner one) to act as an access door to the Filter and/or Opposed Blade Damper.

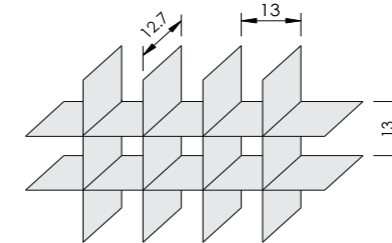
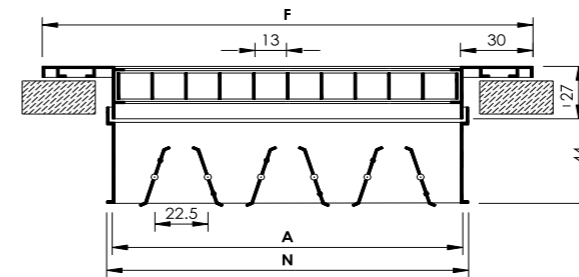
N:	Nominal/Listed Size	= Length (L) x Height (H)
A:	Actual Size	= (L-10) x (H-10)
F:	Face Size	= (L+50) x (H+50)

- Grilles I Registers furnished approximately 10 mm less than the Nominal/Listed Size.
- All dimensions are in mm and subject to ±1 mm tolerance.

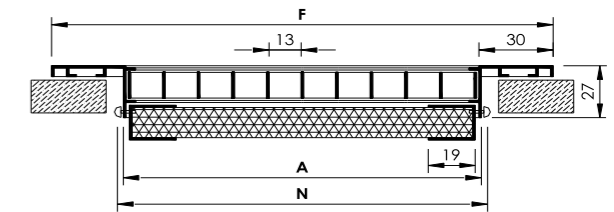
Model ECG



Model ECG+D or ECR



Model ECG+F



- The Eggcrate grilles with Aluminium Eggcrate mesh are normally used for the return and recirculation of air inside offices, living areas, commercial centres, etc.
- The Particular design of the Eggcrate central core of 13 x 13 mm opening permits the use of a large free surface area (90% Free Area) without turbulence.
- The Eggcrate grille frame with the channel border is used to fix the central core.
- In respect to traditional grilles with inclined or fixed blades, it's possible to reduce the grilles dimensions

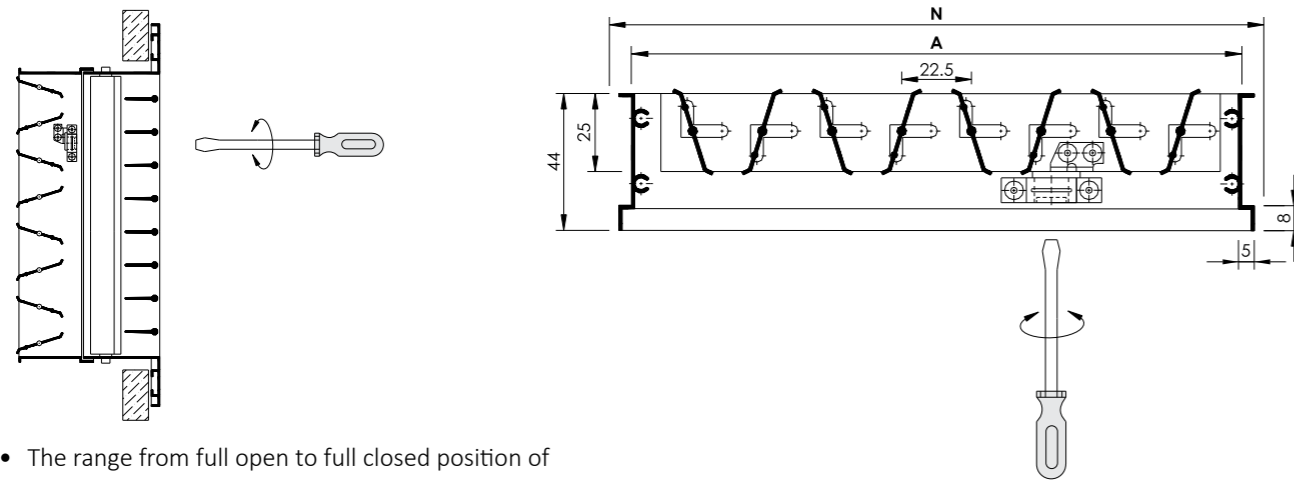
N:	Nominal/Listed Size	= Length (L) x Height (H)
A:	Actual Size	= (L-10) x (H-10)
F:	Face Size	= (L+50) x (H+50)

- Grilles I Registers furnished approximately 10 mm less than the Nominal/Listed Size.
- All dimensions are in mm and subject to ±1 mm tolerance.

- while maintaining equal performances, or reduce noise level and pressure drop while maintaining equal dimensions and air flow.
- Eggcrate grilles can be mounted either horizontally or vertically (ceiling or side wall) without affecting their aesthetic form or performance.
- The Eggcrate grilles are available with standard accessories such as Opposed Blade Damper or Aluminium Washable Filter Media of 1/2 thickness.
- Eggcrate Grilles I Registers furnished approximately 10 mm less than the Nominal/Listed Size.
- All dimensions are in mm and subject to ±1 mm tolerance.

A. Opposed Blade Damper

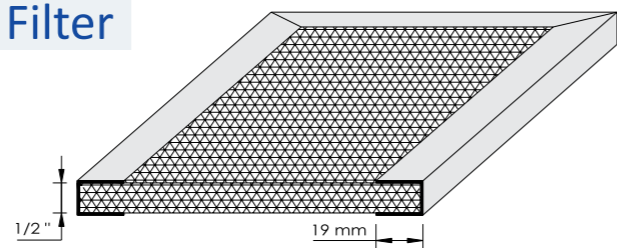
- Frame and Blades are of high quality Extruded Aluminium Profiles construction.
- Blades are designed to rotate opposite to each other.
- The specially designed blades have an overlapping lip which assures a tight closure.
- Generally, the opposed blade damper is attached to the grille and fixed to it by means of 'S' clips.
- Blades are separated from its frame by nylon bushes. This method of assembly provides maximum rattle-free performance and eliminates corrosion.
- Usually Damper standard surface finish is Aluminium in Mill Finish. Matt black: powder coating color is also available on request (as an option).
- Screw type operation.



- The range from full open to full closed position of Damper blades can be easily adjusted by a screw driver accessible from the face of the register as shown in the figure.
- All dimensions are in mm and subject to ± 1 mm tolerance.

B. Aluminium Washable Filter

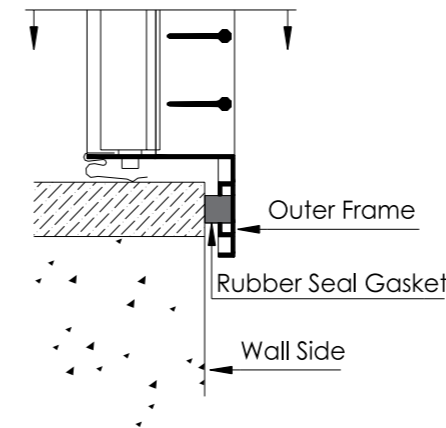
- Construction: Consists of expanded metal Aluminium mesh with unique pattern.
- Application: For collection of big particles of dust. It's used for corrosive atmospheres.
- Features: High dust holding capacity, low resistance filters. It can be cleaned with regular water and lives longer.
- Filter Thickness: Standard '1/2' thickness provided with



Aluminium Profiled U - Channel Frame of 19 mm width.

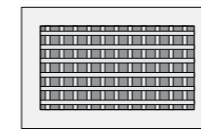
C. Foam Type Rubber Gasket (Optional)

- Gasket type : Single Sided Self- Adhesive Foam.
- Gasket Function: Sealing.
- Gasket Benefits:
 - Stops Grille I Register rattling.
 - Minimize air infiltration.
 - Stops leaks and pressure losses.
 - Takes up unevenness of ceiling.
 - Easy to apply on site or in factory.
- To be applied around the perimeter of the back side of the Grille I Register to act as an air seal to prevent pressurized air from escaping from the sides of the outer frame when fixed to the wall.



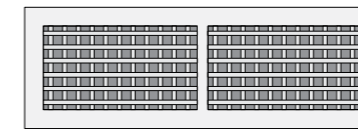
Mullion Arrangement

Without Mullion



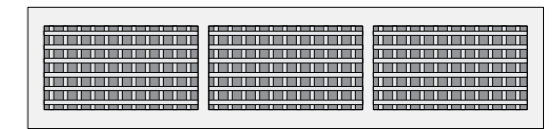
$L \leq 500$ mm

1 Mullion



$L > 500$ mm
& $L \leq 1000$ mm

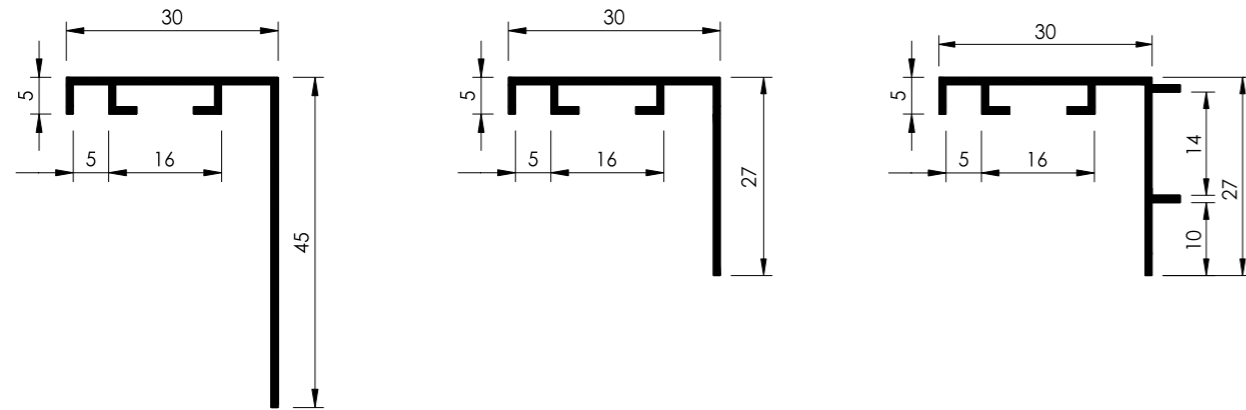
2 Mullions or more



$L > 1000$ mm

- When the length of the Grille I Register is exceeding 500 mm but not more than 1000 mm, the horizontal blades are supported by a mullion. Fixed at the centre of the Grille I Register for more stability.
- When the length of the Grille I Register is exceeding 1000 mm, two or more mullions (depending on length) are required to support the horizontal blades at equal intervals.
- Mullion Construction: Aluminium Profiled U -Channel of 15 mm width.

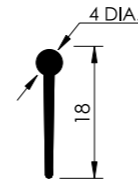
Cross Sectional Drawings for Profiles used in Grilles I Registers



Frame Profile Section
Double Deflection Grilles and Registers

Frame Profile Section
Single Deflection Grilles and Registers

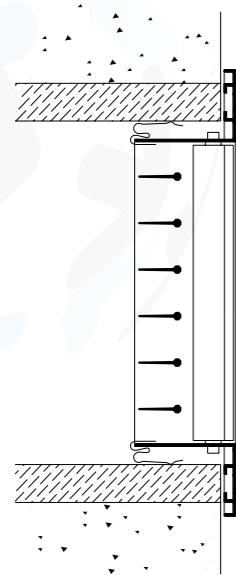
Frame Profile Section
Eggcrate Grilles and Registers



Aerofoil Blade Profile Section
Grilles and Registers

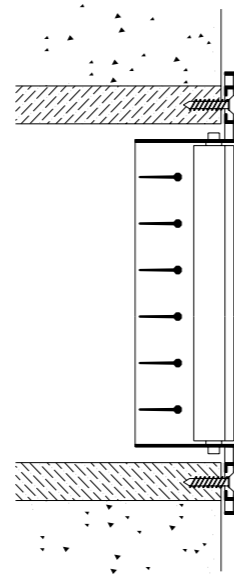
• All dimensions are in mm and subject to ± 0.2 mm tolerance.

Available Fixing Mounting



A. Concealed Fixing (Spring Clip Mounting)

The Grille I Register is fixed by means of spring clips to the wall or partition where no screws are visible.



B. Face Screw Fixing

The Grille I Register is fixed to the wooden Frame by means of visible screws.

