佳恒冷氣工程有限公司
Kai Hang Air-Cond. Eng Co. Ltd

AIR DISTRIBUTION PRODUCT

香港新界葵涌葵豐街41-45號安福工業大廈16字樓H室
Block H, 16/F., On Fook Industrial Building,
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Phone: (852) 39051002, 39050100, 91424728

證書編號: 91441900338110581M

佳恒冷氣工程有限公司
Kai Hang Air-Cond. Eng Co. Ltd

AIR DISTRIBUTION PRODUCT

PRODUCT AND DESIGNATION		REMARKS	SECTION
AMD*		**SQUARE DIFFUSER**. Suitable for all systems. Mild steel or aluminium diffuser, can be connected directly to the ducting or to a connection box. Volume control damper is available. Also for exhaust air.	A
AF22*		**DOUBLE DEFLECTION GRILLE**. Suitable for all systems. Mild steel or aluminium grille. Diffusion in horizontal and vertical planes. Volume control damper is available. Also for exhaust air.	B
AF21*		**SINGLE DEFLECTION GRILLE**. Suitable for all systems. Mild steel or aluminium grille. Diffusion in either horizontal or vertical. Volume control damper is available. Also for exhaust air.	C
REAL*		**RETURN AIR LOURVE**. It is designed for return air and suitable for all systems. Mild steel or aluminium with inclined vane front. Volume control damper is available.	D
L60		**HINGED TYPE RETURN AIR LOURVE**. It is designed to house air filter. Mild steel or aluminium. Filter media is aluminium. The air filter is washable.	E
LBP*		**LINEAR BAR DIFFUSER**. Suitable for all systems. Suitable for ceiling and side wall mounting. Deflection angle can be either 0° or 30°. Aluminium material. Any sizes are available. Fixed or removable type.	F
TBD		**LINEAR SLOT DIFFUSER**. Suitable for VAV system. Aluminium diffuser. Exhaust air version also available. Up to 8 slots.	G

*Materials物料: 304、316 Stainless steel不鏽鋼

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PRODUCT AND DESIGNATION		REMARKS	SECTION
WPL*		**WEATHER PROOF LOURVE.** It is designed for outdoor installation. Mild steel or aluminium. Suitable for intake or exhaust systems.	H
ECG		**EGG CRATE GRILLE.** Suitable for exhaust air. The type ECG is designed for ceiling-mounting. It provides a stable pattern of diffusion, even on wide variations in air flow as it provides a maximum free area of approx 90%.	I
SCD		**CIRCULAR AIR DIFFUSER.** Suitable for all systems. Aluminium diffuser, can be connected directly to the ducting or to a connection box. Volume control damper is available.	J
PDS		**PERFORATED CEILING DIFFUSER.** Suitable for all type of systems. It is primarily designed for ceiling mounting, the hinged type perforated panel can be completed with aluminium filter.	K
HVJ		**HIGH VELOCITY JET NOZZLE.** Suitable for supply air with travelling a long distance to the occupied zone. It is designed for ceiling and side wall mounting. Aluminium material. Nos. of elements and sizes are available. Square or circular shape.	L
LTL		**TROFFER DIFFUSER.** It is designed for attaching quickly and easily to standard fluorescent light troffers. Single side or saddle type are available.	M

*Materials物料: 304、316 Stainless steel不鏽鋼

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The type AMD is designed for ceiling-mounting. It provides a stable pattern of diffusion, even on wide variations in the air flow [down to approx. 25% of the flow at 35 dB(A)] and at supply air temperatures down to 10°C below the room temperature. The diffuser is therefore suitable for VAV systems.

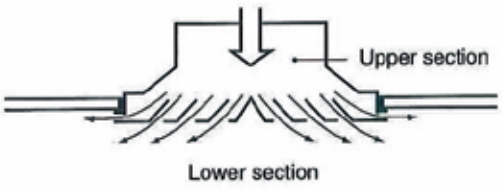
Air flow: Up to 250 l/s (900m³/h) at 35 dB(A).

- The air flow through the gap between the upper and lower section of the diffuser entrains the air flowing downwards, which reduces the risk of draughts and fouling of the ceiling.
- The lower, visible section of the diffuser is normally of white mild steel, anodised aluminium and other colours are also available.

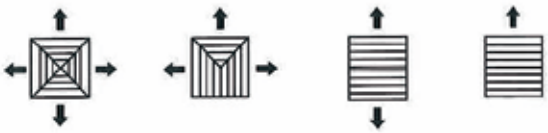
Design

The diffuser is suitable for supply air as well as exhaust air. In the latter case, a 4-way diffuser is used. The square, lower section of the diffuser consists of a number of concentrically arranged sections, with the air flowing through the intervening slots. The upper section of the diffuser is in the form of branch, for direct connection to the ducting or for connection to an intervening connection box.

The following illustration (supply air) shows that the "side air" flowing through the gap between the upper and lower sections entrains the air flowing downwards.



The AMD can be supplied to provide the diffusion patterns shown below:



Sizes

025,030,040,050,060 (Square - length in cm)
Note: Other sizes available to special order.

Accessories (to be specified separately)

The VCD(G) volume control damper for diffuser is available.

Materials and finish

Diffuser
Mild Steel
Anodised aluminium
Other finishes available to special order
304、316 Stainless steel

Instructions

Installation, adjustment and maintenance instructions are supplied.

Contents

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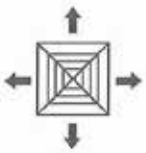
AIR DISTRIBUTION PRODUCT

4-Way

Selection table

Supply

- with ceiling effect
- damper fully open
- valid for cooling up to △ tS= - 16K
- valid for heating up to △ tS= + 30K



The minimum throw value L_T min. is based on a v_T of 0.75 m/s (150 FPM) with a v_R of 0.25 m/s (50 FPM).

The maximum throw value L_T max. is based on a v_T of 0.37 m/s (75 FPM) with a v_R of 0.12 m/s (25 FPM).

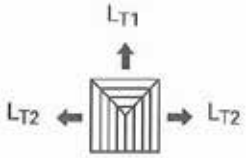
Neck Size	A_k value (m^2)	Supply velocity v_k	1.5m/s	2.0m/s	2.5m/s	3.0m/s	3.5m/s	4.0m/s	4.5m/s
150 x 150	0.022	q_v(m^3/s)	0.035	0.047	0.058	0.070	0.082	0.094	0.106
		NC	-	10	17	23	27	31	35
		L_T min-max(m)	1.2 - 2.0	1.2 - 2.4	1.8 - 2.7	1.8 - 3.0	2.0 - 3.3	2.0 - 3.3	2.4 - 3.6
225 x 225	0.050	q_v(m^3/s)	0.079	0.106	0.133	0.159	0.185	0.212	0.239
		NC	-	14	21	27	31	35	39
		L_T min-max(m)	1.5 - 2.7	1.8 - 3.0	2.0 - 3.3	2.0 - 3.6	2.4 - 3.9	2.4 - 4.2	2.7 - 4.5
300 x 300	0.090	q_v(m^3/s)	0.141	0.188	0.235	0.283	0.330	0.377	0.424
		NC	-	17	24	30	34	38	42
		L_T min-max(m)	1.8 - 3.0	2.0 - 3.6	2.4 - 4.2	2.7 - 4.5	2.7 - 4.8	3.0 - 5.1	3.3 - 5.4
380 x 380	0.144	q_v(m^3/s)	0.220	0.294	0.368	0.441	0.514	0.589	0.660
		NC	-	19	26	32	35	40	44
		L_T min-max(m)	2.0 - 3.6	2.4 - 4.2	2.7 - 4.8	3.0 - 5.0	3.3 - 5.4	3.3 - 6.0	3.6 - 6.4
450 x 450	0.203	q_v(m^3/s)	0.318	0.424	0.530	0.637	0.743	0.849	0.955
		NC	-	21	28	34	38	42	46
		L_T min-max(m)	2.4 - 4.2	2.7 - 4.8	3.0 - 5.4	3.3 - 6.0	3.6 - 6.4	3.9 - 7.0	4.2 - 7.3

3-Way

Selection table

Supply

- with ceiling effect
- damper fully open
- valid for cooling up to △ tS= - 16K
- valid for heating up to △ tS= + 30K



The minimum throw value L_T min. is based on a v_T of 0.63 m/s (125 FPM) with a v_R of 0.25 m/s (50 FPM).

The maximum throw value L_T max. is based on a v_T of 0.30 m/s (60 FPM) with a v_R of 0.12 m/s (25 FPM).

Neck Size	A_k value (m^2)	Supply velocity v_k	1.5m/s		2.0m/s		2.5m/s		3.0m/s		3.5m/s		4.0m/s		4.5m/s	
			LT1	LT2	LT1	LT2	LT1	LT2	LT1	LT2	LT1	LT2	LT1	LT2	LT1	LT2
150 x 150	0.022	q_v(m^3/s)	0.008	0.013	0.011	0.017	0.014	0.022	0.017	0.026	0.020	0.031	0.023	0.035	0.026	0.040
		NC	-		10		17		23		27		31		35	
		L_T min-max(m)	1.2-2.1	1.5-3.0	1.5-2.1	1.8-3.3	1.8-2.7	2.1-3.9	1.8-3.0	2.1-4.2	2.1-3.3	2.4-4.5	2.1-3.3	2.4-4.8	2.4-3.6	2.7-5.1
225 x 225	0.050	q_v(m^3/s)	0.019	0.029	0.026	0.040	0.033	0.050	0.039	0.059	0.046	0.069	0.052	0.079	0.059	0.089
		NC	-		14		21		27		31		35		39	
		L_T min-max(m)	1.5-2.7	2.1-3.6	1..8-3.0	2.4-4.2	2.1-3.3	2.7-4.8	2.1-3.6	3.0-5.1	2.4-3.9	3.3-5.4	2.4-4.2	3.3-6.0	2.7-4.5	3.6-6.4
300 x 300	0.090	q_v(m^3/s)	0.035	0.052	0.047	0.070	0.058	0.088	0.070	0.106	0.082	0.123	0.094	0.141	0.106	1.108
		NC	-		17		24		30		34		38		42	
		L_T min-max(m)	1.8-3.0	2.4-4.2	2.1-3.6	2.7-4.8	1.8-3.0	2.4-4.2	2.7-4.5	3.3-6.0	2.7-4.8	3.6-5.4	3.0-5.1	3.9-7.0	3.3-5.4	4.2-7.3
380 x 380	0.144	q_v(m^3/s)	0.055	0.082	0.073	0.110	0.092	0.137	0.110	0.165	0.128	0.192	0.147	0.220	0.165	0.248
		NC	10		19		26		32		35		40		44	
		L_T min-max(m)	2.1-3.6	3.0-5.1	2.4-4.2	3.6-6.0	2.7-4.8	4.2-7.0	3.0-5.1	4.5-7.6	3.3-5.4	4.8-7.9	3.3-6.0	5.1-8.5	3.6-6.4	5.4-9.1
450 x 450	0.203	q_v(m^3/s)	0.079	0.119	0.106	0.159	0.132	0.199	0.159	0.238	0.185	0.278	0.212	0.318	0.238	0.358
		NC	12		21		28		34		38		42		46	
		L_T min-max(m)	2.4-4.2	3.3-5.7	2.7-4.8	3.9-6.7	3.0-5.4	4.5-7.6	3.3-6.0	4.8-8.2	3.6-6.4	5.1-8.8	3.9-7.0	5.4-9.4	4.2-7.3	6.0-10.0

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AIR DISTRIBUTION PRODUCT

2-Way

Selection table

Supply

- with ceiling effect
- damper fully open
- valid for cooling up to △ tS= - 16K
- valid for heating up to △ tS= + 30K

The minimum throw value L_T min. is based on a v_T of 0.50 m/s (100 FPM) with a v_R of 0.25 m/s (50 FPM).

The maximum throw value L_T max. is based on a v_T of 0.25 m/s (50 FPM) with a v_R of 0.12 m/s (25 FPM).

Neck Size	A_k value (m^2)	Supply velocit v_k	1.5m/s	2.0m/s	2.5m/s	3.0m/s	3.5m/s	4.0m/s	4.5m/s
150 x 150	0.022	q_v(m^3/s) NC L_T min-max(m)	0.035 - 2.1 - 3.3	0.047 10 2.4 - 3.9	0.058 17 2.7 - 4.5	0.070 23 3.0 - 4.8	0.082 27 3.3 - 5.1	0.094 31 3.3 - 5.4	0.106 35 3.6 - 6.0
225 x 225	0.050	q_v(m^3/s) NC L_T min-max(m)	0.079 - 2.7 - 4.5	0.106 14 3.0 - 5.1	0.133 21 3.3 - 5.7	0.159 27 3.6 - 6.4	0.185 31 3.9 - 6.7	0.212 35 4.2 - 7.3	0.239 39 4.5 - 7.9
300 x 300	0.090	q_v(m^3/s) NC L_T min-max(m)	0.141 - 3.0 - 5.1	0.188 17 3.6 - 6.0	0.235 24 4.2 - 7.0	0.283 30 4.5 - 7.6	0.330 34 4.8 - 7.9	0.377 38 5.1 - 8.5	0.424 42 5.4 - 9.1
380 x 380	0.144	q_v(m^3/s) NC L_T min-max(m)	0.220 - 3.6 - 6.4	0.294 19 4.2 - 7.3	0.368 26 4.8 - 8.2	0.441 32 5.1 - 9.1	0.514 35 5.4 - 9.7	0.589 40 6.0 - 10.3	0.660 44 6.4 - 10.9
450 x 450	0.203	q_v(m^3/s) NC L_T min-max(m)	0.318 - 3.9 - 7.0	0.424 21 4.5 - 7.9	0.530 28 5.1 - 9.1	0.637 34 5.4 - 9.7	0.743 38 6.0 - 10.3	0.849 42 6.4 - 11.2	0.955 46 7.0 - 11.8

1-Way

Selection table

Supply

- with ceiling effect
- damper fully open
- valid for cooling up to △ tS= - 16K
- valid for heating up to △ tS= + 30K

The minimum throw value L_T min. is based on a v_T of 0.50 m/s (100 FPM) with a v_R of 0.25 m/s (50 FPM).

The maximum throw value L_T max. is based on a v_T of 0.25 m/s (50 FPM) with a v_R of 0.12 m/s (25 FPM).

Neck Size	A_k value (m^2)	Supply velocit v_k	1.5m/s	2.0m/s	2.5m/s	3.0m/s	3.5m/s	4.0m/s	4.5m/s
150 x 150	0.022	q_v(m^3/s) NC L_T min-max(m)	0.035 - 2.4-4.2	0.047 10 2.7 - 4.8	0.058 17 3.0 - 5.4	0.070 23 3.3 - 6.0	0.082 27 3.6 - 6.4	0.094 31 3.9 - 7.0	0.106 35 4.2 - 7.3
225 x 225	0.050	q_v(m^3/s) NC L_T min-max(m)	0.079 - 3.3 - 5.7	0.106 14 3.9 - 6.7	0.133 21 4.5 - 7.6	0.159 27 4.8 - 8.2	0.185 31 5.1 - 8.8	0.212 35 5.4 - 9.4	0.239 39 6.0 - 10.0
300 x 300	0.090	q_v(m^3/s) NC L_T min-max(m)	0.141 - 3.9 - 7.0	0.188 17 4.5 - 7.9	0.235 24 5.1 - 9.1	0.283 30 5.4 - 9.7	0.330 34 6.0 - 10.3	0.377 38 6.4 - 11.2	0.424 42 7.0 - 11.8
380 x 380	0.144	q_v(m^3/s) NC L_T min-max(m)	0.220 - 4.5 - 7.9	0.294 19 5.1 - 9.1	0.368 26 5.7 - 10.3	0.441 32 6.4 - 11.2	0.514 35 6.7 - 12.1	0.589 40 7.3 - 12.8	0.660 44 7.9 - 13.7
450 x 450	0.203	q_v(m^3/s) NC L_T min-max(m)	0.318 - 4.8 - 8.5	0.424 21 5.7 - 9.7	0.530 28 6.7 - 11.2	0.637 34 7.0 - 11.8	0.743 38 7.6 - 12.8	0.849 42 8.2 - 13.7	0.955 46 8.8 - 14.6

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AIR DISTRIBUTION PRODUCT

Correction factors

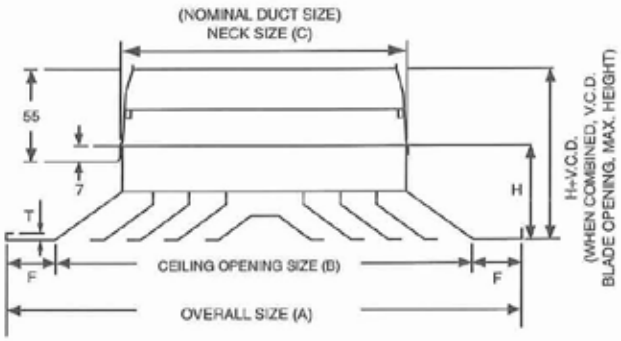
Damper throttling

Damper DT 007		
% open	$\triangle P_t$	NC
100	x 1.0	+ 0
50	x 1.6	+ 6
25	x 2.7	+ 15

Symbols

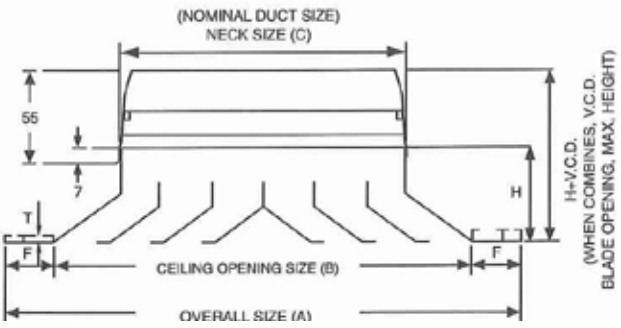
q_v = Supply air volume in m^3/s; CFM
$\triangle P_t$ = Total pressure loss in Pascal (Pa); inch WG
v_k = Supply air velocity in m/s; FPM (velometer reading)
A_k = Area factor (m^2; sq. ft) relative to v_k
L_T = Throw in m; ft
v_T = Envelope velocity in m/s; FPM (terminal velocity).
v_R = Room air velocity in m/s; FPM (residual velocity).
$\triangle t_S$ = Temperature differential between supply air and room air temperature (K).

MODEL NO.: AMD(S)



DIMENSIONS (MILD STEEL)							
A	B	C	F	T	H	H+VCD	A - 150 = C A - 70 = B
250	180	100	38	6	52	100	
300	230	150	38	6	52	100	
350	280	200	38	6	52	100	
400	330	250	38	6	52	100	
450	380	300	38	6	52	100	
500	430	350	38	6	52	100	
550	480	400	38	6	52	100	
600	530	450	38	6	52	100	

MODEL NO.: AMD(A)



DIMINSIONS (ALUMINIUM)							
A	B	C	F	T	H	H+VCD	A - 150 = C A - 57 = B
250	193	100	32	4.5	57	105	
300	243	150	32	4.5	57	105	
350	293	200	32	4.5	57	105	
400	343	250	32	4.5	57	105	
450	393	300	32	4.5	57	105	
500	443	350	32	4.5	57	105	
550	493	400	32	4.5	57	105	
600	543	450	32	4.5	57	105	

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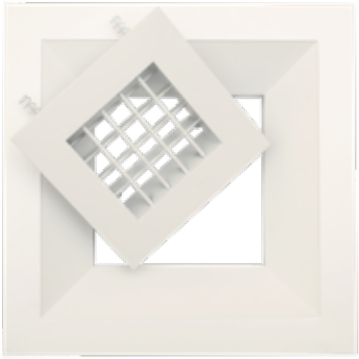
AIR DISTRIBUTION PRODUCT

The type AF22 grille is primarily intended for supply air, but can also be used for exhaust air. Owing to its good technical characteristics and wide scope for variation, it can be used in practically all types of systems. The grille is primarily intended for wall-mounting, although it can be fitted in a ceiling (exhaust air) or in a window sill.



The grille

- is available in 17 sizes for flows up to 940 l/s (3400m³/h) at 35dB(A)
- has horizontal as well as vertical vanes for adjusting the pattern of diffusion at front or back.
- offers simple flow control by means of volume control damper for grille.
- is made of mild steel, extruded aluminium also available.
- standard flange is 32, others sizes 25, 19, 16 also available.

