Air Distribution & Controls | Fire Safety | Attenuation | ACMV System

ADF

PRODUCT CATALOGUE



ACM INTERNATIONAL

West Malaysia





2

1. Tanjung Rhu Resort, Pulau Langkawi

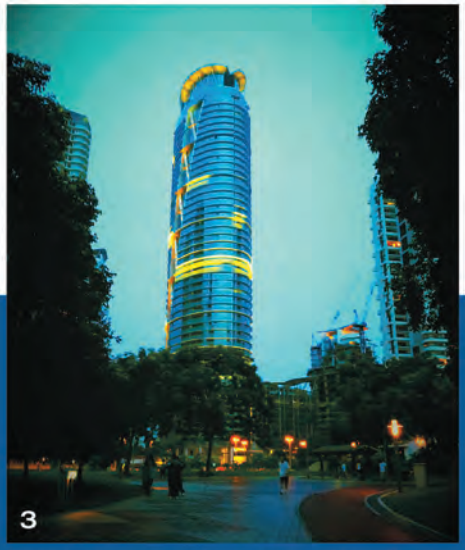
2. Calvary Convention Centre, Bukit Jalil, KL

4. Hard Rock Hotel, Penang

5. Tabung Haji, Hotel & Convention Centre, Sepang



1



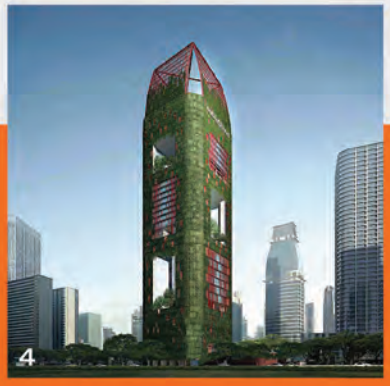
3. Platinum Park Phase IV, KLCC





Singapore

1. National University of Singapore (NUS), Clementi Road - Edusports Complex
2. Singapore Institute of Management (SIM), Clementi Road - Annexe Building
3. Silversea Condominium - Marine Parade
4. Oasia Hotel, Cantonment Road
5. Altez Condominium (Highest Condo in SG)













Sarawak

1. University College of Technology Sibu Sarawak (UCT)
2. Pullman Hotel Kuching
3. Sarawak Energy Berhad
4. UNIMAS Sarawak
5. Kuching International Airport





Sabah



ACM INTERNATIONAL



3



4


5

1. Queen Elizabeth Hospital
2. Sabah Medical Centre
3. Universiti Malaysia Sabah (UMS)
4. Hospital Likas
5. Suria Sabah Shopping Mall


4



5

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DIFFUSERS

MULTI-DIRECTION CEILING DIFFUSER



The information given in this document is based on data and knowledge correct at the time of printing. Data is subject to change without prior notice for continual product improvement. Applications or installations outside general guidelines and code of practice are beyond our product performance guarantees.

MULTI-DIRECTION CEILING DIFFUSER

MCD

Multi-direction Ceiling Diffuser is a common use of all air outlets. The diffusers are basically consist of a series of equally flared louvres which form a series of concentric air passages; and for easy installation purpose, are made in 2 parts, an outer frame with duct connection collar and an easily removable centre core.

DESIGN AND CONSTRUCTION

With its distinctive design of a series of concentric air passages and geometrical pattern, the flush-faced diffusers blend well with any modern or conservative ceiling systems. Besides projecting an uniform and neat appearance to the interior, various air volumes can be obtained by adjusting the volume control device.

ADF Multi-direction Ceiling Diffusers come in Galvanised Steel and Aluminium construction, are available in square and rectangular shapes; finished with baked enamel or natural anodised aluminium.

FEATURES

- Offers good air entrainment.
- Allows diffusion of large air quantity.
- Rapid temperature equalization.
- Even air distribution.
- Stable air throw pattern.
- Detachable centre core for easy maintenance.
- Volume control device can be adjusted from front.

APPLICATIONS

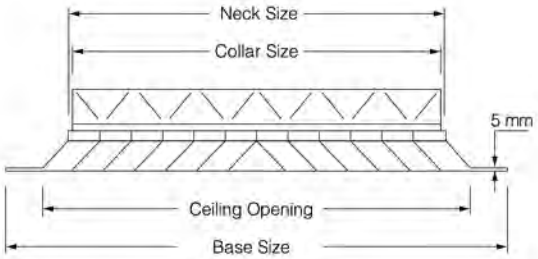
- Office and factory buildings
- Hotels and motels
- Shopping malls and supermarkets
- Restaurants and cafeterias
- Hospitals and medical centres
- Other public areas

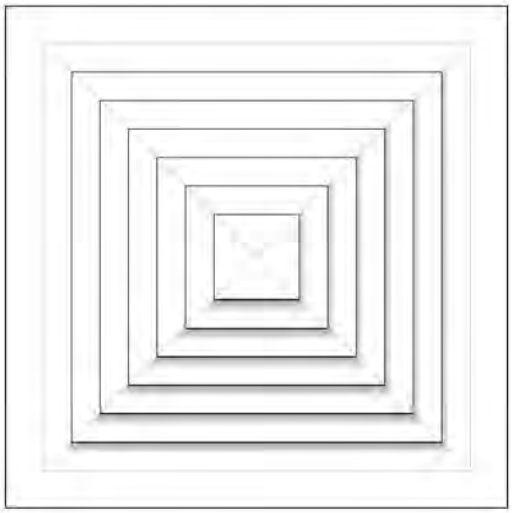


MULTI-DIRECTION CEILING DIFFUSER 4-WAY THROW

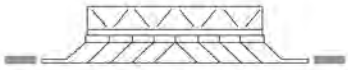
Model MCD-4T

PHYSICAL DIMENSION





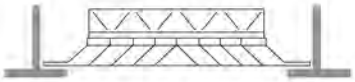
MOUNTING GUIDE



Flush Mounting



Surface Mounting



Lay-on Mounting

Neck Size mm	Collar Size mm	Base Size mm	Ceiling Opening mm
150 x 150	144 x 144	600 x 600	535 x 535
200 x 200	194 x 194	600 x 600	535 x 535
250 x 250	244 x 244	600 x 600	535 x 535
300 x 300	294 x 294	600 x 600	535 x 535
350 x 350	344 x 344	600 x 600	535 x 535
400 x 400	394 x 394	600 x 600	535 x 535
450 x 450	444 x 444	600 x 600	535 x 535
480 x 480	474 x 474	600 x 600	535 x 535

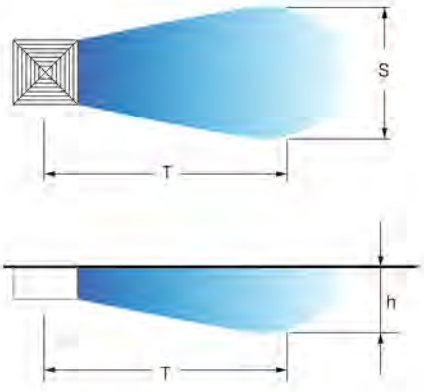
MULTI-DIRECTION CEILING DIFFUSER
4-WAY THROW

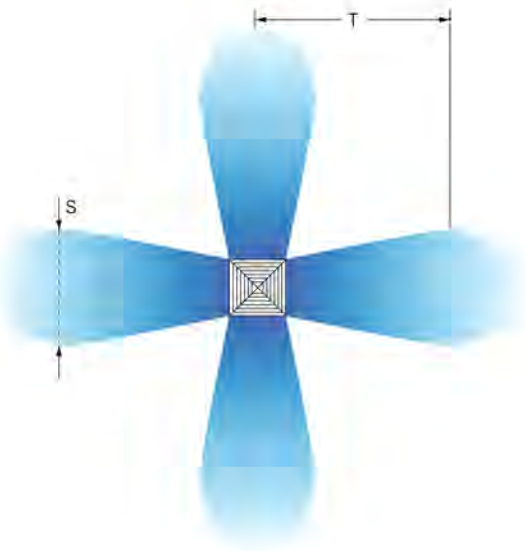
Model MCD-4T

PERFORMANCE DATA

Neck Size mm x mm	ΔP Pa	5	8	12	15	19	24	29	41	54	69	85	103
150 x 150	Air, l/s	-	-	51	60	68	77	85	102	119	136	153	170
	Throw, m	-	-	1	2	3	3	4	5	5	6	6	7
	NR	-	-	7	12	17	21	24	30	36	40	44	48
200 x 200	Air, l/s	-	-	95	110	126	142	158	189	221	252	284	315
	Throw, m	-	-	3	4	4	5	5	6	7	7	8	9
	NR	-	-	10	16	20	24	25	34	39	44	48	51
250 x 250	Air, l/s	-	124	149	173	198	223	248	297	347	396	446	495
	Throw, m	-	3	4	5	5	6	6	7	8	9	9	10
	NR	-	9	14	18	23	27	30	36	42	46	50	54
300 x 300	Air, l/s	-	176	212	247	282	317	353	423	494	564	635	705
	Throw, m	-	4	5	6	6	7	7	8	9	10	11	11
	NR	-	12	17	20	25	29	32	32	44	48	52	56
350 x 350	Air, l/s	168	210	252	294	336	378	420	504	588	672	756	840
	Throw, m	4	5	6	6	7	7	8	9	9	10	11	>11
	NR	8	13	18	22	26	30	33	39	45	49	53	57
400 x 400	Air, l/s	186	233	279	326	372	419	465	558	651	744	837	930
	Throw, m	4	5	6	6	7	8	8	9	10	11	>11	>11
	NR	9	14	19	23	26	30	34	40	45	50	54	57
450 x 450	Air, l/s	195	244	293	341	390	439	488	585	683	780	878	975
	Throw, m	4	5	6	7	7	8	8	9	10	11	>11	>11
	NR	9	15	19	23	27	30	34	40	45	50	54	57
450 x 450	Air, l/s	205	256	308	359	410	461	513	615	718	820	923	1025
	Throw, m	4	5	6	7	7	8	8	9	10	11	>11	>11
	NR	9	15	20	23	27	31	34	40	46	50	54	58

ISOTHERMAL AIR THROW PATTERN





T	Length of throw at 0.25 m/s, terminal velocity
S	T x 0.6
h	T x 0.06

MULTI-DIRECTION CEILING DIFFUSER 4-WAY THROW

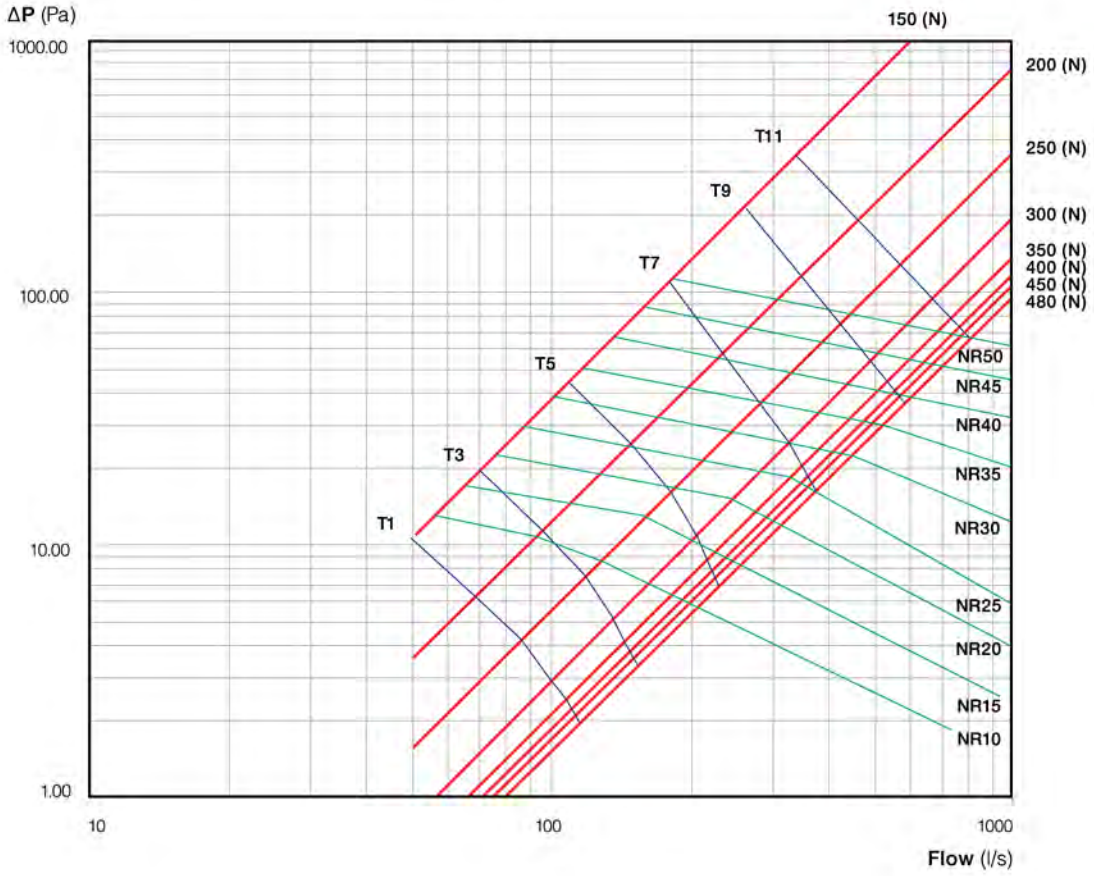
Model MCD-4T

SELECTION NOMOGRAPH

MODEL MCD-4T

PRESSURE DROP vs FLOW vs THROW vs NR

(Throw in metres, for velocity of 0.25 m/s)



SELECTION GUIDE

1. Select from horizontal axis the required air flow, plot a vertical line up.
2. Select the required pressure drop by plotting a horizontal line to cross-section with the plotted air flow line.
3. The cross-section point will determine the desired diffuser with the closest Neck Size, Throw and NR.

MULTI-DIRECTIONAL CEILING DIFFUSER – SQUARE TYPE

OPTIONAL DESIGNS



MULTI-DIRECTION CEILING DIFFUSER RECTANGULAR

Model MCD-R4T



PHYSICAL DIMENSION

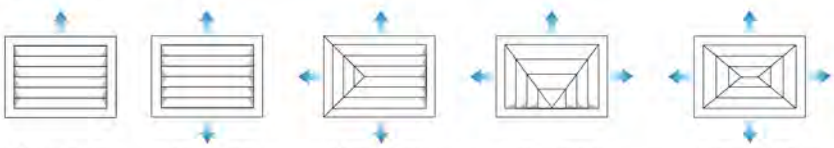
Neck Size mm	Collar Size mm	Base Size mm	Ceiling Opening mm
250 x 150	219 x 144	600 x 300	535 x 235
375 x 150	389 x 194	600 x 300	535 x 235
450 x 150	444 x 244	600 x 300	535 x 235
600 x 450	596 x 294	1200 x 600	1135 x 535

PERFORMANCE DATA

Neck Size mm x mm	ΔP Pa	5	8	12	15	19	24	29	41	54	69	85	103
250 x 150	Air, l/s	45	53	62	72	80	95	105	125	160	175	187	199
	Throw, m	1	2	3	3	4	4	5	5	6	7	8	9
	NR	7	10	12	15	18	22	25	28	32	35	37	39
375 x 150	Air, l/s	65	82	100	113	126	149	163	185	225	252	270	299
	Throw, m	1.5	1.5	2	2	3	4	5	6	7	9	10	11
	NR	7	10	15	18	22	25	26	30	34	36	38	42
450 x 150	Air, l/s	85	114	138	158	172	185	203	220	290	325	350	400
	Throw, m	1.5	2	3	4	5	6	7	8	9	10	11	>11
	NR	7	13	17	20	23	25	27	32	36	38	40	45
600 x 450	Air, l/s	290	400	465	523	568	655	722	848	998	1130	1250	1375
	Throw, m	1.5	2	3	4	5	6	7	8	9	10	11	>11
	NR	7	13	17	20	23	25	27	32	36	38	40	45

MULTI-DIRECTIONAL CEILING DIFFUSER – RECTANGULAR TYPE

OPTIONAL DESIGNS



MCD-RLT MCD-R2T MCD-R3Y MCD-R3V MCD-R4T



DIFFUSERS

ADJUSTABLE SLOT LINEAR DIFFUSER

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ADJUSTABLE SLOT LINEAR DIFFUSER
ALD

The Adjustable Slot Linear Diffuser is an elongated air outlet consisting of single or multiple slots. Usually installed in long continuous length for supply and return air, this range of aluminium diffuser is well suited to the present-day architectural trend toward straight, clean lines and unobtrusive appearance.

DESIGN AND CONSTRUCTION

ADF Adjustable Slot Linear Diffusers, ranging from 1 slot to 8 slots, are specially designed to project a neat and slim appearance as well as excellent air distribution. The internal pair of deflectors in each slot is contoured in purpose to offer perpendicular and parallel air flow by tools-free adjustment.

Options to be natural polished, anodised and enamel baked finished, the aluminium diffusers are one-piece constructed in standard length of 600 mm and 1200 mm. The internal deflectors shall be anodised finish in black.

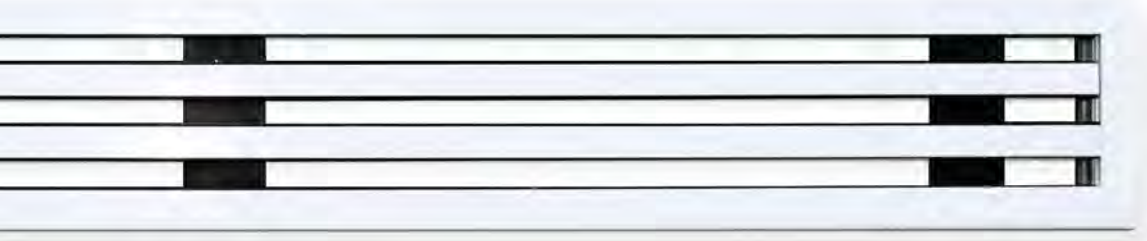
FEATURES

- Slim construction blends well with varies interior design.
- Internal deflectors offer excellent air performance.
- Flexibility in fixture and installation system.
- Sectional or continuous alignment to meet designer's requirement.
- Aesthetic elongated appearance suitable towards straight and clean linear ceiling designs.

APPLICATIONS

- Ceiling installation
- Sills/curbs installation
- High side-wall installation
- For hotels, function halls, shopping malls, etc



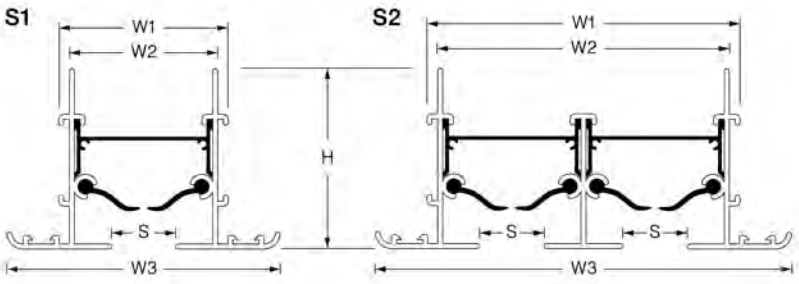


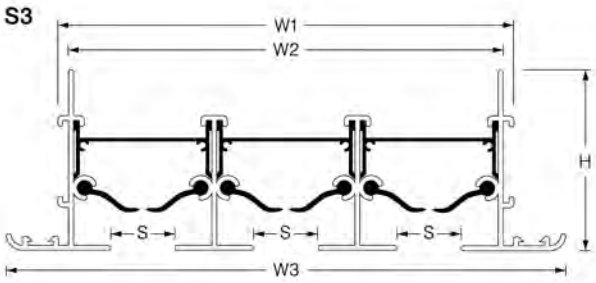
ADJUSTABLE SLOT LINEAR DIFFUSER

Model ALD



PHYSICAL DIMENSION





No. of Slot	W1 mm	W2 mm	W3 mm	H mm	S mm
1	45	39	71	48	19
2	83	77	109	48	19
3	121	115	147	48	19
4	159	153	185	48	19
5	197	191	223	48	19
6	235	229	261	48	19
7	273	267	299	48	19
8	311	305	337	48	19

ADJUSTABLE SLOT LINEAR DIFFUSER

Model ALD

PERFORMANCE DATA - Model ALD600

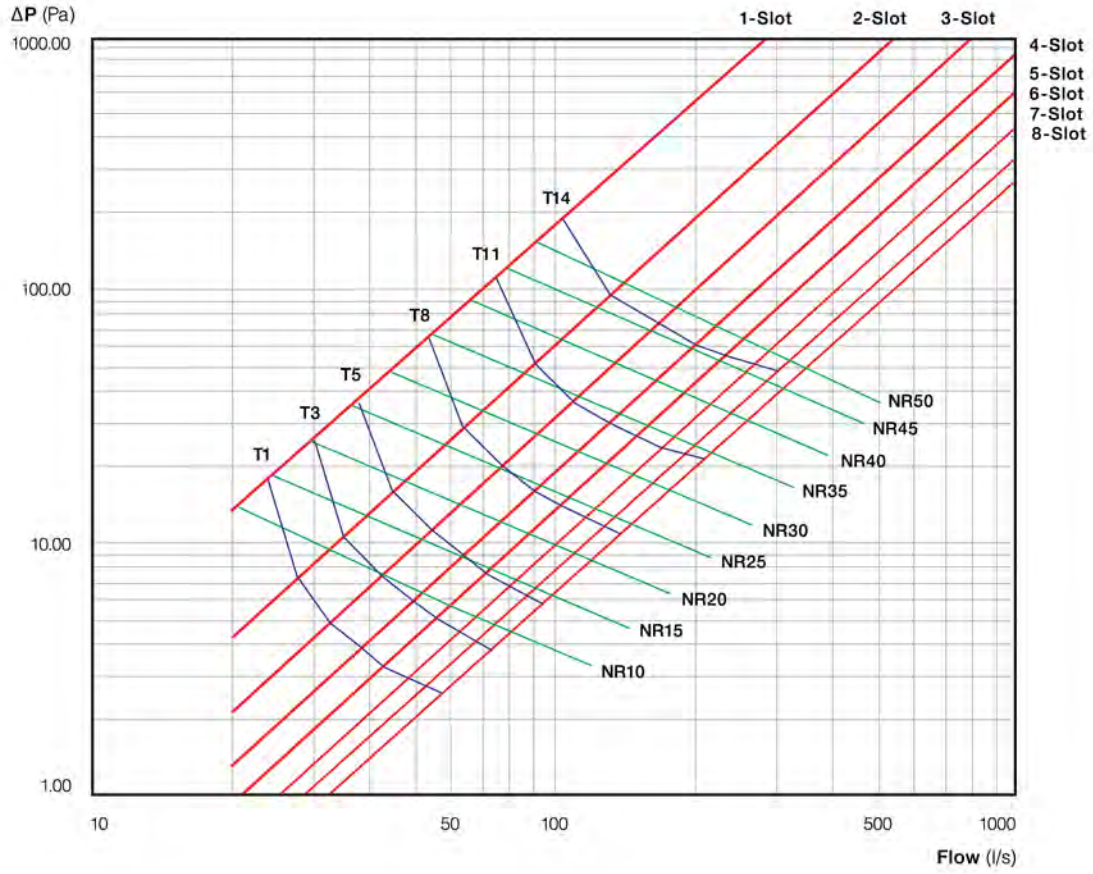
No. of Slot	ΔP Pa	4	8	13	19	26	33	42	60	81	105	130	158
1	Air, l/s	-	-	20	25	30	35	40	50	60	70	80	90
	l/s per m	-	-	33	42	50	58	67	83	100	117	133	150
	Throw, m	-	-	1	2	3	4	6	8	9	11	12	13
	NR	-	-	10	15	20	24	27	33	38	42	45	49
2	Air, l/s	-	30	40	50	60	70	80	100	120	140	160	180
	l/s per m	-	50	67	83	100	117	133	167	200	233	267	300
	Throw, m	-	2	4	6	7	9	10	12	13	14	>14	>14
	NR	-	8	15	21	26	30	33	39	44	49	54	58
3	Air, l/s	-	45	60	75	90	105	120	150	180	210	240	270
	l/s per m	-	75	100	125	150	175	200	250	300	350	400	450
	Throw, m	-	3	6	8	9	10	11	13	>14	>14	>14	>14
	NR	-	11	18	24	29	33	36	42	48	54	59	63
4	Air, l/s	-	60	80	100	120	140	160	200	240	280	320	-
	l/s per m	-	100	133	167	200	233	267	333	400	467	533	-
	Throw, m	-	5	7	9	10	11	12	14	15	16	17	-
	NR	-	13	21	27	31	35	39	46	52	58	63	-
5	Air, l/s	-	75	100	125	150	175	200	250	300	350	-	-
	l/s per m	-	125	167	208	250	292	333	417	500	583	-	-
	Throw, m	-	5	8	9	11	12	13	14	>14	>14	-	-
	NR	-	15	23	28	33	37	41	48	55	61	-	-
6	Air, l/s	-	90	120	150	180	210	240	300	360	420	-	-
	l/s per m	-	150	200	250	300	350	400	500	600	700	-	-
	Throw, m	-	6	8	10	11	12	13	14	>14	>14	-	-
	NR	-	17	24	30	35	39	43	50	57	63	-	-
7	Air, l/s	70	105	140	175	210	245	280	350	420	490	-	-
	l/s per m	117	175	233	292	350	408	467	583	700	817	-	-
	Throw, m	3	6	8	10	11	12	13	>14	>14	>14	-	-
	NR	8	18	25	31	36	40	44	52	59	65	-	-
8	Air, l/s	80	120	160	200	240	280	320	400	480	-	-	-
	l/s per m	133	200	267	333	400	467	533	667	800	-	-	-
	Throw, m	3	7	9	10	12	13	13	>14	>14	-	-	-
	NR	9	19	26	32	37	42	46	54	61	-	-	-

ADJUSTABLE SLOT LINEAR DIFFUSER

Model ALD

SELECTION NOMOGRAPH

MODEL ALD600
PRESSURE DROP vs FLOW vs THROW vs NR
(Throw in metres, for velocity of 0.25 m/s)



SELECTION GUIDE

1. Select from horizontal axis the required air flow, plot a vertical line up.
2. Select the required pressure drop by plotting a horizontal line to cross-section with the plotted air flow line.
3. The cross-section point will determine the desired diffuser with the closest Neck Size, Throw and NR.