Engineering and Performance Data

REGISTERS & GRILLES PERFORMANCE DATA - SUPPLY

SAR, SAG, RAR, RAG

L/S	SIZE	300 X 150		300 X 200		400 X 150		500 X 150		600 X 150		750 X 150		600 X 200			
		300 X 250		300 X 300		450 X 250		500 X 200		300 X 300		450 X 250		600 X 200			
		0°	45°	0°	45°	0°	45°	0°	45°	0°	45°	0°	45°	0°	45°	0°	45°
	A_v	0.041		0.055		0.062		0.069		0.083		0.093		0.105		0.112	
	A_s	0.023	0.019	0.030	0.025	0.033	0.028	0.036	0.030	0.049	0.041	0.057	0.048	0.067	0.056	0.023	0.061
94	V_c	2.32		1.71		1.53		1.36		1.13		1.01		0.90		0.84	
	P_v	3.32		0.421	0.774	0.312	0.570	0.150	0.271	0.082	0.147	0.057	0.102	0.039	0.070	0.031	0.056
	P_t	4.32		0.614	0.969	0.445	0.699	0.229	0.346	0.132	0.193	0.096	0.138	0.068	0.096	0.055	0.077
	Th.	3.4-4.0-6.1	1.8-2.7-4.3	3.1-3.7-5.8	1.5-2.4-4.0	2.8-3.4-5.5	1.2-2.1-3.7	2.5-3.1-5.2	0.9-1.8-3.4	2.3-2.9-5.0	0.8-1.7-3.2	2.2-2.8-4.9	0.7-1.5-3.1	2.1-2.6-4.7	0.6-1.4-2.9	2.0-2.6-4.6	0.6-1.3-2.9
	NC	16	22	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15
118	V_c	2.9		2.1		1.9		1.7		1.4		1.3		1.1		1.1	
	P_v	1.300	2.360	0.660	1.220	0.493	0.897	0.240	0.438	0.132	0.242	0.093	0.171	0.064	0.118	0.052	0.095
	P_t	1.800	2.870	0.910	1.470	0.702	1.102	0.350	0.542	0.196	0.301	0.140	0.213	0.097	0.148	0.079	0.119
	Th.	3.7-4.9-6.7	2.1-3.6-4.9	3.7-4.6-6.7	2.1-3.0-4.9	3.7-4.3-6.4	2.1-3.4-4.9	3.6-4.2-6.4	2.0-3.1-4.6	3.4-4.0-6.3	1.9-3.0-4.4	3.2-3.9-6.3	1.8-2.9-4.3	3.0-3.7-6.2	1.6-2.8-4.2	2.9-3.7-6.2	1.5-2.8-4.1
	NC	23	29	<15	19	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15
142	V_c	3.5		2.6		2.3		2.1		1.7		1.5		1.4		1.3	
	P_v	1.880	3.400	0.970	1.750	0.710	1.300	0.345	0.637	0.189	0.353	0.133	0.249	0.092	0.173	0.074	0.139
	P_t	2.640	4.170	1.470	2.260	0.970	1.550	0.461	0.744	0.249	0.405	0.174	0.283	0.119	0.194	0.094	0.155
	Th.	4.3-5.2-7.3	2.7-4.0-5.2	4.3-4.9-7.3	2.4-3.7-5.5	4.0-4.9-7.0	2.4-3.7-5.2	3.8-4.7-6.8	2.2-3.5-5.0	3.6-4.5-6.6	2.0-3.3-4.8	3.5-4.4-6.5	2.0-3.2-4.7	3.4-4.3-6.4	1.9-3.1-4.6	3.4-4.3-6.3	1.8-3.1-4.6
	NC	29	35	19	25	<15	20	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15
165	V_c	4.1		3.0		2.7		2.4		2.0		1.8		1.6		1.5	
	P_v	2.570	4.620	1.320	2.390	0.970	1.750	0.760	1.400	0.258	0.469	0.182	0.331	0.125	0.228	0.101	0.183
	P_t	3.580	5.640	1.830	2.900	1.470	2.260	1.020	1.650	0.439	0.654	0.319	0.470	0.227	0.332	0.185	0.270
	Th.	4.6-5.8-7.9	3.0-4.3-5.8	4.6-5.8-7.9	2.7-4.0-5.8	4.3-5.5-7.6	2.7-4.0-5.5	4.3-5.5-7.6	2.7-4.0-5.2	4.2-5.4-7.5	2.5-3.8-5.2	4.1-5.3-7.4	2.5-3.8-5.1	4.1-5.3-7.4	2.4-3.7-4.9	4.0-5.2-7.3	2.4-3.7-4.9
	NC	34	40	24	30	19	25	16	22	<15	19	<15	16	<15	<15	<15	<15
189	V_c	4.7		3.4		3.1		2.7		2.3		2.0		1.8		1.7	
	P_v	3.330	6.050	1.730	3.120	1.270	2.290	0.990	1.800	0.343	0.613	0.242	0.432	0.168	0.298	0.135	0.239
	P_t	4.600	7.320	2.490	3.890	1.78	2.790	1.500	2.310	0.491	0.754	0.349	0.533	0.243	0.369	0.196	0.296
	Th.	4.9-6.1-8.5	3.7-4.6-6.1	4.9-6.1-8.5	3.4-4.3-6.1	4.6-5.8-8.2	3.4-4.3-5.8	4.6-5.8-7.9	3.1-4.3-5.8	4.5-5.7-7.9	3.0-4.1-5.7	4.4-5.6-7.8	2.9-4.1-5.6	4.4-5.6-7.6	2.8-4.0-5.6	4.3-5.5-7.6	2.8-4.0-5.5
	NC	38	45	28	34	23	29	20	26	<15	16	<15	<15	<15	<15	<15	<15
212	V_c	5.2		3.8		3.4		3.1		2.5		2.3		2.0		1.9	
	P_v	4.220	7.670	2.180	3.960	1.600	2.900	1.270	2.290	0.580	1.070	0.114	0.216	0.068	0.130	0.050	0.096
	P_t	5.740	9.190	2.950	4.720	2.360	3.660	1.780	2.790	0.840	1.320	0.185	0.280	0.113	0.170	0.084	0.126
	Th.	5.2-6.4-8.8	4.0-5.2-6.7	5.2-6.4-8.8	3.7-4.9-6.4	4.9-6.1-8.5	3.7-4.9-6.4	4.9-6.1-8.5	3.4-4.6-6.1	4.6-5.8-8.5	3.1-4.6-6.1	4.6-5.8-8.4	3.1-4.5-6.0	4.5-5.7-8.3	2.9-4.4-5.9	4.5-5.7-8.3	2.9-4.3-5.8
	NC	42	48	31	38	27	33	24	30	<15	18	<15	18	<15	<15	<15	<15
236	V_c	4.3		3.8		3.4		3.1		2.8		2.5		2.3		2.1	
	P_v	2.690		4.880	1.980	3.580	1.550	2.820	0.740	1.320	0.199	0.368	0.112	0.208	0.079	0.148	
	P_t	3.710		5.890	2.740	4.340	2.310	3.580	1.240	1.830	0.401	0.566	0.244	0.337	0.182	0.247	
	Th.	5.5-6.7-9.4		4.0-5.2-6.7	5.5-6.7-9.4	4.0-5.2-6.4	5.2-6.4-9.1	4.0-4.3-6.1	4.9-6.4-9.1	3.7-4.9-6.4	4.8-6.3-9.0	3.7-4.5-6.2	4.6-6.2-8.9	3.6-4.4-6.1	4.5-6.1-8.8	3.6-4.4-6.0	
	NC	35		41	30	37	27	33	16	22	<15	<15	<15	<15	<15	<15	<15
260	V_c	4.7		4.2		3.8		3.1		2.8		2.5		2.3		2.1	
	P_v	3.250		5.890	2.390	4.340	1.880	3.430	0.890	1.600	0.610	1.120	0.034	0.056	0.020	0.034	
	P_t	4.520		7.160	3.400	5.360	2.640	4.190	1.400	2.110	1.120	1.630	0.083	0.116	0.054	0.071	
	Th.	5.8-7.0-10.1		4.3-5.5-7.3	5.8-7.0-9.8	4.3-5.5-7.0	5.5-6.7-9.8	4.3-5.2-6.7	5.2-6.7-9.5	4.0-5.2-6.7	5.2-6.4-9.5	4.0-5.2-6.7	5.0-6.3-9.3	3.9-5.1-6.5	4.9-6.3-9.2	3.9-5.0-6.4	
	NC	38		44	33	40	30	36	19	25	<15	19	<15	<15	<15	<15	<15