Design

The grille consists of a horizontal and a vertical row of vanes fitted in a frame made of mild steel or aluminium sections. The vanes can be adjusted at site to provide the required pattern of flow in the horizontal and vertical directions at either front or back. Corrections can thus be made for obstacles in the direction of air flow as well as for the supply air being at a temperature above or below that of the room air.

Sizes (length-height in cm)

020-10, 030-10, 040-10, 050-10, 060-10, 100-10,
025-15, 030-15, 040-15, 050-15, 060-15, 100-15,
030-20, 040-20, 050-20, 060-20, 100-20.
Note: Also available in other sizes.

Accessories (to be specified separately)

The VCD(G) volume control damper for grille is available.

Materials and finish

Mild steel
Extruded aluminium
Other finishes available to special order.
304、316 Stainless steel

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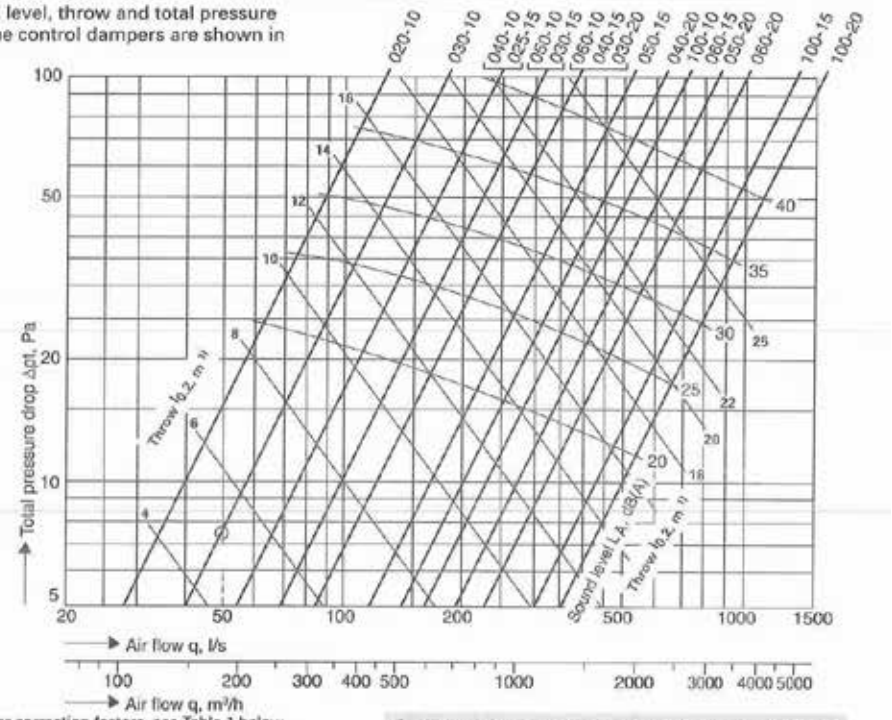
AIR DISTRIBUTION PRODUCT

Sizing - Supply air - Applies without accessories - Air flow, pressure drop, sound level, throw

The change in flow, sound level, throw and total pressure drop for grilles with volume control dampers are shown in Table 2 below.



1) For correction factors, see Table 1 below.

The following conditions apply to the charts:
Pressure drop: At an air density of 1.2 kg/m³
Sound level L_A:
Flow-generated sound in dB(A). The sound level is applicable at a room attenuation of 4dB, which corresponds to the attenuation in the reverberant field in a room with an equivalent sound absorption area of 10m². The tolerance on the acoustic values is ± 2dB(A).
Throw $l_{0.2}$:
The maximum distance in metres from the grille to the 0.2 m/s isovel (line of constant velocity)on isothermal air supply. The throw is applicable to a rectangular air stream, **without** consideration to any influence of a wall or ceiling (Coanda-effect).
If the supply air temperature is lower than the room air temperature, $l_{0.2}$ is reduced by about 1.5% per °C of temperature difference.

Throw - Correction factor
Table 1 specifies correction factors for the throw at various setting of the volume control damper and the vertical air deflectors of the grille. The horizontal vanes can be used to deflect the air upwards or downwards, without significantly affecting the throw.

Table 1 Correction factors for throw at various settings of the vertical air deflectors of the grille.

Correction factor		
Setting of the vertical air deflectors of the grille		
Straight discharge	Diffusing discharge	
	Y = 45° Ɛ = 35°	Y = 90° Ɛ = 60°
1.0	0.8	0.5

Grille with volume control damper VCD(G)

Change in flow, sound level,throw and total pressure drop.

Fig. 3. Grille with straight discharge (plan view).

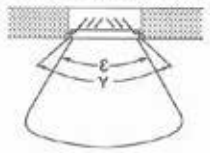


Fig. 4. Grille with diffusing discharge (plan view)

Table 2

Change in :	opening of damper		
	open	1/2 open	1/4 open
At a given pressure			
Flow, %	-20	-45	-60
Sound level, dB(A)	+5	+8	+12
At a given flow			
Total pressure drop, %	+50	+200	+500
Sound level, dB(A)	+12	+25*	>25
Throw:			
Correction factor for various settings of the vert: air deflectors of the grille			
Straight discharge	1.0	1.2	1.5
Diffusing discharge, Y=45°,Ɛ =35°	0.8	1.0	1.2
Y=90°,Ɛ =60°	0.5	0.6	0.8

Sizing same as exhaust air grille.

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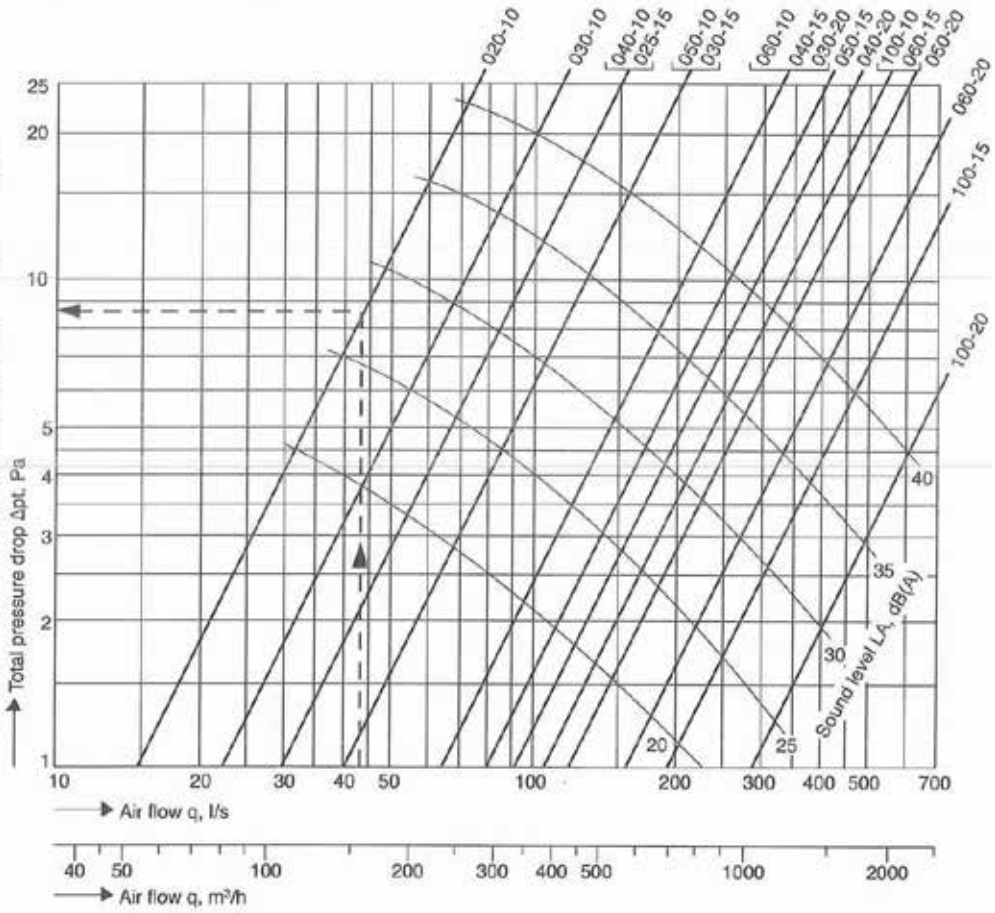
AIR DISTRIBUTION PRODUCT

Sizing (contd.) - Exhaust air - Grille without accessories

Air flow, pressure drop, sound level

The increase in pressure drop and sound level for a grille fitted with a volume control damper is shown in Table 3 below.

The following conditions apply to the charts:
Pressure drop
At an air density of 1.2 kg/m³.
Sound level L_A:
Flow-generated sound in dB(A). The sound level is applicable at a room attenuation of 4 dB, which corresponds to the attenuation in the reverberant field in a room with an equivalent sound absorption area of 10 m².
The tolerance on the acoustic values is ± dB(A).



Grille with volume control damper VCD(G)

Increase in sound level and total pressure drop.

Table 3

Increase in:	Opening of damper		
	open	1/2 open	1/4 open
Total pressure drop, %	65	350	1100
Sound level, dB(A)	2	10	21

Sizing example 1

Determine the size of an exhaust air grille for a room with an equivalent sound absorption area of 10m². The grille is to be equipped with the volume control damper.

Given: Exhaust air flow ..... 43 l/s
Total pressure drop ..... 15 Pa
Max. sound level in the room ..... 35dB(A)

Calculation:

1. The following values can be obtained for the AF22-20-10 from the above chart:
   Exhaust air flow ..... 43 l/s
   Total pressure drop
   (without volume control damper) ..... 8.5 Pa
   Sound level ..... 27.5dB(A)
2. With the volume control damper fully open, Table 3 shows that the pressure drop increase will be 65% and the sound level increase will be 2 dB(A), and thus:
   - The total pressure drop will be 8.5 (1 + 0.65) = 14 Pa
   - The sound level will be 27.5 + 2 = 29.5 dB(A).

Instructions

Installation, adjustment and maintenance instructions are supplied.

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Acoustic particulars

Sound power level L_W
The sound power level L_W can be obtained by adding the correction factor K_{ok} to the sound level L_A read from the charts, as follows:

$$L_W = L_A + K_{ok}$$

Note: K_{ok} are mean values for the entire normal working range of the grille (with or without plenum box).
Tolerance: ± 3dB.

Sound attenuation
The sound attenuation ΔL tabulated below is the reduction in sound power level L_W from the duct to the room
Tolerance: ± 2 dB.

Supply air

Grille without accessories
Sound power level L_W, correction factor K_{ok}

Table 4

Total Pressure drop, Pa	Correction factor K_{ok}, dB						
	Octave band, mid-frequency Hz						
	125	250	500	1000	2000	4000	8000
≤ 30 Pa	+9	+6	+4	+3	-8	-14	-16
> 30 Pa	+4	0	+3	-1	-5	-11	-12

Exhaust air

Grille without accessories
Sound power level L_W, correction factor K_{ok}

Table 8

Correction factor K_{ok}, dB						
Octave band, mid-frequency Hz						
125	250	500	1000	2000	4000	8000
+3	+5	+4	-4	-10	-12	-14

Sound attenuation

See Table 5 - the sound attenuation is the same as for supply air (grille without accessories).

Sound attenuation

Table 5

SDD size	Sound attenuation ΔL, dB						
	Octave band, mid-frequency Hz						
	125	250	500	1000	2000	4000	8000
020-10	14	10	6	1	1	-	-
030-10	12	8	4	1	-	-	-
040-10	11	7	3	1	-	-	-
050-10	11	6	2	1	-	-	-
060-10	10	6	2	-	-	-	-
100-10	8	4	1	-	-	-	-
025-15	11	7	3	1	-	-	-
030-15	11	7	3	1	-	-	-
040-15	10	6	2	-	-	-	-
050-15	10	5	2	-	-	-	-
060-15	9	5	1	-	-	-	-
100-15	7	3	1	-	-	-	-
030-20	9	5	1	-	-	-	-
040-20	9	5	1	-	-	-	-
050-20	8	4	1	-	-	-	-
060-20	8	4	1	-	-	-	-
100-20	8	2	-	-	-	-	-

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AIR DISTRIBUTION PRODUCT

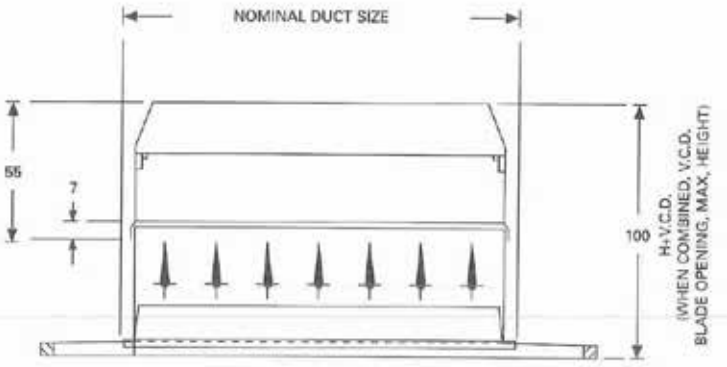


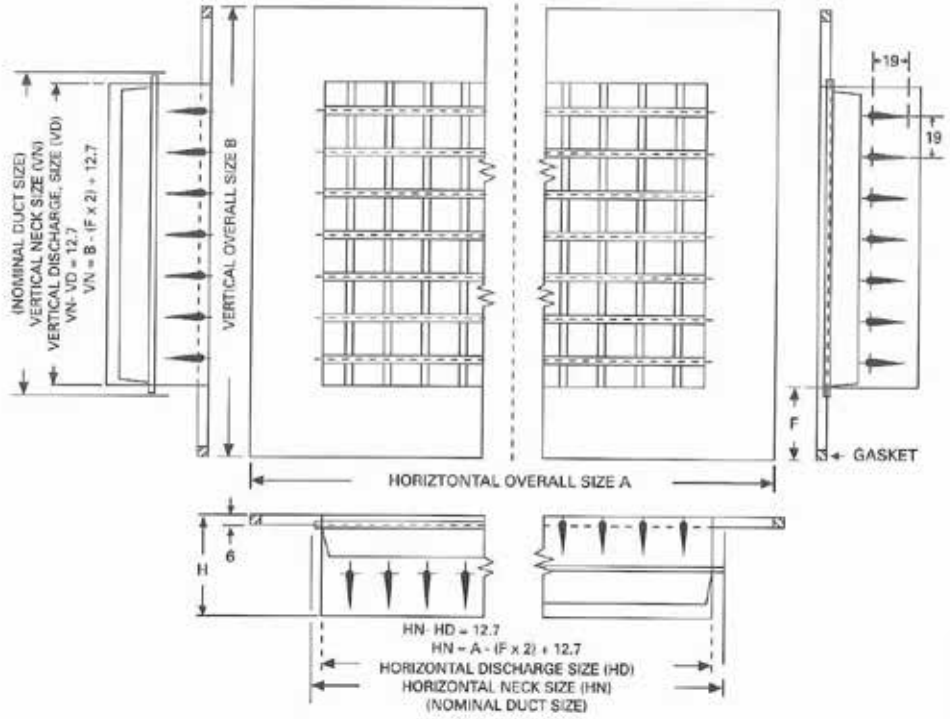
Fig.2

AF22(S) - H

Steel supply double deflection air grille with front horizontal section.

AF22(A) - V

Aluminium supply double deflection air grille with front vertical section.



Flange (F)	32	25	19	16
Height (H)	51	44	38	38

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AIR DISTRIBUTION PRODUCT

The type AF21 grille can be used in practically all types of installations. It is designed for wall-mounting, floor-mounting and can also be fitted in a window sill.

The grille

- is available in 15 sizes for flows up to 620 l/s (2200m³/h) at 35dB(A).
- offers simple flow control by means of a damper.
- is made of mild steel, extruded aluminium also available.
- standard flange is 32, others sizes 25, 19, 16 also available.

Design

The grille consists of a frame of mild steel section, aluminium section is also available, and a number of fixed vanes arranged in the longitudinal or vertical direction of the grille.

Sizes (length, height in cm)

020-10, 030-10, 040-10, 050-10, 060-10, 100-10, 030-15, 040-15, 050-15, 060-15, 100-15, 040-20, 050-20, 060-20, 100-20.

Note: Also available in other combinations of long side - short side

Accessories (to be specified separately)

The VCD(G) volume control damper for grille is available.

Material and finish

Mild Steel
Extruded aluminium
Other finishes available to special order.
304、316 Stainless steel

Instructions

Installation, adjustment and maintenance instructions are supplied on request.

Contents

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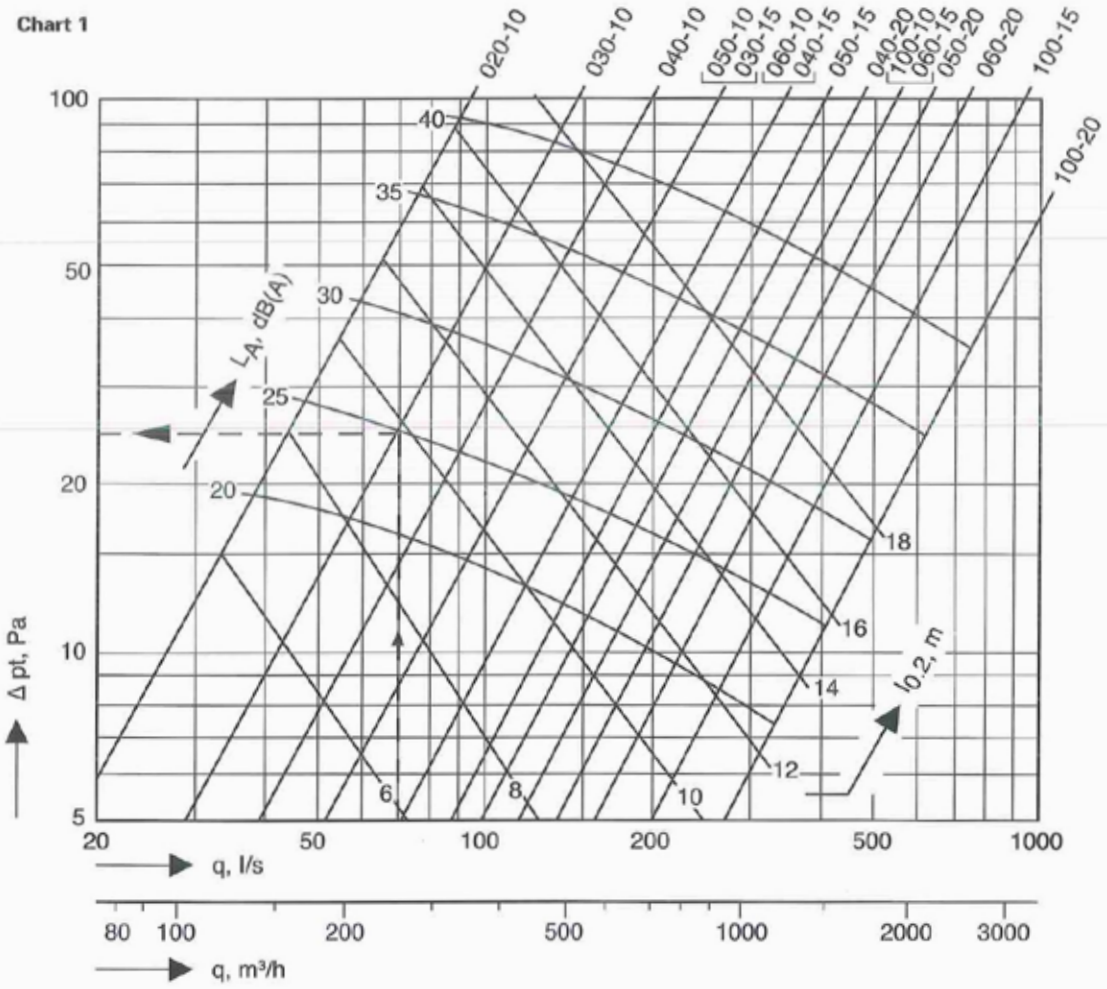
AIR DISTRIBUTION PRODUCT

Sizing - Supply air

- General survey - air flow, pressure drop, sound level, throw

Grille without damper (for particulars of the grille with connection box, see page 3)

Chart 1



The following conditions apply to the charts:

Pressure drop: At an air density of 1.2 kg/m³.

Sound level L_A: Flow generated sound in dB(A). The sound levels are applicable at a room attenuation of 4 dB, which corresponds to the attenuation in the reverberant field in a room with an equivalent sound absorption area of 10 m².