CORRECTION FACTORS

Diffuser Length mm	NR	Throw m
1200	+3.0	x 1.15

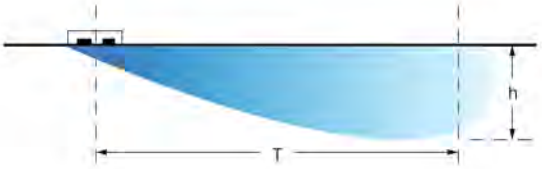
ADJUSTABLE SLOT LINEAR DIFFUSER

Model ALD

ISOTHERMAL AIR THROW PATTERN

1-direction Side Throw

Side View

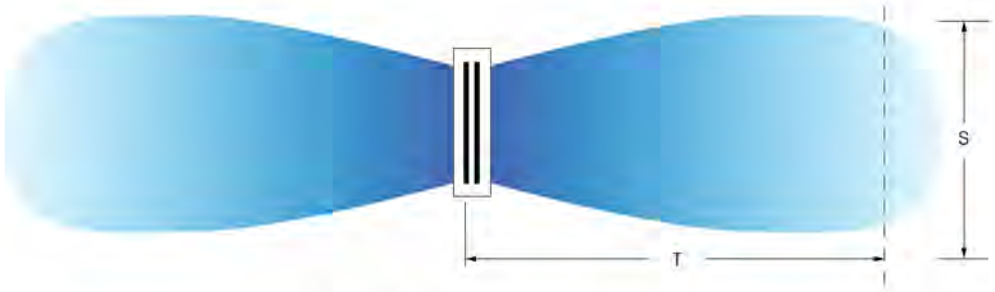


Bi-direction Side Throw

Side View



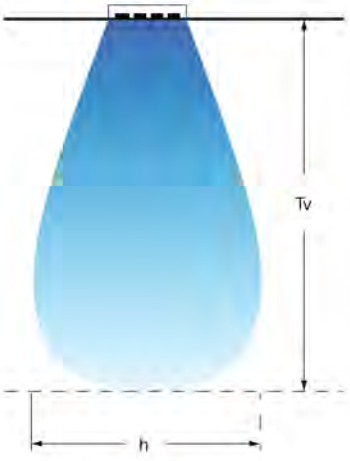
T	Length of throw at 0.25 m/s, terminal velocity
h	T x (0.15 to 0.30) Factor differ from 0.15 to 0.30 due to no. of slots (1 to 8)



S	Length of ALD + (T x 0.2)

Vertical Down Throw

Side View

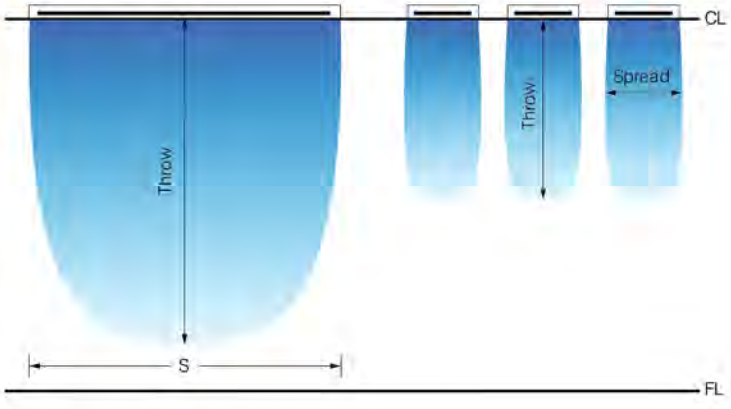


Tv	T x 0.8
h	T x (0.15 to 0.30) Factor differ from 0.15 to 0.30 due to no. of slots (1 to 8)

Comparison of Down Throw Pattern

Continuous Linear Installation of ALD

Multiple Non-continuous Installation of ALD



S	Length of ALD + (T x 0.2)

ADJUSTABLE SLOT LINEAR DIFFUSER

Model ALD

OPTIONS OF AIR THROW

S1

Maximum / down throw	1-direction	1-direction side throw
		

S2

Minimum / closed throw	Maximum / down throw	Down & side throw
		
1-direction side throw	**1-direction side throw**	**Bi-direction side throw**
		

S3

Maximum / down throw	Down & side throw
	
1-direction side throw	
	
Multi-direction side throw	
	

ADJUSTABLE SLOT LINEAR DIFFUSER

Model ALD

PLENUM BOX

Model PLR or PLO
Model PTR or PTO

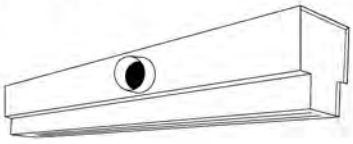


PHYSICAL DIMENSION

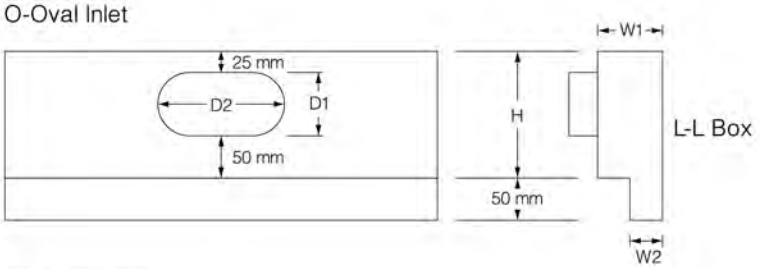
Model PLO



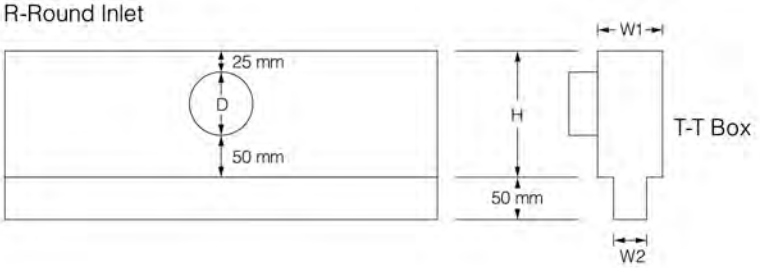
Model PTR



O-Oval Inlet



R-Round Inlet



ALD Slot	W1	W2	Round Inlet		Oval Inlet	
			D Ø	H	D1 x D2	H
	mm	mm	mm	mm	mm	mm
1	77	39	150	225	75 x 150	150
2	115	77	200	275	125 x 250	200
3	153	115	250	325	150 x 300	225
4	191	153	300	375	200 x 400	275
5	229	191	350	425	225 x 450	300
6	267	229	350	425	225 x 450	300
7	305	267	350	425	225 x 450	300
8	343	305	350	425	225 x 450	300

LIGHT TROFFER DIFFUSER

LTD

ADF's Light Troffer Diffusers, model: LTD, are developed to provide superior air distribution at low sound levels when interfaced with compatible air handling light fixtures. This range of products can be factory coordinated to accommodate the various slot configurations of light fixtures. All diffuser models are available in double-sided saddle type units with either round top inlet or oval side inlet.





PERFORMANCE DATA

Light Feature 1200 mm Length

Inlet Size	Air Flow, L/s	30	40	50	60	70	80	100	120	140	160	180
	Max Throw, m	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	6.0	7.0
R125	Pressure, Pa	8	13	19	26	33	42	56	78	94	122	143
	NR	8	12	18	24	28	32	35	39	42	48	52
R150	Pressure, Pa	6	10	13	19	25	33	45	60	79	90	112
	NR	-	8	15	22	25	29	33	37	40	44	48
R200	Pressure, Pa	5	8	11	16	21	29	38	49	62	79	99
	NR	-	-	9	15	18	23	29	32	38	41	45
V125	Pressure, Pa	8	15	21	28	35	44	58	81	97	125	145
	NR	8	13	20	27	30	33	38	41	45	50	54
V150	Pressure, Pa	6	11	18	23	28	38	49	63	72	92	110
	NR	-	9	15	23	27	32	37	40	42	47	50

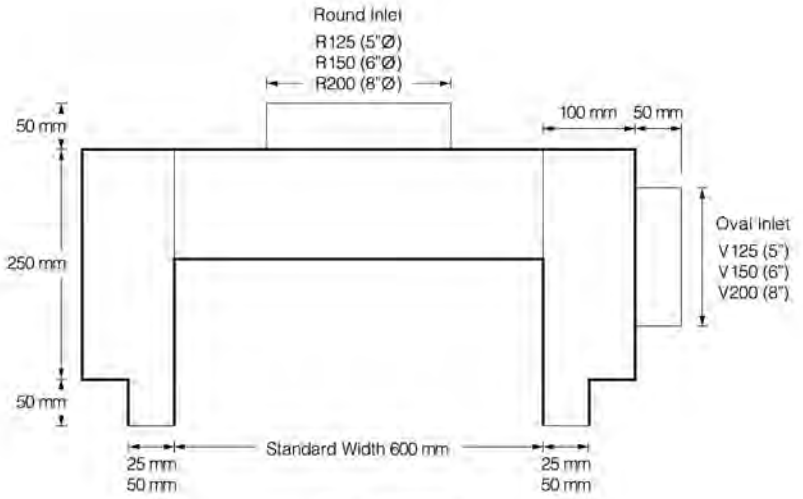
Light Feature 600 mm Length

Inlet Size	Air Flow, L/s	20	25	30	35	40	45	50	60	70	80	100
	Max Throw, m	1.0	2.0	2.4	2.7	3.0	3.4	3.7	4.0	4.5	5.0	6.0
R125	Pressure, Pa	8	13	19	28	37	43	58	70	82	95	110
	NR	-	9	15	21	25	28	31	39	44	49	55
R150	Pressure, Pa	9	13	19	27	37	42	56	65	77	83	95
	NR	-	10	16	22	25	29	33	42	47	50	58
V125	Pressure, Pa	8	11	17	22	30	33	49	62	73	85	103
	NR	9	13	20	25	30	35	37	44	50	57	62
V150	Pressure, Pa	8	13	18	22	28	31	45	50	69	74	90
	NR	-	8	11	20	25	28	30	38	47	55	60

LIGHT TROFFER DIFFUSER

Model LTD

PHYSICAL DIMENSION



Front Elevation

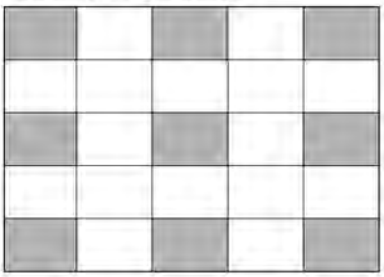
SELECTION AND LAYOUT

The selection and layout of LTD units in a space will depend on the size of the space, light fixture module, amount of air to be supplied, required space noise level, number of diffusers required and throw.

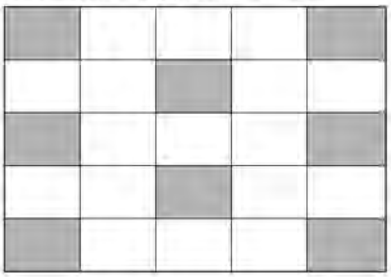
LTD units provide a good method of air distribution up to an air loading of between 10 to 15 L/s per square meter (2 to 3 cfm per square foot). Based on 2.74 m ceiling height, this is equivalent to between 13 to 20 air change per hour.

Location and spacing of the LTD units will depend on the space and lighting module. Sufficient units should be used to provide good, even air distribution throughout the space. Typical arrangements are suggested as below.

Alternate Row Pattern



Alternate Staggered Pattern



Light fixture with LTD

DIFFUSERS

PERFORATED CEILING DIFFUSER



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PERFORATED CEILING DIFFUSER

PCD

Perforated ceiling diffusers meet architectural demands for air outlets which easily blends into perforated ceilings or any other modern designs of ceiling system.

DESIGN & CONSTRUCTION

ADF Perforated Ceiling Diffuser has a perforated face with an open area of 50% which determine their capacity and performance.

Generally used as return air diffuser, this range of products can be alternatively used as supply air outlet with high air entrainment allowing large quantity of air to be diffused.

Standard units without any deflection device are designed for low capacity discharging low volume of air at low velocities. Units for high capacity applications are come with a specified deflection device to obtain horizontal air throw pattern.

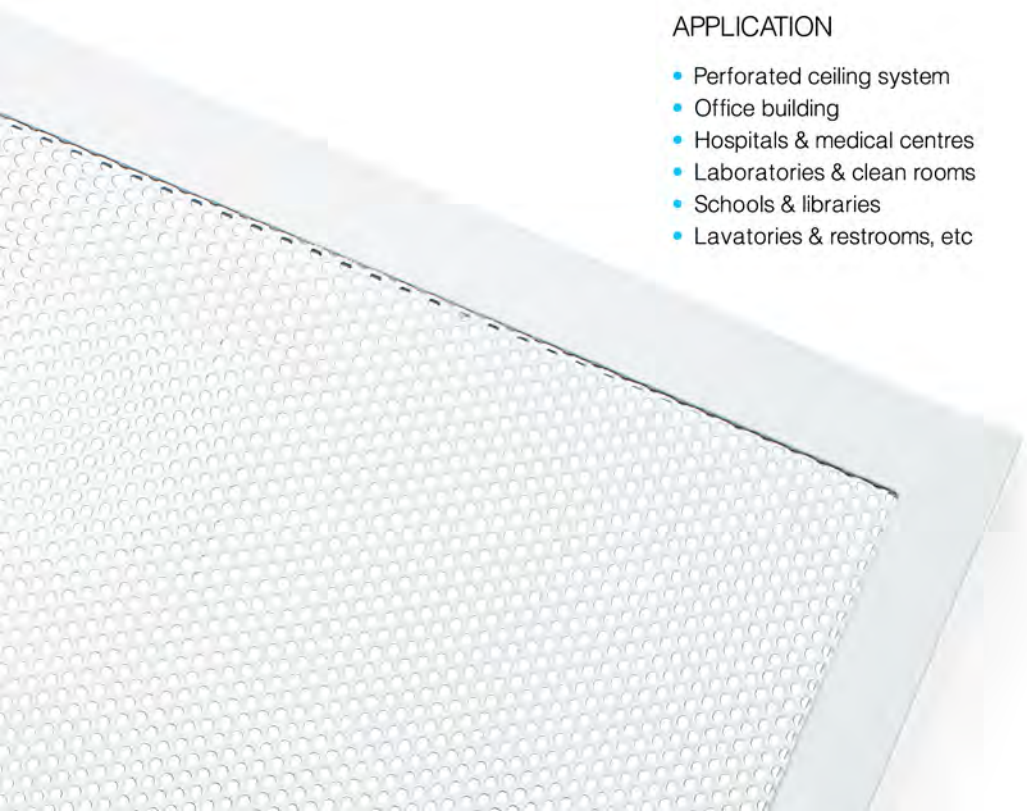
System using this range of products are recommended to be specifically designed for satisfactory performance.

FEATURES

- Flexible in applications: suitable for supply, return or transfer air.
- Ideal for laminar flow and air displacement ventilation.
- High air entrainment.
- Constructed from Galvanised Steel or Aluminium and finished to baked enamel or natural anodised.
- Wide range of deflection devices for optimum performance of air throw.

APPLICATION

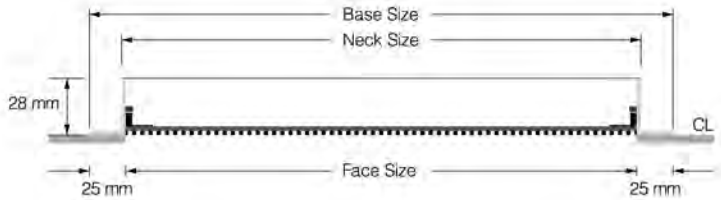
- Perforated ceiling system
- Office building
- Hospitals & medical centres
- Laboratories & clean rooms
- Schools & libraries
- Lavatories & restrooms, etc



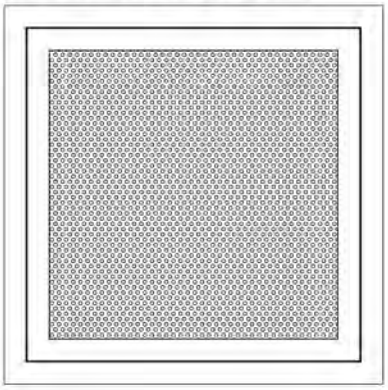
PERFORATED CEILING DIFFUSER

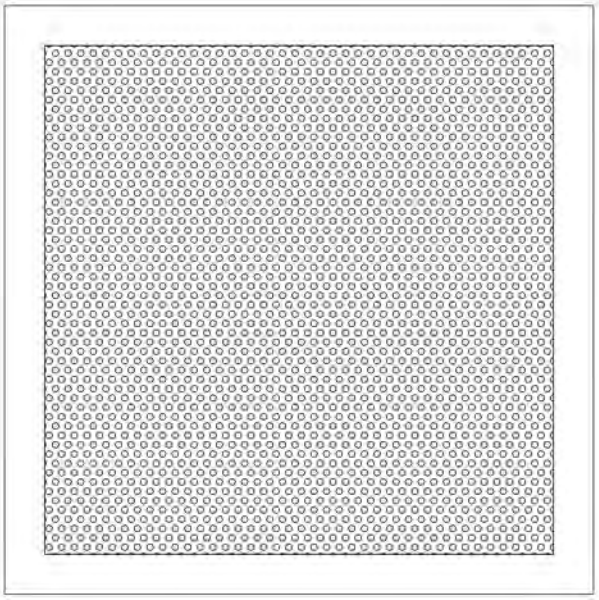
Model PCD

PHYSICAL DIMENSION



PCD with full or semi-detachable front panel





Base Size		Neck / Face Size		Face Area		Effective Free Air Area	
mm	inch	mm	inch	M^2	FT^2	M^2	FT^2
300 x 300	12 x 12	250 x 250	10 x 10	0.0625	0.694	0.031	0.347
400 x 400	16 x 16	350 x 350	14 x 14	0.1225	1.361	0.061	0.681
600 x 300	24 x 12	550 x 250	22 x 10	0.1375	1.528	0.069	0.764
600 x 600	24 x 24	550 x 550	22 x 22	0.3025	3.361	0.151	1.681
1200 x 600	48 x 24	1150 x 550	46 x 22	0.6325	7.028	0.316	3.514

PERFORATED CEILING DIFFUSER

Model PCD

PERFORMANCE DATA

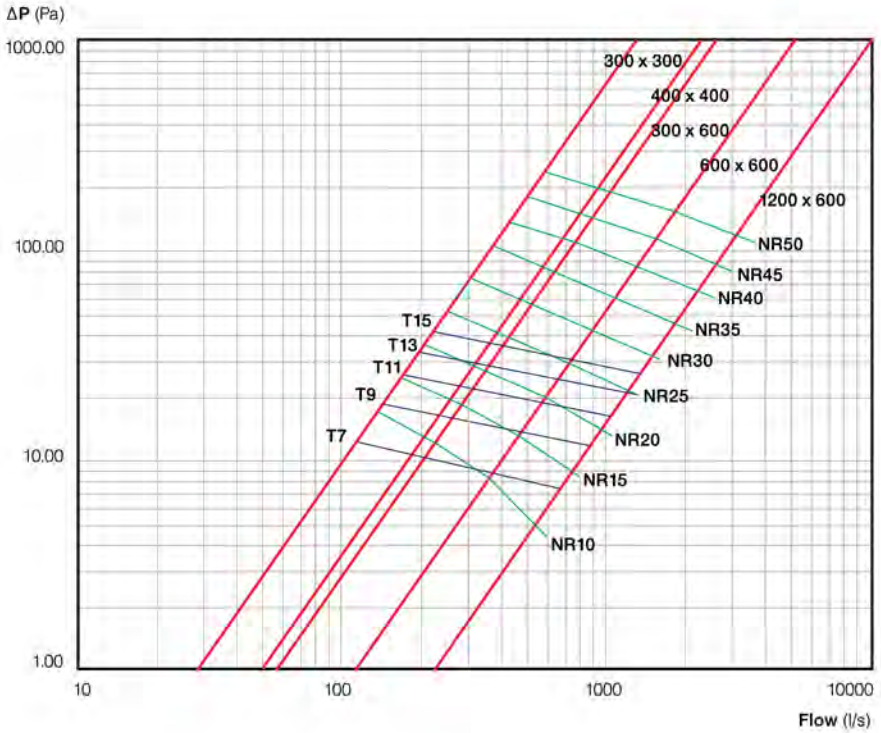
Neck Velocity, m/s		1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
Neck Size	ΔP											
mm x mm	Pa	17	29	43	59	78	99	122	147	174	203	234
300 x 300	Air, l/s	135	180	225	270	315	360	405	450	495	540	585
	Throw, m	9	12	15	19	>19	>19	>19	>19	>19	>19	>19
	NR	10	17	23	27	31	34	38	42	45	47	50
400 x 400	Air, l/s	240	320	400	480	560	640	720	800	880	960	1040
	Throw, m	9	13	17	21	>21	>21	>21	>21	>21	>21	>21
	NR	13	20	26	30	34	38	42	45	48	50	53
600 x 300	Air, l/s	270	360	450	540	630	720	810	900	990	1080	1170
	Throw, m	10	13	17	21	>21	>21	>21	>21	>21	>21	>21
	NR	14	21	27	31	35	39	42	46	49	52	54
	ΔP Pa	8	17	29	43	59	78	99	122	147	174	203
600 x 600	Air, l/s	360	540	720	900	1080	1260	1440	1620	1800	1980	2160
	Throw, m	7	11	15	19	>19	>19	>19	>19	>19	>19	>19
	NR	10	18	25	31	35	39	43	46	50	53	56
1200 x 600	Air, l/s	720	1080	1440	1800	2160	2520	2880	3240	3600	3960	4320
	Throw, m	7	12	16	20	25	>25	>25	>25	>25	>25	>25
	NR	15	23	29	34	39	44	47	51	54	57	60

SELECTION NOMOGRAPH

MODEL PCD

PRESSURE DROP vs FLOW vs THROW vs NR

(Throw in metres, for velocity of 0.25 m/s)



SELECTION GUIDE

1. Select from horizontal axis the required air flow, plot a vertical line up.
2. Select the required pressure drop by plotting a horizontal line to cross-section with the plotted air flow line.
3. The cross-section point will determine the desired diffuser with the closest Neck Size, Throw and NR.

LAMINAR FLOW UNIT

LFU

LFF



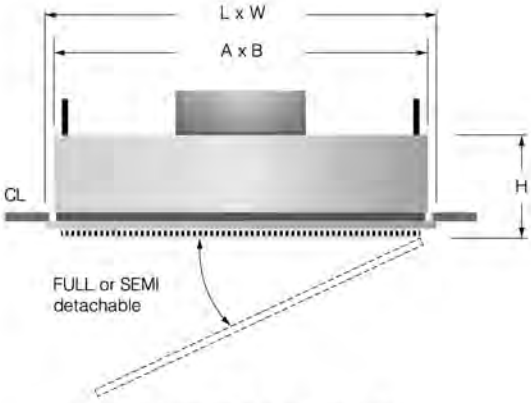
This specialised range of Laminar Flow Unit is constructed with or without removable HEPA filter and perforated-faced plenum mounting system to provide clean supply air at low velocity to the occupied work area preventing mixing of contaminated air. The air displacement effect is further enhanced by exhaust air system at low level.

The front panel is detachable for maintenance purposes such as filter replacement, etc.

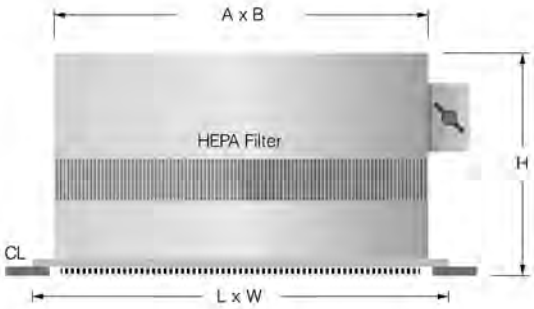
Available in aluminium or stainless steel construction, this product is most applicable for:

- Operating rooms
- Clean rooms
- Semiconductor
- Pharmaceutical
- Biotech
- Food processing
- Laboratories
- Veterinary clinics

OPTIONAL designs and constructions available to meet various project requirements. Contact sales representative for further details.



Flush mounting for Model LFU



Lay-on mounting for Model LFF

PHYSICAL DIMENSION

Model	Base Size L x W	Plenum Size A x B	Top Inlet Round	Side Inlet Oval	Overall Height, H mm	
mm	mm	mm	mm Ø	mm	Top Inlet	Side Inlet
LFU2	600 x 600	550 x 550	200	-	75	-
LFU4	1200 x 600	1150 x 550	300	-	100	-
LFF2	600 x 600	550 x 550	200	125 x 250	250	300
LFF4	1200 x 600	1150 x 550	300	150 x 300	300	300

LAMINAR FLOW UNIT

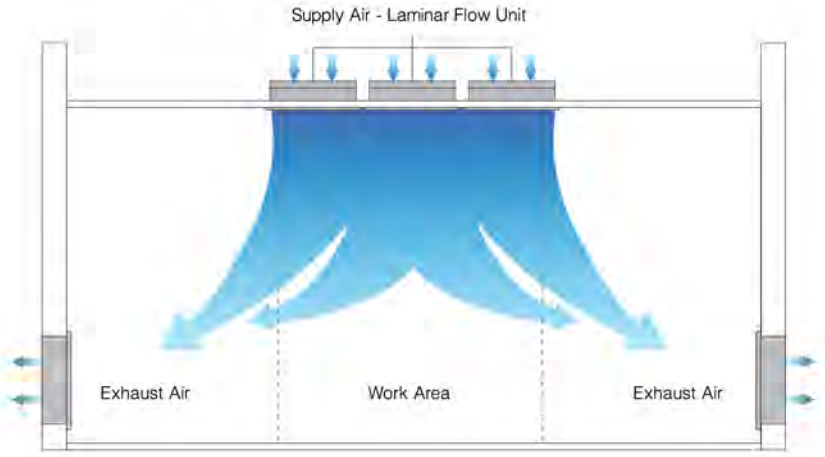
Model LFU
Model LFF

PERFORMANCE DATA

Model	Air Flow, l/s	40	60	80	100	120	150	200	225	250
LFU2	Velocity, m/s	0.42	0.48	0.63	0.71	0.78	0.85	-	-	-
	ΔP, Pa	2	3	4	6	9	12	-	-	-
	NR	<15	<15	16	19	22	27	-	-	-
LFU4	Velocity, m/s	-	-	0.4	0.4	0.53	0.62	0.73	0.78	0.83
	ΔP, Pa	-	-	2	4	5	10	15	20	25
	NR	-	-	<15	<15	<15	<15	15	18	22

** Velocities are the average values measured within 2.5 m of vertical air stream from air outlet and at temperature differential of -10 °C.
** Correction factor of ΔP for Clean HEPA filter, add 200-300 Pa.

TYPICAL LAMINAR FLOW AIR STREAM



DIFFUSERS

ROUND DIFFUSER



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ROUND DIFFUSER
RAD

ADF Round Diffusers offer a simple round cone ceiling style that combines beauty, simplicity and efficiency in one.