REGISTERS & GRILLES
PERFORMANCE DATA - SUPPLY

SAR, SAG, RAR, RAG

*SI UNITS

		900 x 150				1050 x 150																																			
		750 x 200				900 x 200				1050 x 200																															
		600 x 250				750 x 250				900 x 250				1050 x 250																											
		450 x 300				600 x 300				750 x 300				900 x 300				1050 x 300																							
		0° 45°				0° 45°				0° 45°				0° 45°				0° 45°																							
		0.118				0.126				0.141				0.146				0.170				0.178				0.198				0.214				0.228				0.302			
		0.077		0.064		0.085		0.071		0.097		0.081		0.103		0.086		0.121		0.100		0.126		0.105		0.144		0.120		0.156		0.130		0.190		0.158		0.228		0.189	
		2.4		2.2		2.0		1.9		1.7																															
		0.018		0.027		0.011		0.016		0.005		0.007		0.004		0.005		0.001		0.002																					
		0.030		0.040		0.019		0.025		0.009		0.011		0.007		0.009		0.003		0.003																					
		5.4-6.9-9.4		4.2-5.3-6.8		5.3-6.5-9.3		4.2-5.3-6.7		5.2-6.4-9.1		4.1-5.2-6.7		5.2-6.4-9.1		4.1-5.2-6.6		5.0-6.2-8.9		4.0-5.1-6.5																					
		<15		<15		<15		<15		<15		<15		<15		<15		<15																							
		2.8		2.6		2.3		2.3		1.9		1.9		1.7																											
		0.510		0.910		0.104		0.189		0.060		0.109		0.053		0.095		0.025		0.045		0.021		0.037		0.012		0.022													
		1.020		1.420		0.262		0.335		0.166		0.205		0.147		0.181		0.079		0.093		0.067		0.078		0.044		0.049													
		5.5-6.4-9.4		4.6-5.5-7.0		5.4-6.5-9.4		4.5-5.4-7.0		5.2-6.3-9.3		4.4-5.3-6.9		5.2-6.3-9.3		4.4-5.3-6.9		5.0-6.1-9.1		4.3-5.1-6.8		4.9-6.0-9.0		4.3-5.1-6.7		4.8-5.9-8.9		4.2-5.0-6.7													
		<15		15		<15		<15		<15		<15		<15		<15		<15		<15		<15		<15		<15															
		3.2		3.0		2.7		2.6		2.2		2.1		1.9		1.8		1.7																							
		0.660		1.170		0.530		0.970		0.106		0.185		0.091		0.160		0.042		0.074		0.034		0.060		0.020		0.035		0.013		0.024		0.010		0.017					
		1.170		1.680		1.040		1.470		0.256		0.332		0.227		0.291		0.118		0.145		0.098		0.120		0.063		0.071		0.045		0.052		0.034		0.039					
		5.8-7.0-9.7		4.9-5.8-7.3		5.5-6.7-9.4		4.6-5.8-7.0		5.5-6.7-9.3		4.6-5.6-7.0		5.4-6.7-9.3		4.6-5.6-6.9		5.2-6.5-8.9		4.4-5.5-6.8		5.2-6.5-8.9		4.4-5.5-6.7		5.0-6.3-8.7		4.3-5.4-6.6		4.9-6.2-8.5		4.3-5.4-6.5		4.9-6.2-8.4		4.2-5.4-6.4					
		<15		20		<15		16		<15		<15		<15		<15		<15		<15		<15		<15		<15		<15		<15		<15		<15		<15					
		3.6		3.4		3.0		2.9		2.5		2.4		2.2		2.0		1.9																							
		0.810		1.500		0.660		1.190		0.480		0.860		0.410		0.760		0.061		0.115		0.049		0.092		0.029		0.054		0.019		0.036		0.014		0.026					
		1.570		2.260		1.170		1.700		0.990		1.370		0.910		1.270		0.169		0.213		0.140		0.175		0.088		0.107		0.062		0.074		0.047		0.056					
		6.4-7.3-11.0		5.2-6.1-7.6		6.173-10.7		4.9-6.1-7.6		6.1-7.0-10.7		4.9-6.1-7.3		5.8-7.0-10.7		4.6-5.8-7.3		5.6-6.6-10.4		4.6-5.7-7.1		5.5-6.5-10.3		4.5-5.7-7.0		5.3-6.3-10.1		4.4-5.5-6.9		5.2-6.1-10.0		4.3-5.5-6.7		5.1-6.0-9.9		4.3-5.4-6.7					
		17		20		<15		20		<15		<15		<15		<15		<15		<15		<15		<15		<15		<15		<15		<15		<15		<15					
		4.0		3.7		3.3		3.2		2.8		2.7		2.4		2.2		2.1		1.6																					
		1.020		1.850		0.810		1.500		0.610		1.070		0.510		0.940		0.360		0.660		0.047		0.073		0.026		0.040		0.017		0.025		0.012		0.018		0.002		0.004	
		2.030		2.870		1.570		2.010		1.120		1.570		1.020		1.450		0.860		1.170		0.127		0.163		0.077		0.095		0.052		0.064		0.039		0.047		0.010		0.011	
		7.0-8.2-11.6		5.2-6.4-7.9		6.7-8.2-11.3		5.2-6.4-7.9		6.7-7.9-11.3		5.2-6.4-7.9		6.4-7.9-11.0		5.2-6.1-7.6		6.1-7.6-10.7		4.9-5.8-7.3		6.1-7.4-10.6		4.9-5.9-7.4		5.9-7.2-10.4		4.7-5.7-7.2		5.7-7.0-10.2		4.7-5.6-7.1		5.6-6.9-10.0		4.6-5.6-7.0		5.1-6.3-9.5		4.3-5.2-6.7	
		21		27		17		23		<15		18		<15		16		<15		<15		<15		<15		<15		<15		<15		<15		<15		<15		<15			
		4.8		2.640		1.190		2.130		0.860		1.520		0.740		1.350		0.510		0.940		0.460		0.840		0.360		0.640		0.018		0.030		0.012		0.021		0.002		0.004	
		2.740		3.910		2.210		3.150		1.880		2.540		1.500		2.110		1.020		1.450		0.970		1.350		0.860		1.140		0.062		0.081		0.045		0.059		0.011		0.014	
		7.9-9.1-12.5		5.5-7.0-8.2		7.6-9.1-12.2		5.5-6.7-8.2		7.6-8.8-12.2		5.5-6.7-8.2		7.3-8.8-11.9		5.5-6.4-7.9		7.3-8.5-11.6		5.2-6.1-7.6		7.0-8.5-11.6		5.2-6.1-7.3		7.0-8.2-11.3		5.2-6.1-7.3		6.8-7.8-10.9		4.9-5.8-7.1		6.7-7.6-10.7		4.8-5.7-6.9		6.3-7.0-10.0		4.5-5.3-6.5	
		26		33		23		29		18		24		15		22		<15		15		<15		<15		<15		<15		<15		<15		<15		<15		<15			
		5.6		3.6		3.2		2.8		2.5		2.4		2.2		2.0		1.9																							
		1.980		3.610		1.600		2.920		1.170		2.080		1.020		1.830		0.710		1.300		0.640		1.140		0.480		0.860		0.410		0.710		0.028		0.044		0.006		0.009	
		3.760		5.380		3.120		4.450		2.440		3.350		2.290		3.100		1.470		2.060		1.400		1.910		0.990		1.370		0.910		1.220		0.093		0.109		0.023		0.025	
		9.1-10.7-14.0		6.1-7.6-8.8		8.8-10.4-13.4		6.1-7.3-8.5		8.8-10.1-13.4		5.8-7.0-8.5		8.5-10.1-13.1		5.8-7.0-8.2		8.2-9.8-13.1		5.8-6.7-7.9		8.2-9.8-12.8		5.5-6.7-7.9		7.9-9.4-12.5		5.2-6.4-7.6		7.9-9.4-12.5		5.2-6.1-7.6		7.6-9.0-11.9		5.0-6.1-7.3		7.1-8.3-11.1		4.6-5.6-6.8	
		31		38		28		34		23		29		20		26		<15		20		<15		19		<15		<15		<15		<15		<15		<15		<15			
		6.4		4.720		2.110		3.810		1.520		2.720		1.320		2.390		0.910		1.680		0.810		1.500		0.610		1.120		0.510		0.940		0.034		0.047		0.006		0.008	
		5.130		7.260		4.140		5.840		3.050		4.240		2.840		3.910		1.930		2.690		1.830		2.510		1.370		1.880		1.270		1.700		0.070		0.087		0.015		0.018	
		9.4-11.6-15.2		6.7-7.9-9.1		9.4-11.6-15.2		6.7-7.9-9.1		9.4-11.6-15.2		6.4-7.6-8.8		9.1-11.3-14.9		6.4-7.6-8.8		8.8-11.0-14.6		6.1-7.3-8.5		8.8-11.0-14.3		6.1-7.3-8.5		8.5-10.7-14.3		5.8-7.0-8.2		8.5-10.7-14.0		5.8-7.0-8.2		8.3-10.5-13.9		5.7-6.8-8.0		7.9-10.1-13.3		5.4-6.4-7.5	
		35		42		32		38		27		33		24		31		18		25		17		23		<15		18		<15		<15		<15		<15		<15			

L/S	SIZE	300 x 150		300 x 200		450 x 150		500 X 150		600 X 150		500 X 200		750 X 150		600 X 200		500 x 250	
		0° 45°		0° 45°		0° 45°		0° 45°		0° 45°		0° 45°		0° 45°		0° 45°		0° 45°	
		A _c	A _k	A _c	A _k	A _c	A _k	A _c	A _k	A _c	A _k	A _c	A _k	A _c	A _k	A _c	A _k	A _c	A _k
		0.041	0.023	0.055	0.030	0.062	0.033	0.069	0.030	0.083	0.041	0.057	0.093	0.048	0.105	0.073</			

*SI UNITS

900 x 150		750 x 200		1050 x 150		900 x 200		750 x 250		1050 x 200		900 x 250		1050 x 300		1050 x 300	
450 x 300		500 x 300		600 x 300		750 x 250		900 x 250		1050 x 200		900 x 250		1050 x 300		1050 x 300	
0°	45°	0°	45°	0°	45°	0°	45°	0°	45°	0°	45°	0°	45°	0°	45°	0°	45°
0.118		0.126 0.141		0.146		0.170		0.178		0.198		0.214		0.228		0.302	
0.085	0.071	0.097	0.081	0.103	0.086	0.121	0.100	0.126	0.105	0.144	0.120	0.156	0.130	0.190	0.158	0.228	0.189
6.7	6.0	5.8	5.0	4.8	4.3	4.0	3.7	2.8									
2.670	4.830	1.930	3.430	1.680	3.020	1.170	2.130	1.040	1.880	0.790	1.420	0.660	1.190	0.430	0.790	0.011	0.017
5.210	7.370	3.960	5.460	3.710	5.050	2.690	3.660	2.310	3.150	1.800	2.440	1.680	2.210	0.940	1.300	0.054	0.049
10.1-12.5-16.2	7.3-8.2-9.4	10.1-12.2-15.8	7.0-8.2-9.4	9.8-11.1-15.8	6.7-8.2-9.1	9.8-11.9-15.5	6.7-7.9-9.1	9.5-11.9-15.5	6.4-7.6-9.1	9.4-11.6-15.2	6.4-7.3-8.8	9.1-11.6-15.2	6.4-7.3-8.5	9.1-11.3-14.9	5.8-7.3-8.2	8.7-10.8-14.4	5.6-6.8-7.9
36	42	31	37	28	35	22	29	20	27	15	22	<15	19	<15	<15	<15	<15
7.5	6.7	6.5	5.5	5.3	4.8	4.4	4.1	3.1									
3.280	5.940	2.390	4.240	2.060	3.730	1.450	2.620	1.300	2.340	0.970	1.750	0.810	1.470	0.530	0.970	0.360	0.660
6.320	8.990	3.780	6.780	4.340	6.020	3.230	4.390	2.800	3.860	2.240	3.020	2.080	2.740	1.300	1.730	0.860	1.170
10.7-13.4-17.1	7.9-8.8-10.1	10.7-12.8-16.8	7.6-8.5-9.8	10.4-12.8-16.8	7.3-8.5-9.4	10.4-12.5-16.5	7.3-8.2-9.4	10.1-12.5-16.5	7.0-8.2-9.4	10.1-12.5-16.5	7.0-7.9-9.1	9.8-12.2-16.2	6.7-7.9-8.8	9.8-12.2-15.8	6.4-7.6-8.5	9.8-11.9-15.5	6.1-7.4-8.2
39	45	34	40	32	38	26	32	24	30	19	25	16	22	<15	<15	<15	<15
9.0	8.0	7.8	6.7	6.4	5.7	5.3	5.0	3.8									
4.570	8.590	2.540	6.120	2.970	5.380	1.780	3.780	1.980	3.350	1.680	2.510	1.170	2.110	0.760	1.400	0.530	0.940
8.890	12.900	6.100	9.680	6.270	8.690	4.320	6.320	4.270	5.640	3.450	4.290	2.690	3.630	1.780	2.410	1.300	1.700
11.3-14.3-17.9	6.1-9.8-11.3	11.3-14.0-18.0	8.5-9.8-11.0	11.0-14.0-17.7	8.2-9.1-10.4	11.0-13.7-17.4	7.9-9.1-10.4	10.7-13.7-17.4	7.6-8.8-10.1	10.1-13.7-17.4	7.6-8.5-10.1	10.4-13.4-17.1	7.3-8.5-9.8	10.4-13.1-17.1	7.3-8.2-9.5	10.4-13.8-16.8	7.0-8.2-9.5
45	51	40	46	37	44	31	38	30	36	25	31	22	28	<15	20	<15	<15
		9.1	7.8	7.4	6.7	6.2	5.8	4.4									
		4.040	7.340	2.820	5.130	2.510	4.570	1.910	3.430	1.570	2.870	1.040	1.880	0.710	1.300		
		8.610	9.370	5.870	8.180	3.020	7.620	4.450	5.970	3.610	4.900	2.570	3.400	1.730	2.310		
		11.6-14.9-18.3	7.1-10.4-11.6	11.6-14.6-18.0	8.8-10.4-11.3	11.6-14.6-18.0	8.5-9.8-11.0	11.6-14.3-18.0	8.2-9.5-11.0	11.3-14.0-17.7	8.2-9.2-11.0	11.3-14.0-17.7	7.9-9.1-10.7	11.3-13.7-17.4	7.6-8.8-10.7		
		42	49	36	43	34	41	29	35	26	38	19	25	<15	18		
		8.9	8.5	7.6	7.1	6.6	5.0										
		3.710	6.710	3.280	5.970	2.460	4.500	2.060	3.760	1.370	2.460	0.940	1.700				
		8.030	11.020	7.340	10.030	5.510	7.540	4.850	6.550	3.400	4.500	2.460	3.230				
		12.2-15.5-18.9	9.8-11.0-12.2	12.2-15.5-18.9	9.1-10.7-11.9	11.9-15.2-8.6	9.1-10.4-11.9	11.9-14.9-18.3	9.1-10.1-11.6	11.9-14.9-18.3	8.8-10.1-11.6	11.6-14.6-18.0	8.5-9.8-11.3				
		40	47	39	45	34	40	31	37	23	30	16	23				
		9.6	8.6	7.9	7.5	5.6											
		4.170	7.540	3.120	5.690	2.620	4.750	1.730	3.120	1.170	2.130						
		6.450	12.370	7.440	10.010	6.170	8.310	4.270	5.660	2.950	3.910						
		12.8-16.5-19.8	10.1-11.6-12.8	12.5-16.2-19.5	10.1-11.3-12.5	12.5-15.8-19.2	9.7-11.0-12.5	12.5-15.5-18.9	9.4-11.0-12.2	12.2-15.5-18.6	9.4-10.7-12.2						
		42	49	37	44	34	41	27	33	20	26						

NOTES

- * The large throw values are based on the minimum terminal velocity of 0.25 m/Sec.
- * The middle throw values are based on the middle terminal velocity of 0.50 m/Sec.
- * The small throw values are based on the maximum terminal velocity of 0.75 m/Sec.

CORRECTIONS FOR FLOW WITHOUT CEILING EFFECT:

1. Noise Criteria - No correction required
2. Static pressure - No correction required
3. Area Factor - No correction required
4. Throw and Drop - Some work has been done to show that the throw will be reduced by approximately 15-20% and the drop increased by 5-15%.