The tolerance on the acoustic values is ± 2 dB(A).

Throw $l_{0.2}$:

The maximum distance in metres from the grille to the 0.2 m/s isovel on isothermal air supply. The throw is applicable to a rectangular air stream, without consideration to any influence of a wall or ceiling (Coanda effect). If the supply air temperature is lower than the room air temperature, $l_{0.2}$ is reduced by about 1.5% per degree C of temperature difference.

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AIR DISTRIBUTION PRODUCT

Sizing (contd.)

Grille with connection box

The charts apply to the connection box, including grille with the damper in the box fully open (damper angle α = 0°) and closed (α = 45°). The charts must not be used when carrying out adjustments.

Chart 2

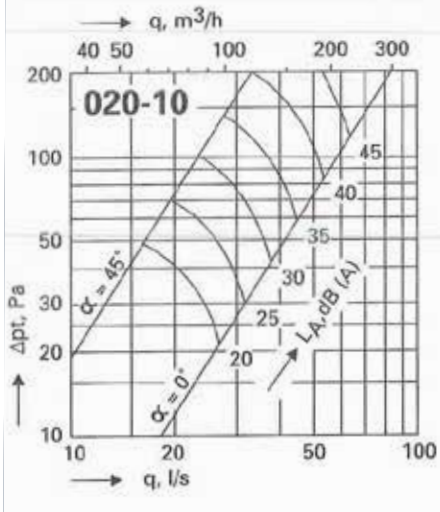


Chart 3

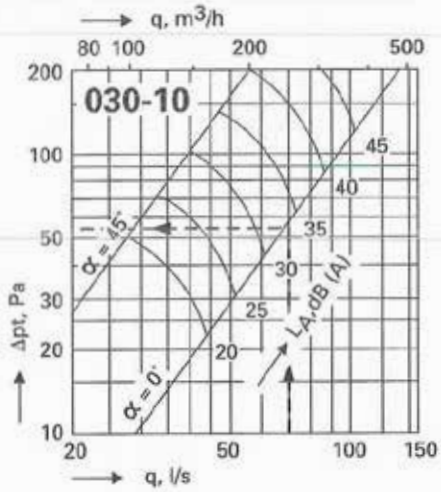


Chart 4

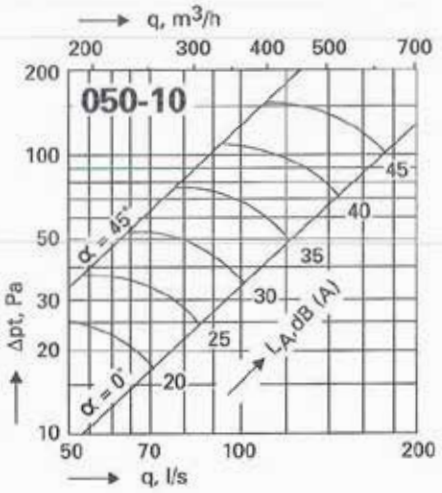


Chart 5

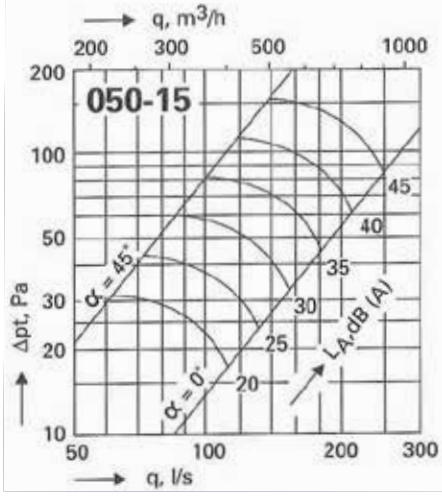


Chart 6

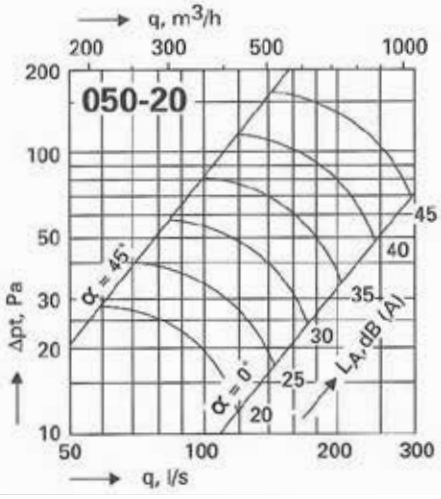
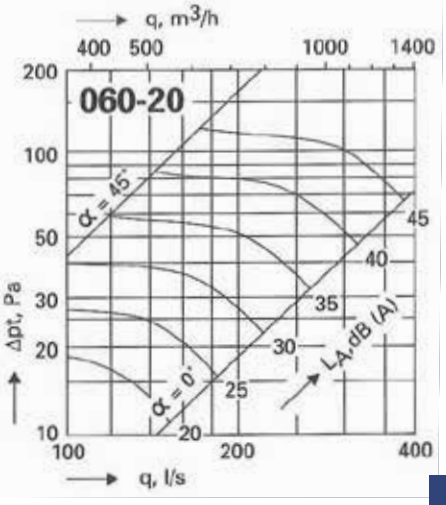


Chart 7



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Throw - Correction factor

Correction factors for the throw at various setting of the throttling damper are specified in Table 1.

Table 1

Correction factor		
Without damper or 100% open damper	50% open damper	25% open damper
1.0	1.2	1.5

If the supply air temperature is lower than the room air temperature, the throw is reduced by 1.5% per °C of tempreature difference.

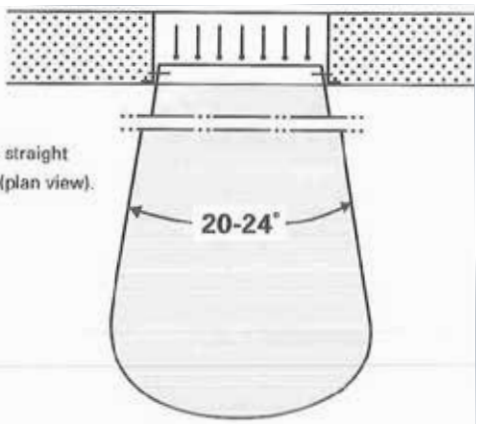

Fig. 2 Grille with straight discharge (plan view).

Acoustic particulars

Sound power level L_W

The sound power level L_W can be obtained by adding the correction factor K_{ok} to the sound level L_A read from the charts, as follows:

$$L_W = L_A + K_{ok}$$

Note. K_{ok} are mean values for the entire normal working range of the grille (with or without connection box). Tolerance: ± 3 dB.

Supply air

1. Grille without accessories

Sound power level L_W, correction factor K_{ok}

Table 2

Correction factor K_{ok}, dB						
Octave band, mid-frequency, Hz						
125	250	500	1000	2000	4000	800
+12	+3	+3	0	-9	-15	-23

Sound attenuation

The sound attenuation ΔL tabulated below is the reduction in sound power level L_W from the duct to the room.

Tolerance: ± 2 dB.

Sound attenuation

Table 3

SSD size	Sound attenuation ΔL, dB						
	Octave band, mid-frequency, Hz						
	125	250	500	1000	2000	4000	8000
020-10	14	10	6	1	1	-	-
030-10	12	8	4	1	-	-	-
040-10	11	7	3	1	-	-	-
050-10	11	6	2	1	-	-	-
060-10	10	6	2	-	-	-	-
100-10	8	4	1	-	-	-	-
030-15	11	7	3	1	-	-	-
040-15	10	6	2	-	-	-	-
050-15	10	5	2	-	-	-	-
060-15	9	5	1	-	-	-	-
100-15	7	3	1	-	-	-	-
040-20	9	5	1	-	-	-	-
050-20	8	4	1	-	-	-	-
060-20	8	4	1	-	-	-	-
100-20	6	2	-	-	-	-	-

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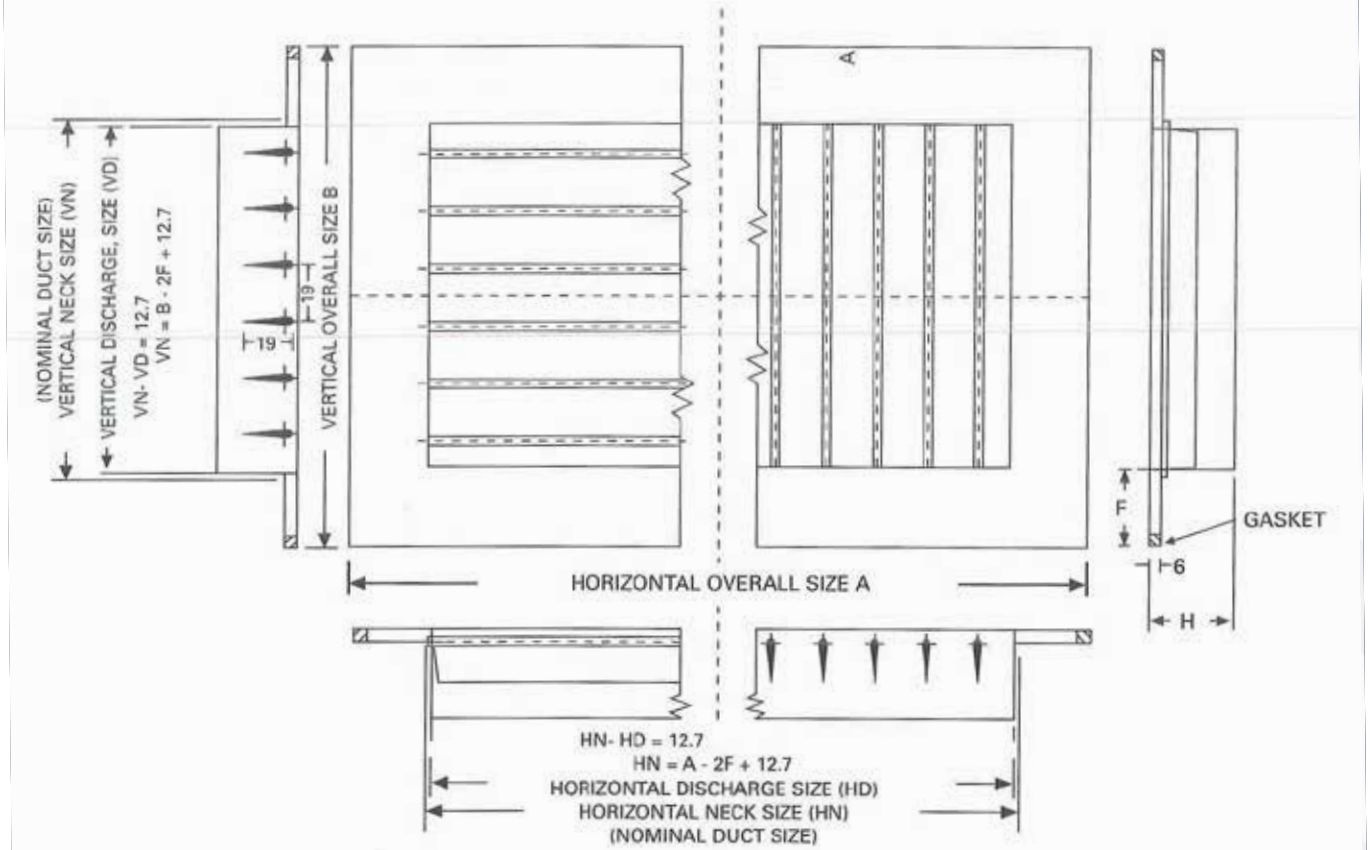
AF21(S) - H

Steel Supply Single Deflection Air Grille with Horizontal Section

AF21(A) - V

Aluminium Supply Single Deflection Air Grille with Vertical Section.



Flange (F)	32	25	19	16
Height (H)	51	44	38	38

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AIR DISTRIBUTION PRODUCT

Sizing - Exhaust air

Air flow, pressure drop, sound level

The following conditions apply to the charts:

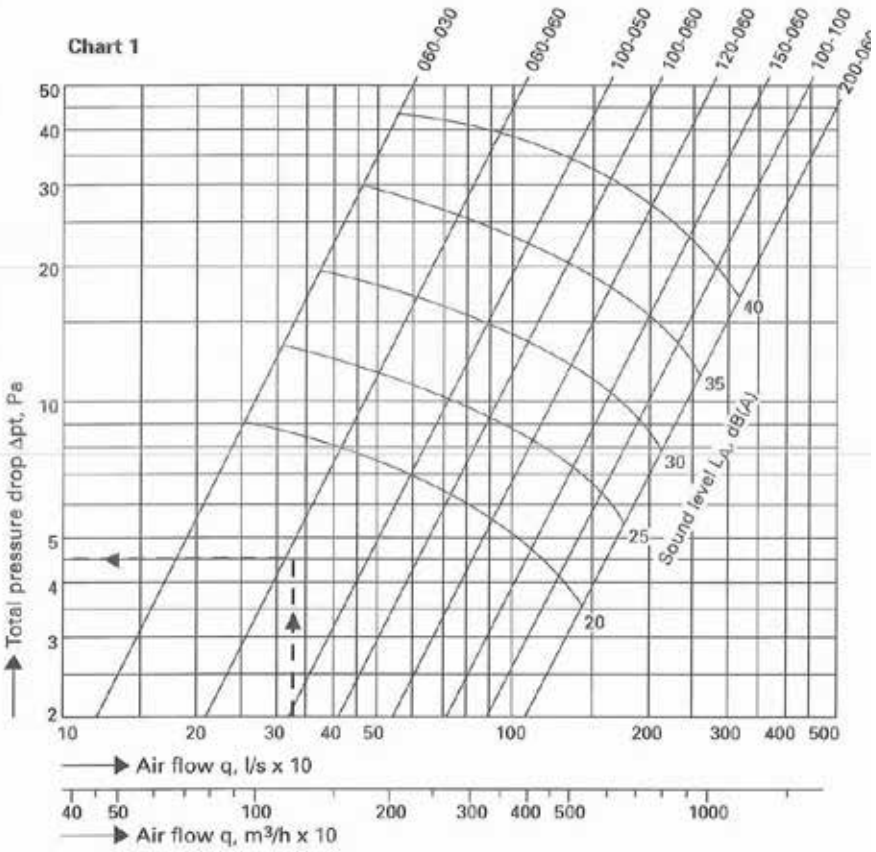
Pressure drop:
At an air density of 1.2 kg/m³.

Sound level L_A:
Flow-generated sound in dB (A). The sound level is applicable at a room attenuation of 4 dB, which corresponds to the attenuation in the reverberant field in a room with an equivalent sound absorption area of 10 m². The tolerance on the acoustic values is ±2 dB(A).

Sizing example
See page 5.

General survey - louvre without volume control damper
The flow, pressure drop and sound level for louvre without damper and with damper can be obtained from Charts 2-11 (damper 25,50 and 100% open).

Chart 1



Charts for louvre-with VCD(G) volume control damper

Chart 2. Size 060-030

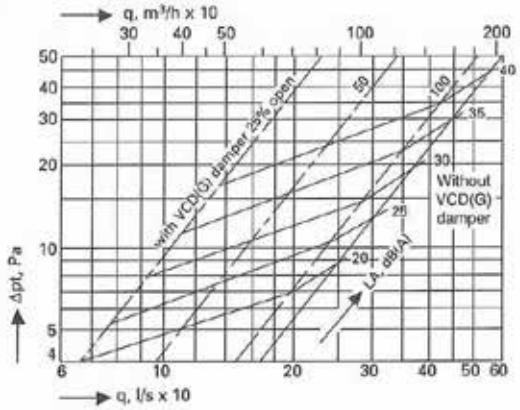


Chart 3. Size 060-060

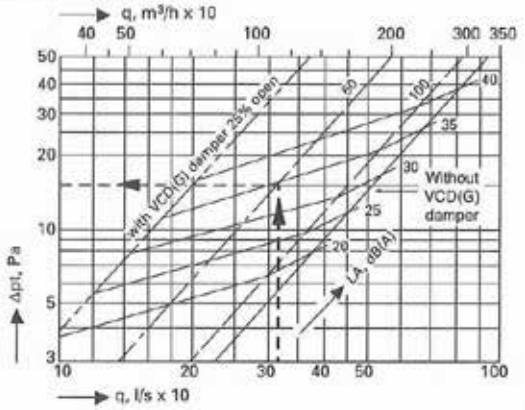


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Chart 4. Size 100-050

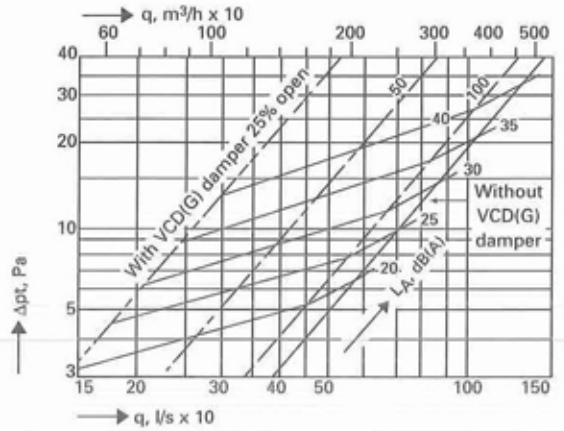


Chart 5. Size 100-060

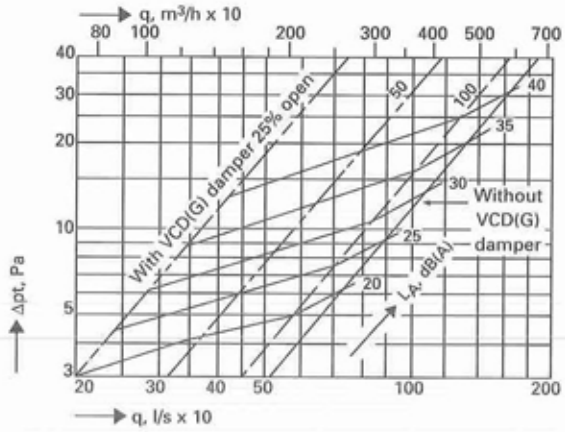


Chart 6. Size 120-060

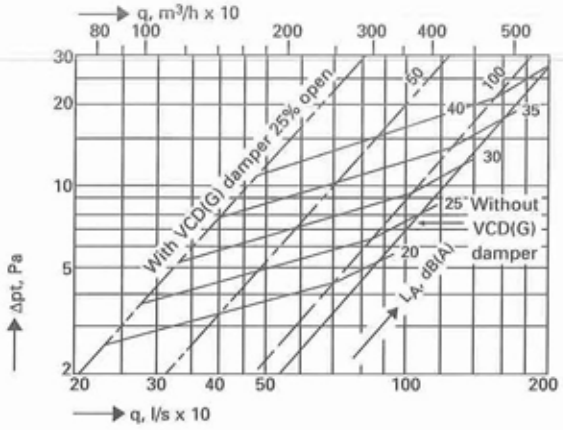


Chart 7. Size 150-060

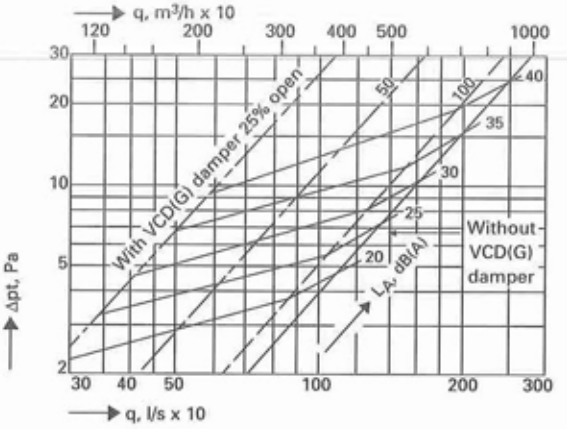


Chart 8. Size 100-100

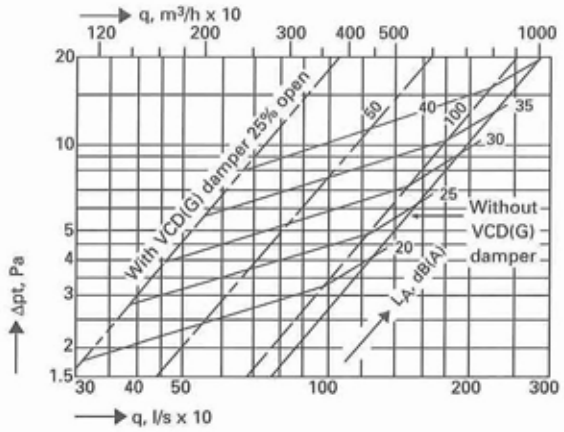
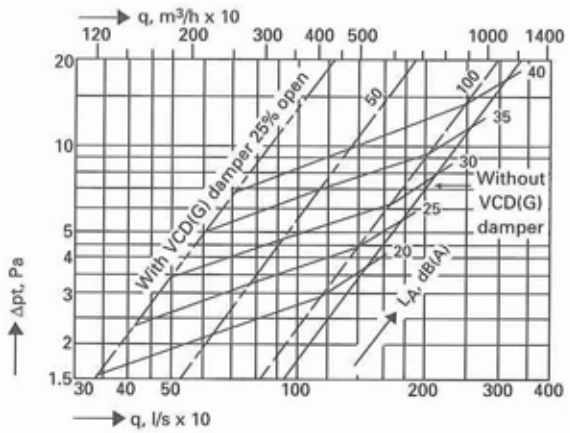


Chart 9. Size 200-060



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AIR DISTRIBUTION PRODUCT

Sound power level

The sound power level L_W can be calculated by adding a correction factor K_{ok} to the L_A value obtained from charts in accordance with the following formula:

$$L_W = L_A = K_{ok}$$

K_{ok} is the mean value for the entire normal operating range of the diffuser, and is subject to a tolerance of ± 3 dB.