DESIGN & CONSTRUCTION

ADF Round Diffusers feature a slot and lock arrangement for quick and easy removal of the centre cone assembly.

This range of products though provides shorter air throw, however a rapid room temperature equalisation can be reached for its 360° even air distribution.

Constructed from Aluminium with baked enamel finished, ADF Round Diffusers are commonly used in shopping malls, arenas, convention centres as well as warehouses and factories.

FEATURES

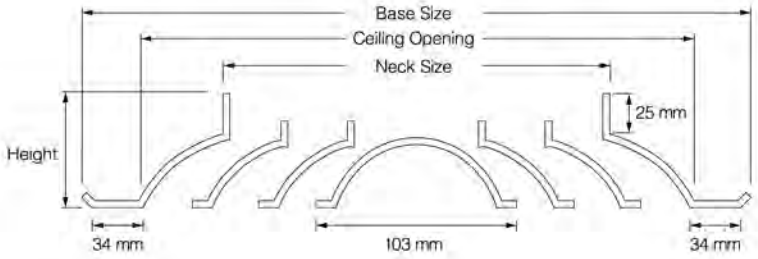
- Classic yet aesthetic appearance.
- Removable centre cone enable front adjustment of volume control device.
- Simple flush mounting or free hung installation.
- Even air distribution.
- Rapid room temperature equalisation.
- Suitable for ceiling supply and extract air installation.
- Standard neck sizes at 150 mm, 200 mm, 250 mm, 300 mm, 350 mm, 400 mm and 450 mm diameter.



ROUND DIFFUSER

Model RAD

PHYSICAL DIMENSION



Model	Neck Size Ø mm	Ceiling Opening Ø mm	Base Size Ø mm	Height mm
RAD150	150	232	300	75
RAD200	200	332	400	75
RAD250	250	382	450	75
RAD300	300	432	500	75
RAD350	350	482	550	75
RAD400	400	532	600	75
RAD450	450	582	650	75

PERFORMANCE DATA

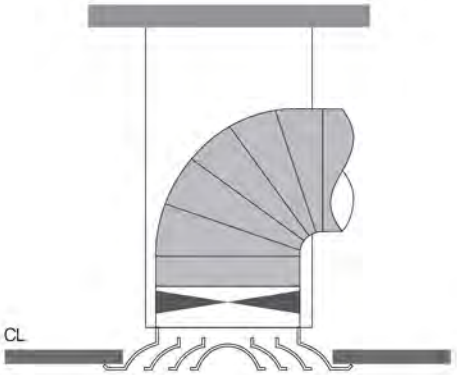
Neck Velocity, m/s			2.0	2.5	3.0	3.5	4.0	4.5	5.0	6.0	7.0	8.0
Model	ΔP, Pa	H	5	9	12	16	21	27	33	47	64	87
		V	7	11	16	21	27	35	43	61	82	108
	Air, l/s		29	38	47	57	66	85	94	111	130	149
RAD150	Throw, Ø m		<1	1	1.3	1.7	2	2.3	2.5	2.7	3	3.3
	NR		<15	<15	15	20	24	27	31	36	41	45
	Air, l/s		66	83	95	110	127	148	160	198	245	264
RAD200	Throw, Ø m		1.3	1.7	2	2.7	3	3.3	3.5	4	4.5	5
	NR		<15	<15	16	21	26	29	32	38	43	47
	Air, l/s		100	123	150	172	198	245	257	298	348	410
RAD250	Throw, Ø m		1.7	2.3	2.7	3	3.3	4	4.7	5.3	6	7
	NR		<15	<15	17	22	27	30	33	39	44	48
	Air, l/s		148	180	220	250	297	330	357	428	500	571
RAD300	Throw, Ø m		2.3	2.7	3.3	3.7	4.3	5	5.3	6	7	8
	NR		<15	<15	18	23	27	31	34	40	45	50
	Air, l/s		200	250	299	352	401	450	500	599	703	800
RAD350	Throw, Ø m		2.7	3	3.7	4.3	5	5.7	6.3	7	8	9
	NR		<15	<15	19	24	28	32	35	41	46	50
	Air, l/s		264	330	396	462	528	595	660	793	925	1057
RAD400	Throw, Ø m		3	3.7	4.3	5	5.7	6.5	7.3	8	9	10
	NR		<15	15	20	25	29	32	36	41	46	51
	Air, l/s		335	418	500	585	670	750	835	1000	1170	1335
RAD450	Throw, Ø m		3.3	4	5	5.7	6.7	7.3	8	9	10	11
	NR		<15	16	21	26	30	33	36	42	47	52

ROUND DIFFUSER

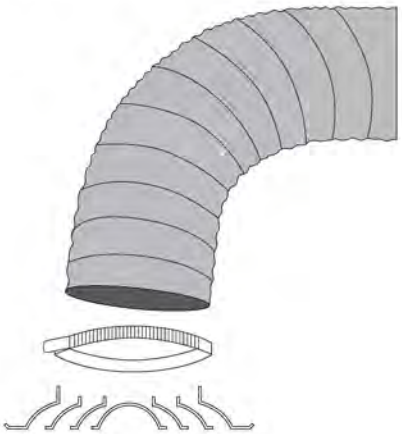
Model RAD

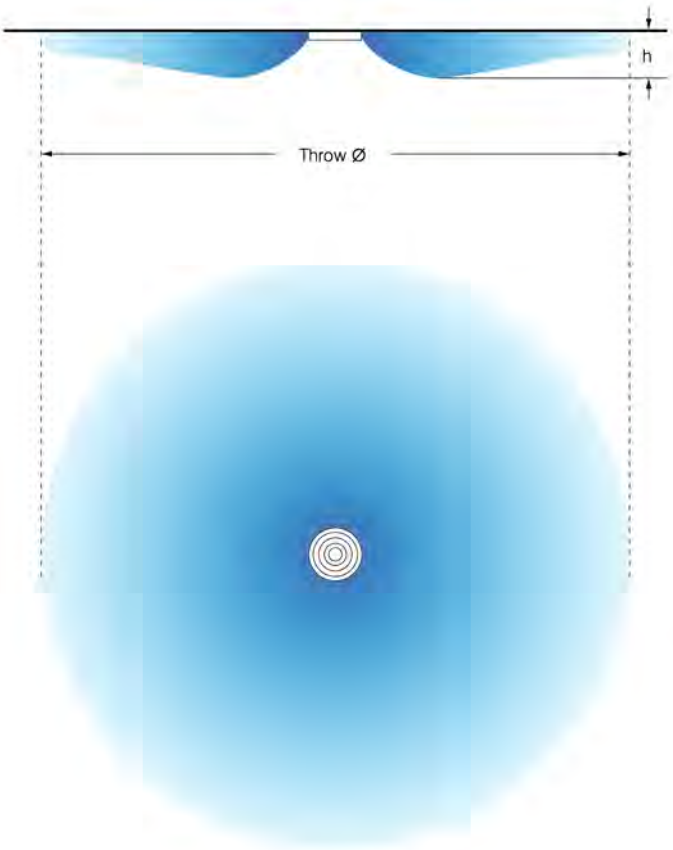
MOUNTING GUIDE AND ISOTHERMAL AIR THROW PATTERN

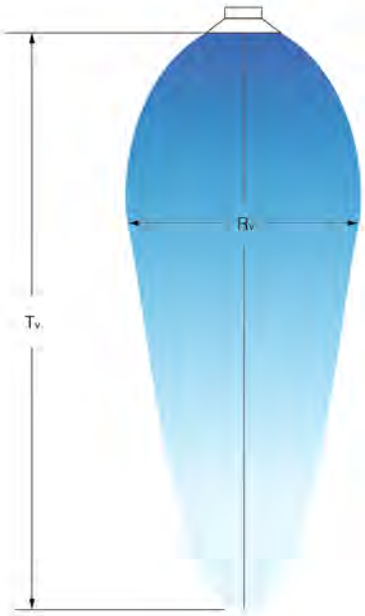
RAD mounting with ceiling effect
H – Horizontal air throw



RAD mounting without ceiling effect
V – Vertical air throw







h	(Throw Ø x 0.1) m

T_v	(Throw Ø x 1.15) m
R_v	(Throw Ø x 0.7) m
NR_v	NR + 1

DIFFUSERS

JET DIFFUSER



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JET DIFFUSER
JAD

ADF Jet Diffusers are specially designed for high velocity and large quantity of air supply to high ceiling applications.

DESIGN & CONSTRUCTION

ADF Jet Diffusers are circular in shape with two concentric cones at the centre which form the jet throw discharge of conditioned air. These centre cones are pivoted at their neck opening for easy adjustment by swinging them to specific angles so that desired direction of air throw can be achieved.

Constructed from Galvanised Steel and baked enamel finished, ADF Jet Diffusers are commonly used in theatres, sports centres or stadium, entertaining stage and other industrial spot cooling applications.

FEATURES

- Adjustable centre core to 45° deflection for desired air throw direction.
- Suitable for high velocity spot cooling.
- Simple connection and mounting system.
- Single or multiple unit installation.
- Ideal for high ceiling space.

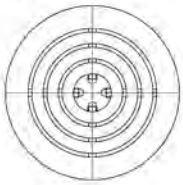


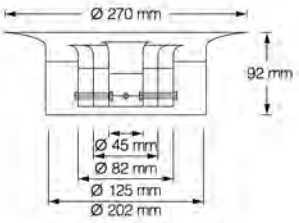
JET DIFFUSER

Model JAD

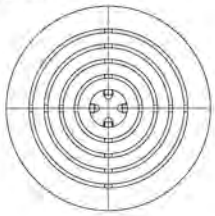
PHYSICAL DIMENSION

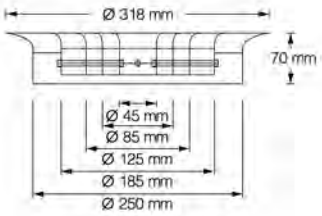
JAD200



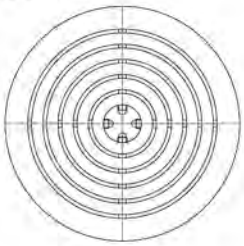


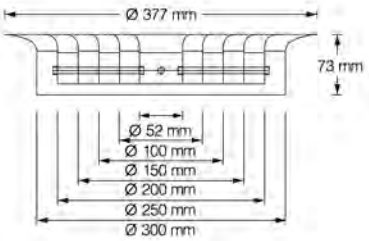
JAD250



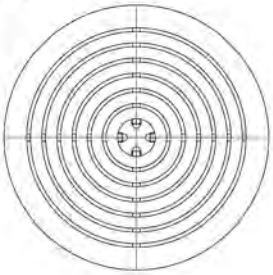


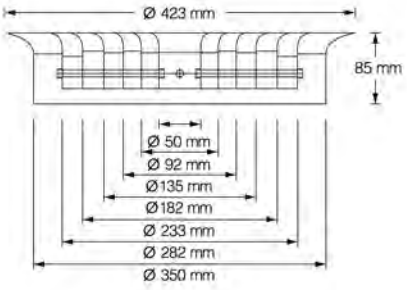
JAD300



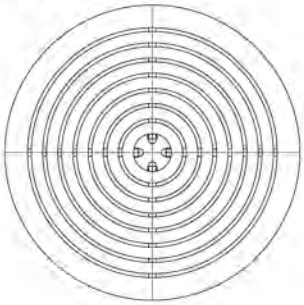


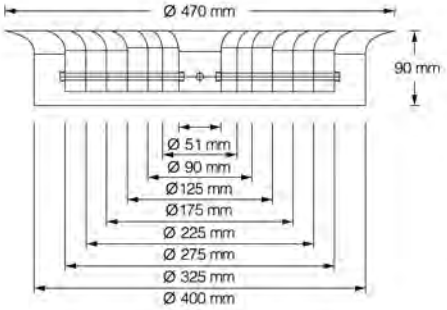
JAD350





JAD400

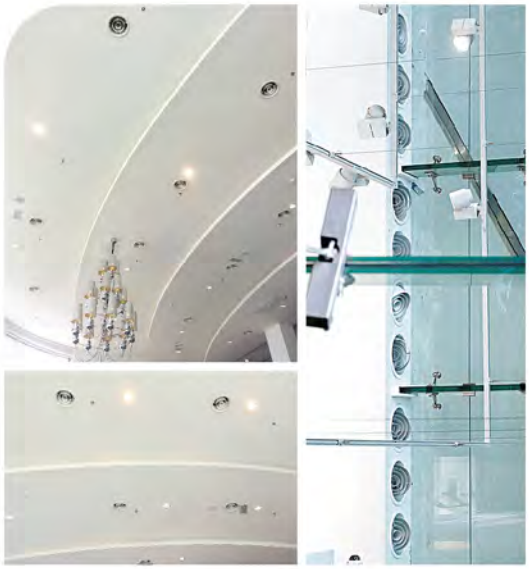


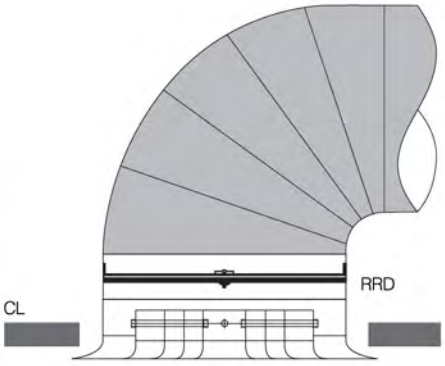


JET DIFFUSER

Model JAD

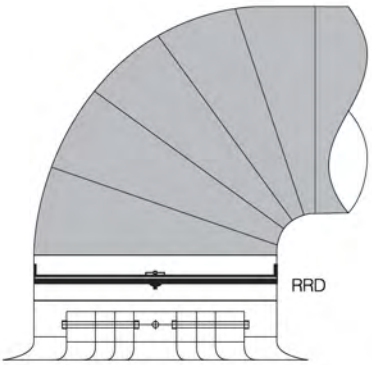
INSTALLATION GUIDE





Ceiling or sidewall Installation c/w RRD





Exposed duct system Installation c/w RRD

JET DIFFUSER

Model JAD

PERFORMANCE DATA

Model	Neck Velocity m/s	3	3.5	4	5	6	7	8
Neck area sq.m	ΔP Pa	15	16	17	25	31	47	65
	Air flow, l/s	98	115	130	165	195	230	255
JAD200	Throw, m	6.5	7	8	9	10	15	18
0.031	NR	<20	22	25	28	32	36	40
	Air flow, l/s	155	185	210	260	315	365	396
JAD250	Throw, m	8	9	10	11	12	17	20
0.049	NR	<20	25	27	33	38	44	48
	Air flow, l/s	225	260	300	380	450	520	665
JAD300	Throw, m	9.5	10	10.5	12	12.5	13	21
0.071	NR	<20	26	29	33	37	44	48
	Air flow, l/s	302	350	400	505	609	708	811
JAD350	Throw, m	11.5	12	12.5	13	15	17	20
0.096	NR	<20	26	28	35	39	45	49
	Air flow, l/s	395	460	528	660	790	922	1050
JAD400	Throw, m	12.5	13	13.5	16	18.5	20.5	25
0.126	NR	20	28	30	35	39	44	50

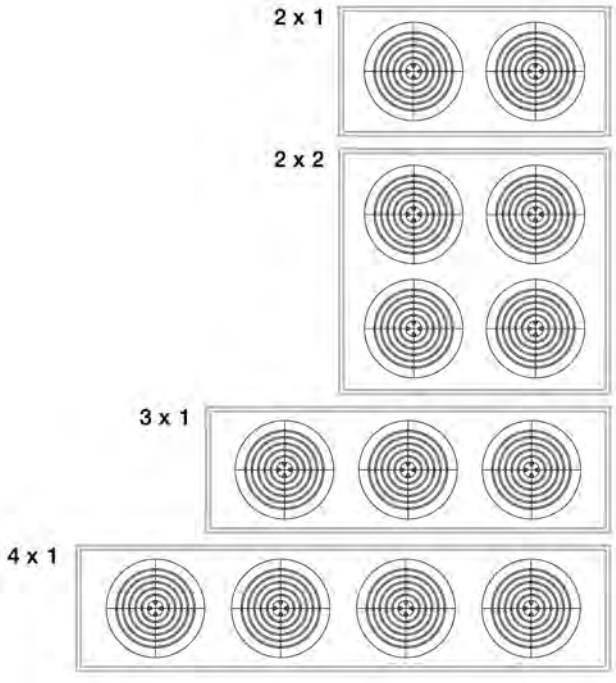
* Test data above based on Single Unit 0° deflection
* Correction Factor for Single Unit 45° deflection:

ΔP, Pa	x 1.5
Throw, m	x 0.9
NR	+ 2

OPTIONAL MULTIPLE UNIT

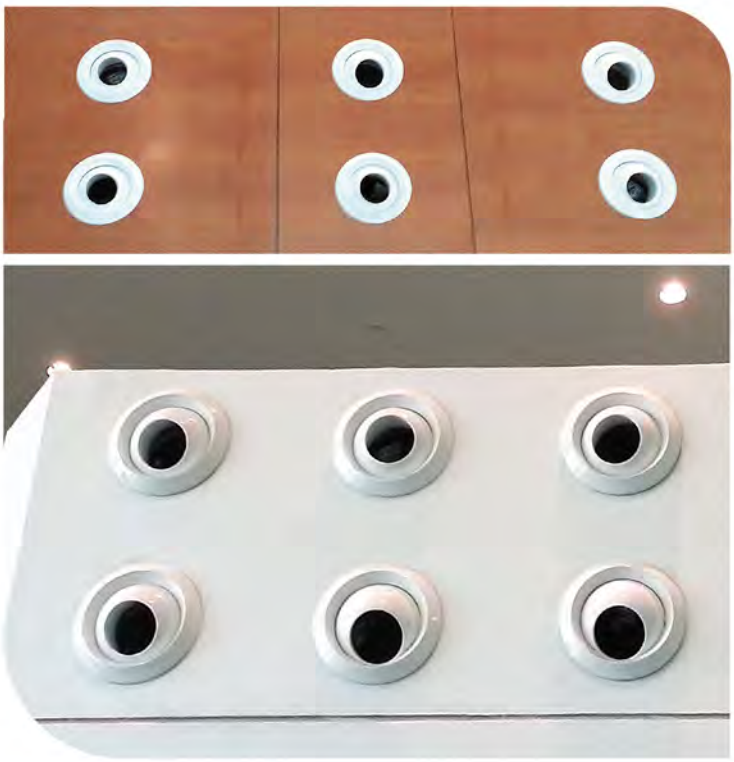
* Correction Factor for Multiple Unit 0° deflection:

Nos. of JAD	2	3	4
Throw, m	x 1.5	x 1.7	x 2.0
NR	+ 3	+ 4	+ 5



BALL JET DIFFUSER

JBD



ADF Ball Jet Diffuser is commendable in performance with low noise rating and pressure drop due to its structure design based on the theory of air flow dynamics.

The main feature of the ball jet diffuser is its nozzle or spout type of outlet that projects long distance air throw and high air volume for high ceiling headroom applications. The outlet of the diffuser functions like an eye-ball, can be regulated a full 360° at 30° deflection angle.

This range of products is constructed from aluminium and baked enamel finished. Architecture-preferred and aesthetically pleasant in appearance, it is ideally suitable for predictable directional control of conditioned air in room space such as shopping malls, convention halls, airport terminals, theatres, museums, sports arenas and atriums, etc.



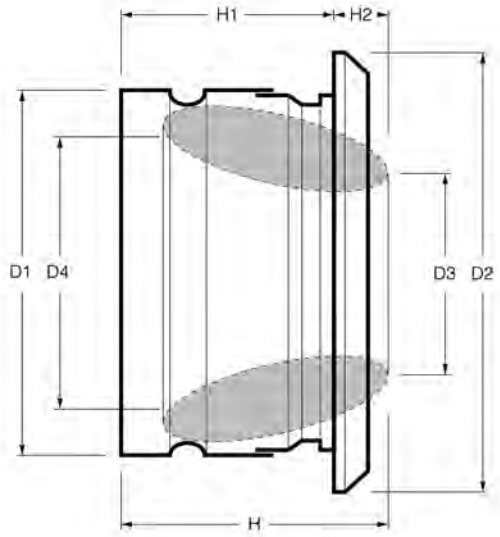
FEATURES

- Excellent functional and aesthetic design blends well with all interior.
- Targeted long distances air throw.
- Adjustable outlet gives full control of air throw directions.
- Low noise rating and pressure loss.
- Ideal for spot cooling.

BALL JET DIFFUSER

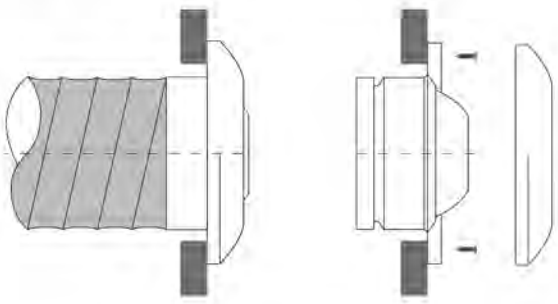
Model JBD

PHYSICAL DIMENSION



Model	D1 Neck Size mm Ø	D2 Face Size mm Ø	D3 Outlet Size mm Ø	D4 Inlet Size mm Ø	H1 Neck Height mm	H2 Frame Height mm	H Overall Height mm
JBD150	151	199	76	108	110	23	133
JBD200	203	265	107	152	138	27	165
JBD250	252	310	128	195	175	26	201
JBD300	318	378	180	240	200	30	230
JBD350	347	433	185	277	190	31	221
JBD400	399	468	223	330	227	31	258
JBD450	448	523	275	375	220	32	252
JBD500	464	583	285	430	250	35	285
JBD600	625	700	295	550	320	37	357

INSTALLATION GUIDE



BALL JET DIFFUSER

Model JBD

PERFORMANCE DATA

Model	Neck Velocity m/s	3	4	5	6	7	8	9	10	13	15	17	20
JBD150	Air flow, l/s	21	28	35	42	49	55	61	69	90	104	118	139
	Throw, m	4.3	5.5	7.1	8.5	9.9	11	12.7	14.1	17	20	22.5	25
	ΔP, Pa	6	9	12	13	16	19	22	25	33	37	44	55
	NR	<15	<15	15	16	17	18	20	22	26	31	37	42
JBD200	Air flow, l/s	26	34	43	51	60	69	78	86	111	128	144	171
	Throw, m	5.5	7.9	9.6	12	13.3	14.9	17	18.5	20	23	25	30
	ΔP, Pa	6	8	10	12	15	17	19	21	28	34	38	47
	NR	<15	15	16	17	19	20	22	24	30	35	39	43
JBD250	Air flow, l/s	43	57	71	85	100	114	128	142	183	213	240	282
	Throw, m	7.7	10.2	12.5	14.8	17.2	19.6	22	24	28	30	33.4	35
	ΔP, Pa	9	11	13	15	16	18	20	22	28	33	38	48
	NR	<15	15	17	19	20	22	24	28	33	38	42	46
JBD315	Air flow, l/s	79	105	131	157	183	209	235	261	339	390	443	520
	Throw, m	8	10	12.5	15	18	20	23	25	29	35	39.7	42
	ΔP, Pa	10	12	14	16	19	21	23	25	32	37	44	53
	NR	<15	16	19	20	22	24	28	32	40	45	50	55
JBD350	Air flow, l/s	100	131	166	188	222	251	285	314	420	469	532	625
	Throw, m	8.5	11.7	13	17	19.6	22.5	27	30	35	40	45	47
	ΔP, Pa	10	12	14	16	19	21	23	25	32	37	44	53
	NR	17	19	22	24	26	29	33	36	44	49	54	59
JBD400	Air flow, l/s	125	166	208	250	292	333	375	417	540	624	707	830
	Throw, m	9	14	16.5	19	22.4	26	31.7	35	42	45	49	52
	ΔP, Pa	6	7	8	10	12	15	18	23	31	35	43	51
	NR	19	22	24	27	31	33	36	40	48	53	58	63
JBD450	Air flow, l/s	159	211	379	456	370	426	480	530	688	794	900	1058
	Throw, m	10	15	18	20.8	24	27	34.4	37	43	47	50.5	57
	ΔP, Pa	6	7	8	11	13	16	19	24	32	36	45	52
	NR	19	23	26	28	32	34	37	41	49	54	59	63
JBD500	Air flow, l/s	193	256	322	387	450	519	584	645	836	964	1093	1286
	Throw, m	11	16	19	22.5	25.3	28	36	40	44.5	48.3	52	58.5
	ΔP, Pa	7	8	9	12	14	17	20	24	32	37	47	53
	NR	20	24	27	30	33	35	39	42	49	55	60	65
JBD630	Air flow, l/s	513	665	857	1024	1195	1389	1553	1848	2220	2560	-	-
	Throw, m	15	20	23	25	27.6	30	38	42.2	47	50	-	-
	ΔP, Pa	11	20	28	35	40	45	50	57	65	75	-	-
	NR	30	36	39	44	47	50	53	57	64	70	-	-

DIFFUSERS

SWIRL DIFFUSER



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SWIRL DIFFUSER
SWD

DESIGN & CONSTRUCTION

ADF Swirl Diffuser consist of a one-piece square diffuser with fixed radial-twisted vanes and an air plenum box. With such distinctive design, these diffusers blend well with any modern or conservative ceiling systems besides their special high induction swirling motion in air discharge providing rapid temperature equalisation in stable room conditions.

Swirl Diffuser completed with plenum box, comes in Galvanised Steel construction with enamel baked finished, available in one standard size at 600 mm x 600 mm. The plenum box is directly screwed to the facial diffuser and available in top and side air inlet connection.

FEATURES

- High induction swirling air discharge offers higher air change rates.
- Supply air temperature differential up to +/-10 K.
- Suitable for space ceiling height from 2.7 m to 4.0 m.
- Aesthetic facial design for office ceiling installation.
- Detachable face diffuser with a centre fixed screw.
- Available in one air outlet sizes : 535 mm Ø (21" Ø).