SAR,SAG, RAR, RAG

REGISTERS & GRILLES
PERFORMANCE DATA - RETURN

*SI UNITS

L/S	SIZE	300 x 150	300 x 200	450 x 150	500 x 150	600 x 150	750 x 150	900 x 150	1050 x 150	900 x 200	1050 x 200	900 x 250	1050 x 250	900 x 300	1050 x 300	
		0.041	0.055	0.062	0.069	0.083	0.093	0.105	0.112	0.118	0.126	0.141	0.146	0.170	0.178	0.198
94	Vc	2.315	1.660	1.485	1.323	1.096										
	Pv	0.331	0.166	0.133	0.106	0.073										
	Ps	0.760	0.575	0.533	0.469	0.405										
	NC	<15	<15	<15	<15	<15										
118	Vc	2.906	2.142	1.856	1.654	1.370	1.228									
	Pv	0.521	0.283	0.208	0.165	0.113	0.091									
	PS	1.020	0.760	0.649	0.582	0.488	0.440									
	NC	<15	<15	<15	<15	<15	<15									
142	Vc	3.498	2.577	2.227	1.985	1.644	1.473	1.311	1.224							
	Pv	0.755	0.410	0.299	0.238	0.163	0.131	0.104	0.090							
	PS	1.520	1.020	0.805	0.691	0.538	0.465	0.398	0.363							
	NC	15	<15	<15	<15	<15	<15	<15	<15							
165	Vc	4.064	2.995	2.598	2.316	1.918	1.719	1.530	1.427	1.361	1.269					
	Pv	1.019	0.553	0.408	0.324	0.222	0.178	0.141	0.123	0.112	0.097					
	PS	2.030	1.270	1.107	0.927	0.694	0.586	0.490	0.440	0.409	0.367					
	NC	24	16	<15	<15	<15	<15	<15	<15	<15	<15					
189	Vc	4.655	3.430	3.068	2.647	2.192	1.964	1.748	1.631	1.555	1.450	1.293	1.256			
	Pv	1.337	0.726	0.581	0.423	0.290	0.233	0.185	0.161	0.146	0.127	0.101	0.095			
	PS	2.540	1.780	1.020	1.197	0.824	0.663	0.527	0.459	0.418	0.364	0.290	0.274			
	NC	27	19	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15			
212	Vc	5.222	3.848	3.442	3.068	2.466	2.210	1.967	1.835	1.749	1.632	1.455	1.413	1.210		
	Pv	1.682	0.913	0.731	0.581	0.367	0.295	0.234	0.203	0.185	0.161	0.128	0.121	0.088		
	PS	3.300	2.290	1.270	1.020	0.564	0.440	0.339	0.290	0.260	0.222	0.172	0.161	0.113		
	NC	29	22	16	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15		
236	Vc	5.813	4.283	3.831	3.415	2.830	2.456	2.186	2.039	1.944	1.813	1.616	1.570	1.344	1.287	1.157
	Pv	2.084	1.132	0.905	0.720	0.494	0.364	0.288	0.251	0.228	0.198	0.158	0.149	0.109	0.100	0.081
	PS	4.060	2.790	1.520	1.270	1.020	0.722	0.567	0.491	0.445	0.385	0.304	0.286	0.207	0.190	0.152
	NC	31	25	20	15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15

REGISTERS & GRILLES
PERFORMANCE DATA - RETURN

SAR,SAG, RAR, RAG

* SI UNITS

L/S	SIZE	300 x 150	450 x 150	500 x 150	600 x 150	750 x 150	900 x 150	1050 x 150	300 x 200	450 x 200	500 x 200	600 x 200	750 x 200	900 x 200	1050 x 200	300 x 250	450 x 250	500 x 250	600 x 250	750 x 250	900 x 250	1050 x 250	300 x 300	450 x 300	500 x 300	600 x 300	750 x 300	900 x 300	1050 x 300			
		Ac	0.041	0.055	0.062	0.069	0.083	0.093	0.105	0.112	0.118	0.126	0.141	0.146	0.170	0.178	0.198	0.214	0.228	0.302												
260	Vc	6.404	4.719	4.221	3.763	3.118	2.701	2.404	2.243	2.138	1.994	1.778	1.727	1.478	1.476	1.273																
	Pv	2.530	1.374	1.090	0.873	0.600	0.441	0.349	0.304	0.276	0.240	0.191	0.180	0.132	0.121	0.098																
	Ps	4.830	3.300	2.030	1.780	1.270	0.879	0.615	0.561	0.490	0.393	0.372	0.276	0.254	0.207																	
	NC	34	29	24	20	17	15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	
283	Vc	6.970	5.136	4.594	4.096	3.393	3.040	2.623	2.447	2.333	2.175	1.940	1.884	1.613	1.545	1.388	1.281															
	Pv	2.997	1.627	1.302	1.035	0.710	0.570	0.415	0.362	0.329	0.286	0.227	0.214	0.157	0.144	0.116	0.099															
	PS	5.840	3.810	2.290	2.030	1.520	1.020	0.832	0.721	0.653	0.565	0.445	0.419	0.304	0.278	0.223	0.189															
	NC	38	33	28	25	22	16	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	
330	Vc	8.128	5.989	5.357	4.776	3.957	3.545	3.155	2.855	2.721	2.538	2.263	2.198	1.881	1.802	1.620	1.495	1.261														
	Pv	4.075	2.213	1.770	1.407	0.996	0.775	0.614	0.492	0.447	0.389	0.309	0.292	0.214	0.196	0.158	0.135	0.096														
	PS	7.870	5.330	3.050	2.790	2.030	1.520	1.020	1.041	0.940	0.811	0.635	0.597	0.429	0.392	0.312	0.263	0.183														
	NC	41	37	33	31	29	21	15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	
378	Vc	9.310	6.860	6.136	5.470	4.532	4.060	3.614	3.372	3.214	2.901	2.586	2.512	2.150	2.059	1.851	1.708	1.441	1.213													
	Pv	5.347	2.903	2.323	1.846	1.267	1.017	0.806	0.701	0.637	0.508	0.404	0.381	0.279	0.256	0.207	0.176	0.125	0.089													
	PS	10.410	7.110	4.060	3.560	2.790	2.030	1.520	1.270	1.020	1.066	0.833	0.782	0.560	0.510	0.406	0.341	0.237	0.163													
	NC	45	40	37	35	32	25	20	15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	
425	Vc		7.713	6.899	6.151	5.096	4.565	4.063	3.791	3.614	3.263	2.909	2.826	2.419	2.317	2.082	1.922	1.621	1.364													
	Pv		3.670	2.936	2.334	1.602	1.286	1.018	0.887	0.806	0.643	0.511	0.482	0.353	0.324	0.262	0.223	0.159	0.112													
	PS		8.890	5.330	4.830	3.560	2.540	1.780	1.520	1.520	1.159	0.893	0.836	0.588	0.533	0.418	0.349	0.237	0.160													
	NC		45	40	38	36	31	24	20	16	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	
472	Vc			7.662	6.831	5.659	5.070	4.512	4.211	4.014	3.743	3.338	3.140	2.688	2.574	2.314	2.135	1.801	1.516													
	Pv			3.622	2.878	1.976	1.586	1.256	1.094	0.994	0.864	0.687	0.596	0.436	0.400	0.323	0.275	0.196	0.139													
	PS			6.600	5.840	4.320	3.050	2.290	1.780	1.780	1.270	1.020	0.937	0.650	0.587	0.456	0.378	0.253	0.169													
	NC			44	43	40	36	30	26	22	16	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	
566	Vc				8.191	6.787	6.079	5.411	5.049	4.813	4.489	4.003	3.887	3.225	3.089	2.776	2.563	2.161	1.819													
	Pv				4.139	2.841	2.280	1.806	1.573	1.429	1.243	0.988	0.932	0.628	0.576	0.466	0.397	0.282	0.200													
	PS				8.380	6.350	4.320	3.300	2.790	2.540	2.030	1.520	1.270	0.955	0.856	0.653	0.533	0.346	0.224													
	NC				48	45	39	35	30	27	21	18	15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	

REGISTERS & GRILLES
PERFORMANCE DATA - RETURN

SAR,SAG, RAR, RAG

* SI UNITS

L/S	SIZE	300 x 150	450 x 150	500 x 150	600 x 150	750 x 150	900 x 150	1050 x 150	300 x 200	450 x 200	500 x 200	600 x 200	750 x 200	900 x 200	1050 x 200	300 x 250	450 x 250	500 x 250	600 x 250	750 x 250	900 x 250	1050 x 250	300 x 300	450 x 300	500 x 300	600 x 300	750 x 300	900 x 300	1050 x 300	
		Ac	0.041	0.055	0.062	0.069	0.083	0.093	0.105	0.112	0.118	0.126	0.141	0.146	0.170	0.178	0.198	0.214	0.228	0.302										
661	Vc					7.100	6.319	5.897	5.621	5.242	4.675	4.540	3.886	3.722	3.239	2.990	2.521	2.122												
	Pv					3.110	2.463	2.145	1.949	1.695	1.348	1.271	0.932	0.854	0.634	0.540	0.384	0.272												
	PS					6.100	4.320	3.810	3.560	2.790	2.290	2.030	1.520	1.270	0.863	0.716	0.481	0.322												
	NC					44	39	34	31	27	23	18	15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15
755	Vc					7.218	6.735	6.420	5.987	5.339	5.185	4.439	4.251	3.821	3.526	2.882	2.425													
	Pv					3.214	2.798	2.543	2.211	1.759	1.659	1.215	1.115	0.901	0.767	0.502	0.355													
	PS					5.840	4.830	4.570	3.560	2.790	2.540	1.780	1.780	1.270	1.020	0.652	0.432													
	NC					42	38	35	31	27	23	18	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15
850	Vc					8.126	7.583	7.228	6.741	6.011	5.838	4.997	4.786	4.302	3.970	3.730	2.729													
	Pv					4.074	3.547	3.223	2.803	2.229	2.102	1.540	1.413	1.141	0.972	0.858	0.450													
	PS					7.370	6.100	5.590	4.570	3.560	3.050	2.290	2.030	1.780	1.520	1.020	0.783													
	NC					47	43	40	36	32	29	22	17	15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15
944	Vc					8.421	8.027	7.486	6.676	6																				

*IMPERIAL UNITS

36 x 6				42 x 6				36 x 8				42 x 8												
24 x 10				36 x 10				42 x 10																
18 x 12				30 x 12				42 x 12																
0°	45°	0°	45°	0°	45°	0°	45°	0°	45°	0°	45°	0°	45°											
1.401		1.572		1.618		1.890		1.973		2.196		2.379		2.821		3.351								
0.915	0.759	1.040	0.870	1.110	0.920	1.300	1.080	1.360	1.130	1.550	1.290	1.680	1.400	2.050	1.700	2.450	2.030							
1285	1145			1113			952			912			820			757			638			537		
0.1050	0.1900	0.0760	0.1350	0.0660	0.1190	0.0460	0.0840	0.0410	0.0740	0.0310	0.0560	0.0260	0.0470	0.0170	0.0310	0.0004	0.0007							
0.2050	0.2900	0.1560	0.2150	0.1460	0.1990	0.1060	0.1440	0.0910	0.1240	0.0710	0.0960	0.0660	0.0870	0.0370	0.0510	0.0021	0.0019							
33-41-53	24-27-31	33-40-52	23-27-31	32-39-52	22-27-30	32-39-51	22-26-30	31-39-51	21-25-30	31-38-50	21-24-29	30-38-50	21-24-28	30-37-49	19-24-27	29-36-47	18-22-26							
36	42	31	37	28	35	22	29	20	27	15	22	<15	19	<15	<15	<15	<15							
1427	1273			1236			1058			1014			911			841			709			597		
0.1290	0.2340	0.0940	0.1670	0.0810	0.1470	0.0570	0.1030	0.0510	0.0920	0.0380	0.0690	0.0320	0.0580	0.0210	0.0380	0.0140	0.0260							
0.2499	0.3540	0.1940	0.2670	0.1710	0.2370	0.1270	0.1730	0.1110	0.1520	0.0880	0.1190	0.0820	0.1080	0.0510	0.0680	0.0340	0.0460							
35-44-56	26-29-33	35-42-55	25-28-32	34-42-55	24-28-31	34-41-54	24-28-31	33-41-54	23-27-31	33-41-54	23-26-30	32-40-53	22-26-29	32-40-52	21-25-28	32-39-51	20-24-27							
39	45	34	40	32	38	26	32	24	30	19	25	16	22	<15	<15	<15	<15							
1713	1527			1483			1270			1216			1093			1009			851			716		
0.2800	0.3380	0.1000	0.2410	0.1170	0.2120	0.0700	0.1490	0.0780	0.1320	0.0660	0.0560	0.0460	0.0830	0.0300	0.0550	0.0210	0.0370							
0.3500	0.5080	0.2400	0.3810	0.2470	0.3420	0.1700	0.2490	0.1680	0.2220	0.1360	0.0960	0.1060	0.1430	0.0700	0.0950	0.0510	0.0670							
37-47-59	20-32-37	37-46-59	28-38-36	36-46-58	27-30-34	36-45-57	26-30-34	35-45-57	25-29-33	33-45-57	25-28-33	34-44-56	24-28-32	34-43-56	24-27-31	34-42-55	23-27-31							
45	51	40	46	37	44	31	38	30	36	25	31	22	28	<15	20	<15	<15							
				1731		1481		1419		1275		1177		993		836								
				0.1590	0.2890	0.1110	0.2020	0.0990	0.1800	0.0750	0.1350	0.0620	0.1130	0.0410	0.0740	0.0280	0.0510							
				0.3390	0.3690	0.2310	0.3220	0.1190	0.3000	0.1750	0.2350	0.1420	0.1930	0.1010	0.1340	0.0680	0.0910							
				38-49-60	30-34-38	38-48-59	29-34-37	38-48-59	28-32-36	38-47-59	27-31-36	37-46-58	27-30-36	37-46-58	26-30-35	37-45-57	25-29-35							
				42	49	36	43	34	41	29	35	26	33	19	25	<15	18							
						1693		1622		1457		1345		1135		955								
				0.1460	0.2640	0.1290	0.2350	0.0970	0.1770	0.0810	0.1480	0.0540	0.0970	0.0370	0.0570									
				0.3160	0.4340	0.2890	0.3950	0.2170	0.2970	0.1910	0.2580	0.1340	0.1770	0.0970	0.1270									
				40-51-62	32-36-40	40-51-62	30-35-39	39-50-61	30-34-39	39-49-60	30-33-38	39-49-60	29-33-38	38-48-59	28-32-37									
				40	47	39	45	34	40	31	37	23	30	16	23									
						1824		1640		1513		1276		1074										
				0.1640	0.2970	0.1230	0.2240	0.1030	0.1870	0.0680	0.1230	0.0460	0.1230	0.0460	0.0840									
				0.2540	0.4870	0.2930	0.3940	0.2430	0.3270	0.1680	0.2230	0.1160	0.1540											
				42-54-65	33-38-42	41-53-64	33-37-41	41-53-63	32-36-41	41-52-62	31-36-40	40-51-61	31-35-40											
				42	49	37	41	34	41	27	33	20	26											