Table 1. Correction factor K_{ok}

Correction factor K_{ok}, dB						
Octave band, mid-frequency						
125	250	500	1000	2000	4000	8000
-2	+5	+5	-6	-14	-17	-18

Sound attenuation

Table 2

RAL size	Sound attenuation ΔL, dB						
	Octave band, mid-frequency Hz						
	125	250	500	1000	2000	4000	8000
060-030	14	10	6	2	-	-	-
060-060	12	8	4	1	-	-	-
100-050	11	6	2	1	-	-	-
100-060	10	6	2	-	-	-	-
120-060	10	5	2	-	-	-	-
150-060	9	5	1	-	-	-	-
100-100	8	4	1	-	-	-	-
120-060	8	4	1	-	-	-	-

The sound attenuation ΔL specified above refers to the reduction in the sound power L_W from the ducting to the room.

Tolerence: ± 2dB.

Sizing example

Determine the size of an exhaust air grille for a room with an equivalent sound absorption area of 10 m². The lourve is to be equipped with the VCD(G) volume control damper.

Given: Exhaust air flow ..... 32 l/s
Total pressure drop .....15 Pa
Max. sound level in the room ..... 35 dB(A)

Calculation:

1. The following values can be obtained from Chart 1 for the RAL(W)-060-060-0
   Exhaust air flow ..... 32 l/s
   Total pressure drop
   (without volume control damper) ..... 4.5 Pa
   Sound level ..... below 20 dB(A)
2. From Chart 3, the necessary opening of the throttling damper is found to be 50%, which gives 15 Pa and 35 dB(A).

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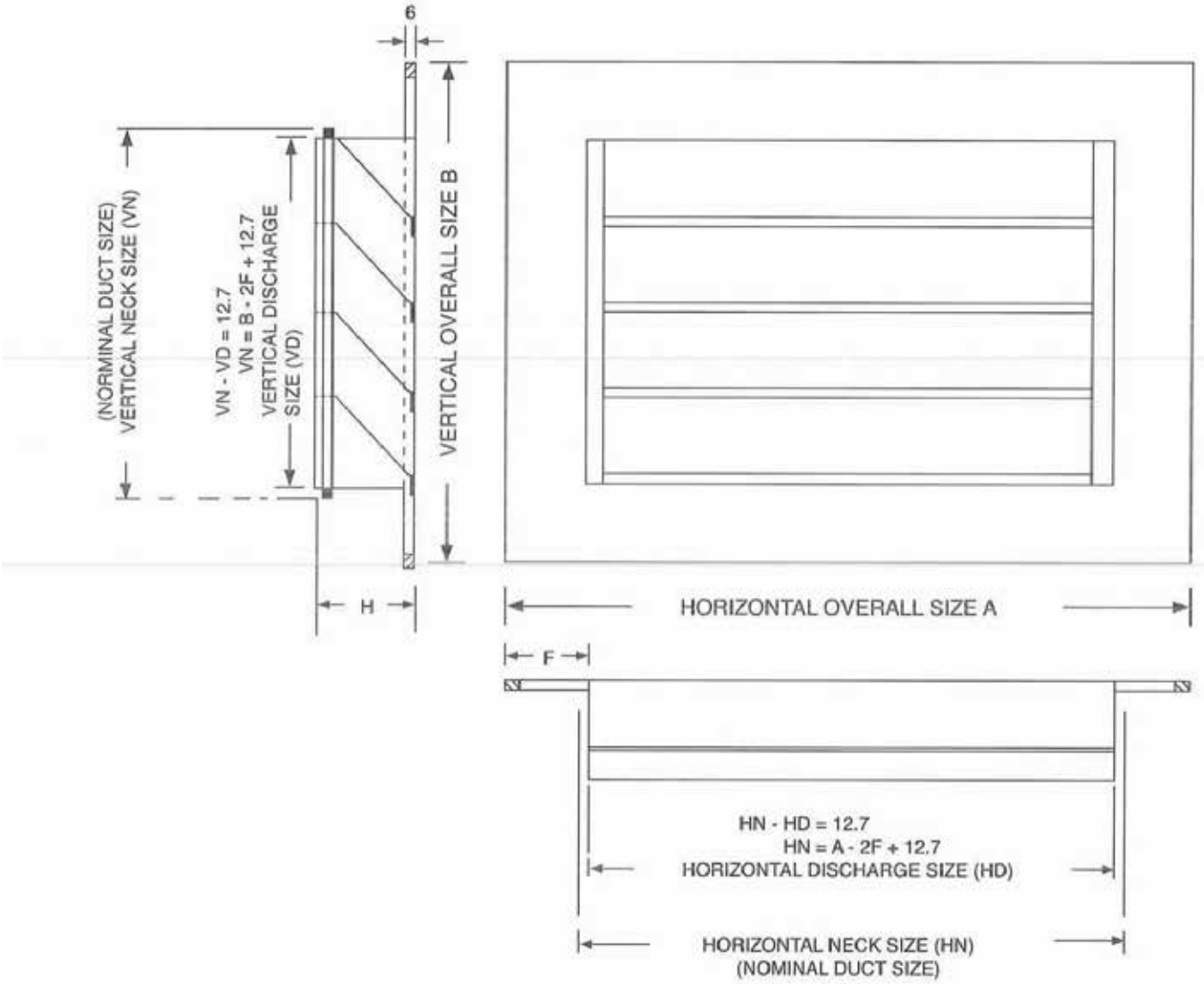
AIR DISTRIBUTION PRODUCT



Flange (F)	32	25	19	16
Height (H)	51	44	38	38

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AIR DISTRIBUTION PRODUCT

Type L60 louvre can be used for all type of systems. It is primarily designed for wall-mounting, although it can be also fitted into the ceiling. The hinged type louvre is also for easy accessiable of filter.

The louvre

- is available in eleven sizes, for air flows up to 2600 l/s (9400m³/h) at 35dB(A), others also available.
- is made of mild steel, extruded aluminium also available
- washable air filter also available.

Design

The louvre consists of a frame made of mild steel or aluminium sections and sturdy, longitudinal vanes inclined at an angle of 45°.

Sizes

060-030, 060-060, 100-050, 100-060, 120-060, 150-060, 100-100, 200-060
Note: Also available in other sizes.

Accessories (to be specified separately)

Washable aluminium air filter is available.

Materials and finish

Mild steel
Extruded aluminium
Other finishes available to special order.

Instructions

Installation, adjustment and maintenance instructions are supplied.

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AIR DISTRIBUTION PRODUCT

Sizing - Exhaust air

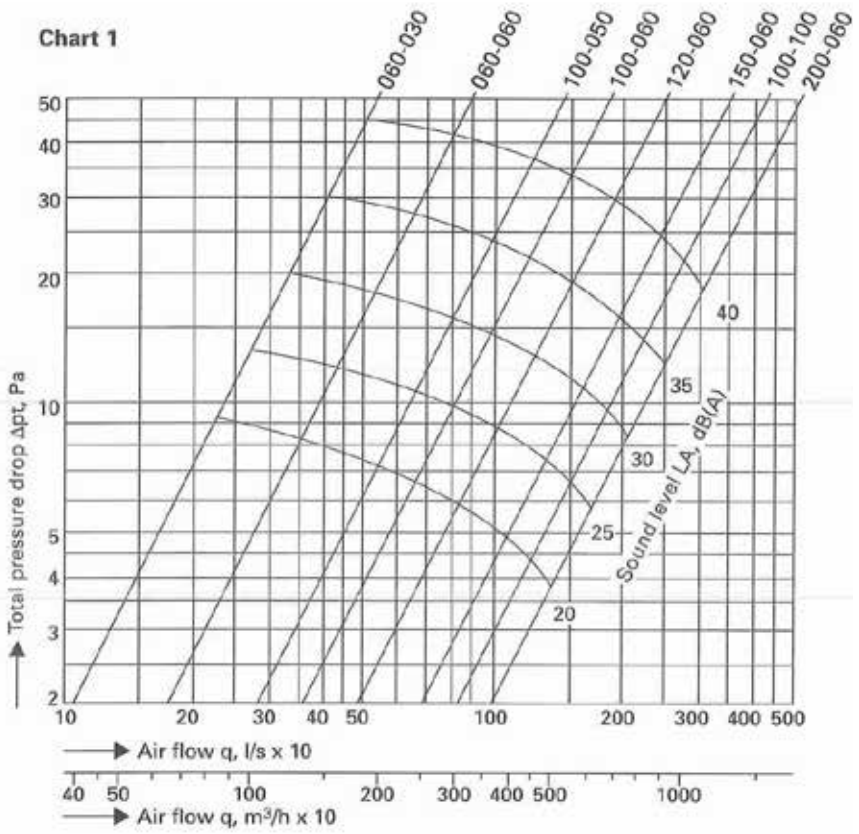
General Survey - louvre without washable air filter.
Air flow, pressure drop sound level.

The following conditions apply to the charts:

Pressure drop
At an air density of 1.2 kg/m³.

Sound level L_A:
Flow-generated sound in dB(A). The sound level is applicable at a room attenuation of 4 dB, which corresponds to the attenuation in the reverberant field in a room with an equivalent sound absorption area of 10 m². The tolerance on the acoustic values is ±2 dB(A).

Chart 1



Sound power level

The sound power level L_W can be obtained by adding a correction factor K_{ok} to the L_A value obtained from charts in accordance with the following formula.

$$L_W = L_A + K_{ok}$$

K_{ok} is the mean value for the entire normal operating range of the diffuser, and is subject to a tolerance: ± 3 dB.

Table 1. Correction factor K_{ok}

Correction factor K_{ok}, dB						
Octave band, mid-frequency, Hz						
125	250	500	1000	2000	4000	8000
-2	+5	+5	-6	-14	-17	-18

Sound attenuation

Table 2

RAL size	Sound attenuation ΔL, dB						
	Octave band, mid-frequency, Hz						
	125	250	500	1000	2000	4000	8000
060-030	14	10	6	2	-	-	-
060-060	12	8	4	1	-	-	-
100-050	11	6	2	1	-	-	-
100-060	10	6	2	-	-	-	-
120-060	10	5	2	-	-	-	-
150-060	9	5	1	-	-	-	-
100-100	8	4	1	-	-	-	-
120-060	8	4	1	-	-	-	-

The sound attenuation ΔL specified above refers to the reduction in the sound power L_W from the ducting to the room.
Tolerence: ± 2dB.

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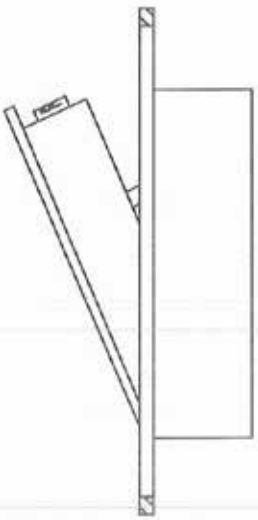
AIR DISTRIBUTION PRODUCT

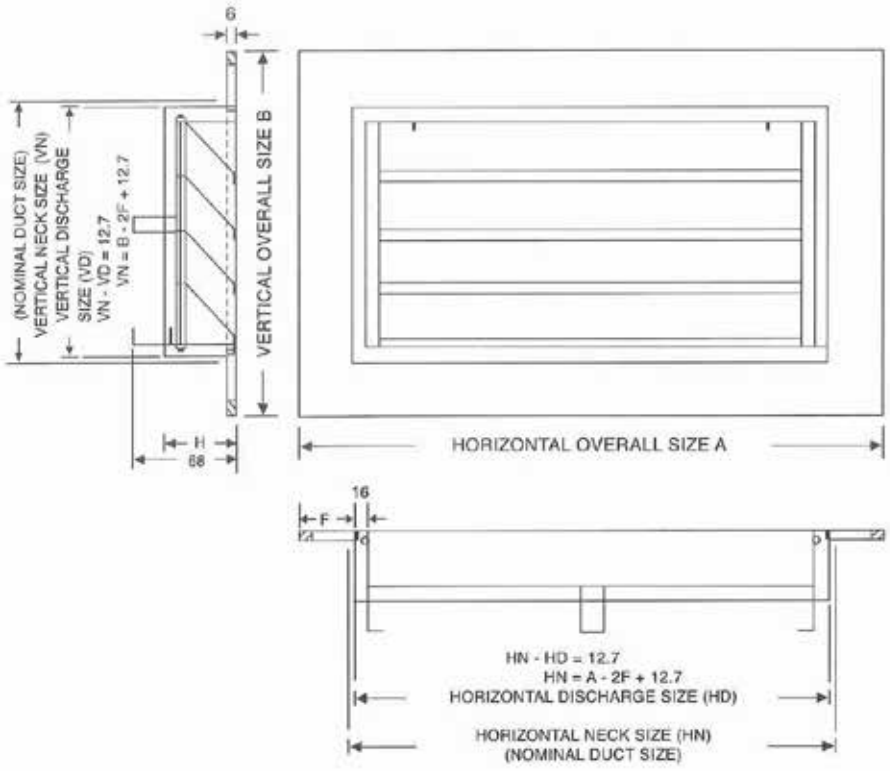


L60 (S) - A

Mild steel hinged type return air lourve with aluminium air filter.

L60 (A) - A

Aluminium hinged type return air lourve with aluminium air filter.



Flange (F)	32	25	19	16
Height (H)	51	44	38	38

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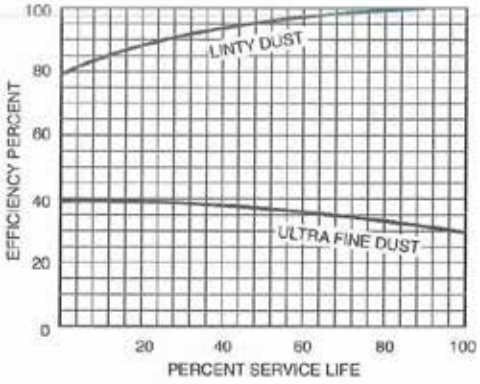
證書編號: 91441900338110581M

AIR DISTRIBUTION PRODUCT

Accessories (washable air filter)

The washable air filter for PDS louvre is a cleanable, viscous, impingement type panel air filter. The screen media is precisely formed to create great air turbulence and arrest bulky material without danger of clogging or causing excessive pressure loss. Light weight and economical, it performs efficiently at either low or high velocity (1.5 to 2.5 m/s.)

Performance



On-the-job filter performance depends on the kinds of air containants. Efficiency improves as lint loads the filter. Ultra fine dust absorbs the adhesive and eventually decreases efficiency. Laboratory tests on type filters prove its range of performance on all kinds of air borne lint and dust.

Design

The filter media is designed to permit considerable face loading of lint and other bulky contaminants without blocking the air flow through the media. The media is scientifically arranged in corrugated and flat layers so it cannot pack down, gap or separate. This design also makes the filter easy to service.

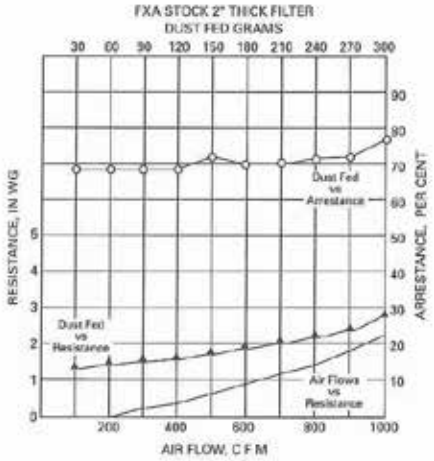
Maintenance

The filters can be cleaned by simple flushing with a hose. Warm water is desirable but not required. Drain in a warm place before replacing in filter bank.

Material

The filter media is aluminium.
Note: Larger sizes are possible but many require addition bracing for support.

Ashrae Standard 52-76 Test
Ashrae Dust Holding Capacity
1305 grams - 19-1/2" x 19-1/2" x 1-7/8"
915 grams - 19-1/2" x 19-1/2" x 7/8"



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AIR DISTRIBUTION PRODUCT

Type LBP linear bar diffuser can be used for all types of systems. It is primarily designed for ceiling mounted, although it can also be wall mounted.

The Diffuser

- is available in many sizes.
- is made of extruded aluminium.
- Standard spacing of deflector is 13mm, others also available.
- Standard flange is 32mm, other sizes 25, 19, 16also available.
- Core can be removable or hinged.

Design

The diffuser consists of a frame made of aluminium sections. There are two different deflection 0° and 30° available in either one way or two way deflection.

Sizes

Any sizes in length and width are available.

Materials and finish

Extruded aluminium
Other finishes available to special order.
304、316 Stainless steel

Instructions

Installation, adjustment and maintenance instruction are supplied.

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AIR DISTRIBUTION PRODUCT

13mm Spacing • 4mm Bars • 0° Deflection

Nominal Duct Width (mm)	51	76	101	127	152	203	254
m³/S/m	0.05	0.11	0.16	0.19	0.22	0.28	0.39
Static Pressure	2.5	5.0	5.0	5.0	2.5	5.0	2.5
Throw (m) Wall	1.8-2.7	3.4-4.9	4.3-6.1	4.6-6.7	4.6-6.7	5.2-7.6	6.4-9.8
NC	20	25	25	25	20	20	25
m³/S/m	0.06	0.12	0.19	0.22	0.25	0.31	0.47
Static Pressure	5.0	7.5	7.5	5.0	5.0	5.0	5.0
Throw (m) Wall	2.4-3.4	3.9-5.5	5.2-7.3	5.2-7.6	5.5-7.9	6.1-8.5	7.6-11.9
NC	25	25	30	25	25	25	30
m³/S/m	0.08	0.14	0.22	0.25	0.28	0.39	0.55
Static Pressure	7.5	9.9	9.9	7.5	7.5	7.5	7.5
Throw (m) Wall	3.0-4.3	4.6-6.4	5.8-8.5	5.8-8.8	6.1-9.1	7.6-10.7	8.8-13.8
NC	25	30	30	30	25	30	30
m³/S/m	0.09	0.16	0.25	0.28	0.31	0.47	0.62
Static Pressure	12.5	9.9	12.5	9.9	9.9	9.9	9.9
Throw (m) Wall	3.7-5.5	4.9-7.0	6.7-9.8	6.7-10.1	7.0-10.1	8.8-12.8	10.1-15.2
NC	30	30	35	30	30	35	40
m³/S/m	0.11	0.19	0.28	0.31	0.39	0.55	0.70
Static Pressure	14.9	14.9	17.3	12.5	12.5	12.5	14.9
Throw (m) Wall	4.2-6.1	5.8-8.5	7.6-10.9	7.3-10.9	8.2-11.9	10.4-14.6	11.3-17.1
NC	30	30	35	35	35	40	40
m³/S/m	0.12	0.22	0.31	0.39	0.47	0.62	0.78
Static Pressure	19.9	19.9	19.9	19.9	17.3	19.9	19.9
Throw (m) Wall	4.8-7.0	6.7-9.8	8.5-12.5	9.1-14.0	10.1-14.6	12.2-16.8	12.3-19.2
NC	30	35	40	40	40	45	45

THROW VALUES ARE GIVEN FOR
TERMINAL VELOCITIES OF 0.508 AND 0.254 m/s.