APPLICATIONS AND INSTALLATION

This range of diffusers can be flushed ceiling mounted or free-hung mounting using the pre-fabricated suspension brackets and are commonly used in:

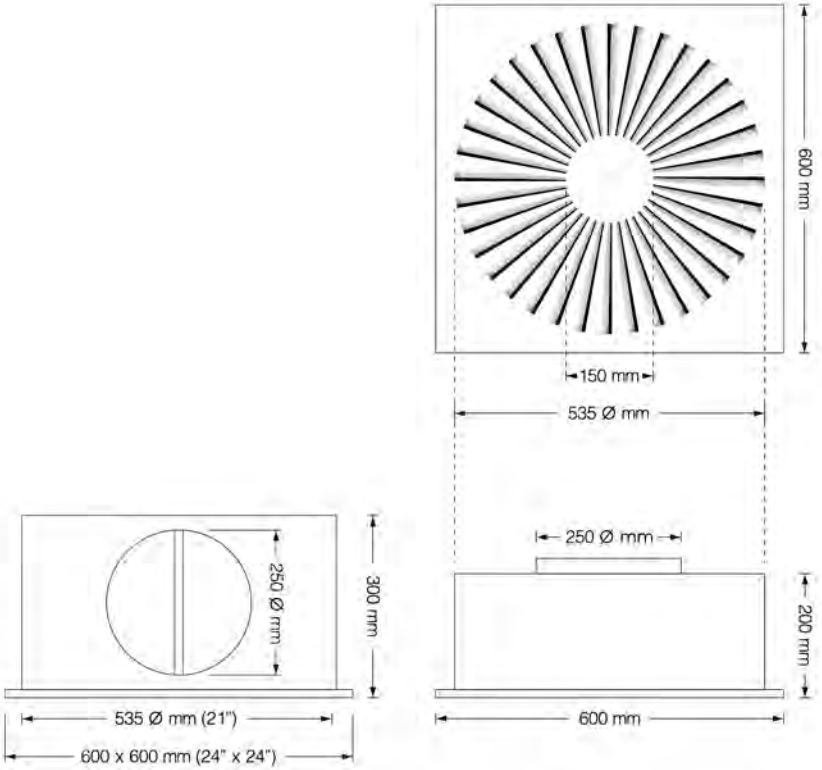
- Office buildings
- Hotels and motels
- Shopping malls
- Restaurants and cafeterias
- Hospitals and medical centres
- University and schools
- Other public areas



SWIRL DIFFUSER

Model SWD

PHYSICAL DIMENSION



PERFORMANCE DATA

Inlet Velocity	Air Volume		Throw, m @Terminal Velocity		Inlet Damper Opening			
					45°		Fully	
m/s	l/s	cmh	0.25 m/s	0.5 m/s	ΔP, Pa	NR	ΔP, Pa	NR
1.05	55	198	0.7	<0.5	22	28	10	20
1.35	70	252	1.0	<0.5	24	32	17	24
1.64	85	306	1.6	0.7	25	25	22	27
1.83	95	342	1.8	1.0	32	38	24	30
2.12	110	396	2.3	1.2	44	43	25	34
2.41	125	450	2.8	1.5	50	45	32	38
2.70	140	504	3.2	1.8	65	50	43	42
3.18	165	594	4.0	1.9	80	55	55	47
3.75	195	702	4.8	2.0	100	60	82	52
4.24	220	792	5.5	2.3	120	65	85	56
4.82	250	900	6.5	2.6	160	70	100	60

SWIRL DIFFUSER

Model SWD







DIFFUSERS

RAISED FLOOR DIFFUSER



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RAISED FLOOR DIFFUSER

RFD

Raised Floor Diffusers belong to the elite design and special application range among air distribution outlets. This range of diffusers is unique with its concentric circular slots, aesthetically elegant, versatile in all raised floor applications.

The excellent looking floor diffusers are of high mechanical rigidity and tensile strength suitable in installation flushing to the raised floor system. Conditioned air is delivered to the raised floor space and distributed to the room via the Raised Floor Diffusers.

ADF RFD consists of an aluminium face plate and casing coupled with a plastic radial swirl device; and a hung down dirt basket via a height-adjustable rod as axle.

FEATURES

- Suitable to all types of raised floor system.
- High impact to traffic loads.
- Manually setting of swirl device to project desirable vertical/horizontal air flow discharge.
- Easy and versatile installation.
- Adjustable hanging distance of dirt basket to facilitate effective air flow besides quick and easy cleaning.

STANDARD CONSTRUCTION

Face plate	Aluminium
Swirl device	Flame-retardant Polyamide
Dirt basket	Flame-retardant ABS Plastic
Adjustable axle	Galvanized Steel Rod

APPLICATION & INSTALLATION

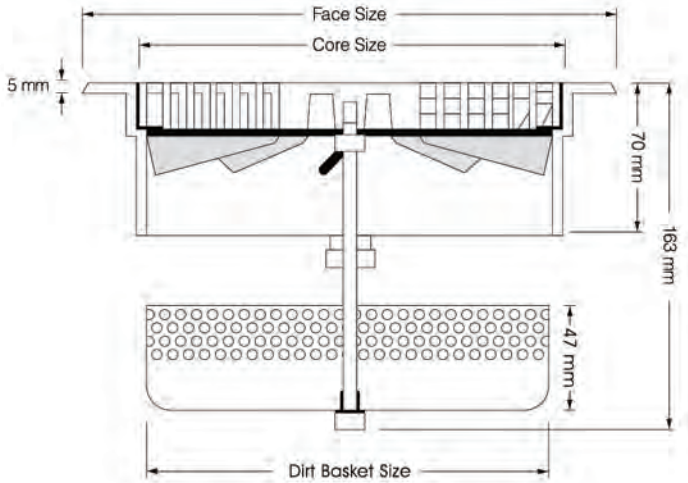




RAISED FLOOR DIFFUSER

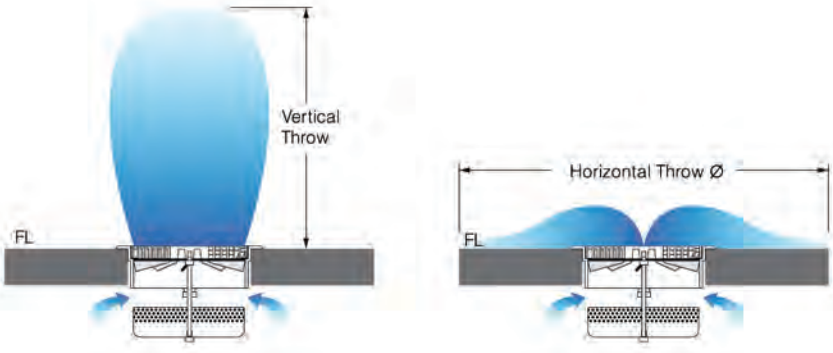
Model RFD

PHYSICAL DIMENSION



Model	Face Size Ø mm	Core Size Ø mm	Dirt Basket Size Ø mm	Face Opening Ø mm	Core Opening Ø mm	Approx. Weight Kg
RFD-150	200 (8")	149	137	151	143	0.7
RFD-200	250 (10")	199	187	201	193	1.2

AIR THROW PATTERNS



RAISED FLOOR DIFFUSER

Model RFD

PERFORMANCE DATA

Model	Air	ΔP	NR	Air Velocity, m/s				
				0.15	0.2	0.25	0.3	0.4
Free Area	l/s	Pa		Vertical Throw, m				
	10	5	>15	0.7	0.5	0.4	0.3	0.2
	15	8	15	1.0	0.8	0.6	0.4	0.3
RFD-150	20	20	25	-	1.0	0.8	0.6	0.4
	25	30	30	-	1.4	1.0	0.7	0.5
	30	45	35	-	1.6	1.4	0.9	0.6
0.004 m²	35	60	38	-	1.9	1.6	1.0	0.7
	20	9	15	0.9	0.7	0.5	0.35	0.25
	25	15	23	-	0.8	0.6	0.4	0.3
RFD-200	30	22	27	-	0.9	0.7	0.5	0.3
	35	30	33	-	1.1	0.85	0.6	0.4
	40	39	36	-	1.4	1.0	0.7	0.48
0.006 m²	45	50	40	-	1.6	1.3	0.85	0.6

** Above data based on dirt basket adjusted to lowest position (Fully Open).
** Correction factors for dirt basket adjusted to half height position (50% Open):

ΔP = ΔP x 1.3
NR = NR + 4

Model	Air	ΔP	NR	Air Velocity, m/s				
				0.15	0.2	0.25	0.3	0.4
Free Area	l/s	Pa		Horizontal Throw, Ø m				
	10	11	>15	1.0	-	-	-	-
	15	25	22	1.8	1.2	-	-	-
RFD-150	20	43	30	2.7	1.8	1.4	1.0	-
	25	65	35	3.5	2.5	1.8	1.4	1.0
0.003 m²	30	90	40	4.0	3.0	2.4	1.8	0.6
	20	10	15	1.7	1.2	-	-	-
	25	15	20	2.2	1.7	-	-	-
RFD-200	30	21	25	2.9	2.0	1.4	1.2	-
	35	30	30	3.5	2.5	1.7	1.4	-
	40	40	35	4.0	2.8	2.2	1.7	1.2
0.005 m²	45	50	40	4.4	3.8	2.9	2.2	1.6

** Above data based on dirt basket adjusted to lowest position (Fully Open).
** Correction factors for dirt basket adjusted to half height position (50% Open):

ΔP = ΔP x 1.15
NR = NR + 2

GRILLES & LOUVRES

SUPPLY AIR GRILLE



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SUPPLY AIR GRILLE
SAG

Properly selected Supply Air Grilles operate satisfactorily from high sidewall location or from perimeter locations at the sill and curb to suit different requirement of designs.

DESIGN & CONSTRUCTION

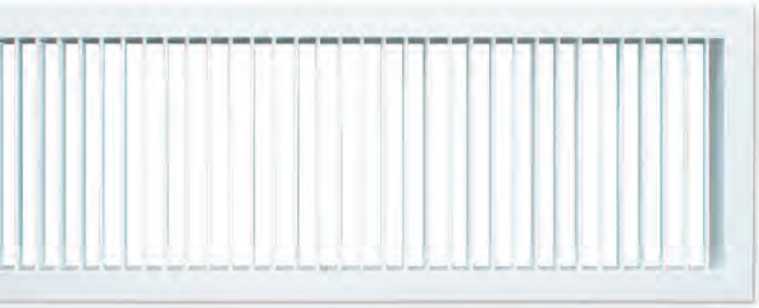
Single Deflection Supply Air Grilles with a larger free area are consist of one set of vanes in the horizontal or vertical orientation. Directional air control is adjustable in one plane only.

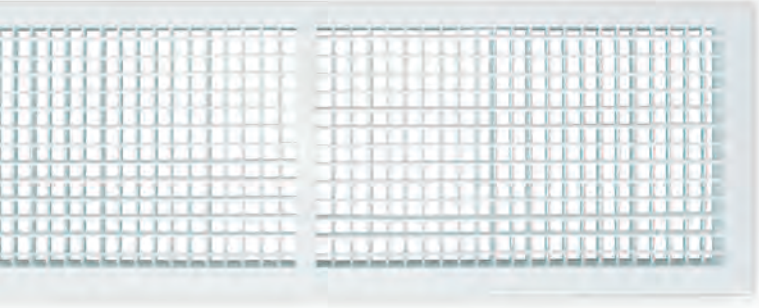
Double Deflection Supply Air Grilles are consist of two sets of adjustable vanes oriented perpendicular to each other, to allow control of directional air in both horizontal and vertical planes.

Constructed from Galvanised Steel or Aluminium with oven baked enamel or natural anodised finish, ADF Supply Air Grilles provide wide range of sizes and auxiliary components to enhance its performance further to meet designer's requirement.

APPLICATION

ADF Supply Air Grilles are suitable for all supply air outlet applications with or without ceiling. Location of sidewall installations are recommended to be within 600 mm below ceiling.



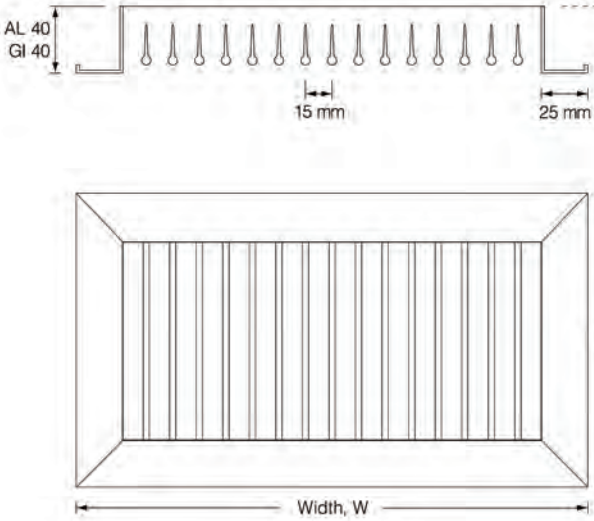


SUPPLY AIR GRILLE

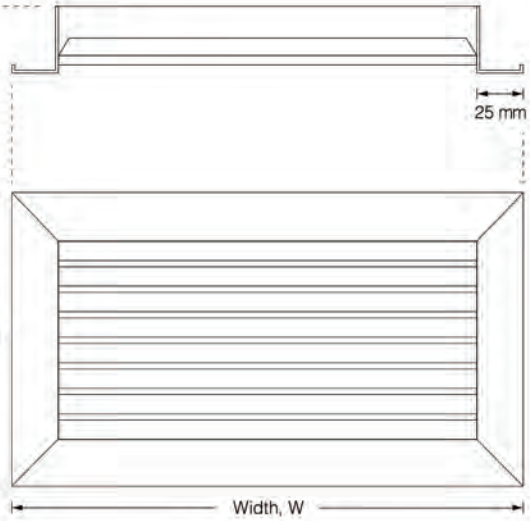
Model SAG-SD
Model SAG-DD

PHYSICAL DIMENSION

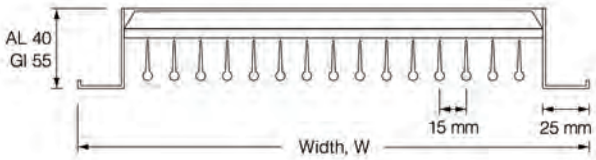
SAG-SD-V



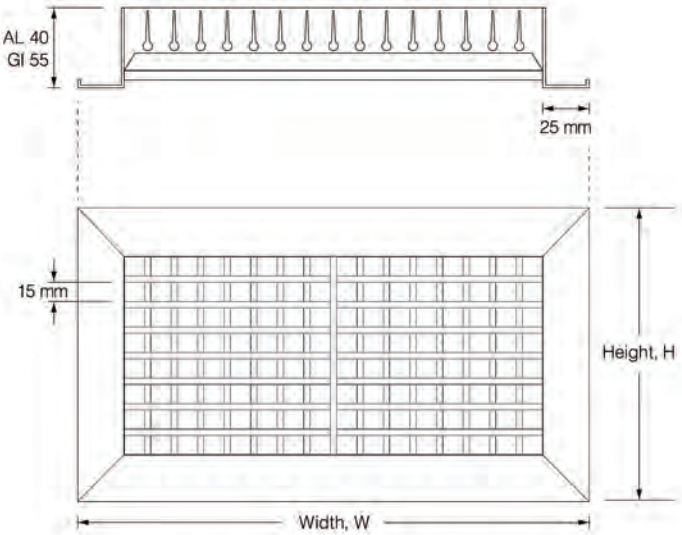
SAG-SD-H



SAG-DD-V



SAG-DD-H



SINGLE DEFLECTION SUPPLY AIR GRILLE

Model SAG-SD



PERFORMANCE DATA

Grille Code	Recommended Grille Size mm x mm	Neck Velocity m/s	Air Flow l/s	Pressure Drop Pa	Throw m	NR
A	200 x 100 0.02m²	3.5	70	22	11	7
		4.0	80	27	15	11
		4.5	90	33	>15	14
		5.0	100	39	>15	17
		5.5	110	45	>15	20
		6.0	120	52	>15	23
		6.5	130	59	>15	26
		7.0	140	67	>15	28
		7.5	150	75	>15	31
		8.0	160	83	>15	34
		8.5	170	92	>15	36
		9.0	180	100	>15	38
B	250 x 100 0.03m²	3.0	75	17	8	6
		3.5	88	22	14	10
		4.0	100	27	17	13
		4.5	113	33	>17	16
		5.0	125	39	>17	19
		5.5	138	45	>17	22
		6.0	150	52	>17	25
		6.5	163	59	>17	28
		7.0	175	67	>17	31
		7.5	188	75	>17	34
		8.0	200	83	>17	36
		8.5	213	92	>17	38
C	200 x 150 250 x 150 300 x 100 350 x 100 0.04m²	3.0	99	17	11	9
		3.5	116	22	16	13
		4.0	132	27	>16	16
		4.5	149	33	>16	19
		5.0	165	39	>16	23
		5.5	182	45	>16	26
		6.0	198	52	>16	28
		6.5	215	59	>16	31
		7.0	231	67	>16	34
		7.5	248	75	>16	37
		8.0	264	83	>16	39
		8.5	281	92	>16	42
D	300 x 150 450 x 100 0.05m²	3.0	135	17	14	12
		3.5	158	22	19	16
		4.0	180	27	>19	20
		4.5	203	33	>19	23
		5.0	225	39	>19	26
		5.5	248	45	>19	29
		6.0	270	52	>19	32
		6.5	293	59	>19	35
		7.0	315	67	>19	38
		7.5	338	75	>19	40
		8.0	360	83	>19	43
		8.5	383	92	>19	45

SINGLE DEFLECTION SUPPLY AIR GRILLE

Model SAG-SD

PERFORMANCE DATA

Grille Code	Recommended Grille Size	Neck Velocity	Air Flow	Pressure Drop	Throw	NR
	mm x mm	m/s	l/s	Pa	m	
E	250 x 200	3.0	153	17	15	13
	350 x 150	3.5	179	22	20	17
	0.06m²	4.0	204	27	>20	21
		4.5	230	33	>20	24
		5.0	255	39	>20	27
		5.5	281	45	>20	30
		6.0	306	52	>20	33
		6.5	332	59	>20	36
		7.0	357	67	>20	39
		7.5	383	75	>20	42
		8.0	408	83	>20	44
		8.5	434	92	>20	47
F	300 x 200	2.5	160	12	12	11
	350 x 200	3.0	192	17	17	16
	400 x 150	3.5	224	22	>17	20
	450 x 150	4.0	256	27	>17	23
	600 x 100	4.5	288	33	>17	27
	0.07m²	5.0	320	39	>17	30
		5.5	352	45	>17	33
		6.0	384	52	>17	36
		6.5	416	59	>17	39
		7.0	448	67	>17	42
		7.5	480	75	>17	44
		8.0	512	83	>17	47
G	400 x 200	2.5	195	12	14	13
	500 x 150	3.0	234	17	19	18
	550 x 150	3.5	273	22	>19	22
	750 x 100	4.0	312	27	>19	25
	0.08m²	4.5	351	33	>19	29
		5.0	390	39	>19	32
		5.5	429	45	>19	35
		6.0	468	52	>19	38
		6.5	507	59	>19	41
		7.0	546	67	>19	44
		7.5	585	75	>19	47
		8.0	624	83	>19	49
H	450 x 200	2.5	235	12	15	15
	500 x 200	3.0	282	17	21	20
	600 x 150	3.5	329	22	>21	24
	650 x 150	4.0	376	27	>21	27
	0.1m²	4.5	423	33	>21	31
		5.0	470	39	>21	34
		5.5	517	45	>21	37
		6.0	564	52	>21	40
		6.5	611	59	>21	43
		7.0	658	67	>21	46
		7.5	705	75	>21	49
		8.0	752	83	>21	51

SINGLE DEFLECTION SUPPLY AIR GRILLE

Model SAG-SD



PERFORMANCE DATA

Grille Code	Recommended Grille Size	Neck Velocity	Air Flow	Pressure Drop	Throw	NR
	mm x mm	m/s	l/s	Pa	m	
I	450 x 250	2.0	236	9	10	11
	500 x 250	2.5	295	12	17	17
	600 x 200	3.0	354	17	>17	22
	750 x 150	3.5	413	22	>17	26
	0.13m²	4.0	472	27	>17	30
		4.5	531	33	>17	33
		5.0	590	39	>17	37
		5.5	649	45	>17	40
		6.0	708	52	>17	43
		6.5	767	59	>17	46
		7.0	826	67	>17	49
		7.5	885	75	>17	51
J	450 x 300	2.0	286	9	12	13
	600 x 250	2.5	358	12	19	19
	750 x 200	3.0	429	17	>19	24
	900 x 150	3.5	501	22	>19	28
	0.17m²	4.0	572	27	>19	32
		4.5	644	33	>19	36
		5.0	715	39	>19	39
		5.5	787	45	>19	42
		6.0	858	52	>19	45
		6.5	930	59	>19	48
		7.0	1001	67	>19	51
		7.5	1073	75	>19	53
K	600 x 300	2.0	362	9	14	16
	700 x 250	2.5	453	12	21	22
	750 x 250	3.0	543	17	>21	27
	900 x 200	3.5	634	22	>21	31
	0.20m²	4.0	724	27	>21	35
		4.5	815	33	>21	38
		5.0	905	39	>21	42
		5.5	996	45	>21	45
		6.0	1086	52	>21	48
		6.5	1177	59	>21	51
		7.0	1267	67	>21	54
		7.5	1358	75	>21	56
L	750 x 300	1.5	338	5	7	12
	0.25m²	2.0	450	9	16	18
		2.5	563	12	>16	24
		3.0	675	17	>16	29
		3.5	788	22	>16	33
		4.0	900	27	>16	37
		4.5	1013	33	>16	41
		5.0	1125	39	>16	44
		5.5	1238	45	>16	47
		6.0	1350	52	>16	50
		6.5	1463	59	>16	53
		7.0	1575	67	>16	56

SINGLE DEFLECTION SUPPLY AIR GRILLE

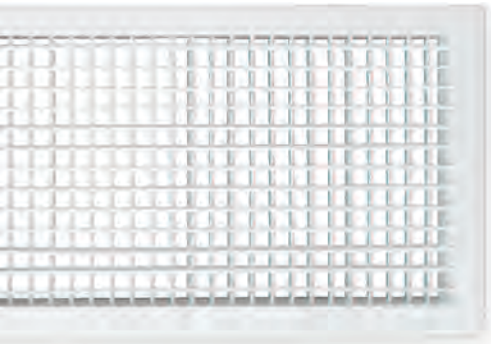
Model SAG-SD

PERFORMANCE DATA

Grille Code	Recommended Grille Size mm x mm	Neck Velocity m/s	Air Flow l/s	Pressure Drop Pa	Throw m	NR
M	900 x 300	1.5	428	5	9	14
	1000 x 300	2.0	570	9	18	21
	0.30m²	2.5	713	12	>18	27
		3.0	855	17	>18	32
		3.5	998	22	>18	36
		4.0	1140	27	>18	40
		4.5	1283	33	>18	43
		5.0	1425	39	>18	47
		5.5	1568	45	>18	50
		6.0	1710	52	>18	53
		6.5	1853	59	>18	56
		7.0	1995	67	>18	59
N	900 x 450	1.5	575	5	12	17
	1200 x 300	2.0	766	9	21	24
	0.45m²	2.5	958	12	>21	30
		3.0	1149	17	>21	35
		3.5	1341	22	>21	39
		4.0	1532	27	>21	43
		4.5	1724	33	>21	47
		5.0	1915	39	>21	50
		5.5	2107	45	>21	53
		6.0	2298	52	>21	56
		6.5	2490	59	>21	59
		7.0	2681	67	>21	62
O	1000 x 450	1.0	450	3	7	12
	0.50m²	1.5	675	5	13	19
		2.0	900	9	22	26
		2.5	1125	12	>22	32
		3.0	1350	17	>22	37
		3.5	1575	22	>22	41
		4.0	1800	27	>22	45
		4.5	2025	33	>22	49
		5.0	2250	39	>22	52
		5.5	2475	45	>22	55
		6.0	2700	52	>22	58
		6.5	2925	59	>22	65

DOUBLE DEFLECTION SUPPLY AIR GRILLE

Model SAG-DD



PERFORMANCE DATA

Grille Code	Recommended Grille Size mm x mm	Neck Velocity m/s	Air Flow l/s	Pressure Drop Pa	Throw m	NR
A	200 x 100	3.5	70	25	12	11
	0.02m²	4.0	80	31	17	15
		4.5	90	37	>17	18
		5.0	100	44	>17	21
		5.5	110	51	>17	24
		6.0	120	59	>17	27
		6.5	130	67	>17	30
		7.0	140	76	>17	32
		7.5	150	85	>17	35
		8.0	160	94	>17	38
		8.5	170	104	>17	40
		9.0	180	114	>17	42
B	250 x 100	3.0	75	19	9	10
	0.03m²	3.5	88	25	15	14
		4.0	100	31	19	17
		4.5	113	37	>19	20
		5.0	25	44	>19	23
		5.5	138	51	>19	26
		6.0	150	59	>19	29
		6.5	163	67	>19	32
		7.0	175	76	>19	35
		7.5	188	85	>19	38
		8.0	200	94	>19	40
		8.5	213	104	>19	42
C	200 x 150	3.0	99	19	12	13
	250 x 150	3.5	116	25	18	17
	300 x 100	4.0	132	31	>18	20
	350 x 100	4.5	149	37	>18	23
	0.04m²	5.0	165	44	>18	27
		5.5	182	51	>18	30
		6.0	198	59	>18	32
		6.5	215	67	>18	35
		7.0	231	76	>18	38
		7.5	248	85	>18	41
		8.0	264	94	>18	43
		8.5	281	104	>18	46
D	300 x 150	3.0	135	19	15	16
	450 x 100	3.5	158	25	21	20
	0.05m²	4.0	180	31	>21	24
		4.5	203	37	>21	27
		5.0	225	44	>21	30
		5.5	248	51	>21	33
		6.0	270	59	>21	36
		6.5	293	67	>21	39
		7.0	315	76	>21	42
		7.5	338	85	>21	44
		8.0	360	94	>21	47
		8.5	383	104	>21	49