NOTES

- * The large throw values are based on the minimum terminal velocity of 50 fpm
- * The middle throw values are based on the middle terminal velocity of 100 fpm
- * The small throw values are based on the maximum terminal velocity of 150 fpm

CORRECTIONS FOR FLOW WITHOUT CEILING EFFECT :

- Noise Criteria-No correction required
- Static pressure - No correction required
- Area Factor - No correction required
- Throw and Drop - Some work has been done to show that the throw will be reduced by approximately 15-20% and the drop increased by 5-15%.

How to use this Diagram

REGISTERS & GRILLES PERFORMANCE DATA - RETURN

SAR,SAG,RAR,RAG

CFM	SIZE	*IMPERIAL UNITS																
		12 x 6	12 x 8	18 x 6	18 x 8	20 x 6	20 x 8	24 x 6	24 x 8	30 x 6	30 x 8	36 x 6	36 x 8	42 x 6	42 x 8	42 x 10	42 x 12	
200	Ac	443	612	684	768	827	1034	1162	1307	1401	1572	1618	1980	1973	2196	2379	2821	3351
	Vc		327	292	260	216												
	Pv	0.012	0.007	0.005	0.004	0.003												
	Ps	0.030	0.023	0.021	0.019	0.016												
250	Ac	<15	<15	<15	<15	<15												
	Vc	554	408	365	326	270	242											
	Pv	0.019	0.010	0.008	0.007	0.005	0.004											
	Ps	0.040	0.030	0.026	0.023	0.020	0.018											
300	Ac	<15	<15	<15	<15	<15	<15											
	Vc	665	490	438	391	324	290	258	241									
	Pv	0.028	0.015	0.012	0.010	0.007	0.005	0.004	0.004									
	Ps	0.0600	0.0400	0.0322	0.0276	0.0215	0.0186	0.0159	0.0145									
350	Ac	15	<15	<15	<15	<15	<15	<15	<15	<15	250	268	250					
	Vc	776	572	511	456	378	338	301	281	268	0.004	0.004						
	Pv	0.038	0.020	0.016	0.013	0.009	0.007	0.006	0.005	0.004	0.004							
	Ps	0.0800	0.0500	0.0443	0.0371	0.0278	0.0234	0.0196	0.0176	0.0164	0.0147							
400	Ac	24	16	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	247	238	228
	Vc	887	653	584	521	431	387	344	321	306	285	255	247	238	228	253	228	
	Pv	0.049	0.027	0.021	0.017	0.012	0.009	0.007	0.006	0.005	0.004	0.004	0.004	0.004	0.004	0.004	0.003	0.003
	Ps	0.100	0.070	0.040	0.048	0.033	0.027	0.021	0.018	0.017	0.015	0.012	0.012	0.011	0.011	0.011	0.008	0.006
450	Ac	27	19	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15
	Vc	998	735	658	586	485	435	387	361	344	321	286	278	255	238	228	253	228
	Pv	0.062	0.034	0.027	0.021	0.015	0.012	0.009	0.008	0.007	0.006	0.005	0.005	0.005	0.005	0.004	0.004	0.003
	Ps	0.130	0.090	0.050	0.040	0.033	0.027	0.021	0.018	0.017	0.015	0.012	0.012	0.011	0.011	0.011	0.008	0.006
500	Ac	29	22	16	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15	<15
	Vc	1108	817	731	651	539	483	430	401	383	357	318	309	265	253	228	253	228
	Pv	0.077	0.042	0.033	0.026	0.018	0.015	0.012	0.010	0.009	0.008	0.006	0.006	0.006	0.004	0.004	0.003	0.003
	Ps	0.160	0.110	0.060	0.050	0.040	0.029	0.023	0.020	0.018	0.015	0.012	0.011	0.011	0.008	0.008	0.008	0.006

How to use this Diagram

REGISTERS & GRILLES PERFORMANCE DATA - RETURN

SAR,SAG,RAR,RAG

*IMPERIAL UNITS

CFM	SIZE	12 x 6		18 x 6		20 x 6		24 x 6		30 x 6		36 x 6		42 x 6		30 x 10		36 x 10		42 x 10		36 x 12		42 x 12	
		12 x 6	12 x 8	18 x 6	18 x 8	20 x 6	20 x 8	24 x 6	24 x 8	30 x 6	30 x 8	36 x 6	36 x 8	42 x 6	42 x 8	30 x 10	36 x 10	42 x 10	36 x 12	42 x 12	36 x 12	42 x 12	36 x 12	42 x 12	
3600	Ac	0.451	0.612	0.684	0.768	0.927	1.034	1.162	1.246	1.307	1.401	1.488	1.572	1.640	1.973	2.196	2.379	2.821	3.331	3.331	3.331	3.331	3.331	3.331	3.331
	Vc													1640			1513	1276	1074						
	Pv													0.168			0.143	0.102	0.072						
	Ps													0.270			0.220	0.150	0.110						
4000	Ac													38			34	26	20						
	Vc													1681			1418	1194							
	Pv													0.176			0.125	0.089							
	Ps													0.280			0.190	0.130							
4400	Ac																								
	Vc													1560			1313								
	Pv													0.152			0.107	0.070							
	Ps													0.230			0.160	0.110							
4800	Ac																								
	Vc													36			36								
	Pv													0.128			0.089	0.060							
	Ps													0.19			0.130	0.090							

SYMBOLS

- * CFM :Air Volume in Cubic Foot Per Minute
- *Ac :Core Area in square foot
- *Vc :Core Velocity in feet per minute
- *Pv :Velocity Pressure in inches water gauge
- *Ps :Negative static Pressure in inches water gauge

CONDITIONS

- * Return
- * Damper is fully open
- * Noise Criteria is based on (10dB) room attenuation.

PERFORMANCED REGISTER & GRILLES PERFORMANCE DATA - RETURN

PAG,PAR

*SI UNITS

L/S	SIZE	300 x 100		500 x 150		600 x 150		750 x 150		900 x 200		900 x 200		900 x 200		900 x 200		900 x 200		900 x 200			
		150 x 150	200 x 150	250 x 150	300 x 250	450 x 200	600 x 200	750 x 200	900 x 200	900 x 200	900 x 200	900 x 200	900 x 200	900 x 200	900 x 200	900 x 200	900 x 200	900 x 200	900 x 200	900 x 200	900 x 200		
94	Ac	0.020	0.020	0.035	0.037	0.071	0.086	0.108	0.116	0.146	0.176	0.183	0.200	0.222	0.274	0.359							
	Vc	4.67	3.47	2.72	2.53	1.32	1.10	0.87	0.81														
	Pv	1.419	0.768	0.464	0.400	0.104	0.070	0.044	0.038														
	Ps	10.480	5.804	3.572	3.095	0.847	0.581	0.370	0.319														
118	Ac																						
	Vc		4.34	3.40	3.17	1.65	1.37	1.09	1.02	0.81													
	Pv		1.220	0.737	0.635	0.165	0.112	0.070	0.060	0.037													
	Ps		9.062	5.578	4.833	1.322	0.907	0.578	0.499	0.316													
142	Ac																						
	Vc		5.21	4.08	3.80	1.98	1.64	1.31	1.22	0.97	0.81												
	Pv		1.781	1.076	0.927	0.241	0.163	0.102	0.088	0.055	0.037												
	Ps		13.042	8.027	6.955	1.902	1.306	0.831	0.718	0.455	0.315												
165	Ac																						
	Vc		6.07	4.76	4.43	2.32	1.92	1.53	1.42	1.13	0.94												
	Pv		2.451	1.487	1.276	0.332	0.225	0.140	0.121	0.075	0.051												
	Ps		17.743	10.921	9.462	2.588	1.776	1.131	0.976	0.619	0.428												
189	Ac																						
	Vc			5.44	5.07	2.85	2.19	1.75	1.62	1.29	1.08	1.03											
	Pv			1.953	1.683	0.438	0.296	0.185	0.159	0.099	0.068	0.062											
	Ps			14.257	12.354	3.379	2.319	1.476	1.274	0.808	0.559	0.513											
212	Ac																						
	Vc			6.12	5.70	2.98	2.47	1.97	1.83	1.45	1.21	1.16											
	Pv			2.949	2.149	0.559	0.378	0.237	0.203	0.127	0.086	0.079											
	Ps			18.038	15.629	4.275	2.934	1.868	1.612	1.023	0.707	0.649											
236	Ac																						
	Vc				6.33	3.31	2.74	2.19	2.03	1.62	1.34	1.29											
	Pv				2.673	0.696	0.470	0.294	0.253	0.157	0.107	0.098											
	Ps				19.289	5.276	3.621	2.305	1.990	1.262	0.873	0.801											
260	Ac																						
	Vc				6.97	3.64	3.01	2.40	2.23	1.78	1.48	1.42	1.30										
	Pv				3.258	0.848	0.573	0.359	0.308	0.192	0.131	0.120	0.100										
	Ps				23.332	6.382	4.380	2.789	2.407	1.527	1.056	0.969	0.816										
283	Ac																						
	Vc				7.60	3.97	3.29	2.62	2.44	1.94	1.61	1.54	1.42	1.28									
	Pv				3.902	1.015	0.687	0.430	0.369	0.230	0.157	0.143	0.120	0.097									
	Ps				27.760	7.593	5.211	3.318	2.864	1.816	1.257	1.153	0.970	0.790									
330	Ac																						
	Vc					4.63	3.84	3.06	2.84	2.26	1.88	1.80	1.65	1.49									
	Pv					1.398	0.945	0.591	0.508	0.316	0.216	0.197	0.165	0.133									
	Ps					10.329	7.089	4.54	3.896	2.471	1.709	1.568	1.320	1.075									
378	Ac																						
	Vc					5.29	4.38	3.50	3.25	2.59	2.15	2.06	1.89	1.70	1.38								
	Pv					1.843	1.247	0.780	0.670	0.417	0.285	0.260	0.218	0.176	0.138								
	Ps					13.485	9.255	5.893	5.086	3.226	2.232	2.048	1.724	1.403	0.919								