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AIR DISTRIBUTION PRODUCT

13mm Spacing · 4mm Bars · 30° Deflection (1 - Way)

Nominal Duct Width (mm)		51	76	101	127	152	203	254
m³/S/m		0.05	0.11	0.16	0.19	0.22	0.28	0.39
Static Pressure		2.5	7.5	7.5	7.5	2.5	7.5	2.5
Throw (m)	Wall	1.8-2.7	3.4-4.9	4.3-6.1	4.6-6.7	4.6-6.7	5.2-7.6	6.4-9.8
	Ceiling	0.3-0.6	1.2-2.7	2.1-3.9	2.1-4.3	2.1-4.3	2.4-4.9	--
NC		20	25	25	25	20	20	25
m³/S/m		0.06	0.12	0.19	0.22	0.25	0.31	0.47
Static Pressure		7.5	9.9	9.9	7.5	7.5	7.5	7.5
Throw (m)	Wall	2.4-3.4	3.9-5.5	5.2-7.3	5.2-7.6	5.5-7.9	6.1-8.5	7.6-11.9
	Ceiling	0.6-1.2	1.8-3.3	2.7-4.9	2.7-5.2	2.7-5.2	--	--
NC		25	25	30	25	25	25	30
m³/S/m		0.08	0.14	0.22	0.25	0.28	0.39	0.55
Static Pressure		9.9	12.5	12.5	9.9	9.9	9.9	9.9
Throw (m)	Wall	3.0-4.3	4.6-6.4	5.8-8.5	5.8-8.5	6.1-9.1	7.6-10.7	8.8-13.8
	Ceiling	0.9-2.1	2.4-4.3	3.3-6.0	3.0-6.0	3.3-6.4	--	--
NC		25	30	30	30	25	30	35
m³/S/m		0.09	0.16	0.25	0.28	0.31	0.47	0.62
Static Pressure		17.4	12.5	17.4	12.5	12.5	12.5	12.5
Throw (m)	Wall	3.7-5.5	4.9-7.0	6.7-9.8	6.7-10.1	7.0-10.1	8.8-12.8	10.1-15.2
	Ceiling	1.5-3.4	2.7-4.8	3.9-7.0	3.9-7.3	--	--	--
NC		30	30	35	30	30	35	40
m³/S/m		0.11	0.19	0.28	0.31	0.39	0.55	0.70
Static Pressure		19.9	19.9	22.4	17.4	17.4	19.9	17.4
Throw (m)	Wall	4.6-6.1	5.8-8.5	7.6-10.9	7.3-10.9	8.2-11.9	10.4-14.6	11.3-17.1
	Ceiling	2.1-4.0	3.3-6.1	4.9-8.3	--	--	--	--
NC		30	30	35	35	35	40	40
m³/S/m		0.12	0.22	0.31	0.39	0.47	0.62	0.78
Static Pressure		24.9	27.4	27.4	27.4	22.4	27.4	24.9
Throw (m)	Wall	4.8-7.0	6.7-9.8	8.5-12.5	9.1-14.0	10.1-14.6	12.2-16.8	12.3-19.2
	Ceiling	2.7-4.8	4.2-7.3	--	--	--	--	--
NC		30	35	40	40	40	45	45

THROW VALUES ARE GIVEN FOR TERMINAL VELOCITIES OF 0.508 AND 0.254 m/s.

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AIR DISTRIBUTION PRODUCT

13mm Spacing · 4mm Bars · 30° Deflection (2 - Ways)

Nominal Duct Width (mm)		51	76	101	127	152	203	254
m³/S/m		0.05	0.11	0.16	0.19	0.22	0.28	0.39
Static Pressure		2.5	7.5	7.5	7.5	2.5	7.5	2.5
Throw (m)	Wall	1.6-2.5	3.1-4.4	4.0-5.8	4.2-6.2	4.2-6.1	4.8-7.0	5.8-9.0
	Ceiling	0.2-0.5	0.9-2.3	1.8-3.6	1.8-3.9	1.8-3.9	2.1-4.4	--
NC		20	25	25	25	20	20	25
m³/S/m		0.06	0.12	0.19	0.22	0.25	0.31	0.47
Static Pressure		7.5	9.9	9.9	7.5	7.5	7.5	7.5
Throw (m)	Wall	2.2-3.1	3.6-5.1	4.9-6.8	4.9-6.9	5.0-7.2	5.7-8.0	7.1-11.2
	Ceiling	0.5-1.0	1.6-3.1	2.4-4.5	2.4-4.9	2.4-4.9	--	--
NC		25	25	30	25	25	25	30
m³/S/m		0.08	0.14	0.22	0.25	0.28	0.39	0.55
Static Pressure		9.9	12.5	12.5	9.9	9.9	9.9	9.9
Throw (m)	Wall	2.7-4.1	4.2-5.9	5.2-7.8	5.2-7.8	5.6-8.5	6.9-9.9	8.0-12.3
	Ceiling	0.8-1.8	2.1-4.0	3.0-5.4	2.7-5.4	3.0-5.8	--	--
NC		25	30	30	30	25	30	35
m³/S/m		0.09	0.16	0.25	0.28	0.31	0.47	0.62
Static Pressure		17.4	12.5	17.4	12.5	12.5	12.5	12.5
Throw (m)	Wall	3.3-5.0	4.5-6.3	6.1-9.0	6.1-9.5	6.3-9.5	8.0-11.3	9.7-14.3
	Ceiling	1.4-3.1	2.3-4.3	3.4-6.3	3.4-6.6	--	--	--
NC		30	30	35	30	30	35	40
m³/S/m		0.11	0.19	0.28	0.31	0.39	0.55	0.70
Static Pressure		19.9	19.9	22.4	17.4	17.4	19.9	17.4
Throw (m)	Wall	4.2-5.5	5.3-7.6	6.8-9.9	6.8-9.9	7.6-10.1	9.3-13.3	10.2-15.8
	Ceiling	1.8-3.6	3.0-5.7	4.4-7.5	--	--	--	--
NC		30	30	35	35	35	40	40
m³/S/m		0.12	0.22	0.31	0.39	0.47	0.62	0.78
Static Pressure		24.9	27.4	27.4	27.4	22.4	27.4	24.9
Throw (m)	Wall	4.3-6.3	6.0-9.1	7.7-11.4	8.0-12.8	9.1-13.3	11.0-14.9	11.1-17.9
	Ceiling	2.3-4.2	3.8-6.7	--	--	--	--	--
NC		30	35	40	40	40	45	45

THROW VALUES ARE GIVEN FOR TERMINAL VELOCITIES OF 0.508 AND 0.254 m/s.

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AIR DISTRIBUTION PRODUCT

13mm Spacing · 4mm Bars · 15° Deflection (2-way)

Nominal Duct Width(mm)		51	76	101	127	152	203	254
$m^3/s/m$		0.05	0.11	0.16	0.19	0.22	0.28	0.39
Static pressure		2.5	6.0	6.0	6.0	2.5	6.0	2.5
Throw (m)	Wall	1.6 - 2.5	3.1 – 4.5	4.4 – 6.1	4.5 – 6.6	4.5 – 6.6	5.1 – 7.5	6.2 – 9.6
	Ceiling	0.3 – 0.4	1.1 – 2.4	2.1 – 3.7	2.1 – 4.1	2.1 – 4.1	2.3 – 4.7	--
NC		20	25	25	25	20	20	25

$m^3/s/m$		0.06	0.12	0.19	0.22	0.25	0.31	0.47
Static pressure		6.0	8.6	8.6	6.0	6.0	6.0	6.0
Throw (m)	Wall	2.2 – 3.2	3.7 – 5.3	4.9 – 7.0	5.0 – 7.1	5.2 – 7.5	6.0 – 8.2	7.3 – 11.5
	Ceiling	0.6 – 1.1	1.6 – 3.2	2.4 – 4.6	2.5 – 5.0	2.5 – 5.0	--	--
NC		25	25	30	25	25	25	30

$m^3/s/m$		0.08	0.14	0.22	0.25	0.28	0.39	0.55
Static pressure		8.6	11.1	11.1	8.6	8.6	8.6	8.6
Throw (m)	Wall	2.8 – 4.2	4.5 – 5.6	5.4 – 8.0	5.4 – 8.0	6.0 – 8.7	7.2 – 10.0	8.3 – 10.8
	Ceiling	0.9 – 2.0	2.2 – 4.3	3.2 – 5.6	3.1 – 5.6	3.4 – 6.0	--	--
NC		25	30	30	30	25	30	35

$m^3/s/m$		0.09	0.16	0.25	0.28	0.31	0.47	0.62
Static pressure		15.4	11.1	15.4	11.1	11.1	11.1	11.1
Throw (m)	Wall	3.4 – 5.2	4.6 – 6.5	6.3 – 9.5	6.3 – 10.0	6.5 – 10.1	8.2 – 10.8	9.9 – 13.2
	Ceiling	1.5 – 3.2	2.5 – 4.5	3.6 – 6.5	3.6 – 6.8	--	--	--
NC		30	30	35	30	30	35	40

$m^3/s/m$		0.11	0.19	0.28	0.31	0.39	0.55	0.70
Static pressure		16.6	16.6	19.1	15.4	15.4	19.1	15.4
Throw (m)	Wall	4.3 – 5.8	5.5 – 7.8	7.2 – 10.2	7.0 – 10.4	7.8 – 10.7	9.5 – 13.5	10.5 – 16.1
	Ceiling	2.1 – 3.9	3.3 – 6.0	4.6 – 7.6	--	--	--	--
NC		30	30	35	35	35	40	40

$m^3/s/m$		0.12	0.22	0.31	0.39	0.47	0.62	0.78
Static pressure		22.1	24.6	24.6	24.6	19.6	24.6	22.1
Throw (m)	Wall	4.4 – 6.5	6.3 – 9.4	7.9 – 11.5	8.1 – 13.0	9.2 – 13.5	11.2 – 15.2	11.3 – 18.2
	Ceiling	2.5 – 4.4	4.0 – 6.9	--	--	--	--	--
NC		30	35	40	40	40	45	45

THROW VALUES ARE GIVEN FOR TERMINAL VELOCITIES OF 0.508 AND 0.254 m/s.

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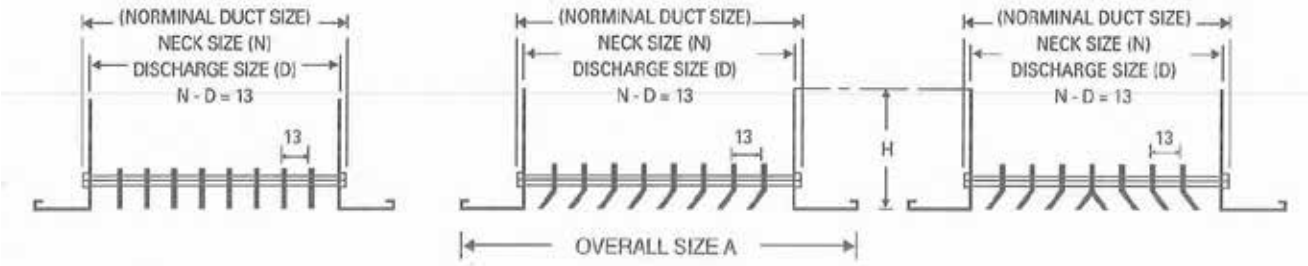
AIR DISTRIBUTION PRODUCT

Flange (F) width (mm)	32	25	19	16
H (mm)	51	44	38	38



LBP (A) - 0
(0°)

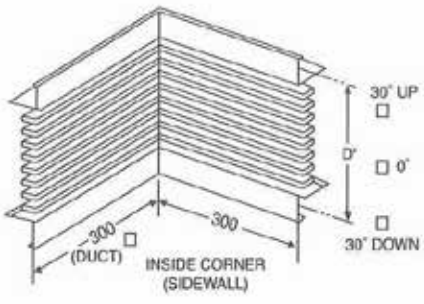
LBP (A) - 1
(30° - One Way Deflection)

LBP (A) - 2
(30° - Two Way Deflection)

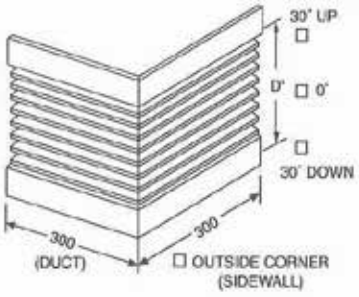
$$A - 2F + 13 = N$$

MITERED CORNERS

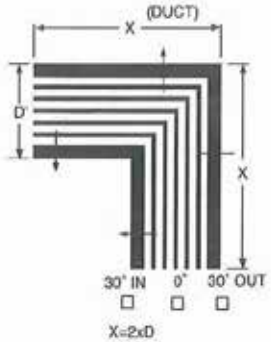
INSIDE



OUTSIDE



FLOOR, CEILING OR SILL



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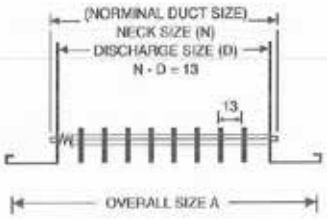
AIR DISTRIBUTION PRODUCT

REMOVABLE TYPE

Flange (F) width (mm)	32	25	19	16
H (mm)	51	44	38	38

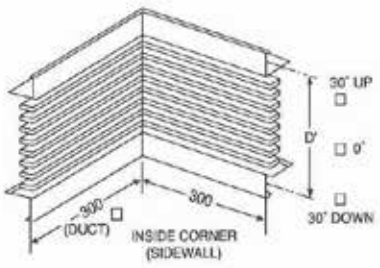
A - 2F + 13 = N



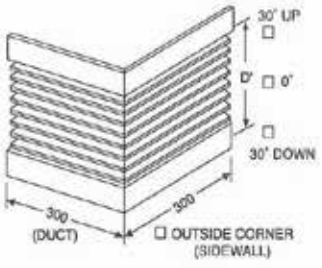
RLBP (A) - 0
(0°)

MITERED CORNERS (FIXED)

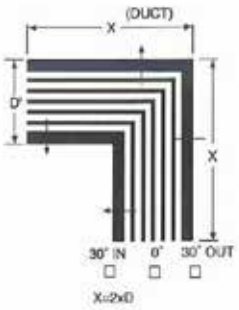
INSIDE



OUTSIDE



FLOOR, CEILING OR SILL



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AIR DISTRIBUTION PRODUCT

The type TBD(S,R) is designed for ceiling-mounting. It provides a stable pattern of diffusion, even on wide variations in the air flow [down to approx. 20% of the flow at 35 dB(A)] and at supply air temperatures of as much as 10°C below the room temperature. It is therefore suitable for VAV-systems.

The diffuser is normally connected to the ducting by means of a connection box (accessory), and is adjustable in height for accurate lining-up with the ceiling.

The diffuser is available in four standard lengths, with one or up to eight slots.

Air flow: Up to 75l/s(270m³/h) per m diffuser with two slots at 35dB(A).

- The visible parts of the diffuser are made of natural anodised aluminium but are also available in other colours.
- Several diffusers can be mounted in series, without the joint being visible.
- Air deflectors can be used to adjust the throw.

Design

Two types of the slot diffuser are available:
TBD (S)-for supply air
TBD (R)-for return air
The diffuser is normally manufactured in four lengths, with one or up to eight slots. Quotations for diffusers of other lengths, and/or in a colour other than aluminium can be ordered. The pattern of air discharge of the TBD (S) can be set by means of air deflectors. The deflectors are easily adjustable from the outside, using a screwdriver, for example.

Sizes

060 ,090, 120, 150 (length in cm)
Number of slots: 1, 2, 3, 4, 6 or 8.
Note: Also available in other sizes.

Materials and finish

Diffuser: Natural-anodised aluminium sections. The air deflectors are painted black.

Instructions

Installation, adjustment and maintenance instruction are supplied.

Contents

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AIR DISTRIBUTION PRODUCT

Sizing -

The charts are applicable under the following conditions:

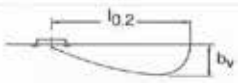
Pressure drop Δ_{pt}: At an air density of 1.2 kg/m³.
Sound level L_A: Flow-generated sound, dB(A), from the diffuser, including connection box (insulated or uninsulated). The specified sound levels are applicable at a room attenuation of 4 dB, which corresponds to the attenuation in a room with an equivalent sound absorption area of 10 m².
The tolerance on the acoustic values is ± 2 dB.

Diffusion, throw
b_h, b_v and $l_{0.2}$ are applicable at the 0.2 m/s isovel and on isothermal air supply.

Symbols used

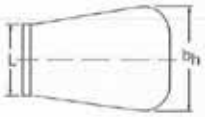
b_h	= max. diffusion in the horizontal plane	m
b_v	= max. diffusion in the vertical plane	m
$l_{0.2}$	= throw	m
L_A	= sound level	dB(A)
Δ_{pt}	= total pressure drop	Pa
q	= air flow	l/s, m³/h
q_{min}	= lowest recommended flow when the air temp. is 10°C below the room temp	l/s, m³/h

Side elevation



$b_v = 0.08 \times l_{0.2}$

Plan view



$b_h = L + 0.14 \times l_{0.2}$

Supply air TBD (S) - Calculation procedure
The numerals in the text refer to the numerals in the adjacent chart.

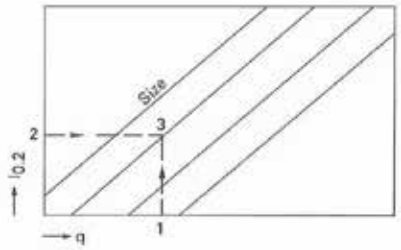
Step 1
1. Plot the required flow q in the charts on page 3.
2. Plot the required throw $l_{0.2}$
3. Determine a suitable diffuser size.
4. Calculate the diffusion b_v and b_h using the formulas above.

At variable air flow, the LSD(S) provides a stable pattern of diffusion on variations in the air flow down to 20% of the flow at 35dB(A), i.e. $q_{min} = 0.2 \times q$ at 35 dB(A).

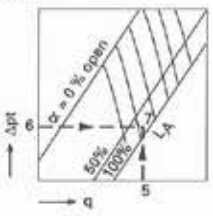
Step 2 - Alt. 1
With connection box, with damper
5. Plot the actual air flow q in the appropriate chart on page 4 or 5.
6. Plot the required total pressure drop ΔPt (often 50 Pa.)
7. Read the sound level L_A.

Step 2 - Alt. 2
With connection box without damper
5. Plot the actual air flow q in the general survey chart at the bottom of page 3 or the appropriate chart on page 4 or 5.
6. Read the sound level L_A on the line for damper setting of 100% open.
7. Read the total pressure drop Δ_{pt}.

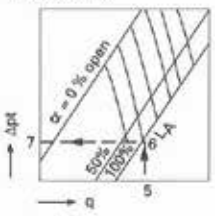
Step 2 - Alt. 3
Without connection box
The same particulars apply as those for diffuser with connection box and fully open damper, provided that the air velocity in the duct does not exceed 3 m/s.



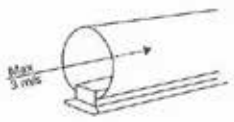
Alt. 1



Alt. 2 and 3



α = damper blade angle %



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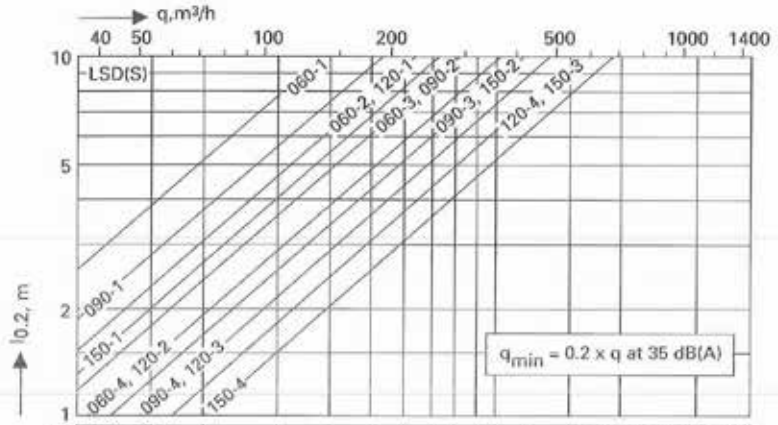
AIR DISTRIBUTION PRODUCT

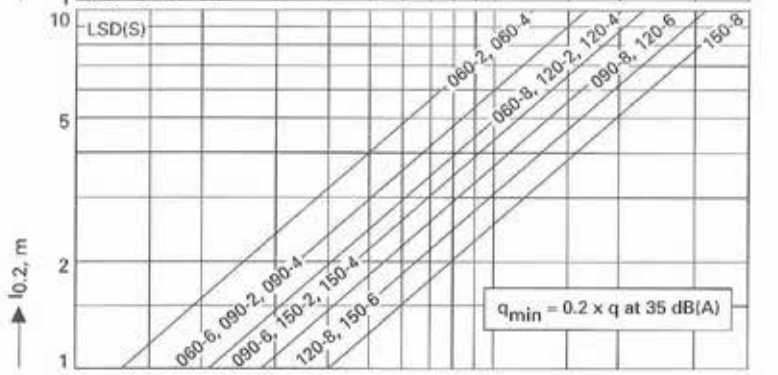
Supply air TBD(S) - Throw, pressure drop, sound level

If the diffusers are mounted in-line and have a total length in excess of 1.5m, no additional throw is achieved.