DOUBLE DEFLECTION SUPPLY AIR GRILLE

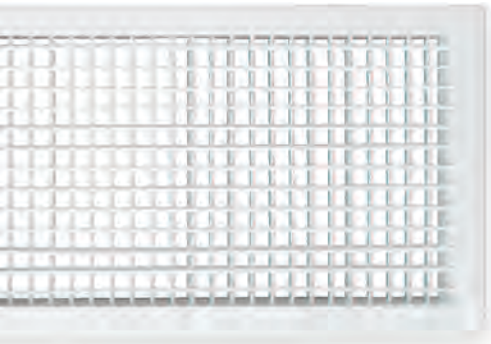
Model SAG-DD

PERFORMANCE DATA

Grille Code	Recommended Grille Size mm x mm	Neck Velocity m/s	Air Flow l/s	Pressure Drop Pa	Throw m	NR
E	250 x 200	3.0	153	19	17	17
	350 x 150	3.5	179	25	22	21
	0.06m²	4.0	204	31	>22	25
		4.5	230	37	>22	28
		5.0	255	44	>22	31
		5.5	281	51	>22	34
		6.0	306	59	>22	37
		6.5	332	67	>22	40
		7.0	357	76	>22	43
		7.5	383	85	>22	46
		8.0	408	94	>22	48
		8.5	434	104	>22	51
F	300 x 200	2.5	160	14	13	15
	350 x 200	3.0	192	19	19	20
	400 x 150	3.5	224	25	>19	24
	450 x 150	4.0	256	31	>19	27
	600 x 100	4.5	288	37	>19	31
	0.07m²	5.0	320	44	>19	34
		5.5	352	51	>19	37
		6.0	384	59	>19	40
		6.5	416	67	>19	43
		7.0	448	76	>19	46
		7.5	480	85	>19	48
		8.0	512	94	>19	51
G	450 x 200	2.5	195	14	15	17
	500 x 150	3.0	234	19	21	22
	550 x 150	3.5	273	25	>21	26
	750 x 100	4.0	312	31	>21	29
	0.08m²	4.5	351	37	>21	33
		5.0	390	44	>21	36
		5.5	429	51	>21	39
		6.0	468	59	>21	42
		6.5	507	67	>21	45
		7.0	546	76	>21	48
		7.5	585	85	>21	51
		8.0	624	94	>21	53
H	450 x 200	2.5	235	14	17	19
	500 x 200	3.0	282	19	23	24
	600 x 150	3.5	329	25	>23	28
	650 x 150	4.0	376	31	>23	31
	0.10m²	4.5	423	37	>23	35
		5.0	470	44	>23	38
		5.5	517	51	>23	41
		6.0	564	59	>23	44
		6.5	611	67	>23	47
		7.0	658	76	>23	50
		7.5	705	85	>23	53
		8.0	752	94	>23	55

DOUBLE DEFLECTION SUPPLY AIR GRILLE

Model SAG-DD



PERFORMANCE DATA

Grille Code	Recommended Grille Size mm x mm	Neck Velocity m/s	Air Flow l/s	Pressure Drop Pa	Throw m	NR
I	450 x 250	2.0	236	10	11	15
	500 x 250	2.5	295	14	19	21
	600 x 200	3.0	354	19	>19	26
	750 x 150	3.5	413	25	>19	30
	0.13m²	4.0	472	31	>19	34
		4.5	531	37	>19	37
		5.0	590	44	>19	41
		5.5	649	51	>19	44
		6.0	708	59	>19	47
		6.5	767	67	>19	50
		7.0	826	76	>19	53
		7.5	885	85	>19	55
J	400 x 300	2.0	286	10	13	17
	650 x 250	2.5	358	14	21	23
	750 x 200	3.0	429	19	>21	28
	900 x 150	3.5	501	25	>21	32
		4.0	572	31	>21	36
		4.5	644	37	>21	40
		5.0	715	44	>21	43
		5.5	787	51	>21	46
		6.0	858	59	>21	49
		6.5	930	67	>21	52
		7.0	1001	76	>21	55
		7.5	1073	85	>21	57
K	600 x 300	2.0	362	10	16	20
	700 x 250	2.5	453	14	23	26
	750 x 250	3.0	543	19	>23	31
	900 x 200	3.5	634	25	>23	35
		4.0	724	31	>23	39
		4.5	815	37	>23	42
		5.0	905	44	>23	46
		5.5	996	51	>23	49
		6.0	1086	59	>23	52
		6.5	1177	67	>23	55
		7.0	1267	76	>23	58
		7.5	1358	85	>23	60
L	750 x 300	1.5	338	6	8	16
		2.0	450	10	18	22
		2.5	563	14	>18	28
		3.0	675	19	>18	33
		3.5	788	25	>18	37
		4.0	900	31	>18	41
		4.5	1013	37	>18	45
		5.0	1125	44	>18	48
		5.5	1238	51	>18	51
		6.0	1350	59	>18	54
		6.5	1463	67	>18	57
		7.0	1575	76	>18	60

DOUBLE DEFLECTION SUPPLY AIR GRILLE

Model SAG-DD

PERFORMANCE DATA

Grille Code	Recommended Grille Size mm x mm	Neck Velocity m/s	Air Flow l/s	Pressure Drop Pa	Throw m	NR
M	900 x 300	1.5	428	6	10	18
	1000 x 300	2.0	570	10	20	25
		2.5	713	14	>20	31
		3.0	855	19	>20	36
		3.5	998	25	>20	40
		4.0	1140	31	>20	44
		4.5	1283	37	>20	47
		5.0	1425	44	>20	51
		5.5	1568	51	>20	54
		6.0	1710	59	>20	57
		6.5	1853	67	>20	60
		7.0	1995	76	>20	63
N	900 x 450	1.5	575	6	13	21
	1200 x 300	2.0	766	10	23	28
		2.5	958	14	>23	34
		3.0	1149	19	>23	39
		3.5	1341	25	>23	43
		4.0	1532	31	>23	47
		4.5	1724	37	>23	51
		5.0	1915	44	>23	54
		5.5	2107	51	>23	57
		6.0	2298	59	>23	60
		6.5	2490	67	>23	63
		7.0	2681	76	>23	66
O	1000 x 450	1.0	450	3	8	16
		1.5	675	6	15	23
		2.0	900	10	25	30
		2.5	1125	14	>25	36
		3.0	1350	19	>25	41
		3.5	1575	25	>25	45
		4.0	1800	31	>25	49
		4.5	2025	37	>25	53
		5.0	2250	44	>25	56
		5.5	2475	51	>25	59
		6.0	2700	59	>25	62
		6.5	2925	67	>25	65

SUPPLY AIR GRILLE

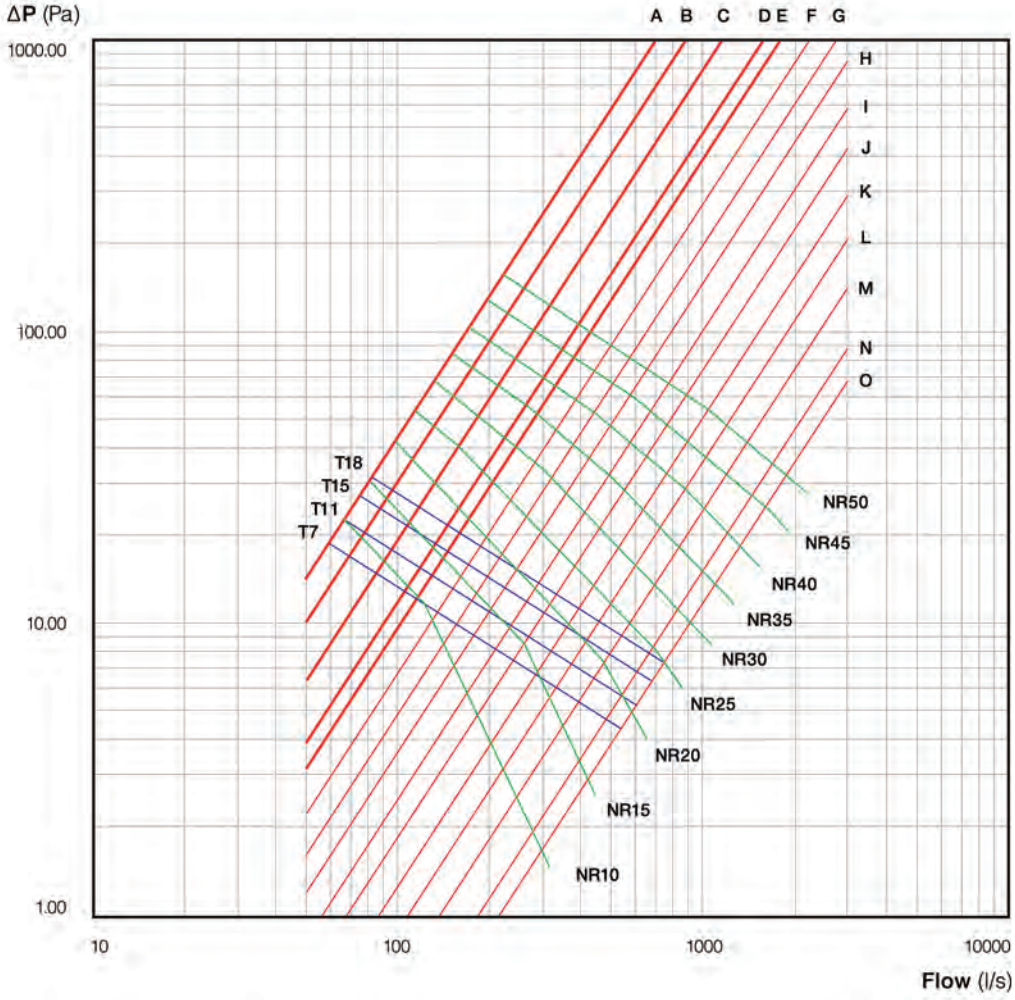
Model SAG

SELECTION NOMOGRAPH

MODEL SAG-DD

PRESSURE DROP vs FLOW vs THROW vs NR

(Throw in metres, for velocity of 0.25 m/s)



SELECTION GUIDE

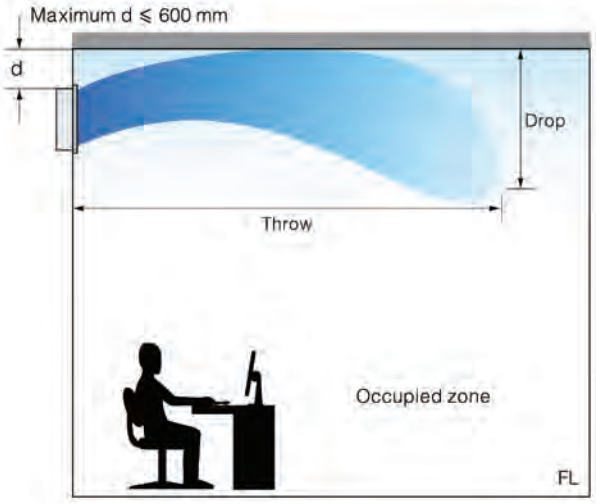
1. Select from horizontal axis the required air flow, plot a vertical line up.
2. Select the required pressure drop by plotting a horizontal line to cross-section with the plotted air flow line.
3. The cross-section point will determine the desired diffuser with the closest Neck Size, Throw and NR.

SUPPLY AIR GRILLE

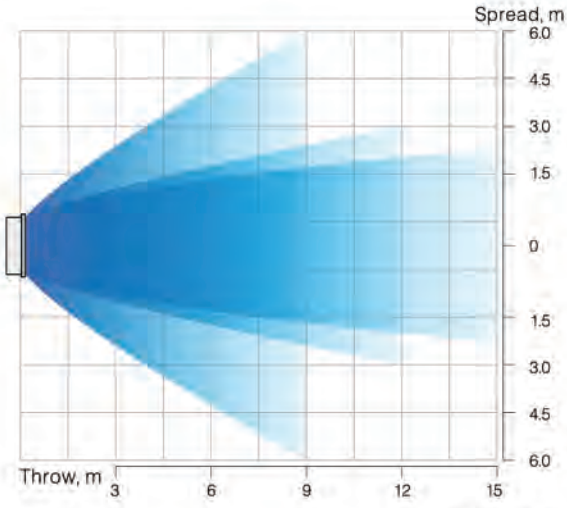
Model SAG

ISOTHERMAL AIR THROW PATTERN

Indicative Throw and Spread patterns of isothermal air flow at V_T = 0.25 m/s.



Side View



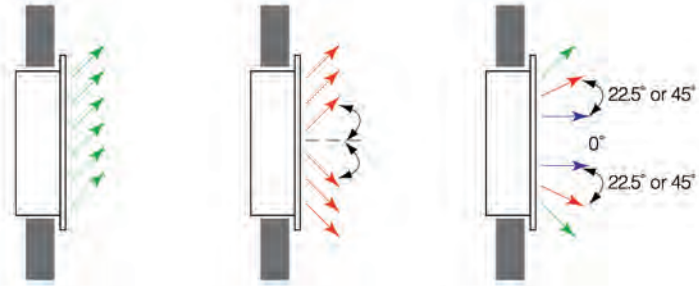
Plan View

**Correction Factor: Air Throw for SAG installation below ceiling > 600 mm or without ceiling = T x 0.7

VANE DEFLECTION PATTERNS

Adjustment of the vertical vanes controls spread of the air where distance of throw is the prime concern.

Adjustment of the horizontal vanes controls deflections of air pattern to be upward or downward where unwanted drop is the prime concern.



1-Way
22.5° or 45°

2-Way
22.5° or 45°

3-Way
22.5° or 45°

CORRECTION FACTOR FOR VANE ADJUSTMENT

Front Row Vane Position	1-Way		2-Way		3-Way	
Deflection	22.5°	45°	22.5°	45°	22.5°	45°
NR	+2	+4	+2	+4	+3	+5
Pressure, Pa	1.2	1.7	1.2	1.7	1.2	1.7
Throw, m	1.1	1.2	0.7	0.5	0.8	0.6

SUPPLY AIR GRILLE

Model SAG









GRILLES & LOUVRES

RETURN AIR GRILLE



The information given in this document is based on data and knowledge correct at the time of printing. Data is subject to change without prior notice for continual product improvement. Applications or installations outside general guidelines and code of practice are beyond our product performance guarantees.

RETURN AIR GRILLE

RAG-FB

ADF Return Air Grilles are designed and constructed to meet wide range of applications. They are commonly installed on internal walls or partitions, ceilings and duct system for air extract purpose.

DESIGN & CONSTRUCTION

ADF Return Air Grilles are of fixed blade type which blade angle are set at 45° and sight proof, besides perform to a quality standard in air flow, pressure drop as well as noise rating. Grille frame is of external flange border. These return air grilles can be constructed of Galvanised Steel or Aluminium and finished to baked enamel or natural anodised.

FEATURES

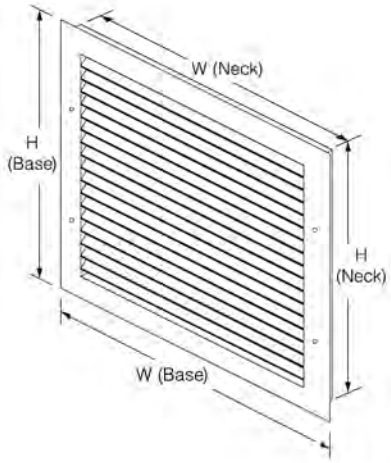
- Neat, clean and pleasant appearance to meet requirement.
- Galvanised Steel construction offers strength and rigidity while durability and lightness in weight for aluminium construction are extra advantages to consider.
- Minimum 45° blade angle designed to ensure visual privacy.
- Available in horizontal aligned or continuous line construction to enhance and complement architectural designs.

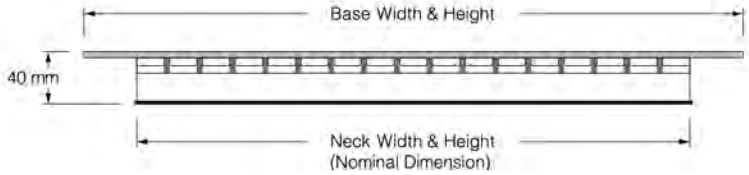


RETURN AIR GRILLE

Model RAG-FB

PHYSICAL DIMENSION





Code	Nominal Area sq.m.	Nominal Grille Dimension mm x mm			
A	0.02	250 x 100 200 x 100			
B	0.03	350 x 100 300 x 100	250 x 150		
C	0.04	450 x 100 400 x 100	300 x 150 200 x 200		
D	0.05	500 x 100 350 x 150	250 x 200		
E	0.06	600 x 100 400 x 150	300 x 200 250 x 250		
F	0.07	750 x 100 700 x 100	500 x 150 450 x 150	350 x 200 300 x 250	
G	0.08	800 x 100 750 x 100	600 x 150 550 x 150	500 x 200 450 x 200	400 x 200 400 x 250
H	0.10	1200 x 100 750 x 150	600 x 150 600 x 200	500 x 250 450 x 250	350 x 250 400 x 300
I	0.13	1500 x 100 900 x 150	750 x 200 600 x 250	450 x 300 400 x 350	
J	0.17	1200 x 150 900 x 200	750 x 250 700 x 250	600 x 300 500 x 350	450 x 400 400 x 400
K	0.20	1500 x 150 1000 x 200	900 x 250 750 x 300	600 x 350 500 x 400	450 x 450
L	0.25	1800 x 150 1200 x 200	1000 x 300 900 x 300	800 x 300 650 x 350	600 x 400 500 x 450
M	0.30	1500 x 200 1200 x 250	1200 x 300 900 x 400	750 x 400 900 x 450	900 x 450 600 x 500
N	0.45	1800 x 250 1500 x 300	1200 x 400 1000 x 450	900 x 500 750 x 600	
O	0.50	1800 x 300 1500 x 350	1200 x 450 1000 x 500	900 x 600	

RETURN AIR GRILLE

Model RAG-FB

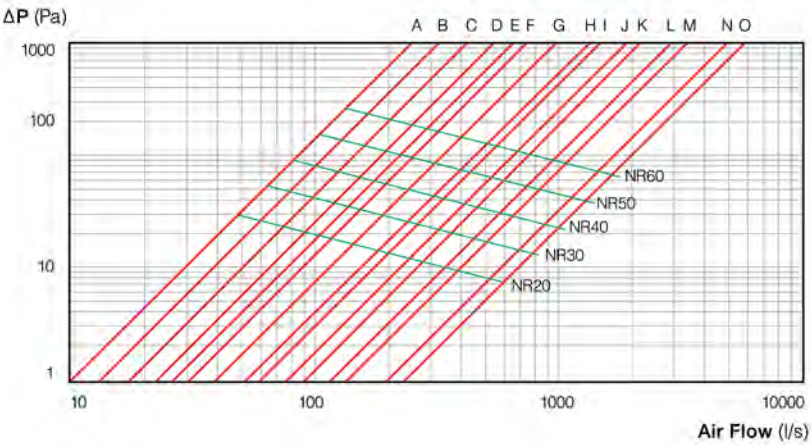
PERFORMANCE DATA

Neck Velocity, m/s			1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
Nominal Area sq.m.		Negative ΔP Pa	5	14	25	38	54	75	98	122	152	183
A	.02	l/s	21	31	42	52	62	73	83	91	100	114
		NR	<10	10	18	23	30	35	42	47	50	53
B	.03	l/s	28	43	57	71	85	99	113	128	142	156
		NR	<10	12	19	27	33	39	45	48	53	55
C	.04	l/s	37	55	74	92	110	129	147	166	184	200
		NR	<10	13	22	29	35	41	47	50	55	58
D	.05	l/s	49	74	98	123	147	172	196	217	245	270
		NR	<10	15	23	31	37	44	48	52	56	60
E	.06	l/s	57	85	113	147	170	198	227	255	283	302
		NR	<10	16	24	32	39	45	50	54	58	61
F	.07	l/s	65	100	147	163	195	228	261	293	326	358
		NR	<10	17	26	33	40	46	51	55	60	62
G	.08	l/s	85	147	180	212	255	297	340	382	415	467
		NR	<10	18	28	35	42	48	52	57	61	64
H	.10	l/s	112	172	233	278	334	390	445	498	557	613
		NR	<10	19	30	38	45	51	55	60	63	65
I	.13	l/s	137	190	263	316	389	443	506	569	632	696
		NR	<10	20	31	39	46	51	56	60	64	67
J	.17	l/s	170	255	340	405	500	595	660	725	820	904
		NR	<10	22	33	40	48	53	58	63	67	69
K	.20	l/s	196	298	397	491	589	687	775	863	982	1180
		NR	10	23	34	41	49	55	59	64	68	70
L	.25	l/s	262	394	525	636	787	895	1000	1181	1312	1443
		NR	11	25	36	44	50	57	61	65	69	71
M	.30	l/s	294	440	597	734	881	1027	1274	1321	1468	1614
		NR	13	26	38	45	52	58	63	66	70	72
N	.45	l/s	439	658	888	1097	1317	1536	1756	1975	2194	2414
		NR	14	28	41	49	55	61	65	69	72	74
O	.50	l/s	527	790	1173	1317	1580	1843	1997	2370	2633	2797
		NR	16	30	43	50	56	62	66	70	73	75

SELECTION NOMOGRAPH

MODEL RAG-FB

AIR FLOW vs PRESSURE LOSS vs NR

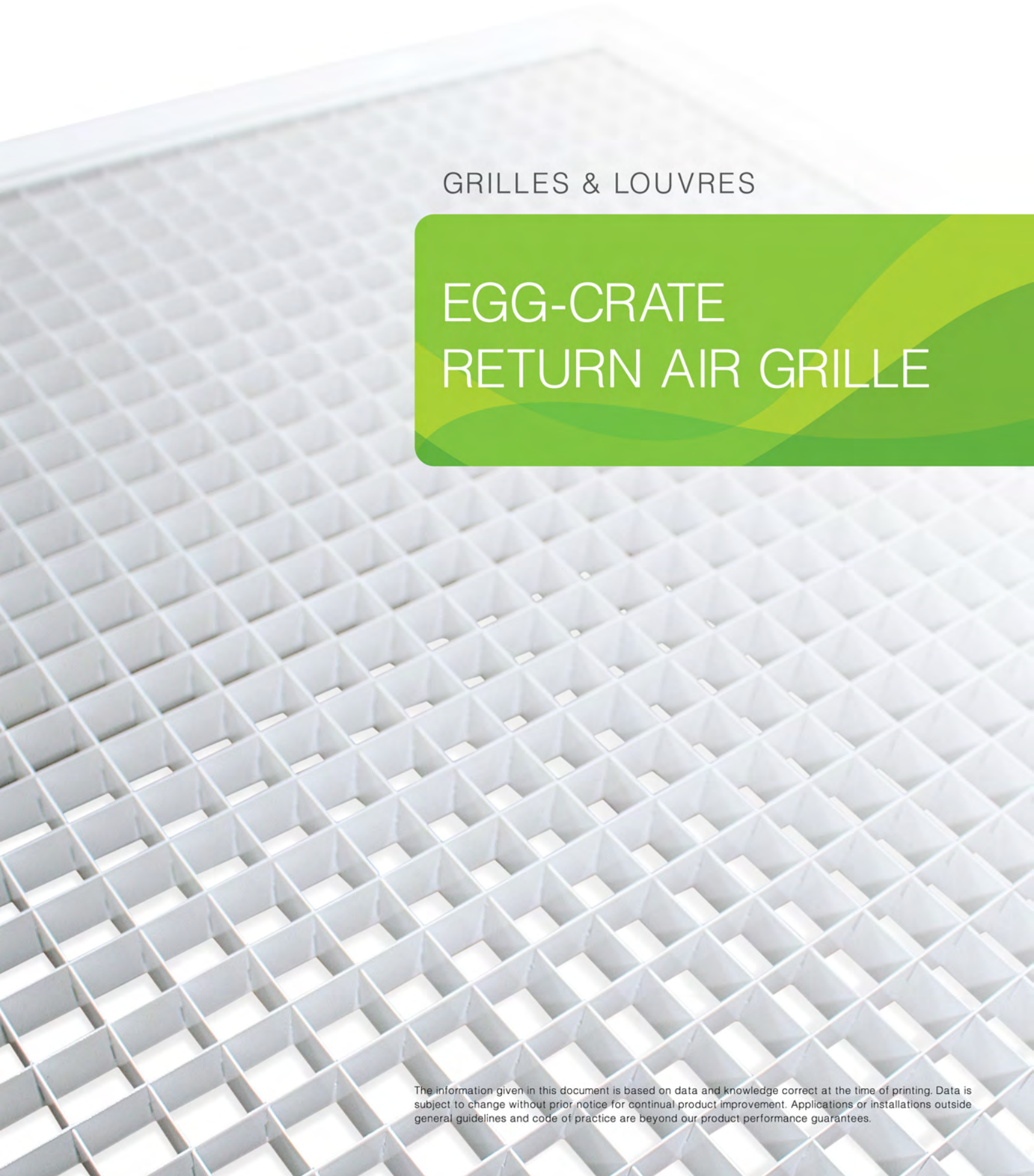


SELECTION GUIDE

1. Select from horizontal axis the required air flow, plot a vertical line up.
2. Select the required pressure drop by plotting a horizontal line to cross-section with the plotted air flow line.
3. The cross-section point will determine the desired diffuser with the closest Neck Size, Throw and NR.

GRILLES & LOUVRES

EGG-CRATE RETURN AIR GRILLE



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EGG-CRATE RETURN AIR GRILLE

RAG-EC

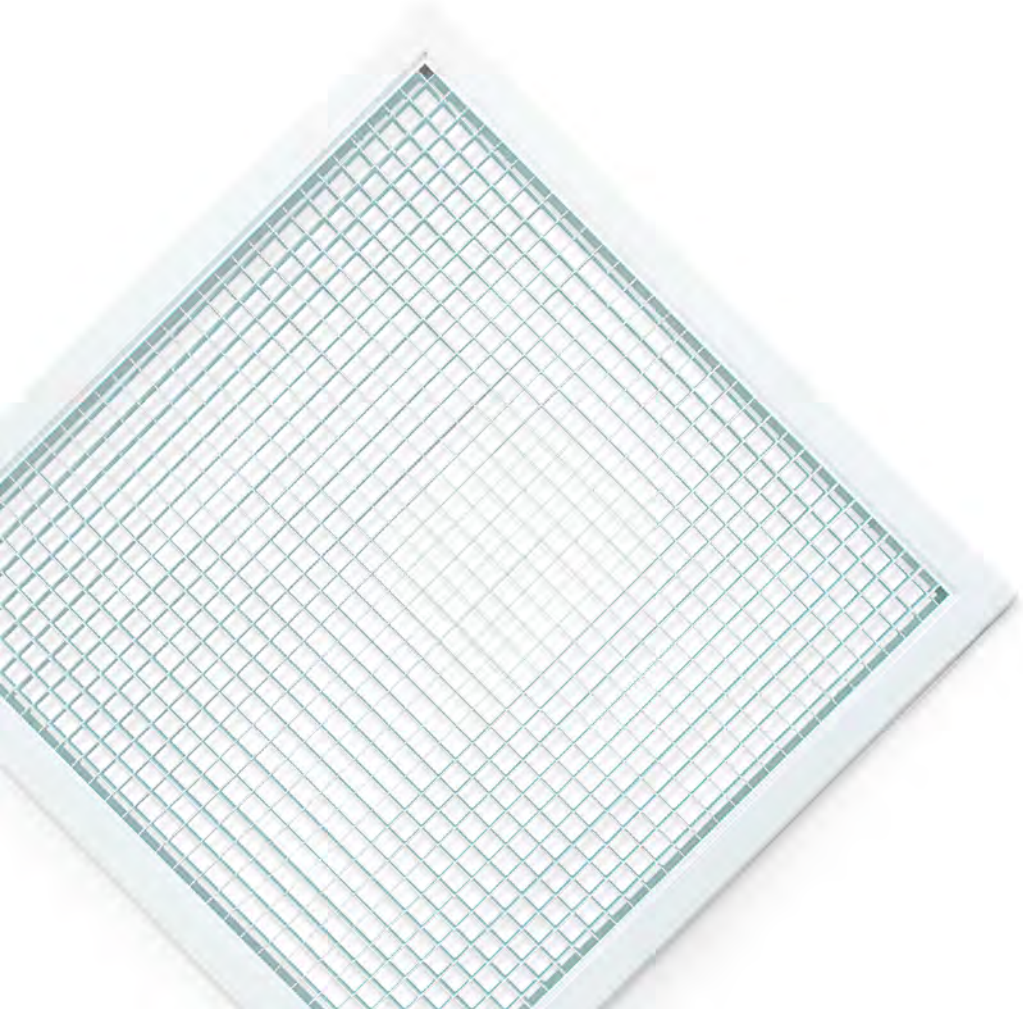
Different requirements and designs expect application of different types of air grille. Egg-crate Return Air Grilles generally are grilles of largest free area with extremely low pressure loss.