PER FOR ATED RE GIS TER S & GR ILLE S
PER FOR MANCE DATA - RET URN

PAR ,PAG

*IMPERIAL UNITS

CFM	SIZE	12 x 4		20 x 6		24 x 6		30 x 6										
		6 x 6	8 x 6	10 x 6		8 x 8	12 x 10	18 x 10	24 x 8	30 x 8	36 x 8							
Ac		0.218	0.293	0.373	0.401	0.768	0.927	1.162	1.251	1.571	1.890	1.973	2.151	2.384	2.947	3.868		
900	V _c					1172	971	774	719	573	476	456	418	377	305			
	P _v					0.093	0.063	0.039	0.034	0.021	0.014	0.013	0.011	0.009	0.006			
	P _s					0.672	0.461	0.294	0.253	0.161	0.111	0.102	0.086	0.070	0.046			
	NC					47	39	31	29	23	20	19	17	16	13			
1000	V _c					1079	860	799	636	529	507	465	419	339	259			
	P _v					0.078	0.049	0.042	0.026	0.018	0.016	0.014	0.011	0.007	0.004			
	P _s					0.569	0.362	0.313	0.198	0.137	0.126	0.106	0.086	0.057	0.033			
	NC					43	35	32	26	22	21	19	17	14	11			
1200	V _c					1294	1033	959	764	635	608	558	503	407	310			
	P _v					0.114	0.071	0.061	0.038	0.026	0.024	0.020	0.016	0.010	0.006			
	P _s					0.819	0.521	0.450	0.285	0.197	0.0181	0.152	0.124	0.081	0.047			
	NC					51	41	38	31	26	25	23	21	17	13			
1400	V _c					1205	1119	891	741	709	651	587	475	362				
	P _v					0.098	0.084	0.052	0.036	0.033	0.027	0.022	0.014	0.008				
	P _s					0.709	0.612	0.388	0.269	0.246	0.207	0.169	0.111	0.064				
	NC					48	45	36	30	29	27	24	20	<15				
1600	V _c					1377	1279	1018	847	811	744	671	543	414				
	P _v					0.129	0.111	0.069	0.047	0.043	0.036	0.029	0.019	0.011				
	P _s					0.926	0.799	0.507	0.351	0.322	0.271	0.220	0.144	0.084				
	NC					54	51	41	34	33	30	27	22	17				
1800	V _c					1439	1145	952	912	837	755	611	465					
	P _v					0.142	0.088	0.060	0.055	0.046	0.037	0.024	0.014					
	P _s					1.011	0.641	0.444	0.407	0.343	0.279	0.183	0.106					
	NC					57	46	38	37	34	31	25	19					
2000	V _c					1273	1058	1014	930	839	679	517						
	P _v					0.110	0.075	0.069	0.057	0.046	0.030	0.017						
	P _s					0.792	0.548	0.502	0.423	0.344	0.226	0.131						
	NC					50	42	41	37	34	28	21						
2400	V _c					1270	1216	1116	1007	814	621							
	P _v					0.109	0.100	0.084	0.068	0.044	0.025							
	P _s					0.788	0.723	0.609	0.495	0.325	0.189							
	NC					50	48	44	40	33	25							

SYMBOLS
CFM : Air Volume in Cubic Feet Per Minute
Ac : Core area in square foot
V_c : Core velocity in foot per minute
P_v : Velocity pressure in inches water gauge
P_s : Negative Static Pressure in inches water

CONDITIONS
* Return
* Damper is fully open
* Noise Criteria is based on (10dB) room attenuation.

EGG CRA TER EGI STE RS & GR ILLE S
PER FOR MANCE DATA - RETUR N

ECR,ECG

*SI UNITS

L/S	SIZE	300 x 100		500 x 150		600 x 150		750 x 150										
		150 x 150	200 x 150	250 x 150		200 x 200	300 x 250	450 x 200	450 x 250	600 x 200	750 x 200	900 x 200						
A _c		0.020	0.027	0.035	0.037	0.071	0.086	0.108	0.116	0.146	0.176	0.183	0.200	0.222	0.274	0.359		
94	V _c	4.7	3.5	2.7	2.5	1.3	1.1	0.9	0.8									
	P _v	1.423	0.793	0.491	0.426	0.118	0.082	0.052	0.045									
	P _s	2.871	1.568	0.955	0.824	0.219	0.149	0.094	0.081									
	NC	29	21	16	15	<15	<15	<15	<15									
118	V _c	4.3	3.4	3.2	1.7	1.4	1.1	1.0	0.8									
	P _v	1.232	0.763	0.662	0.184	0.127	0.081	0.070	0.045									
	P _s	2.474	1.506	1.300	0.345	0.235	0.148	0.127	0.080									
	NC	27	21	19	<15	<15	<15	<15	<15									
142	V _c	5.2	4.1	3.8	2.0	1.6	1.3	1.2	1.0	0.8								
	P _v	1.766	1.093	0.949	0.264	0.182	0.116	0.101	0.064	0.045								
	P _s	3.591	2.185	1.887	0.501	0.341	0.215	0.185	0.116	0.080								
	NC	33	25	23	<15	<15	<15	<15	<15	<15								
165	V _c	6.1	4.8	4.4	2.3	1.9	1.5	1.4	1.1	0.9								
	P _v	2.393	1.482	1.286	0.357	0.246	0.158	0.136	0.087	0.060								
	P _s	4.920	2.994	2.586	0.686	0.467	0.294	0.253	0.159	0.109								
	NC	39	30	28	<15	<15	<15	<15	<15	<15								
189	V _c	5.4	5.1	2.6	2.2	1.7	1.6	1.3	1.1	1.0								
	P _v	1.928	1.674	0.465	0.321	0.205	0.177	0.113	0.079	0.072								
	P _s	3.933	3.397	0.902	0.613	0.387	0.333	0.209	0.143	0.131								
	NC	35	32	16	<15	<15	<15	<15	<15	<15								
212	V _c	6.1	5.7	3.0	2.5	2.0	1.8	1.5	1.2	1.2								
	P _v	2.432	2.111	0.587	0.404	0.259	0.224	0.143	0.099	0.091								
	P _s	5.003	4.321	1.147	0.780	0.492	0.423	0.265	0.182	0.167								
	NC	39	36	18	15	<15	<15	<15	<15	<15								
236	V _c	6.3	3.3	2.7	2.2	2.0	1.6	1.3	1.3									
	P _v	2.599	0.722	0.498	0.319	0.276	0.176	0.122	0.112									
	P _s	5.359	1.422	0.968	0.610	0.525	0.329	0.226	0.207									
	NC	41	20	17	<15	<15	<15	<15	<15	<15								
260	V _c	7.0	3.6	3.0	2.4	2.2	1.8	1.5	1.4	1.3								
	P _v	3.137	0.871	0.601	0.385	0.333	0.212	0.147	0.135	0.114								
	P _s	6.510	1.728	1.176	0.741	0.637	0.400	0.274	0.251	0.211								
	NC	45	22	18	<15	<15	<15	<15	<15	<15								
283	V _c	7.6	4.0	3.3	2.6	2.4	1.9	1.6	1.5	1.4	1.3							
	P _v	3.724	1.035	0.713	0.475	0.395	0.252	0.175	0.161	0.136	0.111							
	P _s	7.777	2.064	1.405	0.885	0.761	0.478	0.328	0.300	0.252	0.204							
	NC	49	25	20	16	15	<15	<15	<15	<15	7							
330	V _c	4.6	3.8	3.1	2.8	2.3	1.9	1.8	1.7	1.5								
	P _v	1.402	0.967	0.619	0.535	0.341	0.237	0.218	0.184	0.150								
	P _s	2.828	1.924	1.213	1.043	0.655	0.449	0.411	0.345	0.279								
	NC	29	24	19	17	<15	<15	<15	<15	<15								
378	V _c	5.3	4.4	3.5	3.2	2.6	2.2	2.1	1.9	1.7	1.4							
	P _v	1.825	1.258	0.805	0.696	0.444	0.309	0.283	0.239	0.195	0.129							

EGG CRATE REGISTERS & GRILLES
PERFORMANCE DATA - RETURN

ECR,ECG

*IMPERIAL UNITS

CFM	SIZE	12 x 4		20 x 6		24 x 6		30 x 6		24 x 8		30 x 8		36 x 8		30 x 10		18 x 18		30 x 12		21 x 21		24 x 24	
		6 x 6	8 x 6	10 x 6	8 x 8	12 x 10	12 x 12	16 x 12	20 x 12	24 x 12	18 x 18	30 x 12	21 x 21	24 x 24											
	A _c	0.218	0.293	0.373	0.401	0.763	0.927	1.162	1.251	1.571	1.890	1.973	2.151	2.384	2.947	3.868									
900	V _c					1172	971	774	719	573	476	456	418	377	305										
	P _v					0.091	0.062	0.040	0.035	0.022	0.015	0.014	0.012	0.010	0.006										
	P _s					0.186	0.127	0.080	0.069	0.043	0.030	0.027	0.023	0.018	0.012										
	NC					38	31	24	23	18	<15	<15	<15	<15	<15										
1000	V _c					1079	860	799	636	529	507	465	419	339	259										
	P _v					0.077	0.049	0.043	0.027	0.019	0.017	0.015	0.012	0.008	0.005										
	P _s					0.157	0.099	0.085	0.053	0.037	0.034	0.028	0.023	0.015	0.008										
	NC					35	27	25	20	16	15	<15	<15	<15	<15										
1200	V _c					1294	1033	959	764	635	608	558	503	407	310										
	P _v					0.110	0.071	0.061	0.039	0.027	0.025	0.021	0.017	0.011	0.007										
	P _s					0.228	0.144	0.124	0.078	0.053	0.049	0.041	0.033	0.021	0.021										
	NC					42	33	31	24	20	19	17	15	<15	<15										
1400	V _c					1205	1119	891	741	709	651	587	475	362											
	P _v					0.096	0.083	0.053	0.037	0.034	0.028	0.023	0.015	0.009											
	P _s					0.197	0.169	0.106	0.073	0.067	0.056	0.045	0.029	0.017											
	NC					39	36	28	23	22	20	18	<15	<15											
1600	V _c					1377	1279	1018	847	811	744	671	543	414											
	P _v					0.124	0.108	0.069	0.048	0.044	0.037	0.030	0.020	0.012											
	P _s					0.258	0.222	0.140	0.096	0.088	0.073	0.060	0.039	0.022											
	NC					45	42	33	27	26	23	21	17	<15											
1800	V _c					1439	1145	952	912	837	755	611	465												
	P _v					0.136	0.087	0.060	0.055	0.047	0.038	0.025	0.015												
	P _s					0.283	0.177	0.122	0.111	0.093	0.076	0.049	0.028												
	NC					47	37	30	29	26	24	19	<15												
2000	V _c					1273	1058	1014	930	839	679	517													
	P _v					0.107	0.074	0.068	0.057	0.047	0.031	0.018													
	P _s					0.220	0.151	0.138	0.116	0.094	0.061	0.035													
	NC					42	34	33	30	27	21	16													
2400	V _c					1270	1216	1116	1007	814	621														
	P _v					0.106	0.097	0.082	0.067	0.044	0.026														
	P _s					0.219	0.201	0.168	0.136	0.088	0.051														
	NC					41	40	36	32	26	19														

SYMBOLS:
CFM :Air Volume in Cubic Feet Per Minute
A_c :Core area in square foot
V_c :Core Velocity in foot per minute
P_v :Velocity Pressure in inches water gauge
P_s :Negative static Pressure in inches water gauge
NC :Noise Criteria

CONDITIONS
* Return
* Damper is fully open
* Noise Criteria is based on (10dB) room attenuation.