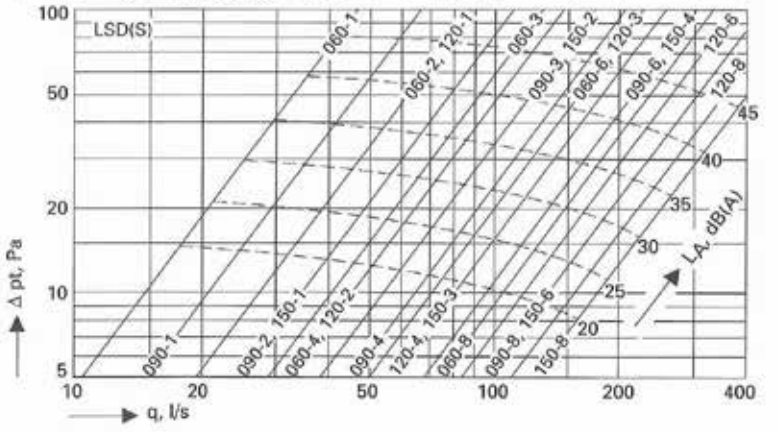
1-4 slots" 1 direction



2, 4, 6, 8 slots, 2 directions (equal number of slots in each direction)



Pressure drop, sound level
Applicable to a connection box without damper and a conn. box with the damper fully open.



For accurate particulars of sound level, see the charts on pages 4 and 5.

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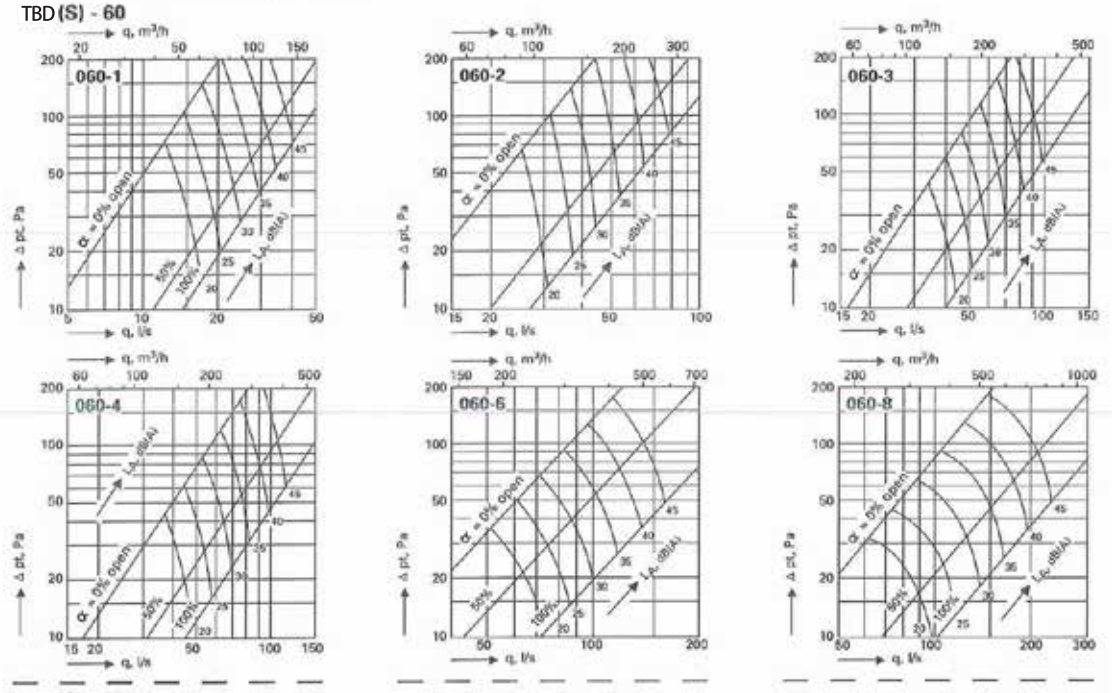
AIR DISTRIBUTION PRODUCT

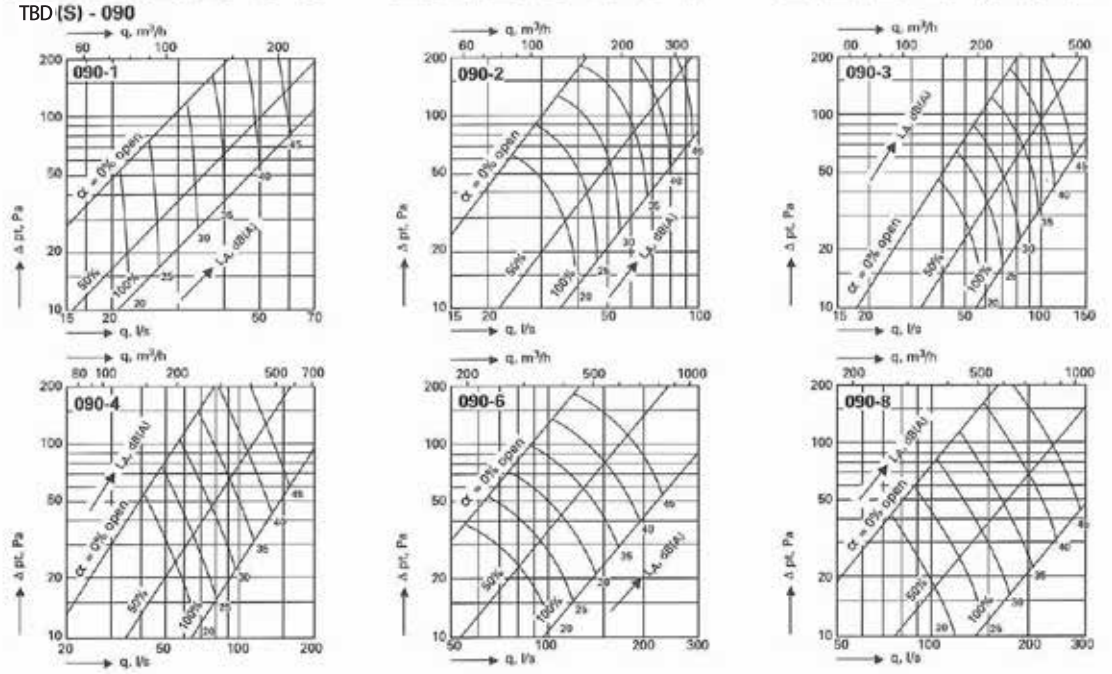
Supply air TBD (S) - With or without connection box - Total pressure drop, sound level

Note : Since it is primarily the diffuser that produces the pressure drop, the charts can be used even when the diffuser does not have a connection box. A connection box without a damper produces the same pressure drop and sound level as a box with an open damper.

TBD (S) - 60



TBD (S) - 090



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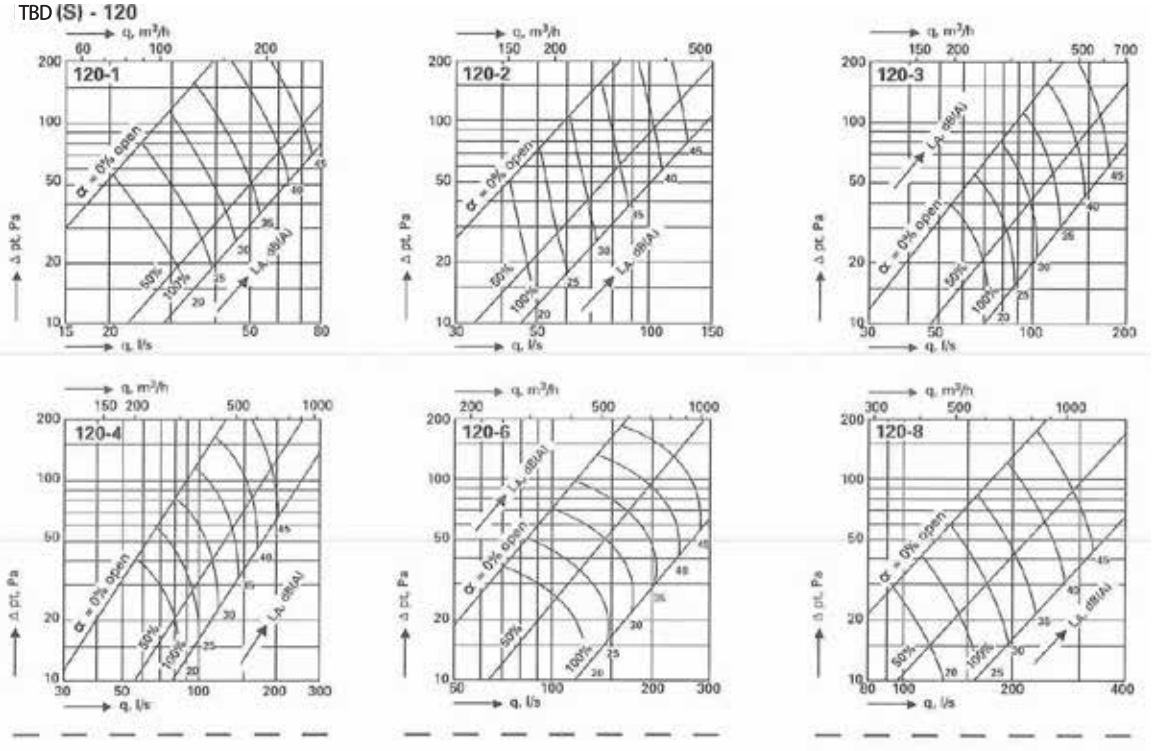
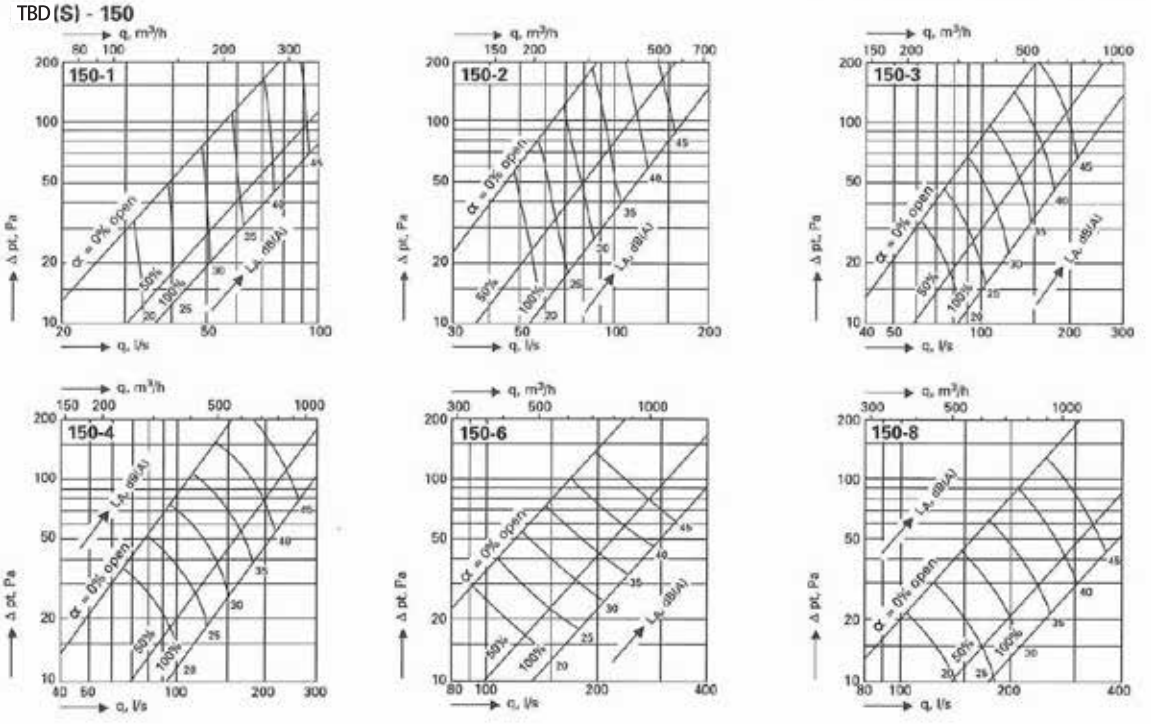
AIR DISTRIBUTION PRODUCT

TBD (S) - 120



TBD (S) - 150



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AIR DISTRIBUTION PRODUCT

Return air TBD (R) - Calculation procedure

The numerals in the text refer to the numerals in the adjacent chart.

Alt. 1. With connection box, with damper

1. Plot the actual air flow q in the appropriate chart on page 7 or 8.
2. Plot the required total pressure drop Δp_t (often 50 Pa).
3. Read the sound level L_A.

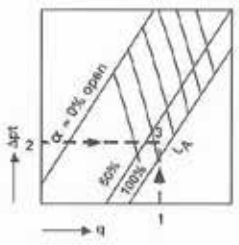
Alt. 2. With connection box, without damper

1. Plot the actual air flow in the general survey chart below or the appropriate chart on page 7 or 8.
2. Read the sound level L_A on the line for damper setting of 100% open.
3. Read the total pressure drop Δp_t.

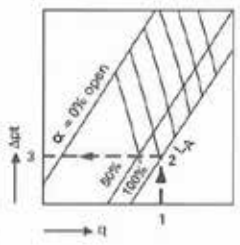
Alt. 3. Without connection box

The same particulars apply as those for diffuser with connection box and fully open damper, provided that the air velocity in the duct does not exceed 3 m/s.

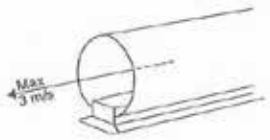
Alt. 1



Alt. 2

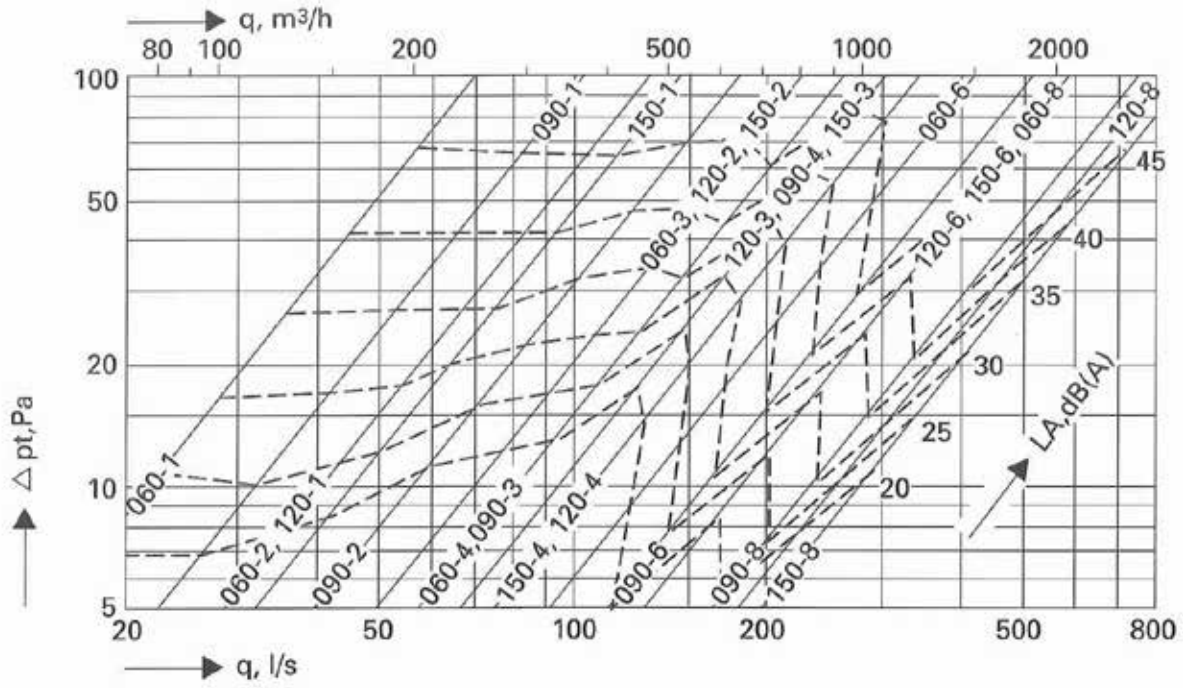


α = damper blade angel %



Exhaust air, pressure drop, sound level. General survey chart

(applicable to a connection box without damper and a connection box with a fully open damper)



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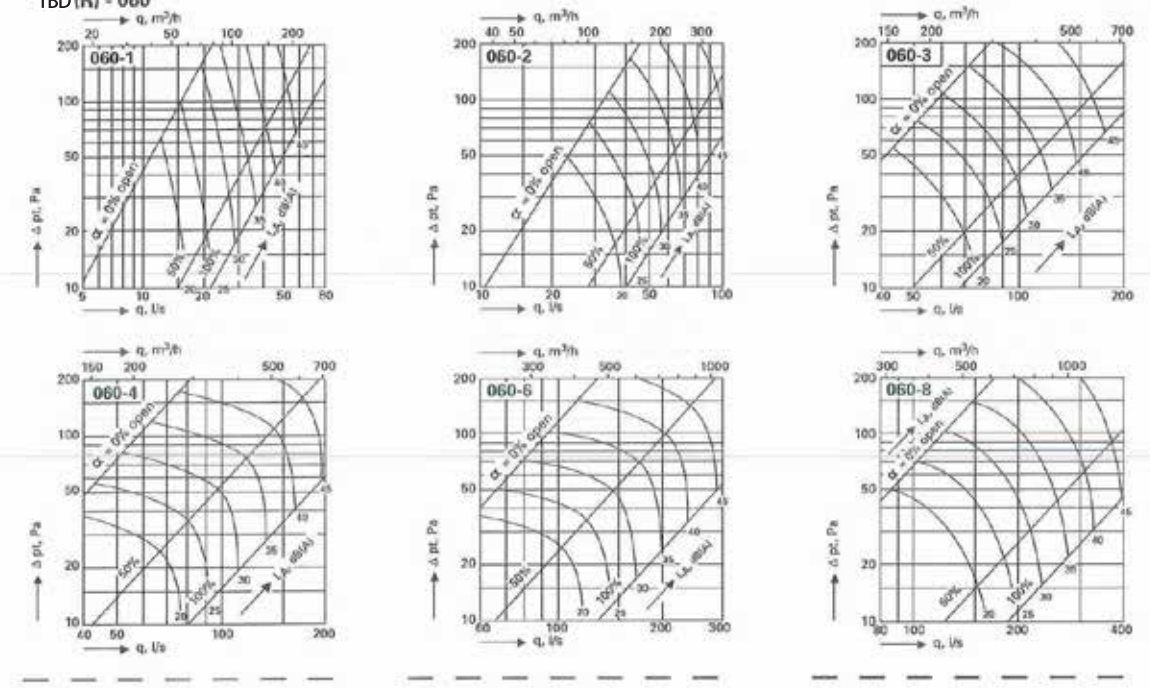
AIR DISTRIBUTION PRODUCT

Return air TBD (R) - Connection box with damper - Total pressure drop, sound level