DESIGN & CONSTRUCTION

ADF Egg-crate Return Air Grille is smart and neat looking. It consists of an outer frame of standard width and inner hollow core of 20 mm x 20 mm x 20 mm crate pattern in Galvanised Steel or Aluminium construction. Alternatively, plastic centre core construction also available with 12.5 mm x 12.5 mm x 12.5 mm crate pattern.

FEATURES

- Largest free area for air flow.
- Low pressure loss.
- Options of centre hollow crate can be of Galvanised Steel, Aluminium or Plastic.
- Smart and neat appearance blends well with modern interior and ceiling design.
- Applicable to ceiling and sidewall extract or return air system installation.

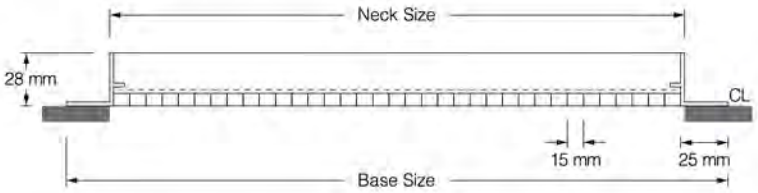


EGG-CRATE RETURN AIR GRILLE

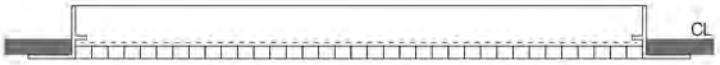
Model RAG-EC

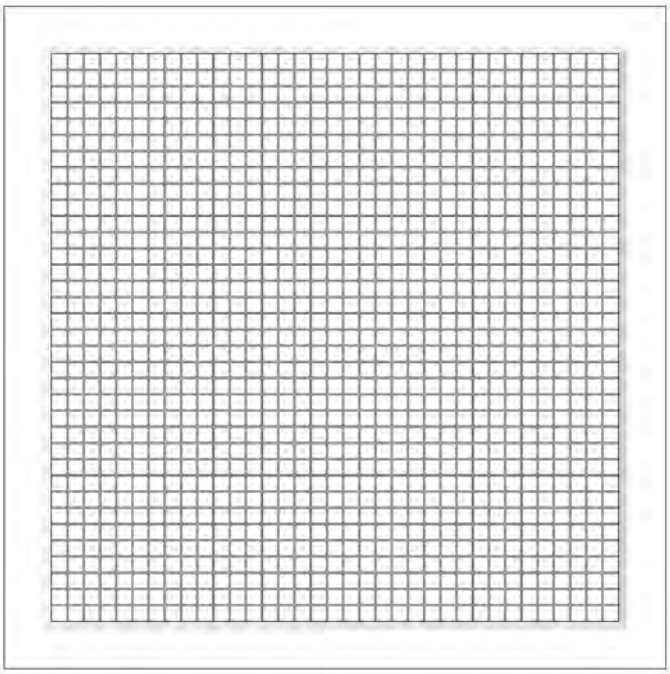
PHYSICAL DIMENSION AND MOUNTING GUIDE

Lay-on Mounting



Flush Mounting





Base Size		Neck Size / Ceiling Opening Size		Gross Face Area		Effective Free Air Area	
mm	inch	mm	inch	M^2	FT^2	M^2	FT^2
300 x 300	12 x 12	250 x 250	10 x 10	0.0625	0.694	0.055	0.611
400 x 400	16 x 16	350 x 350	14 x 14	0.1225	1.361	0.108	1.198
600 x 300	24 x 12	550 x 250	22 x 10	0.1375	1.528	0.121	1.345
600 x 600	24 x 24	550 x 550	22 x 22	0.3025	3.361	0.266	2.958
1200 x 600	48 x 24	1150 x 550	46 x 22	0.6325	7.028	0.557	6.185

EGG-CRATE RETURN AIR GRILLE

Model RAG-EC

PERFORMANCE DATA

Neck Velocity, m/s		1.5	2.0	2.5	3.0	3.5	4.0	5.0	6.0	7.0
Neck Size	Negative ΔP									
mm x mm	Pa	3	6	9	12	17	22	33	48	65
300 x 300	l/s	127	170	212	255	297	340	425	510	595
	NR	10	12	14	20	25	30	37	43	48
400 x 400	l/s	230	290	365	436	509	582	727	873	1018
	NR	10	13	20	26	31	36	43	49	54
600 x 300	l/s	255	340	425	510	595	680	850	1020	1145
	NR	11	14	17	23	28	33	40	46	51
600 x 600	l/s	492	656	820	985	1150	1312	1640	1969	2297
	NR	11	13	20	26	31	36	43	49	54
1200 x 600	l/s	855	1140	1420	1705	1988	2275	2840	3410	3980
	NR	12	15	22	28	33	38	45	51	56

GRILLES & LOUVRES

LINEAR BAR GRILLE



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LINEAR BAR GRILLE

GLB

Different requirements and designs expect different grilles application. Properly selected grilles will operate satisfactorily from high side wall and perimeter at the sill, curb or floor. ADF Linear Bar Grilles are commonly used in these applications due to its robust construction, neat appearance and efficient air delivery.

DESIGN & CONSTRUCTION

ADF Linear Bar Grilles are available in 2 main designs, Heavy Duty Extruded Aluminium mandrel tube with solid flat bars, High Quality Aluminium fixed bar for linear and clean look. All flat bars are fixed at 0° deflection and further enhanced with frame or without frame. They are suitable for supply and extract air system and commonly used in computer rooms and any raised-floor office environments.

FEATURES

- Neat, crisp and smart appearance to meet requirement.
- Efficient air distribution.
- Heavy duty and robust with reinforced round tubes.
- Suitable for high traffic areas of raised-floor installations.
- Natural anodised or oven-baked paint finished.



LINEAR BAR GRILLE

Model GLB



Model GLB



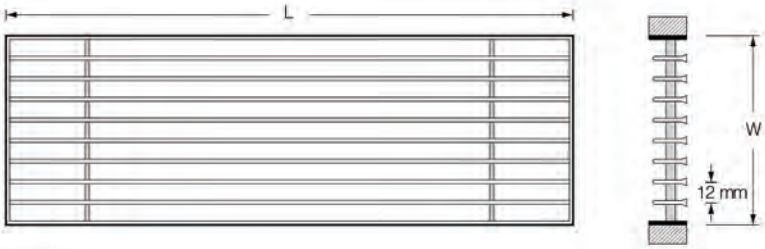
Model GLB-F



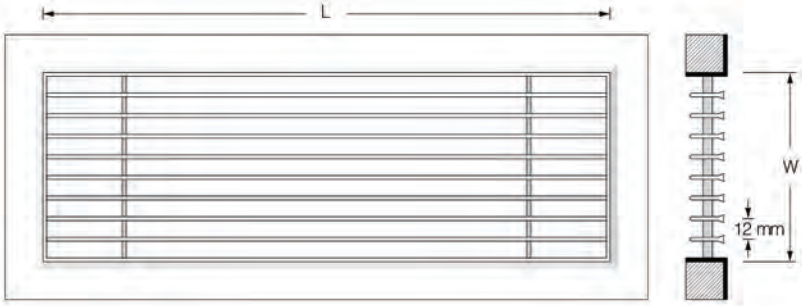
Model GLB-HD

PHYSICAL DIMENSION

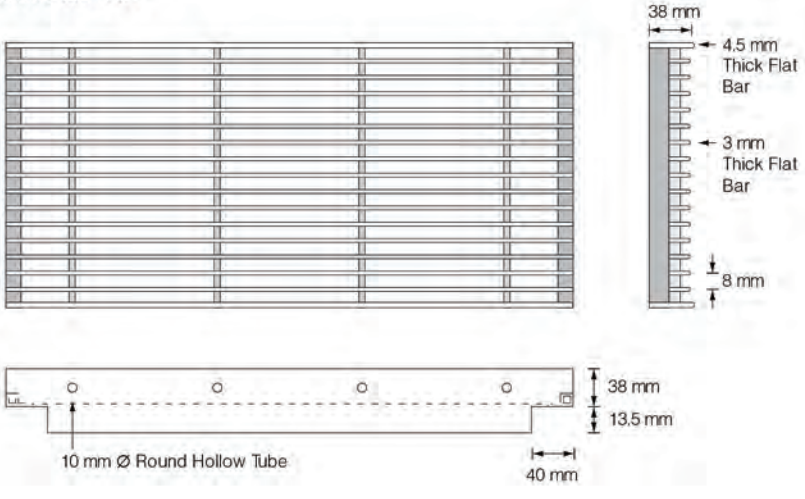
Model GLB



Model GLB-F



Model GLB-HD



LINEAR BAR GRILLE
Model GLB

PERFORMANCE DATA - Supply Air GLB, GLB-F

Inlet Velocity, m/s		2.0	2.5	3.0	3.5	4.0	4.5	5.0
Grille Size W x L	ΔP							
mm	Pa	2.5	4	5.5	8	10	13	16
50 x 1000	Air, l/s	28	35	42	49	56	63	70
	V/H Throw, M	0.5/2	0.7/2.5	1/3	1.5/3.2	2/3.5	2.5/3.7	3/4
	NR	<10	<10	<10	<10	<10	11	14
100 x 1000	Air, l/s	82	103	124	144	164	185	206
	V/H Throw, M	1/2.5	1.5/3	2.5/4	3/4.5	4/5	4.5/5.8	5/6.5
	NR	<10	<10	<10	11	13	15	18
150 x 1000	Air, l/s	138	172	206	240	276	310	344
	V/H Throw, M	1.5/3.5	2.2/4.3	3/5	3.5/5.5	4.5/6	5.3/6.8	6/7.5
	NR	<10	<10	11	15	19	22	25
200 x 1000	Air, l/s	165	207	250	290	330	373	415
	V/H Throw, M	3/5	3.7/5.5	4.5/6	5.1/6.8	6/7.5	6.5/8.3	7/9
	NR	11	14	18	21	23	25	28
250 x 1000	Air, l/s	220	275	330	385	440	495	548
	V/H Throw, M	4/6	5/6.8	6/7.5	6.5/8.3	7/9	7.5/9.5	8/10
	NR	15	18	21	24	26	29	31
300 x 1000	Air, l/s	275	340	410	480	550	618	685
	V/H Throw, M	5.5/7.5	6.2/8.3	7/9	7.5/9.5	8/10	8.5/11	9/12
	NR	18	21	23	26	28	30	33

PERFORMANCE DATA - Return Air GLB, GLB-F

Inlet Velocity, m/s		2.0	3.0	4.0	5.0
Grille Size W x L	Negative ΔP				
mm	Pa	2.4	4.8	9	13.6
50 x 1000	Air, l/s	28	42	56	70
	NR	<10	<10	<10	10
100 x 1000	Air, l/s	82	124	164	206
	NR	<10	<10	<10	14
150 x 1000	Air, l/s	138	206	276	344
	NR	<10	<10	15	21
200 x 1000	Air, l/s	165	250	330	415
	NR	<10	14	19	24
250 x 1000	Air, l/s	220	330	440	548
	NR	11	17	22	27
300 x 1000	Air, l/s	275	410	550	685
	NR	14	19	24	29

LINEAR BAR GRILLE
Model GLB

PERFORMANCE DATA - Supply Air GLB-HD

Inlet Velocity, m/s		2.0	2.5	3.0	3.5	4.0	4.5	5.0
Grille Size W x L	ΔP							
mm	Pa	3	4.4	6	8.5	11	14	17
50 x 600	Air, l/s	18	22	26	31	35	40	44
	V/H Throw, M	0.25/1.7	0.6/2.2	1.0/2.7	1.2/3.2	1.5/3.6	1.9/4	2.2/4.5
	NR	<10	<10	<10	10	12	15	18
100 x 600	Air, l/s	46	58	69	80	93	104	115
	V/H Throw, M	0.7/2.7	1.2/3.3	1.9/3.9	2.5/4.5	3.2/4.9	3.6/5.5	3.9/6.1
	NR	<10	<10	<10	13	16	18	22
150 x 600	Air, l/s	74	92	109	128	146	164	183
	V/H Throw, M	1.2/3.2	1.8/3.9	2.4/4.6	3.1/4.2	3.7/5.7	4.0/6.3	4.4/6.8
	NR	<10	<10	10	14	18	21	24
200 x 600	Air, l/s	115	143	172	202	233	260	288
	V/H Throw, M	2.1/4.5	2.8/5	3.5/5.5	3.8/6	4.2/6.5	4.9/7.5	5.5/8
	NR	10	13	16	20	23	26	28
250 x 600	Air, l/s	147	185	222	258	295	333	370
	V/H Throw, M	3/5.5	3.7/6	4.5/6.5	5/7.5	5.5/8	5.7/8.5	6/9
	NR	16	18	21	24	26	28	31
300 x 600	Air, l/s	185	228	272	319	365	411	457
	V/H Throw, M	4/6	4.7/7	5.5/8	5.7/8.5	6/9	6.5/9.8	7/10.5
	NR	21	24	27	29	31	32	33

PERFORMANCE DATA - Return Air GLB-HD

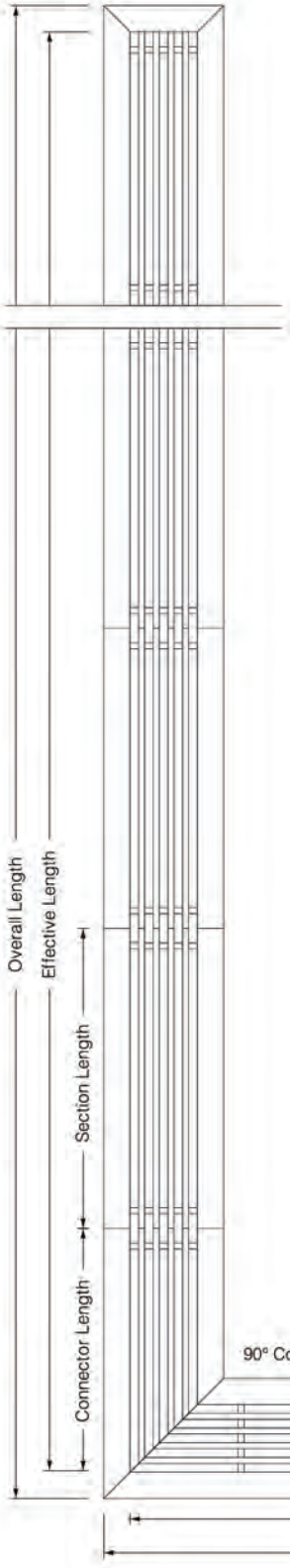
Inlet Velocity, m/s		2.0	3.0	4.0	5.0
Grille Size W x L	Negative ΔP				
mm	Pa	2.4	4.8	9	13.6
50 x 600	Air, l/s	18	26	35	44
	NR	<10	<10	<10	14
100 x 600	Air, l/s	46	69	93	115
	NR	<10	<10	12	18
150 x 600	Air, l/s	74	109	146	183
	NR	<10	<10	14	20
200 x 600	Air, l/s	115	172	233	288
	NR	<10	12	19	24
250 x 600	Air, l/s	147	222	295	370
	NR	12	17	22	27
300 x 600	Air, l/s	185	272	365	457
	NR	17	22	26	29

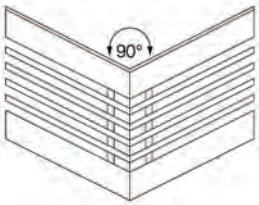
LINEAR BAR GRILLE

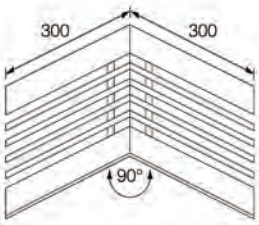
Model GLB

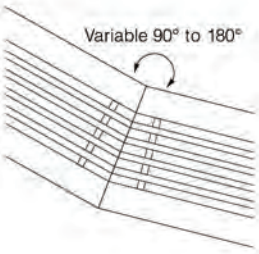
OPTIONAL PATTERNS

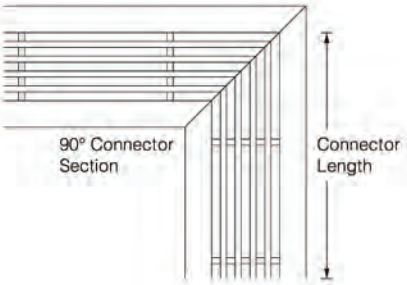
Please furnish plan view with dimensions when order

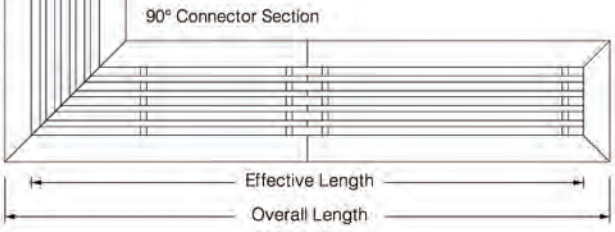












APPLICATIONS GUIDE



Floor Mounting



Sidewall Mounting



Sill Mounting

GRILLES & LOUVRES

AIR LOUVRE



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AIR LOUVRE
AL

Air louvres play an important role in today's modern architecture. Their practical task is to permit air into or out of a building. Louvres are usually installed in openings of internal or external walls, roof penthouse and ductwork.

ADF Louvres are available in 2 designs: Indoor and Outdoor air louvre. This range of products are commonly used in curtain wall systems or interior partition application. Another common application is fresh air intake or exhaust in conjunction with air-conditioning equipment or any mechanical and electrical plantroom.

DESIGN & CONSTRUCTION

ADF offers various depths of indoor and outdoor air louvres used for certain architectural purposes and different wall thicknesses. Blade angles of outdoor louvres positioned at 45° are visual-protected besides compromising air flow, pressure drop, water penetration performance and weather proof. Louvre frame is of external flange type which overlaps the wall opening to prevent leakage between the louvre and the adjacent wall construction.

All ADF air louvres can be constructed of Galvanised Steel or Extruded Aluminium with either natural anodised or baked enamel finished.

FEATURES

- Neat, clean and pleasing appearance to meet architectural aesthetics.
- Galvanised Steel construction offers strength and rigidity while durability and lightness in weight for aluminium construction are extra advantages to consider.
- Top end angled trap of louvre's blades designed to prevent rain or water penetration while bottom end to be straight vane for easy water drainage.
- Minimum 45° blade angle designed to be visual-protected.
- Available in vertical, horizontal aligned or continuous line construction to enhance and complement architectural features.





AIR LOUVRE

Model AL

INDOOR AIR LOUVRE

Model AL-ID





OUTDOOR AIR LOUVRE

Model AL-OD

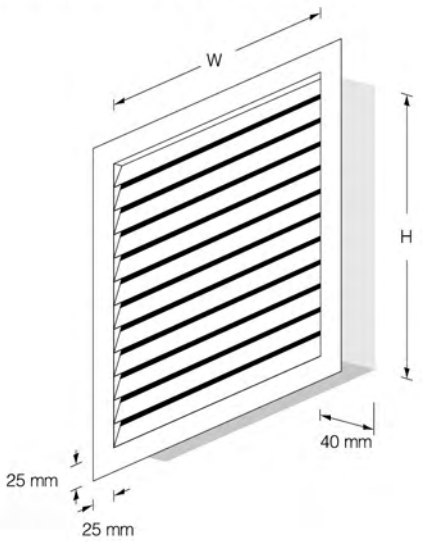
Optional C-blade (Moon Blade)







PHYSICAL DIMENSION



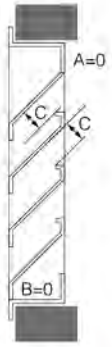
AIR LOUVRE
Model AL

LOUVRE FREE AREA

Width	300	450	600	750	900	1050	1200	1350	1500	1650	1800	1950	2100	2250	2400
Height	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96
300	0.03	0.05	0.07	0.09	0.11	0.13	0.15	0.17	0.19	0.21	0.23	0.25	0.26	0.28	0.30
12	0.35	0.56	0.76	0.97	1.18	1.39	1.60	1.81	2.01	2.22	2.43	2.64	2.85	3.06	3.26
450	0.05	0.08	0.11	0.14	0.18	0.21	0.24	0.27	0.30	0.33	0.36	0.39	0.42	0.45	0.49
18	0.56	0.89	1.22	1.56	1.89	2.22	2.56	2.89	3.22	3.56	3.89	4.22	4.56	4.89	5.22
600	0.07	0.12	0.16	0.21	0.25	0.30	0.34	0.39	0.43	0.48	0.52	0.57	0.61	0.66	0.70
24	0.80	1.28	1.76	2.25	2.73	3.21	3.69	4.17	4.65	5.13	5.61	6.10	6.58	7.06	7.54
750	0.09	0.15	0.21	0.27	0.32	0.38	0.44	0.49	0.55	0.61	0.66	0.72	0.78	0.84	0.89
30	1.02	1.63	2.25	2.86	3.47	4.08	4.70	5.31	5.92	6.53	7.15	7.76	8.37	8.98	9.60
900	0.12	0.19	0.27	0.34	0.41	0.48	0.56	0.63	0.70	0.77	0.84	0.92	0.99	1.06	1.13
36	1.30	2.08	2.86	3.64	4.42	5.19	5.97	6.75	7.53	8.31	9.09	9.87	10.65	11.43	12.21
1050	0.14	0.23	0.31	0.40	0.48	0.57	0.65	0.74	0.82	0.91	0.99	1.08	1.16	1.25	1.33
42	1.53	2.44	3.36	4.28	5.19	6.11	7.03	7.94	8.86	9.78	10.69	11.61	12.53	13.44	14.36
1200	0.16	0.26	0.36	0.46	0.56	0.65	0.75	0.85	0.95	1.05	1.14	1.24	1.34	1.44	1.54
48	1.76	2.81	3.87	4.92	5.97	7.03	8.08	9.14	10.19	11.24	12.30	13.35	14.41	15.46	16.52
1350	0.18	0.30	0.41	0.52	0.63	0.74	0.85	0.96	1.07	1.18	1.29	1.40	1.51	1.62	1.74
54	1.99	3.18	4.37	5.56	6.75	7.94	9.14	10.33	11.52	12.71	13.90	15.09	16.29	17.48	18.67
1500	0.21	0.34	0.47	0.60	0.73	0.85	0.98	1.11	1.24	1.37	1.49	1.62	1.75	1.88	2.01
60	2.30	3.67	5.05	6.43	7.81	9.18	10.56	11.94	13.32	14.69	16.07	17.45	18.83	20.20	21.58
1650	0.24	0.38	0.52	0.66	0.80	0.94	1.08	1.22	1.37	1.51	1.65	1.79	1.93	2.07	2.21
66	2.53	4.05	5.57	7.09	8.61	10.13	11.65	13.17	14.69	16.21	17.73	19.25	20.77	22.29	23.81
1800	0.26	0.41	0.57	0.72	0.88	1.03	1.18	1.34	1.49	1.65	1.80	1.96	2.11	2.27	2.42
72	2.77	4.43	6.10	7.76	9.42	11.08	12.75	14.41	16.07	17.73	19.40	21.06	22.72	24.38	26.05
1950	0.28	0.45	0.62	0.78	0.95	1.12	1.29	1.45	1.62	1.79	1.96	2.13	2.29	2.46	2.63
78	3.01	4.81	6.62	8.42	10.23	12.03	13.84	15.64	17.45	19.25	21.06	22.86	24.67	26.47	28.28
2100	0.30	0.48	0.66	0.84	1.03	1.21	1.39	1.57	1.75	1.93	2.11	2.29	2.47	2.65	2.84
84	3.25	5.19	7.14	9.09	11.04	12.98	14.93	16.88	18.83	20.77	22.72	24.67	26.62	28.56	30.51
2250	0.33	0.52	0.72	0.91	1.11	1.31	1.50	1.70	1.89	2.09	2.29	2.48	2.68	2.87	3.07
90	3.51	5.62	7.73	9.84	11.95	14.06	16.16	18.27	20.38	22.49	24.60	26.71	28.81	30.92	33.03
2400	0.35	0.56	0.77	0.98	1.19	1.40	1.60	1.81	2.02	2.23	2.44	2.65	2.86	3.07	3.28
96	3.75	6.01	8.26	10.51	12.76	15.01	17.27	19.52	21.77	24.02	26.27	28.53	30.78	33.03	35.28

** Louvre's Width and Height - in mm & inches

** Louvre's Free Area - in sq.m. & sq.ft.



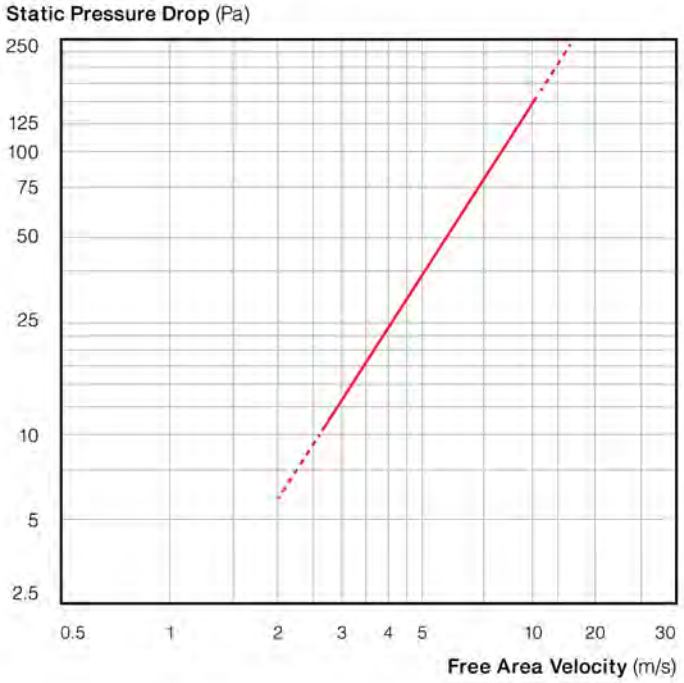
LOUVRE'S FREE AREA CALCULATION

% Free Area	$\frac{\text{Free Area}}{\text{Face Area}} \times 100$
Free area sq.m.	(Rows of C x C) x W
Face area sq.m.	W x H

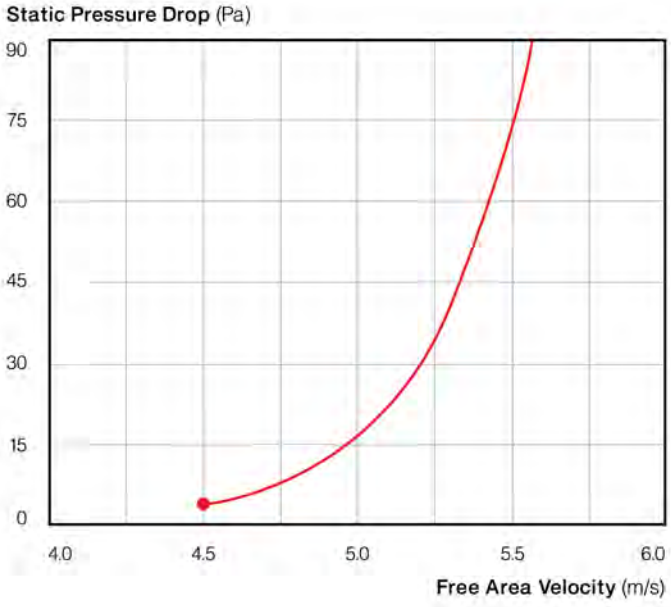
AIR LOUVRE
Model AL

PERFORMANCE NOMOGRAPH

Airflow Resistance
Tested on Louvre 1200 mm x 1200 mm
Std air density 1.2 kg/m³



Water Penetration
Tested on Louvre 1200 mm x 1200 mm
Duration 15 minutes
Std air density 1.2 kg/m³



AIR LOUVRE

Model AL

SELECTION AND CALCULATION

1. Based on the AIR FLOW RESISTANCE NOMOGRAPH, decide a Free area Velocity (m/s) that provides acceptable Pressure Drop and minimum Water Penetration (Water penetration only applicable to Outdoor air Intake Louvres, it is not critical for Indoor or Exhaust air louvres).