DOOR GRILLES
PERFORMANCE DATA

DG

*SI UNITS

A _c M ²	NOMINAL SIZE MM	V _c M/S	0.508	0.762	1.016	1.27	1.524	1.778	2.032
			P _v MMWG	0.015	0.035	0.0625	0.0975	0.14	0.19
		P _s MMWG	0.275	0.65	1.15	1.825	2.6	3.525	4.65
0.02	250 x100	L/S	10	15	20	25	30	35	40
		NC	-	-	-	-	-	16	19
0.05	400x150	L/S	26	40	53	66	79	92	106
		NC	-	-	17	24	28	31	35
0.07	500x150, 400x200	L/S	35	52	70	87	105	122	140
		NC	-	-	19	25	30	33	36
0.09	700x150,500x200,400x250	L/S	47	70	93	117	140	164	187
		NC	-	15	23	29	32	36	40
0.14	750x200,600x250,500x300,400x350	L/S	69	104	139	173	208	243	277
		NC	-	19	26	31	37	41	44
0.19	800x250,650x300,550x350,500x400	L/S	94	142	189	236	283	330	378
		NC	-	24	31	37	42	46	49
0.23	800x300,700x350,600x400,550x450	L/S	118	177	236	295	354	413	472
		NC	16	27	34	40	44	48	52
0.29	850x350,750x400,650x450, 600x500	L/S	145	218	291	363	436	509	581
		NC	19	30	37	43	47	51	55
0.35	850x400,750x450,700x500,600x550	L/S	178	267	356	445	534	623	712
		NC	22	32	40	46	50	54	58
0.40	850x450,800x500,700x550,650x600	L/S	204	306	409	511	613	715	817
		NC	24	34	42	47	52	56	60
0.44	850x500,800x550, 700x600,650x650	L/S	224	336	447	559	671	783	895
		NC	24	35	42	48	52	57	62
0.50	850x550,800x600,750x650,700x700	L/S	252	379	505	631	757	884	1010
		NC	26	36	44	50	55	58	63

SYMBOLS:
L/S :Air volume in litre per second
A_c :Core Area in meter square
V_c :Core Velocity in meter per second
NC :Noise Criteria
P_v :Velocity Pressure in mm water gauge
P_s :Static Pressure in mm water gauge

DOOR GRILLES PERFORMANCE DATA

DG

*IMPERIAL UNITS

A _c FT ²	NOMINAL SIZE INCH	V.F.P.M	100	150	200	250	300	350	400
			P _v ,IWG	0.0006	0.0014	0.0025	0.0039	0.0056	0.0076
		P _s ,IWG	0.011	0.026	0.046	0.073	0.104	0.141	0.186
0.21	10 x 4	CF M	21	32	42	53	63	74	84
		NC	-	-	-	-	-	16	19
0.56	16 x 6	CF M	56	84	112	140	168	196	224
		NC	-	-	17	24	28	31	35
0.74	20x6, 6x8	CF M	74	111	148	185	222	259	296
		NC	-	-	19	25	30	33	36
0.99	28x6, 20x8, 16x10	CF M	99	149	198	248	297	347	396
		NC	-	15	23	29	32	36	40
1.47	30x8, 20x12, 24x10, 16x14	CF M	147	221	294	368	441	515	588
		NC	-	19	26	31	37	41	44
2.00	32x10, 26x12, 22x14, 20x16	CF M	200	300	400	500	600	700	800
		NC	-	24	31	37	42	46	49
2.50	32x12, 28x14, 24x16, 22x18	CF M	250	375	500	625	750	875	1000
		NC	16	27	34	40	44	48	52
3.08	34x14, 30x16, 26x18, 24x20,	CF M	308	462	616	770	924	1078	1232
		NC	19	30	37	43	47	51	55
3.77	34x16, 30x18, 28x20, 24x22	CF M	377	556	754	943	1131	1320	1508
		NC	22	32	40	46	50	54	58
4.33	34x18, 32x20, 28x22, 26x24	CF M	433	650	866	1083	1299	1516	1732
		NC	24	34	42	47	52	56	60
4.74	34x20, 32x22, 28x24, 26x26	CF M	474	711	948	1185	1422	1659	1896
		NC	24	35	42	48	52	57	62
5.35	34x22, 32x24, 30x26, 28x28	CF M	535	803	1070	1338	1605	1873	2140
		NC	26	36	44	50	55	58	63

SYMBOLS:
 CFM :Air volume in cubic foot per minute
 A_c :Core Area in feet square
 V_c :Core Velocity in feet per minute
 NC :Noise Criteria
 P_v :Velocity Pressure in inches water guage
 P_s :Static Pressure in inches water guage

Ordering Data

Available Surface Finishes For Grilles and Registers:

- Natural Matt Silver Anodized.
- Powder Coating (Standard Colors are white RAL 9010 | 9016, other optional colors if required to be provided in RAL- No. only and charged extra).
- Aluminium in Mill Finish.
- Other Special Finishes (on request if available).

Available Surface Finishes For Opposed Blade Dampers:

- Aluminium in Mill Finish (standard).
- Matt Black Powder Coating (optional).

Ordering Specifications: Specify:

1. Grille | Register Description (Supply, Return, Extract, Exhaust, Fresh Air ...etc).
2. Blades Mounting (Not required for Fresh Air and Eggcrate Grilles | Registers).
3. Single | Double Deflection (Not required for Fresh Air and Eggcrate Grilles | Registers).
4. Opposed Blade Damper to be mentioned only: -
- If required in black color.
- Or, in case it's attached with Fresh Air or Eggcrate Grilles.
5. Nominal | Neck size.
6. Quantity.
7. Grille | Register Surface Finish.
8. RAL- No. (only mention if powder coating surface finish is required).
9. Type of Fixing (Concealed or Face Screw Fixing).
10. Optional Accessories or Remarks (Aluminium Washable Filter, Gasket ... or others).

Example 1:

1	2	3	4	5	6	7	8	9	10
SAR	HFB	DD	BD	20" x 8" 500 x 200 (mm)	150	Powder Coating	9016	Concealed	With Rubber Gasket

Example 2:

1	2	3	4	5	6	7	8	9	10
FAG + D c/w FILTER	-	-	D	12" x 6" 300 x 150 (mm)	23	Silver Anodized	-	Concealed	(Double Frame) Fixed Blades < 45°

Example 3:

1	2	3	4	5	6	7	8	9	10
ECG + F	-	-	-	12" x 8" 300 x 200 (mm)	10	Powder Coating	1015 (Optional)	Screw	With Filter

DOOR TRANSFER GRILLES

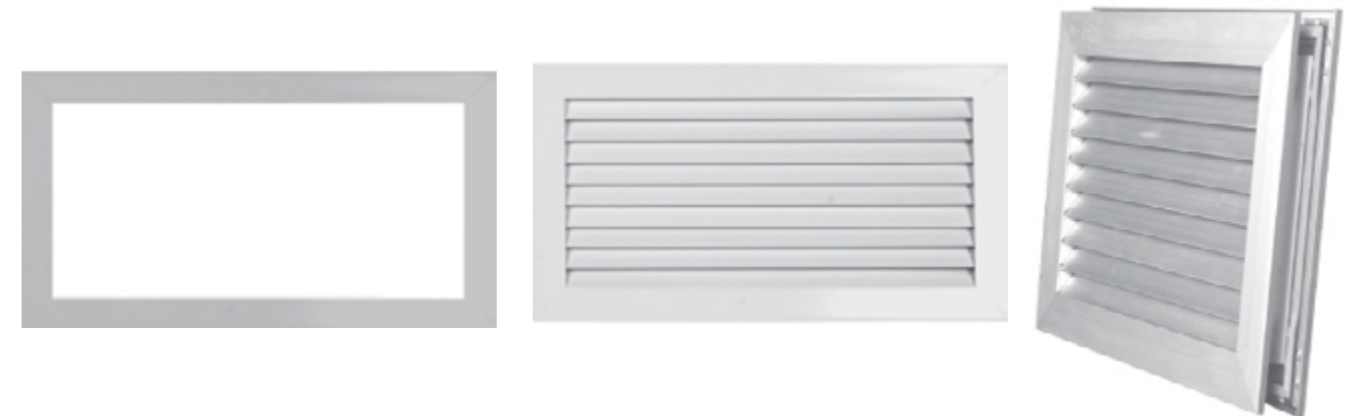
CONTENTS

- 01 Introduction, Features & Characteristics.
- 02 Models, Profiles used in Door Grilles.
- 03 Mounting Instructions, Face Screw Fixing, Effective Area Values.
- 04 Selection Diagrams.
- 05 Ordering Data.

Engineering Notes:

➔ TFE Door Transfer Grilles of the DG Model are particularly designed to allow the passage of air from a conditioned space to another while preventing vision. They are widely used, not only in doors, panels or partitions, but

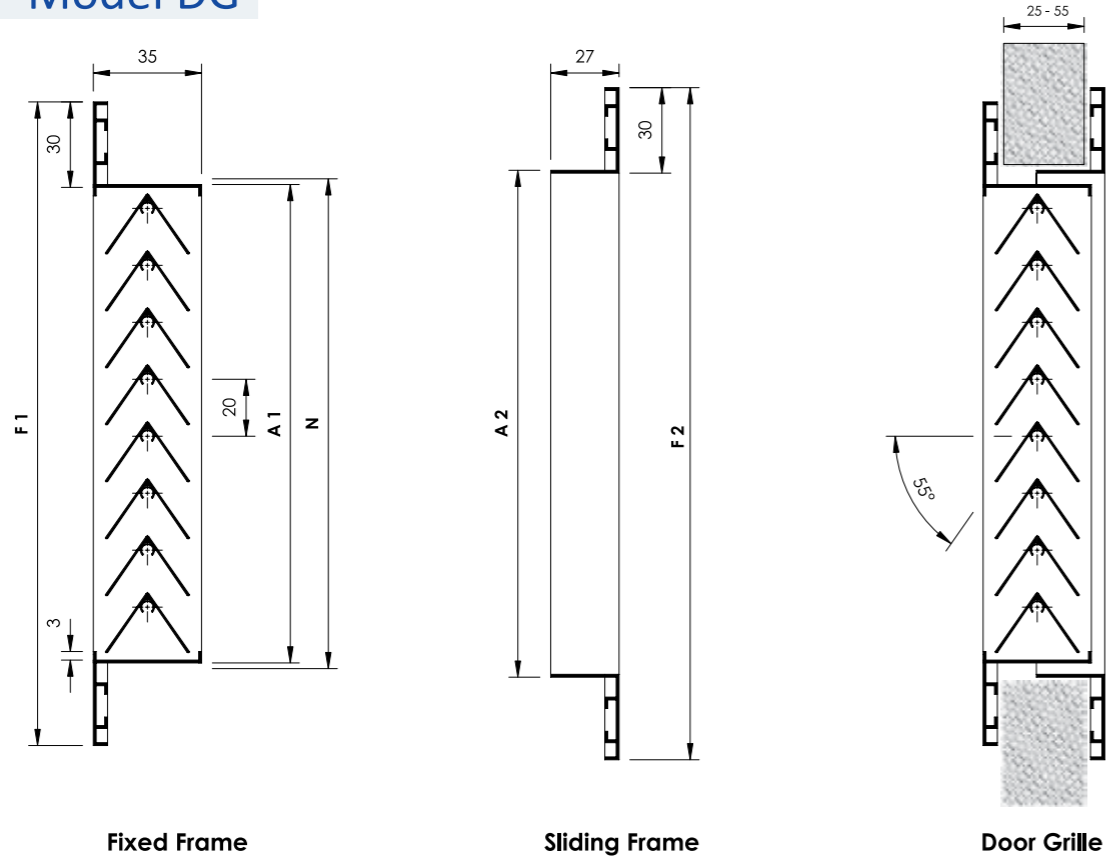
also in places of conventional exhaust and return air grilles where it's required that the interior of the duct be hidden.