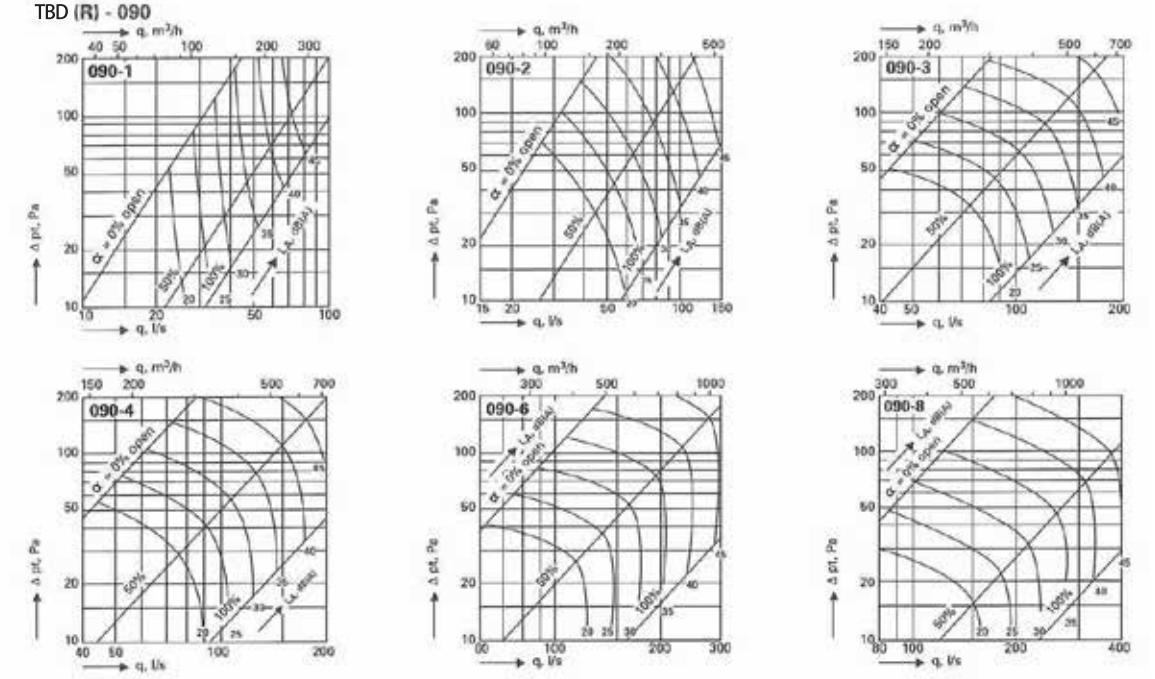
Note: A connection box without a damper produces the same pressure drop and sound level as a box with an open damper

α = damper angle %

TBD (R) - 060



TBD (R) - 090



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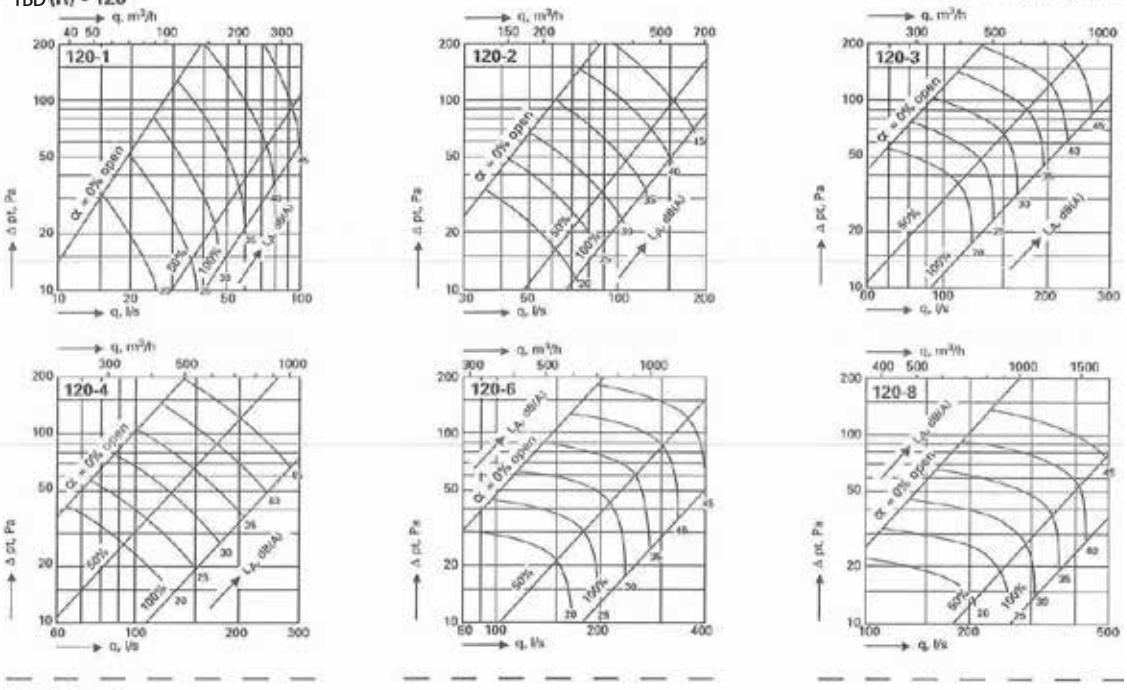
AIR DISTRIBUTION PRODUCT

Return air TBD (R) - Connection box with damper - Total pressure drop, sound level

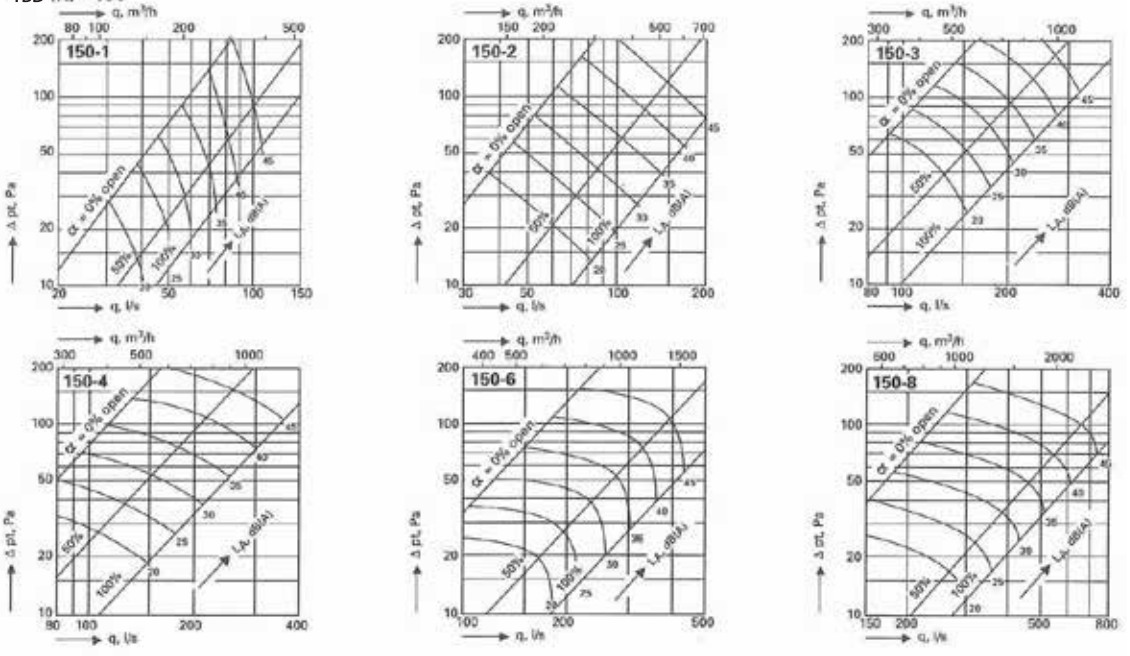
Note: A connection box without a damper produces the same pressure drop and sound level as a box with an open damp

α = damper angle %

TBD (R) - 120



TBD (R) - 150



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AIR DISTRIBUTION PRODUCT

Sound power level

The sound power level L_W can be calculated by adding a correction factor K_{ok} to the L_A value obtained from charts on pages 4 and 5, 7 and 8, in accordance with the following formula:

$$L_W = L_A + K_{ok}$$

K_{ok} is the mean value for the entire normal operating range of the diffuser.

Correction factor K_{ok}

Diffuser Type	Size	Number of slots	Correction factor K_{ok}, dB, Octave band, Hz 63	125	250	500	1000	2000	4000	8000
LSD(S)	060	1	-16	-2	+6	+3	-3	-4	-10	-18
		2	-10	-4	+3	+2	-3	-4	-7	-18
		3	-3	+4	+6	+1	-1	-8	-14	-20
		4	+1	+6	+9	+1	-3	-8	-18	-21
		6	-15	+4	+6	+2	-1	-4	-14	-22
		8	+7	+7	+5	+2	-2	-5	-15	-22
	090	1	-12	-4	+7	+1	-3	-3	-8	-19
		2	-10	-3	+6	+2	-2	-4	-10	-20
		3	-4	+3	+8	+1	-2	-8	-14	-21
		4	-3	+7	+9	+1	-3	-10	-15	-22
		6	-1	+6	+7	+1	-1	-7	-15	-22
		8	+5	+9	+8	+2	-2	-9	-16	-22
	120	1	-8	-3	+7	+2	-3	-5	-10	-19
		2	-5	-2	+6	+3	-2	-6	-12	-20
		3	-4	+5	+8	+1	-3	-8	-15	-21
		4	-2	+8	+9	+2	-3	-8	-16	-22
		6	+3	+7	+7	+1	-1	-8	-17	-22
		8	+8	+9	+7	+2	-2	-10	-18	-22
	150	1	-3	-3	+8	+3	-3	-7	-13	-20
		2	-1	0	+7	+3	-2	-8	-13	-21
		3	+2	+6	+10	+2	-4	-10	-19	-22
		4	+6	+9	+10	+2	-4	-8	-20	-22
		6	+9	+9	+7	+1	-1	-9	-19	-23
		8	+14	+10	+6	+1	-3	-12	-19	-23
Tolerance			±6	±3	±2	±2	±2	±2	±2	±2

Diffuser Type	Size	Number of slots	Correction factor K_{ok}, dB, Octave band, Hz 63	125	250	500	1000	2000	4000	8000
LSD(R)	060	1	-6	-4	+12	-1	-9	-18	-21	-16
		2	-3	+4	+10	+3	-10	-17	-19	-11
		3	+3	-2	+2	-3	+1	-3	-17	-18
		4	+12	+2	+2	-3	+2	-6	-13	-13
		6	+4	+3	+3	-1	+2	-8	-14	-19
		8	+6	+5	+6	+1	+1	-10	-16	-20
	090	1	-11	-4	+12	-2	-15	-20	-23	-18
		2	-3	+3	+9	-2	-1	-8	-10	-13
		3	+8	+2	+2	-3	+2	-8	-22	-19
		4	+10	-4	-4	-6	+3	-12	-20	-16
		6	+10	-1	-2	-3	+3	-11	-23	-20
		8	+12	-3	-2	-2	+2	-13	-20	-18
	120	1	-8	-3	+12	-1	-13	-20	-23	-17
		2	+4	+6	+9	0	-3	-12	-14	-13
		3	+4	-2	+6	+1	-1	-7	-20	-14
		4	+10	+7	+8	+2	-4	-10	-18	-12
		6	+10	+1	+4	-2	+2	-9	-16	-16
		8	+12	+8	+6	-2	+1	-12	-14	-18
	150	1	-4	-4	+12	-1	-10	-19	-24	-16
		2	+10	+10	+10	+2	-5	-15	-17	-14
		3	+6	+2	+2	-4	0	-2	-16	-22
		4	+12	+5	+4	-4	+2	-8	-13	-23
		6	+10	+2	+7	-4	-1	-4	-15	-20
		8	+14	+4	+6	-2	0	-6	-17	-21
Tolerance			±6	±3	±2	±2	±2	±2	±2	±2

Sound attenuation - The specified sound attenuation ΔL refers to the reduction in the sound power L_W from the ducting to the room.

Diffuser with uninsulated connection box

Diffuser Type	Size	Number of slots	Sound attenuation ΔL, dB, Octave band, Hz 63	125	250	500	1000	2000	4000	8000
LSD(S,R)	060	1	16	14	10	14	12	10	11	8
		2	15	11	8	12	12	6	7	6
		3	17	12	7	12	8	5	6	4
		4	18	12	6	11	7	5	6	4
		6	13	8	6	12	4	5	5	4
		8	15	4	5	8	2	3	4	4
	090	1	15	12	8	10	10	7	9	9
		2	14	11	8	9	9	5	6	6
		3	17	12	6	10	7	5	6	5
		4	17	11	6	9	6	4	5	3
		6	13	7	6	9	2	4	4	3
		8	14	5	7	6	2	3	4	3
	120	1	15	11	5	10	9	9	9	6
		2	14	10	10	12	13	8	8	6
		3	17	11	7	10	8	7	7	5
		4	16	10	6	10	7	6	6	4
		6	12	7	7	10	3	5	5	6
		8	11	6	8	7	4	4	6	7
	150	1	14	12	4	9	9	11	8	6
		2	13	10	9	11	11	8	9	7
		3	14	11	8	10	10	8	8	6
		4	15	10	8	9	10	8	9	6
		6	10	8	8	11	5	7	7	6
		8	9	7	11	12	6	6	8	8
Tolerance			±6	±3	±2	±2	±2	±2	±2	±2

Diffuser with insulated connection box

Diffuser Type	Size	Number of slots	Sound attenuation ΔL, dB, Octave band, Hz 63	125	250	500	1000	2000	4000	8000
LSD(S,R)	060	1	15	13	10	16	18	17	15	19
		2	15	11	10	15	17	13	14	16
		3	16	12	7	15	13	11	13	9
		4	16	11	8	16	12	10	13	9
		6	14	6	8	15	8	8	11	9
		8	15	5	8	13	7	8	11	13
	090	1	15	12	10	14	17	13	17	19
		2	14	11	9	12	17	13	14	16
		3	16	11	8	12	14	12	14	9
		4	16	11	8	11	11	9	11	9
		6	15	6	8	11	7	8	11	8
		8	15	5	9	10	7	7	10	11
	120	1	14	11	12	15	19	16	15	18
		2	13	9	12	14	19	16	14	16
		3	15	11	8	13	15	13	14	9
		4	15	10	9	12	14	12	13	9
		6	12	6	9	14	11	9	12	10
		8	11	5	10	17	10	8	11	12
	150	1	14	12	12	15	19	16	15	17
		2	13	10	12	14	19	16	15	16
		3	12	10	9	14	16	14	15	9
		4	12	9	9	13	15	13	15	9
		6	10	6	10	13	12	11	14	9
		8	12	4	12	18	10	10	12	13
Tolerance			±6	±3	±2	±2	±2	±2	±2	±2

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AIR DISTRIBUTION PRODUCT

Aluminium Linear Slot Diffusers

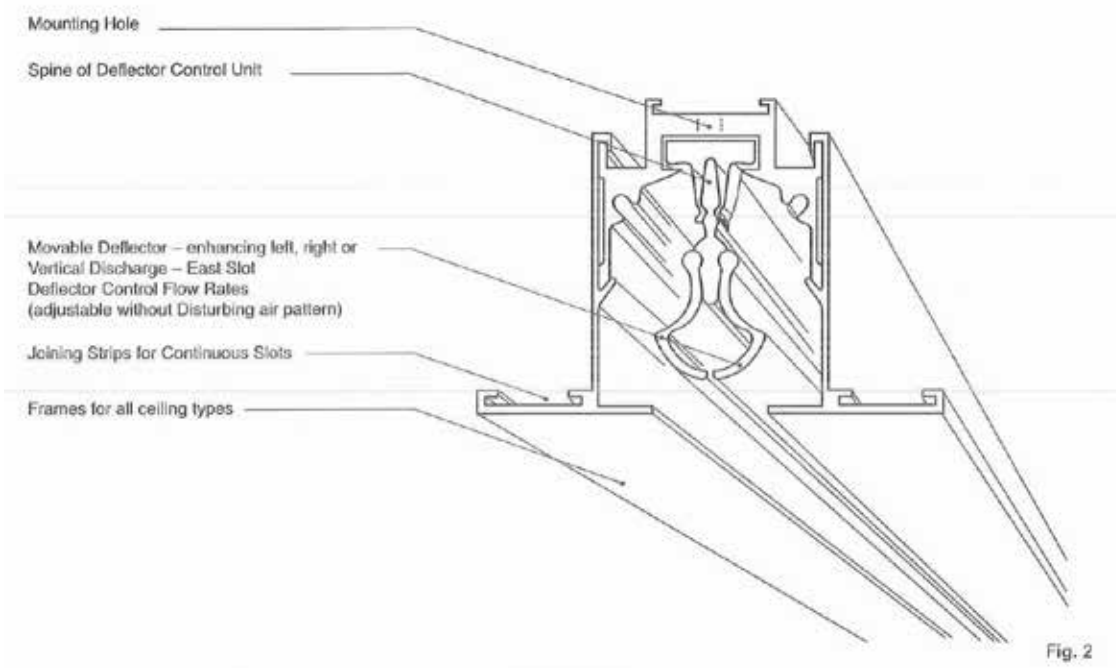
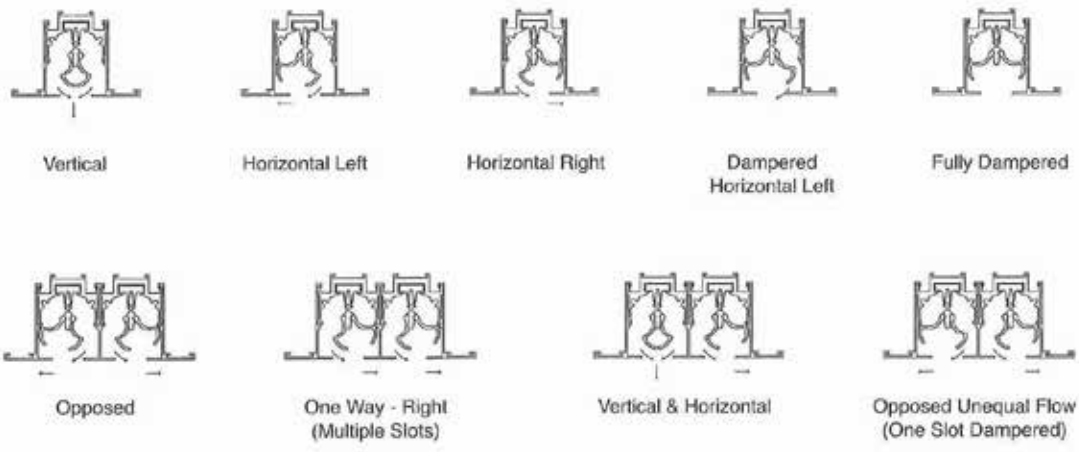


Fig. 2

OPERATION OF DEFLECTOR CONTROL UNIT



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AIR DISTRIBUTION PRODUCT

(One Slot)

(Two Slots)

(Three Slots)

(Four Slots)

(Five Slots)

(Six Slots)

(Seven Slots)

(Eight Slots)

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證書編號: 91441900338110581M

AIR DISTRIBUTION PRODUCT

WPL Lourve for outdoor

Type WPL lourve can be used for intake or exhaust systems. It is designed for outdoor mounting.

The lourve

- is available in eighteen different height form 150 to 1500mm (or more special size).
- is made of mild steel, aluminium also available.
- Standard flange is 32mm, other sizes 25, 19, 16 also available.

Design

The lourve consists of a frame made of mild steel or aluminium sections and sturdy, longitudinal vanes inclined at angle 45° ; as shown in Fig. 2, framed trims also available.

Sizes

HEIGHT mm	FREE AREA m^2 per m length
150	0.055
200	0.076
250	0.097
300	0.119
350	0.144
400	0.167
450	0.190
500	0.215
600	0.262
700	0.309
800	0.362
900	0.415
1000	0.472
1100	0.528
1200	0.586
1300	0.640
1400	0.693
1500	0.749

Fig. 2

Material and finish

Mild steel
Extruded aluminium
Other finishes available to special order.
304、316 Stainless steel

Instructions

Installation, adjustment and maintenance instructions a supplied.