2. Using the selected Free Area Velocity and total Airflow Volume (l/s), work out the Louvre's Free Area required.

3. From the LOUVRE FREE AREA TABLE, select a next higher, Free Area (sq.m.), then determine the Height (mm) and Width (mm) of the required Louvre.

Step 1:
Given airflow = 3000 l/s @ acceptable free area velocity, 4.5 m/s

$$\text{Minimum required Free Area} = \frac{\text{Air Flow}}{\text{Free Area Velocity}}$$

$$= (3000/4.5) / 1000$$

$$= 0.667 \text{ sq.m.}$$

Step 2:
From the LOUVRE FREE AREA TABLE,
using the desired Louvre's height (e.g. 1500 mm) to determine the width with the calculated minimum required free area.

Selected Louvre Size : 1500 x 900
This Louvre free area : 0.73 sq.m.

Step 3:
Re-calculate the performance of the selected Louvre:

Free area velocity = (3000/0.73) / 1000
= 4.11 m/s

From the Nomograph, Pressure Drop = 22.5 Pa

Hence,
Selected Louvre is of 3000 l/s @ 22.5 Pa, size: 900 W x 1500 H with a free area velocity of 4.11 m/s (below water penetration point-zero).

DAMPERS

AIR DAMPER



The information given in this document is based on data and knowledge correct at the time of printing. Data is subject to change without prior notice for continual product improvement. Applications or installations outside general guidelines and code of practice are beyond our product performance guarantees.

AIR DAMPER
VCD



Dampers are used when the control or balance of 3 important functional elements of a HVAC system, Air flow, Temperature and Pressure, is needed.

DESIGN & CONSTRUCTION

ADF dampers are constructed of heavy gauge, corrosion resistant Aluminium or Galvanised Steel. Each has been designed with air flow efficiency of flanged frame and vee-blades. Blade rotations can be selected from single, parallel to opposed mode and are available in circular and rectangular shapes.

APPLICATION

ADF's range of dampers are designed base on these general applications:

Volume
Dampers are in-used to regulate air flow at the specific location in a duct system. These dampers are commonly controlled by manual or an electric actuator.

Temperature
Constructed and controlled similarly to Volume Control Dampers, these dampers are used in pairs by regulating two air streams of different temperature to reach specific temperature requirement. The pairs of dampers are usually linked together in a face and bypass or multizone-mixing arrangement.

Pressure
Backdraft or auto-shut damper are most commonly use in this application. Pressure Relief Dampers are used to control pressure at a specific location in a duct system or at a specific space.

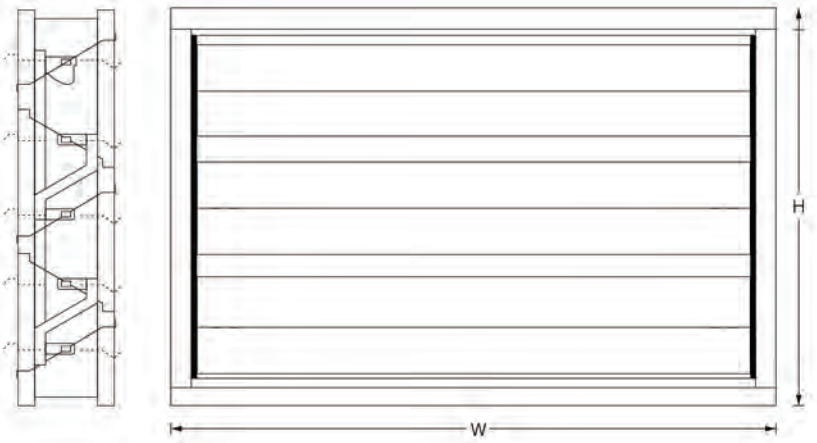
DAMPER STANDARD SPECIFICATIONS

Frame Material	Corrosion resistant Galvanised Steel / Aluminium
Frame Thickness	0.9-1.2 mm
Blade Material	Galvanised Steel
Blade Thickness	0.7-0.9 mm
Blade Width	125-150 mm
Blade Type	Vee-blade, Opposed / Parallel
Drive Shaft	Corrosion resistant Galvanised Steel
Bearings	Oilite Bronze
Linkage	Corrosion resistant Galvanised Steel
Finishes	Mill Galvanised
Size per Single Module • Minimum • Maximum	 150 x 150 mm 900 x 900 mm

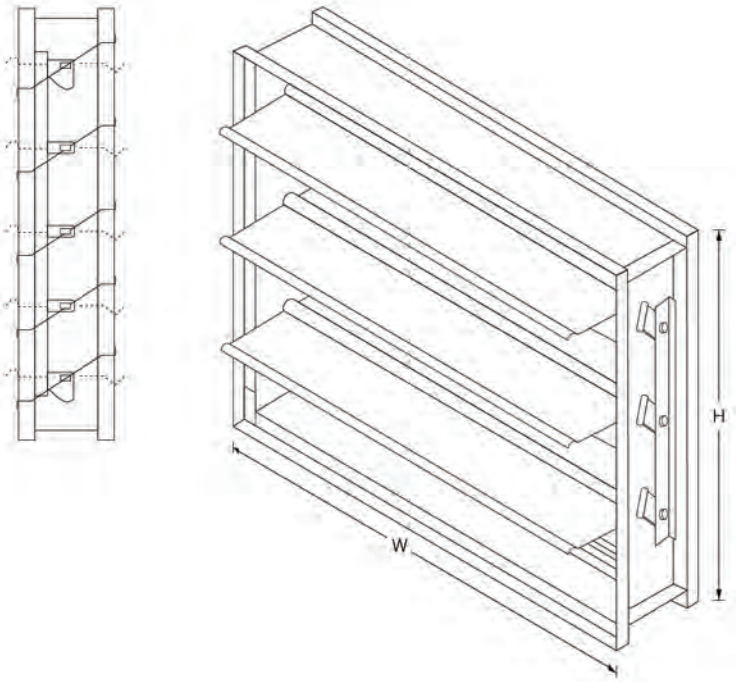
VOLUME CONTROL DAMPER

Model VCD-OB
Model VCD-PB

MODEL VCD-OB
Opposed Blades



MODEL VCD-PB
Parallel Blades

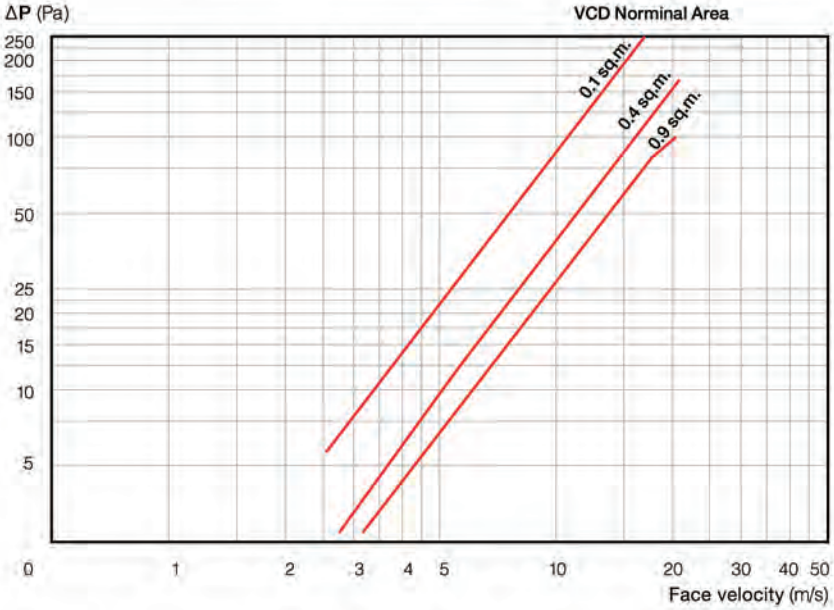


VOLUME CONTROL DAMPER

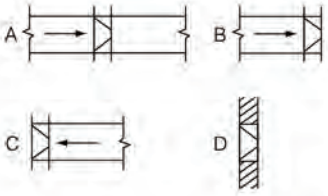
Model VCD-OB
Model VCD-PB

PERFORMANCE NOMOGRAPH

MODEL VCD-OB
FACE VELOCITY vs PRESSURE DROP
Ducted installation (Type A-0°)



TYPES OF INSTALLATION



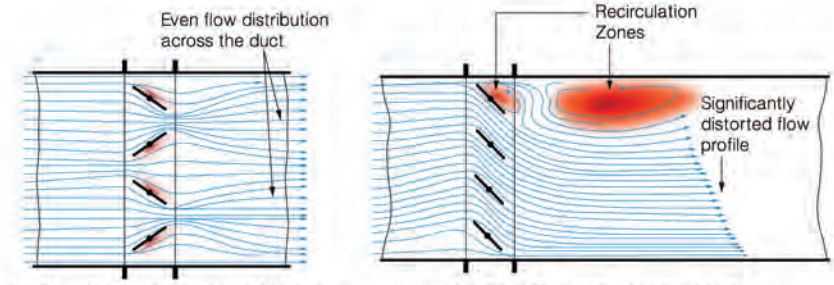
CORRECTION FACTORS

Blade Angle	Type of Installation		
	B	C	D
0°	6.0	4.0	9.0
15°	4.3	2.9	6.3
30°	2.0	1.7	2.7
45°	1.4	1.4	1.8

AIR FLOW PATTERN

Opposed Blade vs. Parallel Blade

Comparison of	Opposed Blade	Parallel Blade
Air Control	On-Off or modulating	Best suit for On-Off
Air Flow	Even air distribution	Directive air



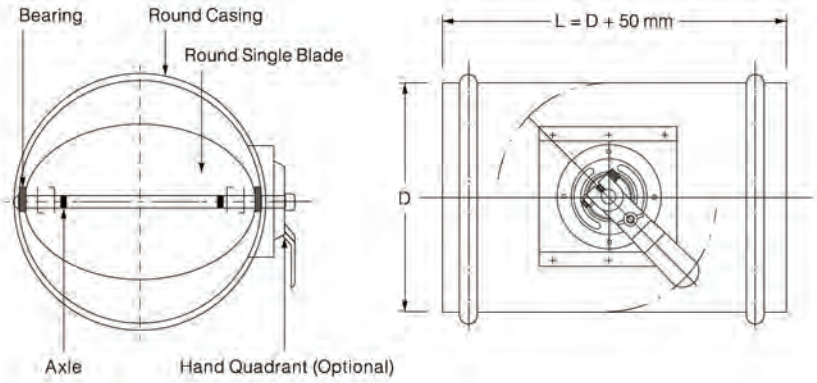
Air flow through opposed blades

Air flow through parallel blades

VOLUME CONTROL DAMPER

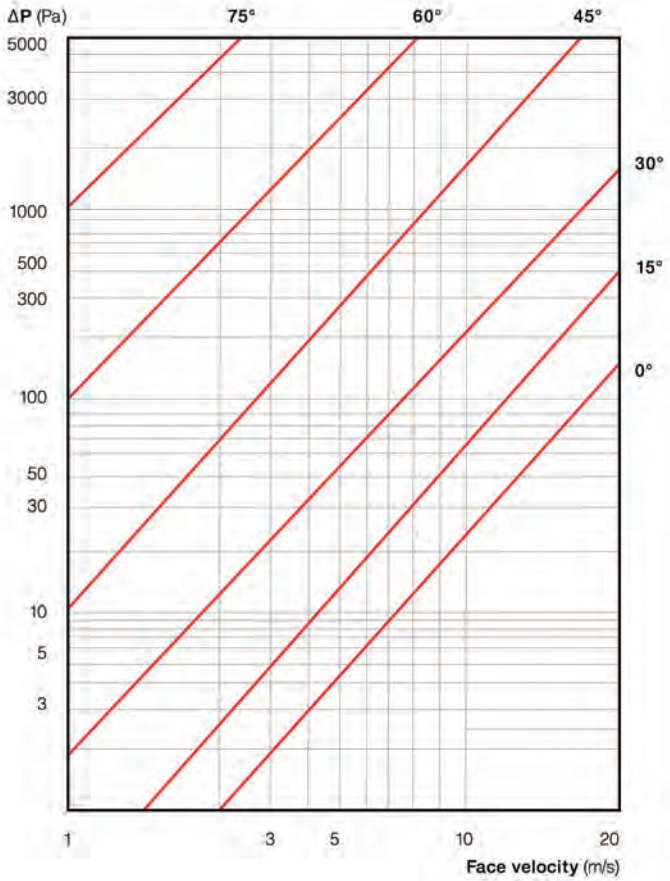
Model VCD-RB

Round or circular volume control damper consists of a round galvanised steel casing pivoting a round single flap as damper blade on a smoothly regulating bearing. This range of dampers are available from minimum size 150 mm Ø and above.



PERFORMANCE DATA

MODEL VCD-RB
FACE VELOCITY vs PRESSURE DROP
Ducted Installation (Type A)



VOLUME CONTROL DAMPER

OPTIONS OF VCD APPLICATION

MANUAL HAND LEVER (Optional - Wormgear)





ELECTRIC ACTUATOR (Motorised)



External Mounting Type



Internal Mounting Type

ACTUATOR Manufacturer's Specification

Model	ADF-ACT series / LM...NM...SM / Others
Operating	Spring Return / Power
Mode	On-Off or 3-point Modulating
Mounting	Direct-coupled : External or Internal
Auxiliary Switch	Built-in 1 SDPT
Power Supply	24 V AC/DC or 230 V AC
Frequency	50 - 60 Hz
Power	1.5 W - 5 W
Torque	5 - 40 Nm
Wire Sizing	3 - 9 VA
Rotation / Running Time	95 ° / 150 s
Max Sound Power	30 - 48 dBA
Shaft Ø	6 ... 25 mm
Casing Material	Flame resistant Polycarbonate / ABS Plastic
Overall Dimension	Approx. 120 (W) x 180 (L) x 70 (H) mm
Max Damper Face Area	2 - 6 m^2

PNEUMATIC ACTUATOR



Direct Mounting Type

ACTUATOR Manufacturer's Specification

Model	ADF-ACT series / Others
Operating	Spring Return
Mode	On-Off or Pressure Modulating
Mounting	Direct / Fixed Bracket
Control Signal	3-25 PSI
Power	20 PSI
Accessories	Solenoid valves / Auxiliary switches

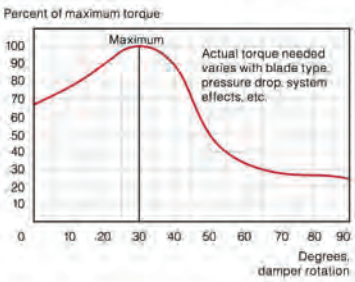
VOLUME CONTROL DAMPER

OPTIONS OF VCD APPLICATION

TORQUE

The torque is required to operate a damper dependent upon the differential pressure and air flow. Take note that typically the maximum torque requirement is at about damper 30% open position, but not at the fully closed position.

Typical Torque Requirement



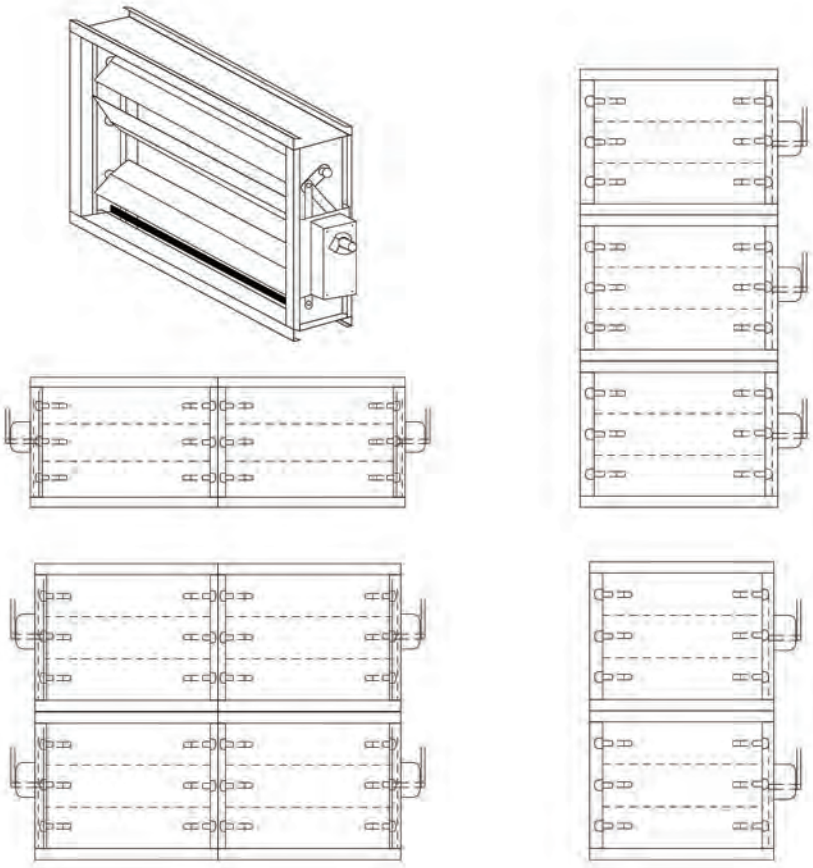
Selection Of Motors

Motors are selected by torque requirement and application type in relation to the size of the damper.

Size of Damper mm	Torque of Motor mm	Type of Motor
From 100 x 100 to 500 x 500	5	On/Off or Modulating
From 550 x 550 to 1000 x 1000	10	On/Off or Modulating
From 1050 x 1050 to 2000 x 2000	20	On/Off or Modulating

MULTIPLE MODULE ARRANGEMENT
(Manual or Motorised)

For requirement larger than the maximum damper size (900 mm x 900 mm), VCDs can be provided by assembling sections of smaller module for strength and convenience in handling and controls; and to be inter-connected so as to operate as one unit.



NON-RETURN DAMPER

Model NRD

Generally known as Auto Shut Backdraft Damper, this range of dampers only allow positive air draft to pass through from one direction, and automatically shut to prevent air flow in the reverse direction; typically used in heavy duty supply-return air bypass and also mechanical ventilation system. The parallel blades of the damper provide effective one-way air traffic and low air leakage. Various dimensions and mounting types can be manufactured to meet applications and requirements.





NRD STANDARD SPECIFICATION

Frame	0.9 mm Galvanised Steel
Frame Depth	200 mm
Parallel Blade	0.5 mm Galvanised Steel
Blade Depth	150 mm
Blade Seals	Synthetic Vinyl / Rubber
Drive Shaft	Corrosion-resistant Mild Steel
Bearings	Olite Bronze
Linkage	Corrosion-resistant Mild Steel
Finishes	Mill Galvanised
Type	V-Ducted Vertical Mounting H-Ducted Horizontal Mounting C-Ducted Circular

PERFORMANCE DATA

Inlet Velocity m/s (FPM)	Static Pressure Pa (inch w.g.)
5.0 (1000)	7.5 (0.03)
6.0 (1200)	10.0 (0.04)
7.5 (1500)	12.5 (0.05)
9.0 (1800)	22.5 (0.09)
10.0 (2000)	27.5 (0.11)
12.5 (2500)	45.0 (0.18)
15.0 (3000)	62.5 (0.25)

PRESSURE RELIEF DAMPER

Model PRD-R
Model PRD-D

Some called it Barometric Relief Damper or Weight-countering Damper, ADF pressure relief damper is rust and corrosion resistance, easy to install and maintain, mechanical operating, to suit its purpose and applications.

- Room Relief - to achieve / balance required pressures within a multi-zone area with specific room conditions; namely clean rooms and operating theatres.
- Duct Relief - to relieve built up excess pressure within a multi-zoned duct system.

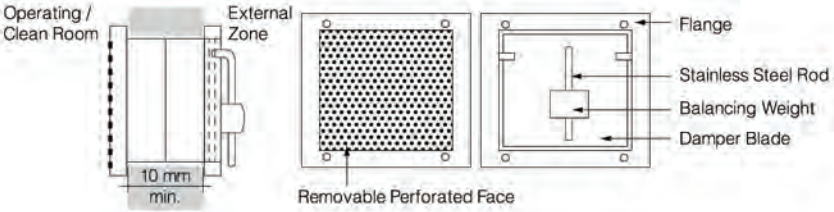
These dampers are mainly constructed by a single blade of Galvanised Steel with adjustable counterbalancing weight mounted on an extensive arm, either at the centre or by the side. Available in standard dimensions and specifications to meet various requirements.



Optional Louvred Face



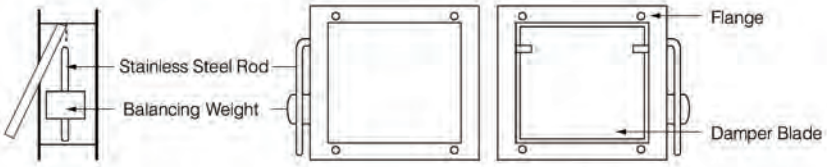
MODEL PRD-R (Room Relief)



Side View **Front View** **Back View**



MODEL PRD-D (Duct Relief)



Side View **Front View** **Back View**

STANDARD SPECIFICATION

Nominal Dimension mm	250 x 250 (10" x 10")	300 x 300 (12" x 12")	400 x 300 (16" x 12")	500 x 300 (20" x 12")	600 x 300 (24" x 12")
Air Flow, L/s (min-max)	5-83	10-167	15-250	20-333	45-440
Pressure Range, Pa	5-50				
Type	Wall mounting type c/w removable perforated face				
Frame	Hot Dip Galvanised Steel				
Blade	Hot Dip Galvanised Steel				
Shaft	Stainless Steel				
Counterbalancing Weight / Rod	Stainless Steel				
Finishes	Epoxy coated / Mill finished				
Net Dimension, mm	200 x 200	250 x 250	350 x 250	450 x 250	550 x50
Physical Weight, Kg	4.5	5.2	8.6	10.5	12.5

TECHNICAL CONSIDERATION

The information and performance data printed are as tested to specific laboratory and standard air conditions; and serve as a guide and estimation only. ACMV field installations and system designs due to many other factors will vary results.

All dampers should be installed squarely upright and free of racking for proper operation.

Overhangs, obstructions or adjacent walls could cause air current that alters or disrupts the purpose and performance of the damper, particularly Non return dampers and Pressure relief dampers.

Type of Mounting & Inlet / Outlet Conditions
Full-ducted damper has the lowest pressure drop. Inlet and outlet losses are minimized by straight duct runs.
Semi-ducted damper at inlet / outlet has a slightly higher pressure drop.
Wall mounted damper has the highest pressure drop due to its high inlet and outlet losses of large open area.

Location of Dampers
Dampers should be located away from the fan (minimum distance = 1.5 x fan Ø), restrictive fittings or elbows to ensure even distribution of air flow across the dampers.

DAMPERS

FIRE DAMPER



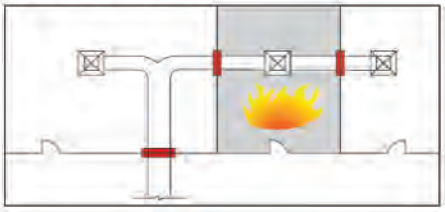
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FIRE DAMPER
DFD

Selection and installation of Fire Dampers are required by building codes to maintain safety and protection in accordance to its specified fire resistance rating of 1.5 hours to 3 hours or higher. Fire Dampers close automatically upon detection of heat by the melting of a fusible link, shutting down the opening and preventing the spread of fire and smoke.

APPLICATIONS

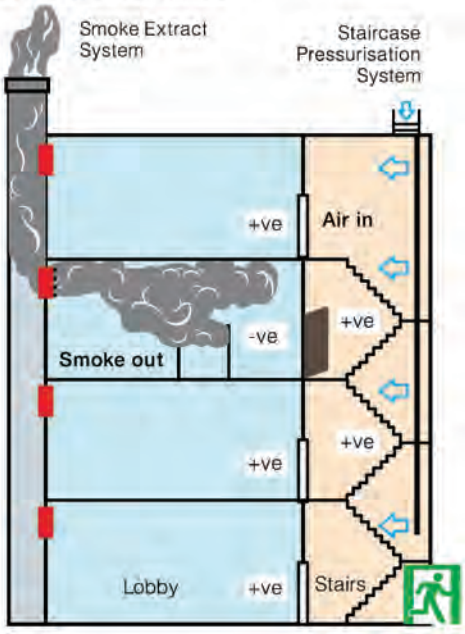
1. Fire Containment



2. Fire Spread Prevention



3. Smoke Protection



MODEL DFD-RL / DFD-RC / DFD-SP

Dynamic or static rated Fire Damper is a high performance low leakage damper. It carries both an air flow velocity rating and a pressure differential rating, of up to 15 m/s and 2000 Pa respectively. The samples of ADF DFD Fire Dampers are tested and certified by accredited laboratories of NATA Australia, SIRIM Malaysia and TÜV SÜD PSB, Singapore.