➔ Features & Characteristics:

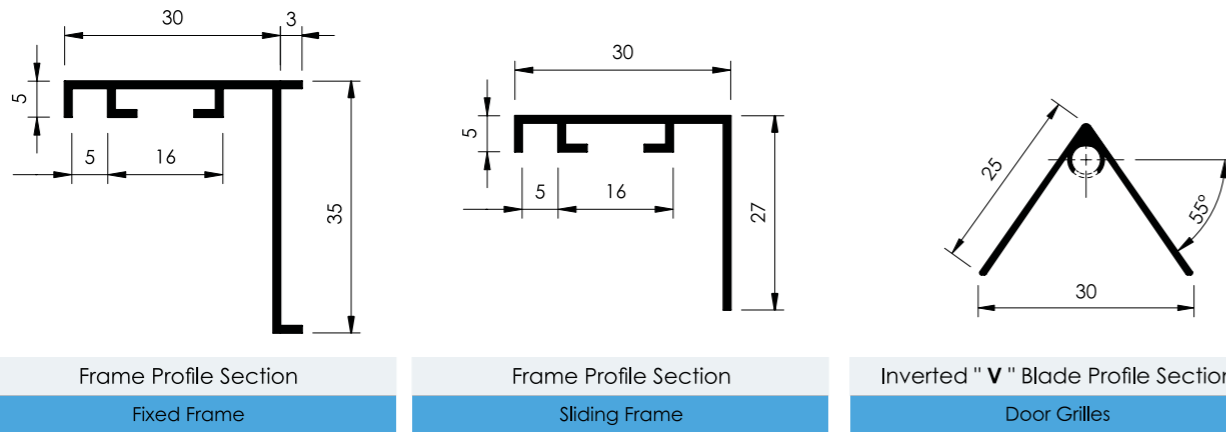
- Construction: Frame & blades are made of high quality Extruded Aluminium Profiles of 6063 Alloy.
- Frame Flange width: 30 mm.
- Blades: Inverted "V" horizontal cross section louvers arranged to overlap each other to be Sight-Tight when viewed from any angle.
- Blades pitch: blades are spaced at a distance of 20 mm.
- The inverted "V" louver cross section not only blocks vision, but also provides additional strength and rigid construction.
- Available in wide variety of standard neck sizes ranging from 200 x 100 up to 1200 x 500 mm (other non-Standard Sizes are available on request).
- Telescopic frame suitable for doors or partitions from 25 - 55 mm thick (Fixed on both sides of the door).
- The frame of the Door Transfer Grille is composed of two parts, one part is the fixed one, holding the core and can be fixed to one side of the door or partition. While the other part, the sliding one, is fixed to the other side of the door or partition. Thus the sliding frame gives the facility of installing this grille to different thicknesses of doors or partitions.
- The large free area (up to 70%) is capable of transferring high air volumes at minimum pressure loss and noise level.
- The frame mounting holes are dimpled, allowing for a counter-sunk fastener head appearance.
- Available with Foam type Rubber Gasket for air sealing (provided as an option).
- Mounting instructions: see page No. DG- 03.
- Surface Finishes: see page No. DG- 05

Model DG



N : Nominal / Listed Size = Length (L) x Height (H) in mm
Case I: Specified height (H) in cm is even figure :
A 1 = Actual Size = (L-10) x (H-15)
F 1 = Face Size = (L+50) x (H+45)
A 2 = Actual Size = (L-5) x (H-10)
F 2 = Face Size = (L+55) x (H+50)

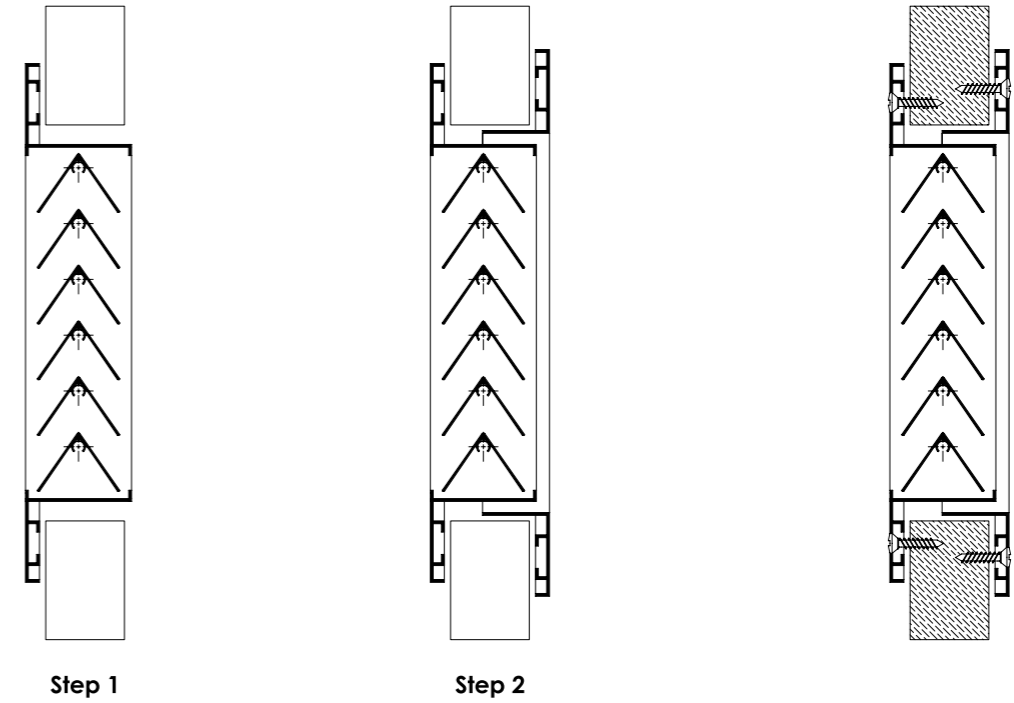
Case II: Specified height (H) in cm is even figure :
A 1 = Actual Size = (L-10) x (H-5)
F 1 = Face Size = (L+50) x (H+55)
A 2 = Actual Size = (L-5) x (H)
F 2 = Face Size = (L+55) x (H+60)



• All Dimensions are in mm and subject to ± 0.2 mm tolerance.

Mounting Instructions:

- Insert the counter frame in the door portion opening and fix with screws using the holes on the border edge.
- On the opposite part, install the grille with frame in a way that allows the telescopic port to open into the counter frame. Fix with screws.

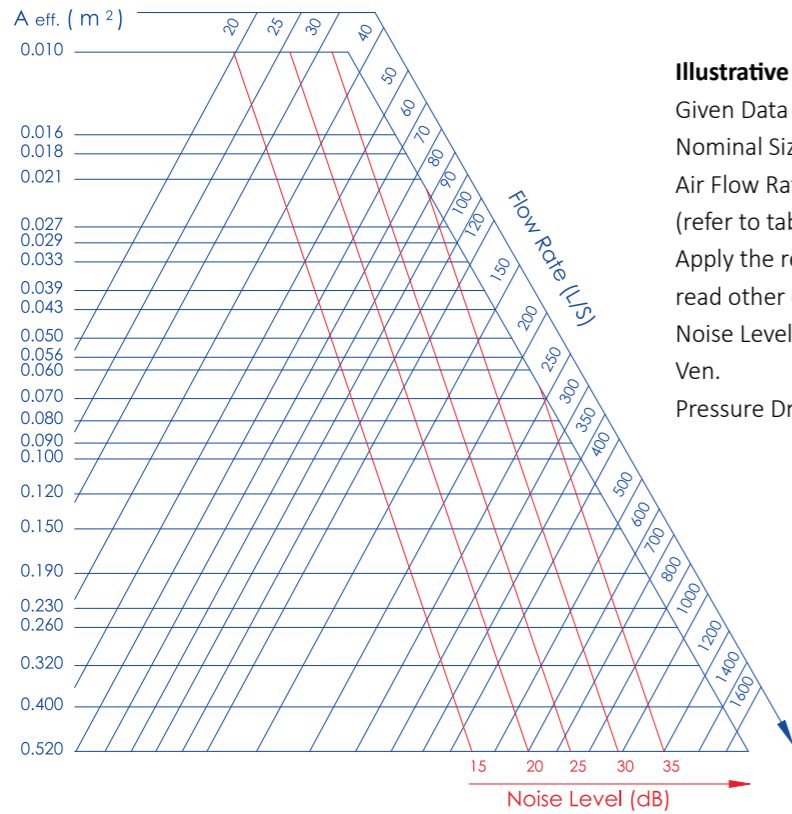


- Insert the counterframe in the door portion opening and fix with screws using the holes on the border edge.
- On the opposite part, install the grille with frame in a way that allows the telescopic port to open into the counterframe. Fix with screws.
- The Door Grille is fixed to the door or partition by means of visible counter- sunk screws.

Effective Area Values for Door Transfer Grilles in (m ²)							
L	H	100	150	200	250	300	500
150		0.005	0.008				
200		0.010	0.018	0.027			
250		0.014	0.025	0.040	0.045		
300		0.016	0.029	0.043	0.057	0.070	
400		0.021	0.039	0.056	0.073	0.090	0.120
500		0.027	0.050	0.070	0.095	0.120	0.190
600		0.033	0.060	0.090	0.120	0.150	0.260
800		0.043	0.080	0.120	0.155	0.190	0.320
1000		0.056	0.100	0.150	0.190	0.230	0.400
1200		0.070	0.120	0.190	0.225	0.260	0.520

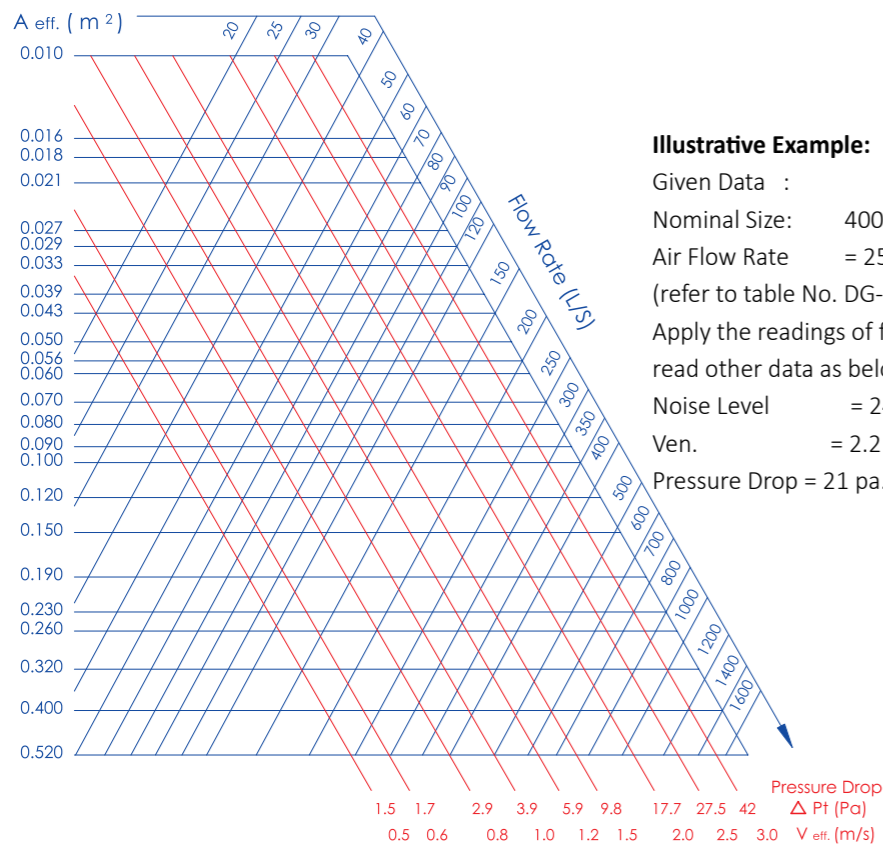
• L & H Dimensions are in mm.

Selection Diagram



Illustrative Example:

Given Data :
 Nominal Size: 400 x 200 mm
 Air Flow Rate = 255 CFM = 120 (L/S) AeH. = 0.056 m²
 (refer to table No. DG-01)
 Apply the readings of flow rate and Aeff. on the chart and read other data as below:
 Noise Level = 24 dB.
 Ven. = 2.2 m/s.
 Pressure Drop = 21 pa.



Illustrative Example:

Given Data :
 Nominal Size: 400 x 200 mm
 Air Flow Rate = 255 CFM = 120 (L/S) AeH. = 0.056 m²
 (refer to table No. DG-01)
 Apply the readings of flow rate and Aeff. on the chart and read other data as below:
 Noise Level = 24 dB.
 Ven. = 2.2 m/s.
 Pressure Drop = 21 pa.

Available Surface Finishes for Door Transfer Grilles:

- Natural I Matt Silver Anodized.
- Powder Coating (Standard Colors are white RAL 901019016, other optional colors if required to be provided in RAL - No. only and charged extra).
- Aluminum in Mill Finish.
- Other Special finishes (on request if available).

Ordering Specifications:

NatuSpecify:

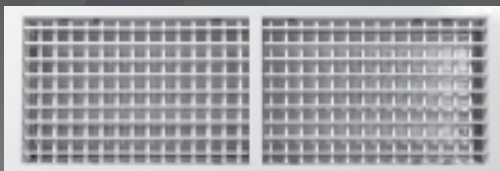
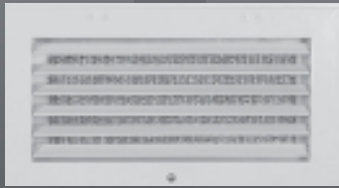
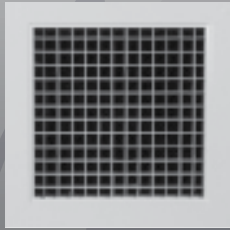
1. Door Grille Description I Model (DG).
2. Nominal I Neck size.
3. Quantity.
4. Door Grille Surface Finish.
5. RAL- No. (only mention if powder coating surface finish is required).
6. Rubber Gasket (only mention if required).

1	2	3	4	5	6
DG	12" x 8" 300 x 200 (mm)	25	Powder Coating	9016	—

1	2	3	4	5	6
DG	20" x 10" 500 x 250 (mm)	40	Silver Anodized	—	With Rubber Gasket

1	2	3	4	5	6
DG	16" x 12" 400 x 300 (mm)	6	Mill Finish	—	—

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