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AIR DISTRIBUTION PRODUCT

PRESSURE

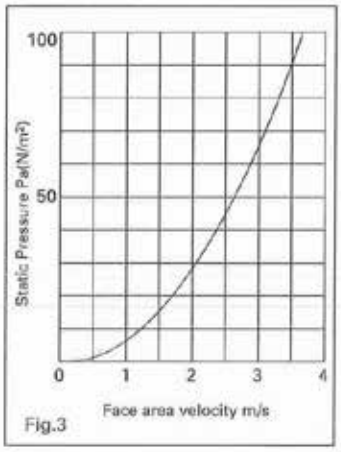
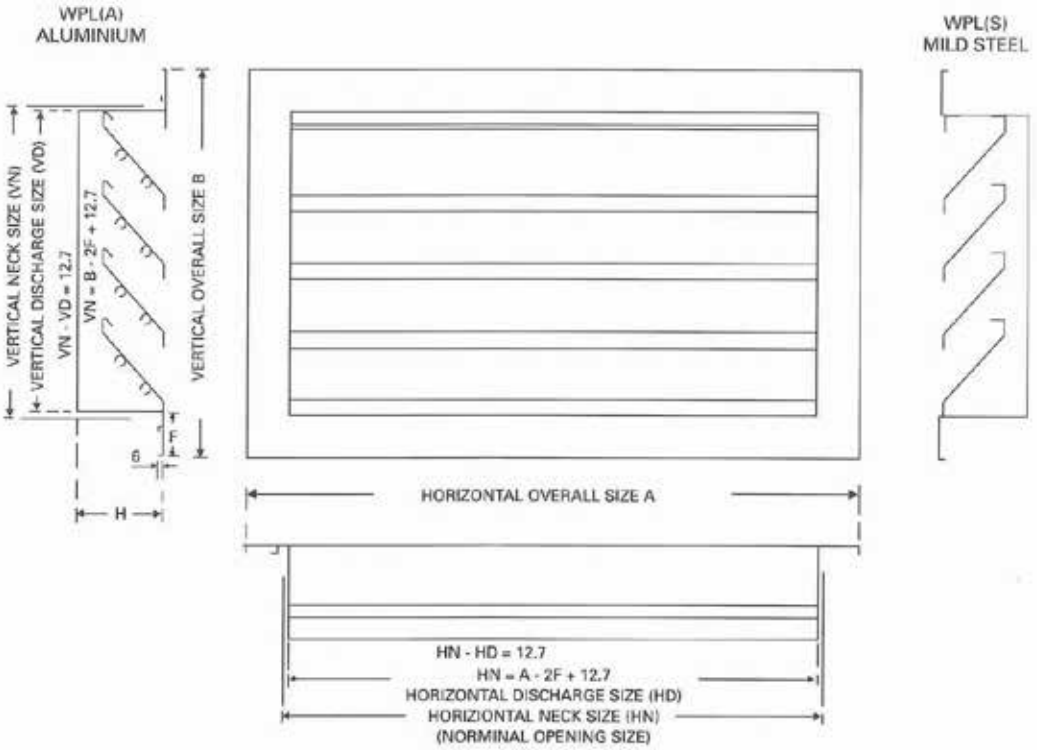


Fig.3



Flange (F)	32	25	19	16
Height (H)	51	44	38	38

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AIR DISTRIBUTION PRODUCT

The type ECG is designed for ceiling-mounting. It provides a stable pattern of diffusion, even on wide variations in air flow as it provides a maximium free area of approx. 90%.

- Square pattern grid provides a minimum see through.
- The grille is of anodised aluminium.
- Standard flange is 32mm, other sizes 25, 19, 16 also available.
- Core can be hinged.

Design

The grille is suitable for supply air as well as exhaust air. The aluminium square pattern grid gives a minimun pressure drop across the grille as the free area is approx. 90%

Sizes

025, 030, 040, 050, 060 (square-length in cm)
Note: other sizes available to speical order.

Accessories (to be specified separately)

The VCD(G) volume control damper for the grille is available.

Materials and finish

Grille

Anodised aluminium.
Other finishes available to special order.

Instructions

Installation, adjustment and maintenance instruction are supplied.

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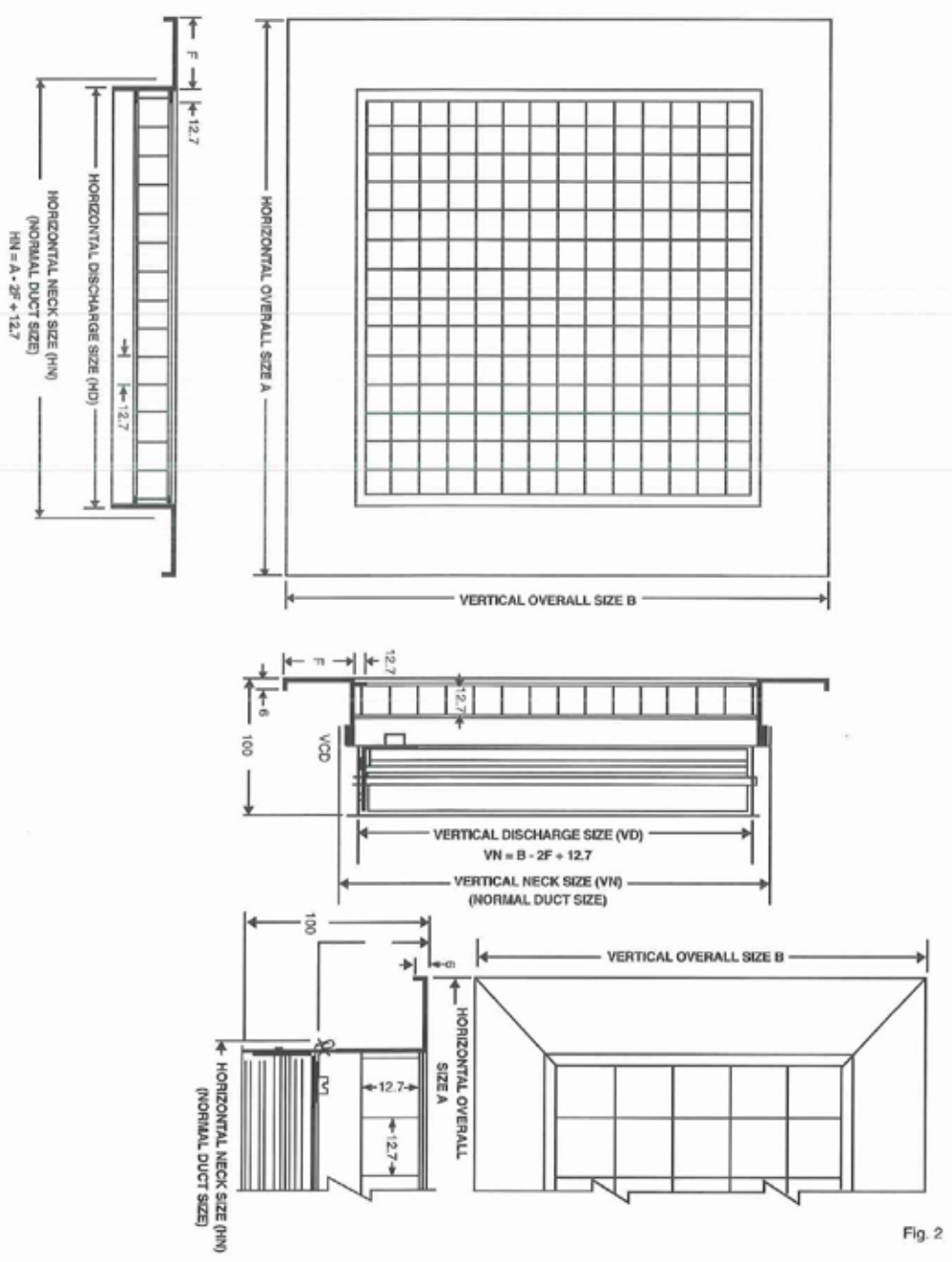

Fig. 2

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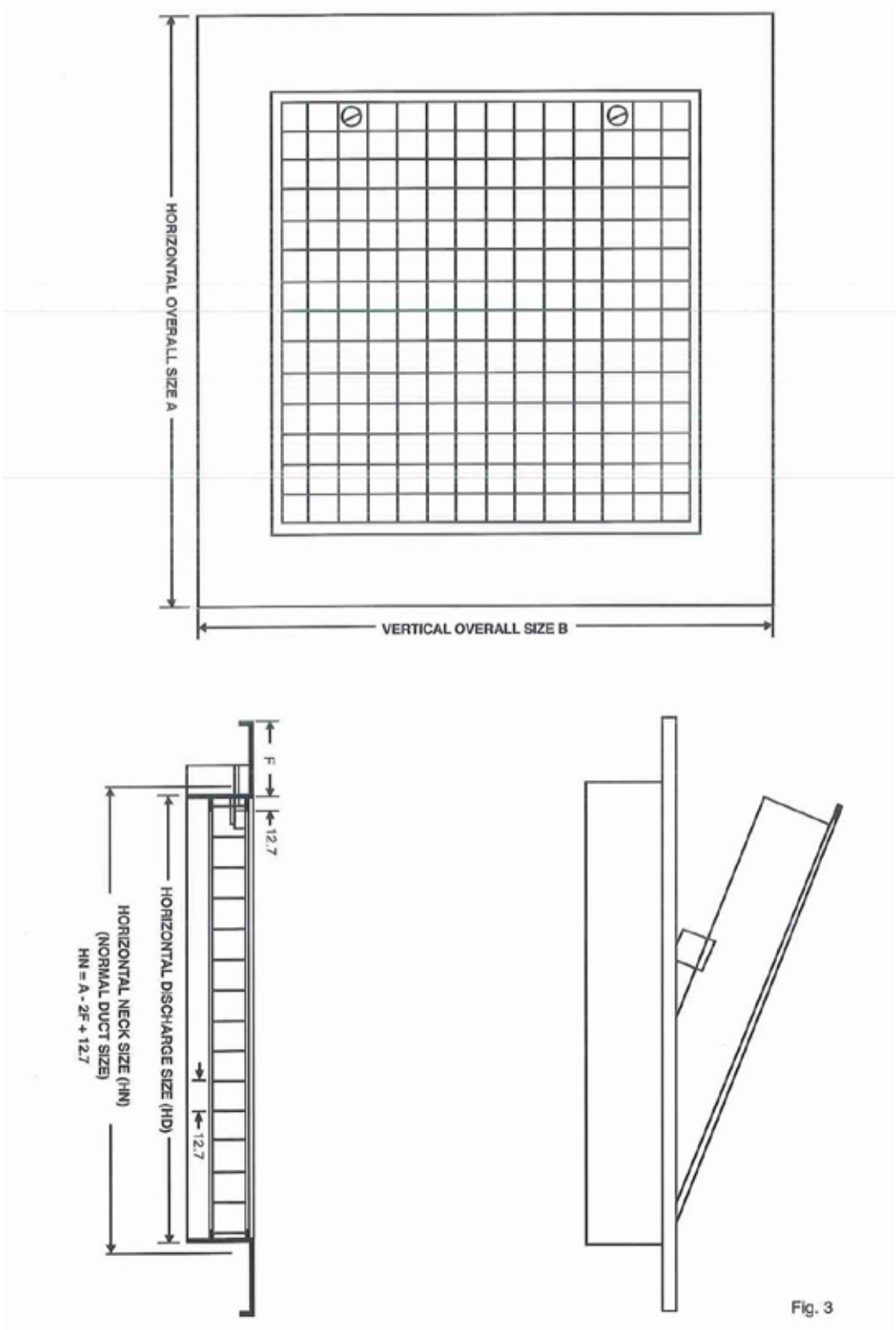

Fig. 3

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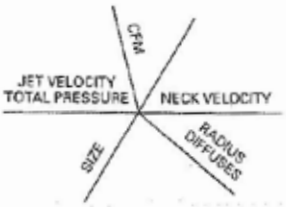
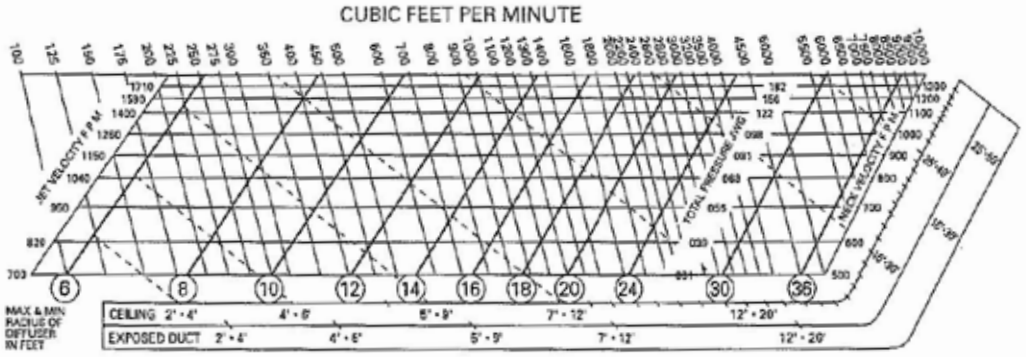
證書編號: 91441900338110581M

AIR DISTRIBUTION PRODUCT

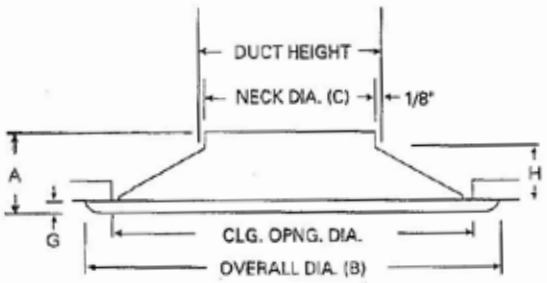
THE MODEL S.C.D. DIFFUSER IS A FLUSH DIFFUSER WITH FIXED BLADES. IT DELIVERS AIR SUPPLY IN A HORIZONTAL PATTERN. ALL DIFFUSERS HAVE THE SAME NUMBER OF CONES SO THAT A UNIFORM APPEARANCE IS ASSURED WHEN VARIOUS SIZE ARE INSTALLED IN THE SAME AREA.

TO INSTALL THIS DIFFUSER FIRST TAKE OUT THE CORE AND ATTACH THE OUTSIDE CONE THE TAKE-OFF DUCT. THIS OPERATION SHOULD BE DONE WITH THE CONE PRESSED SECURELY AGAINST THE CEILING. REPLACE THE CENTER SECTION BY TURNING CLOCKWISE UNTIL THE CORE CLICKS INTO PLACE.





DIMENSIONS (mm)					
Neck Size	CLG Opng Dia.	Ovll Dia.	A	H	G
150 (6")	315	335	78	53	4.5
200 (8")	415	435	96	70	6
250 (10")	480	540	115	88	7.5
300 (12")	570	640	134	105	9
350 (14")	660	740	153	123	10.5



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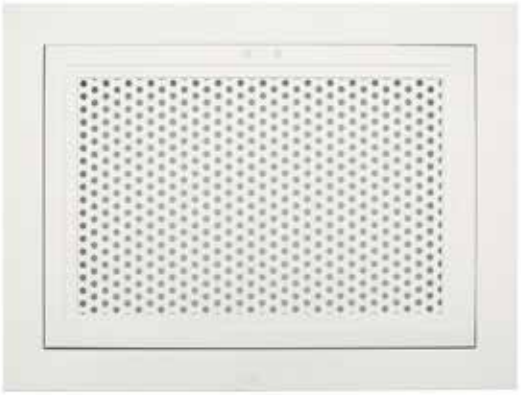
AIR DISTRIBUTION PRODUCT

Type PDS air diffuser can be used for all type of systems. It is primarily designed for ceiling mounting. The hinge type air louver is also for easy accessible of filter.



THE DIFFUSER

Perforated panel is made of G.I. sheet steel with extruded aluminium or mild steel flange.
Washable air filter also available.
Standard flange is 32mm, other sizes 25, 19 and 16 also available.

SIZES

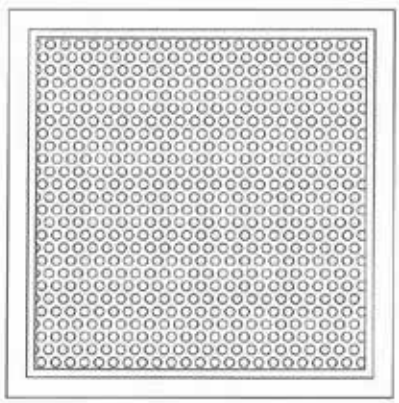
600mm X 600mm
Note: Also available in other sizes.

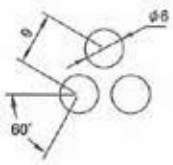
ACCESSORIES

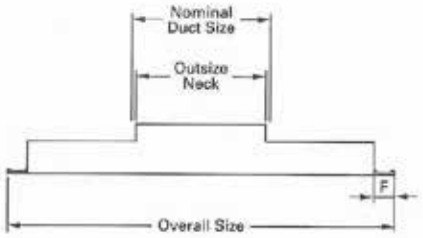
Washable air aluminium filter is available.

MATERIALS AND FINISH

G.I. sheet steel perforated panel.
Extruded aluminium or mild steel flange.
Other finishes available to special order.







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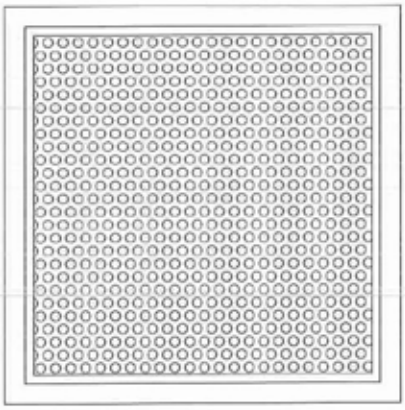
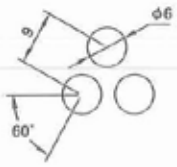
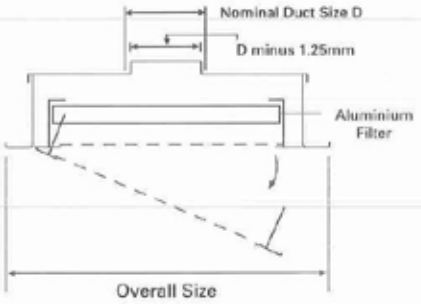
AIR DISTRIBUTION PRODUCT

Model HPG perforated panels are designed for return or exhaust applications.
Hinged type perforatied panels can be completed with aluminium filter.
Panels match Model PDS supply diffusers in appearance after installation.
Perforation panel has 0.6mm diameter holes.
Material is made of G.I. sheet steel with extruded aluminium or mild steel flange.







PDS & HPG. FLUSE FACE. 600mm X 600mm MODULE SIZE

Neck Size	Neck Velocity, FPM	300	400	500	600	700	800	1000	1200	1400
	Velocity Pressure, Inches WG	.006	.010	.016	.023	.031	.040	.063	.090	.123
6" Dia.	Total Pressure Inches WG	.011	.020	.031	.045	.061	.080	.125	.180	.244
	Flow Rate, CFM	58	78	98	117	137	156	196	235	274
	NC (Noise Criterion)	10	11	14	18	21	24	29	33	38
	Throw, Feet	1-1-5	1-3-7	2-4-9	3-5-10	4-6-10	5-7-11	6-9-13	7-10-14	8-10-15
8" Dia.	Total Pressure Inches WG	.014	.025	.039	.056	.076	.099	.0155	.223	.303
	Flow Rate, CFM	104	139	174	209	244	279	349	418	488
	NC (Noise Criterion)	10	12	17	21	24	27	32	36	40
	Throw, Feet	1-2-7	1-4-10	2-6-12	4-7-13	5-9-14	6-10-15	8-12-17	10-13-19	11-14-20
10" Dia.	Total Pressure Inches WG	.016	.029	.045	.065	.089	.116	.181	.250	.354
	Flow Rate, CFM	163	218	272	327	381	436	545	654	763
	NC (Noise Criterion)	11	15	20	24	27	30	35	40	45
	Throw, Feet	1-2-9	2-5-12	3-8-15	5-9-16	6-11-18	8-12-19	10-15-21	12-16-23	14-18-25
12" Dia.	Total Pressure Inches WG	.019	.033	.052	.075	.101	.132	.207	.298	.406
	Flow Rate, CFM	235	314	392	471	549	628	785	942	1099
	NC (Noise Criterion)	11	17	22	26	29	32	39	45	50
	Throw, Feet	1-3-11	2-6-15	4-9-18	6-11-20	8-13-21	10-15-23	12-18-26	15-20-28	17-21-30
Return 24" x 24"	Total Pressure Inches WG	.024	.043	.068	.098	.133	.174	.271	.391	.532
	Flow Rate, CFM	1007	1344	1679	2015	2352	2688	3359	4031	4704
	NC (Noise Criterion)	10	12	16	19	22	26	34	40	46

- All pressures are in inches of water.
- Throw values are given for terminal velocities of 150, 100 and 50 fpm.
- Throw values are given for isothermal conditions.
- NC values are based on Octave Band 2 through 7 sound power levels

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