ADF DFD-RL, Louvred type and DFD-RC, Curtain type Fire Dampers are of the same functions: keep operating or totally shutdown during fire mode. Their main difference is in the blade design which varies the free area of air flow.

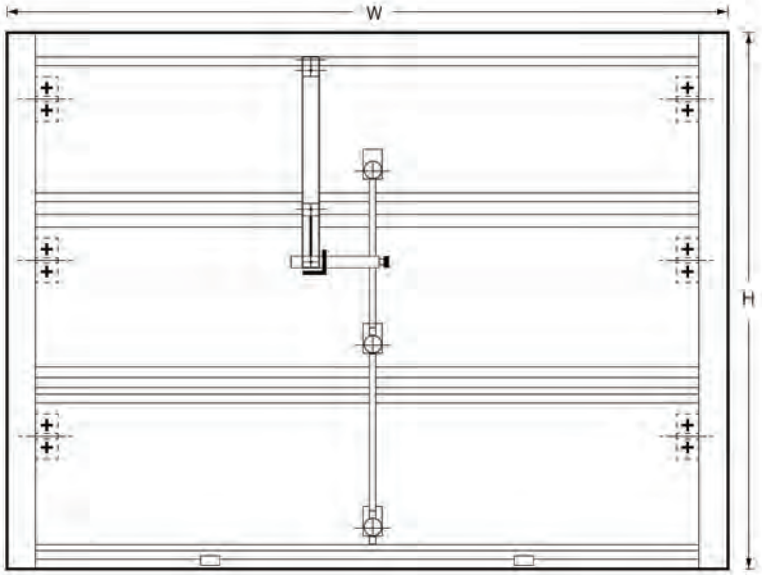
ADF DFD-SP with its high compact construction and fully sealed features, is specifically designed for fire-smoke protection of extreme low leakage. It is generally motorised operated with an electric or pneumatic actuator, and controlled by smoke or fire alarm in the building automation system.

Tested Rating		
Fire Resistance	4 hour to	AS 1530.4 AS 1682.1 BS 476 : Part 20 SS 333
Temperature	Tested to 1153 °C at 250 min	
Diff. Presure	Up to 2000 Pa	
Velocity	Up to 15 m/s	
Leakage	Conform to	AS 1682.1 SS 333 AMCA 500

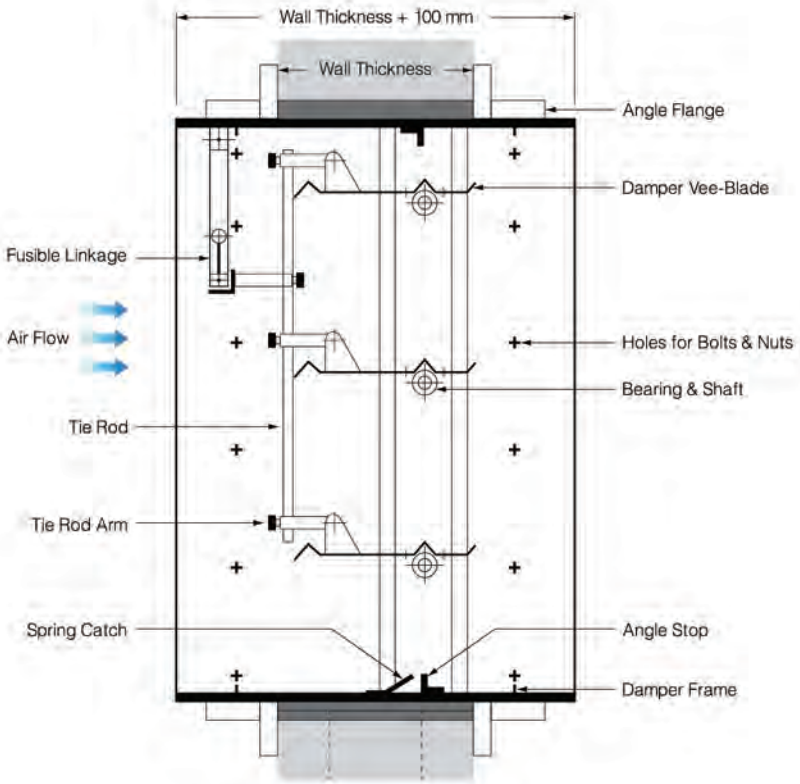
Standard Construction	
Frame	Hot Dip Galvanised Steel
Blade	Hot Dip Galvanised Steel
Seals	Fire-rated Silicone
Linkage	Stainless Steel
Bearings	Oilite Bronze
Shaft	Stainless Steel
Fusible Link	68 °C (Liquid temperature)

FIRE DAMPER
RECTANGULAR LOUVRED TYPE

Model DFD-RL



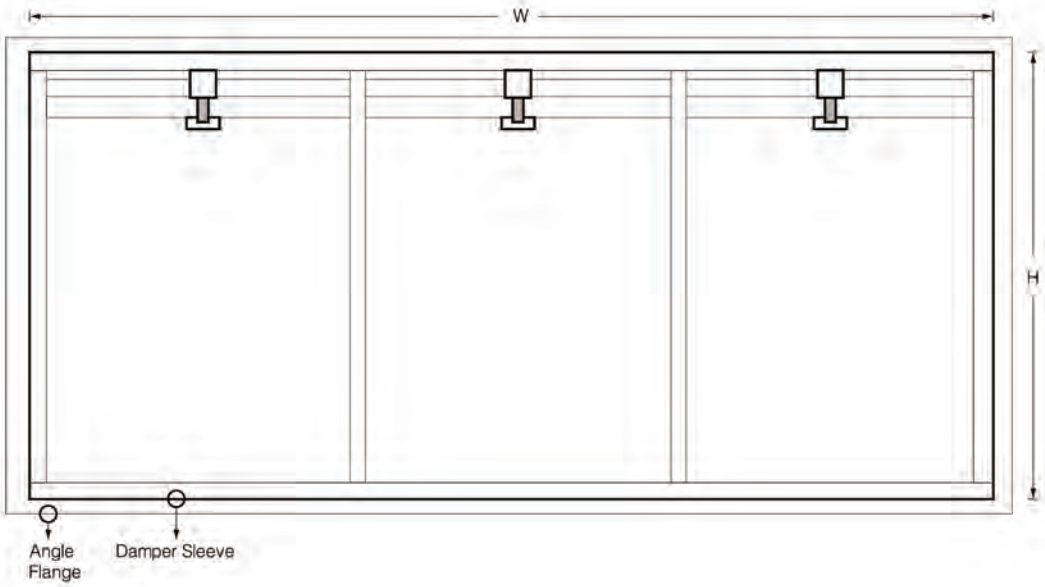
Front View in Closed Position



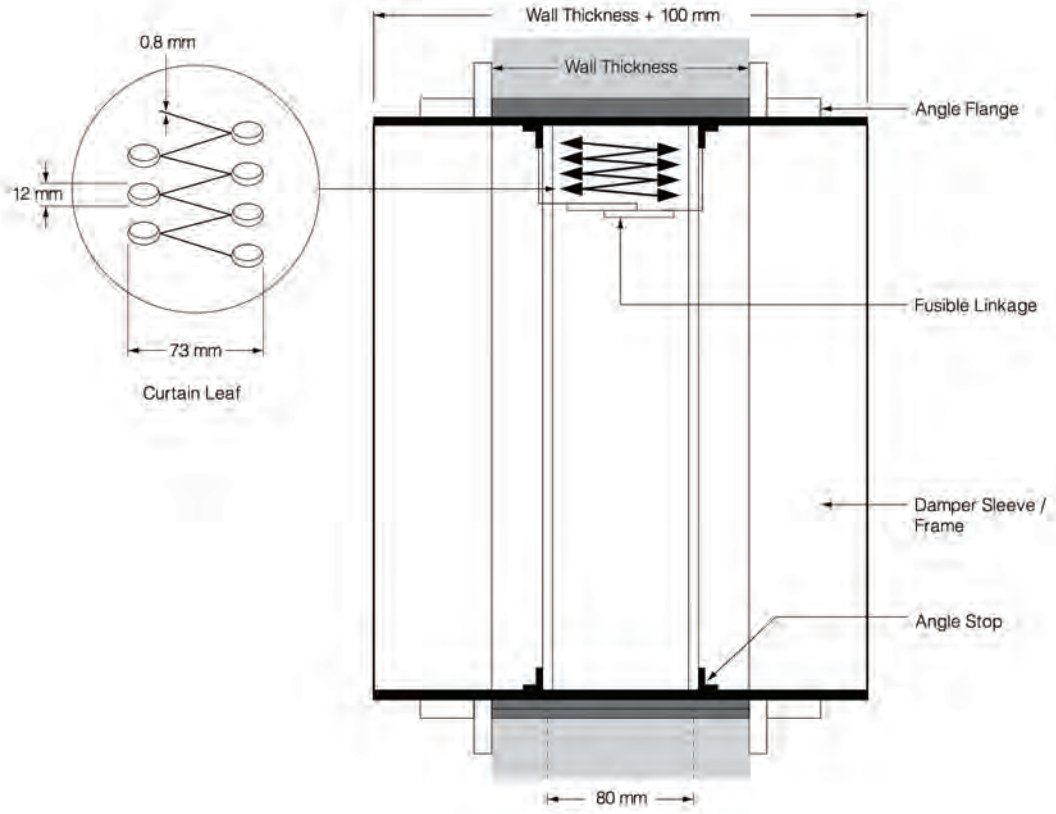
Side View in Open Position

FIRE DAMPER
RECTANGULAR CURTAIN TYPE

Model DFD-RC



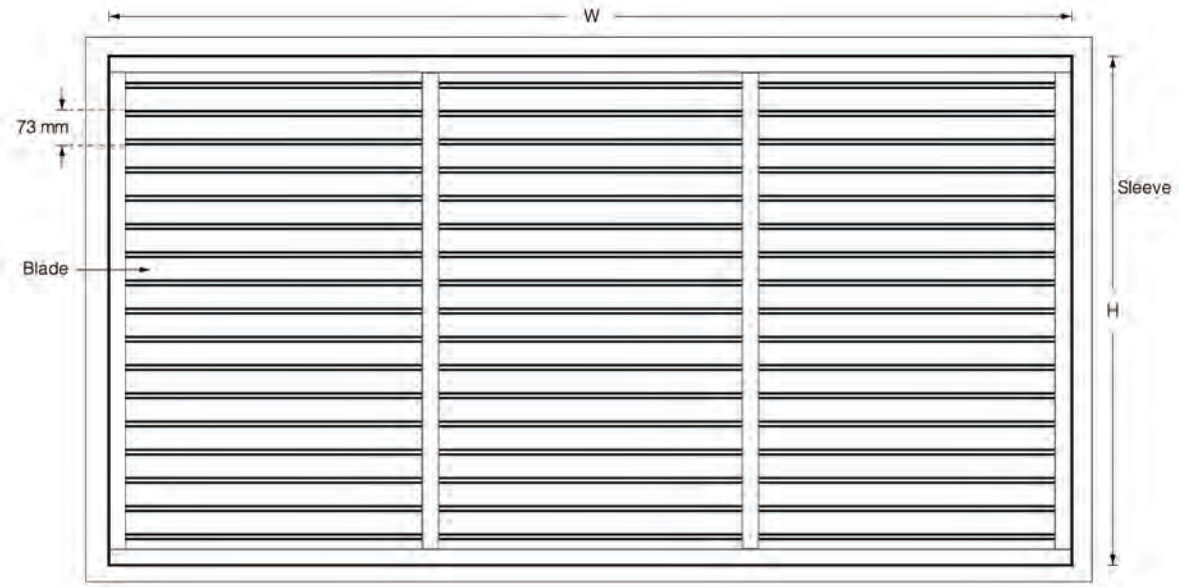
Front View in Open Position



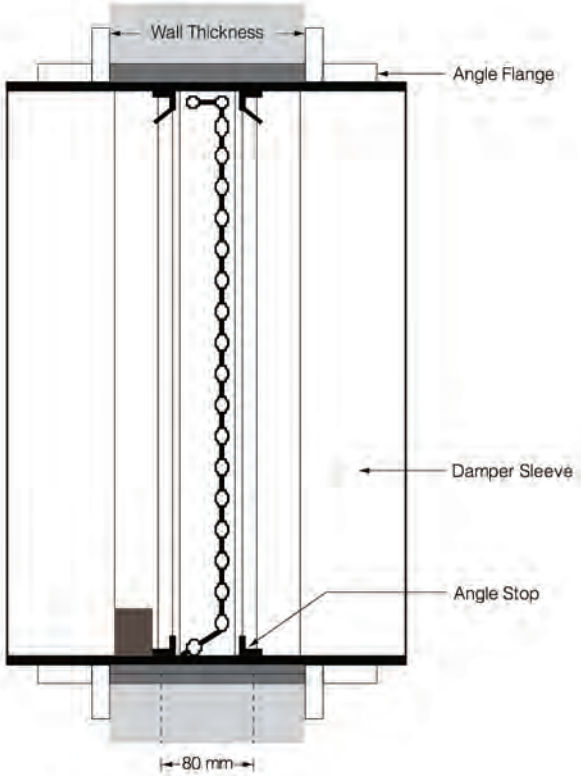
Side View in Open Position

FIRE DAMPER
RECTANGULAR CURTAIN TYPE

Model DFD-RC



Front View in Closed Position



Side View in Closed Position

FIRE DAMPER
MOTORISED FIRE DAMPER

Model DFD

The function of a motorised fire damper is to shutdown or keep regulating during fire mode; either seal off an opening or to create a pressure difference to prevent the spread of fire. The damper actuator (commonly referred as damper motor) is the operator that drives the fire damper to OPEN or CLOSED.

When a motorised fire damper is being installed, it must fit in the space available with room for wiring or conduit. After the fire damper is installed it must work properly and perform its important function for the life of the building and its occupants. The fire damper, its actuator and any optional accessories must be accessible for inspection, testing and service.

Factory Assemble
The most practical option is for the fire damper and actuator to be supplied and assembled by the factory.

Field Installation
The site contractor shall be responsible for proper selection, installation and operation of the motorised fire damper.

OPTIONAL ACTUATOR MOUNTING



External Mounting



Internal Mounting

External Mounting
The actuator and optional accessories are normally mounted externally on one side of the sleeve. ADF's standard mounting is to be on the RIGHT side. Left side or top mountings are available on special request.

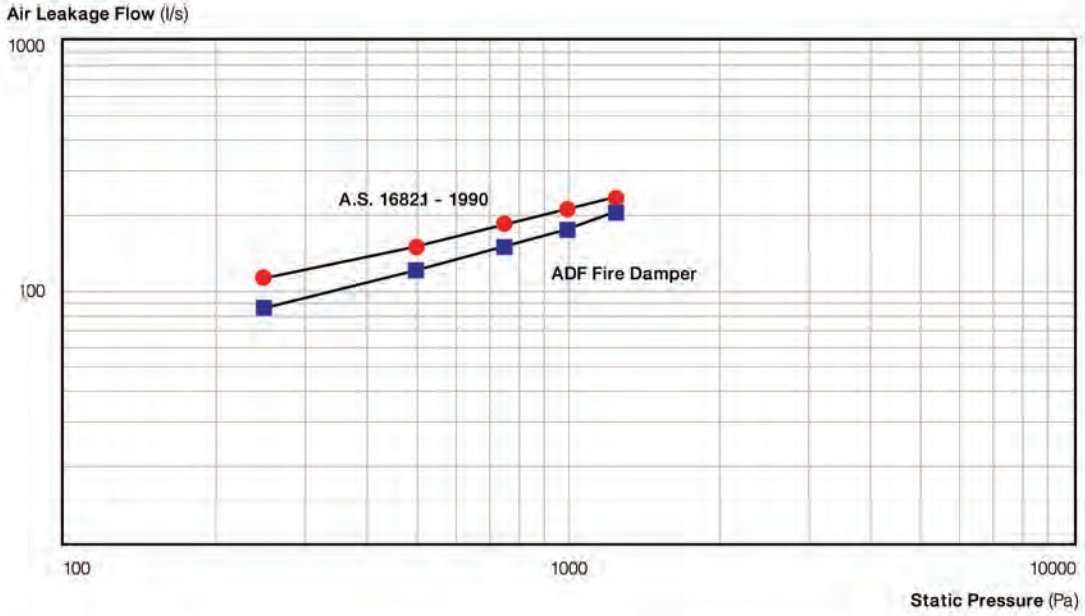
Internal Mounting
The actuator and optional accessories can be mounted at a special compartment provided within the damper sleeve. The application of this mounting option is designed for side wall grilles and louvres installation which are front accessible for inspection and maintenance.

FIRE DAMPER

Model DFD

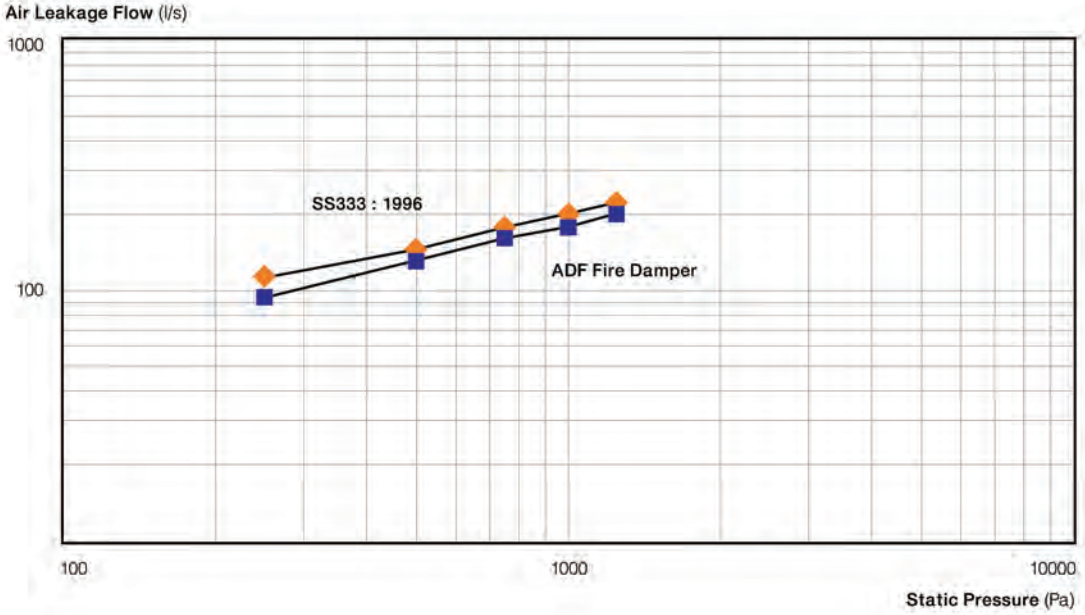
AIR LEAKAGE TEST PERFORMANCE CHART

MODEL DFD-RL
AIR LEAKAGE FLOW vs STATIC PRESSURE
(Tested to AS16821-1990)



AIR LEAKAGE TEST PERFORMANCE CHART

MODEL DFD-RL
AIR LEAKAGE FLOW vs STATIC PRESSURE
(Tested to SS333 : 1996)



FIRE DAMPER

Model DFD

INSTALLATION INSTRUCTION

1. TO DETERMINE

Clearance And Opening Size

Openings in walls or floors must be larger than the fire damper and sleeve to allow for heat expansion. Clearances required are 3 mm per every 300 mm of damper nominal width and height, to a maximum of 38 mm and must be fire-sealed.

2. TO CONNECT

Damper Sleeve To Duct Spigot

Sleeve to duct spigot assemblies must be installed using angled flanges on each side of the opening. Assemble first set of flanges on one side as shown. Align duct spigot between damper sleeve and flanges. Tighten the bolts for all sides.

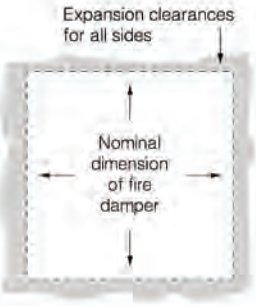
3. TO SECURE

Assembly To Opening

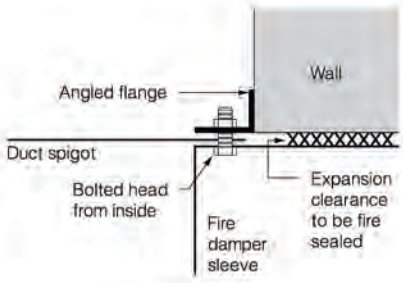
Before mounting the fire damper and duct assembly to the opening, the air flow direction must be checked. Assemble second set of flanges at the other side of opening. Fit in duct spigot then the flanges bolts.

Note

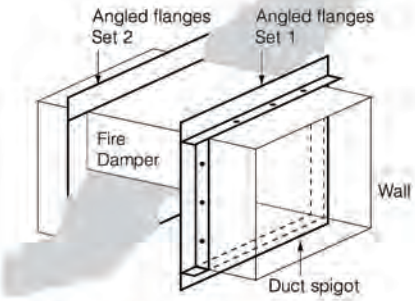
- Flanges must be completely cover the clearances space between the damper and opening, overlapping the wall or floor of minimum 25 mm for all corners.
- Flanges should only sandwich the wall or floor slab and should not be fastened to it.
- Flanges bolt heads must be from inside.



1. Front View of Wall Opening



2. Sectional View of Sleeve To Duct Assembly



3. 3D View of Damper and Duct Assembly To Wall

4. TO SET

Damper To Ready Mode

Seal duct spigots to damper sleeve for all sides. Reset spring catch and fix blades to open position with fusible link. Pre-operation test can be carried out if desired. Reset of spring catch and linkage must be done after testing.

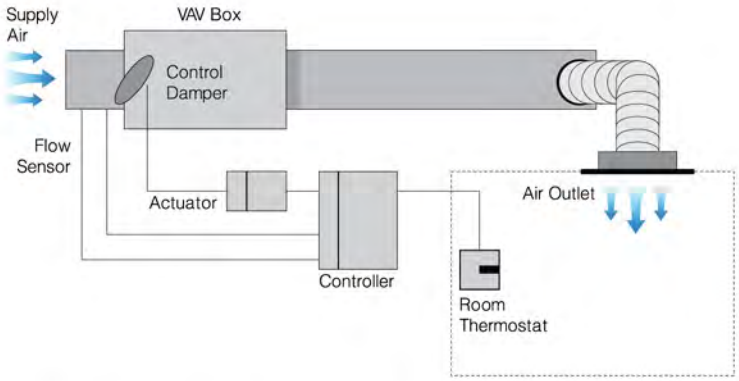
SPECIALISED

VARIABLE AIR VOLUME CONTROL SYSTEM



The information given in this document is based on data and knowledge correct at the time of printing. Data is subject to change without prior notice for continual product improvement. Applications or installations outside general guidelines and code of practice are beyond our product performance guarantees.

VARIABLE AIR VOLUME CONTROL SYSTEM



The control of air temperature in a space requires that the space loads are offset by some ways. In an air conditioning system compensating for the loads is achieved by introducing air into the space at a given temperature and volume. Since space loads are always fluctuating, the compensation to offset the loads must also be changing in a corresponding manner. Varying the air temperature or the air volume or a combination of both in a controlled manner will offset the space load as required.

A well designed VAV terminal unit allows us to vary the air volume into a room and in certain cases also lets us vary the temperature into a room to achieve the desired comfort levels



VAV TERMINAL BOX

AVB



AVB is an actuator-integrated and pressure independent terminal box, designed to monitor the air flow rate of conditioned air into an occupied space in response to a control signal usually via a room sensor or a thermostat.

PRESSURE INDEPENDENT control assures proper distribution of air to the spaces and maintains the specific comfort level of design limits. This can be achieved with the addition of a flow sensor and controller to the VAV terminal box. The controller maintains a preset volume by measuring the flow through the inlet and modulating the damper in response to the flow signal. The preset volume can be varied between calibrated limits by the thermostat output.

The efficient design of AVB enables minimum pressure drop and low noise generation for quiet operation. Its compact configuration also makes the unit suitable to use in crowded ceiling spaces and retrofitting existing systems.

FEATURES

- Pressure independent operation.
- Factory calibrated to project requirements.
- Adjustable minimum and maximum air volumes at site.
- Light-weight and compact for easy installation.
- External mounted controls is conveniently accessible.
- Stand-alone or network operation.
- 5 sensor readings per second.
- Outputs updated every second.
- Programmable time extension.
- LonMark® and BACnet® protocols available.
- Optional occupancy control by sensor or by switch on the thermostat.
- Optional programmable time extension & air quality sensing.
- Space temperature, temperature set point, date and time of the day is available.

APPLICATIONS

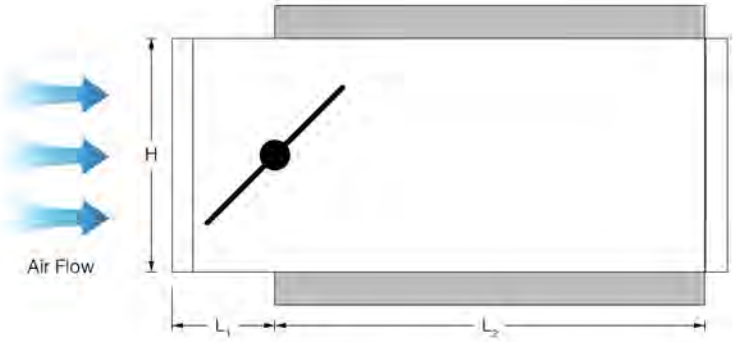
AVB's controls are configurable for the following application:

- Cooling only
- Cooling with central heating
- Cooling with 3 stage electric reheat
- Cooling with 3 stage electric reheat and serial fan assist
- Cooling with 3 stage electric reheat and parallel fan assist
- Cooling with hot water reheat
- Cooling with hot water reheat and serial fan assist
- Cooling with hot water reheat and parallel fan assist

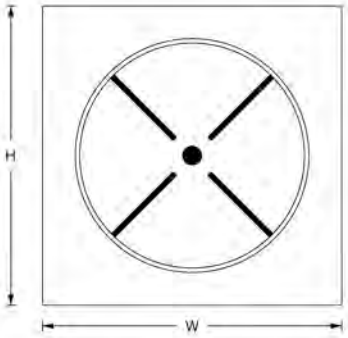
VAV TERMINAL BOX

Model AVB

PHYSICAL DIMENSION



Side Elevation



Front Elevation

Model	D mm Ø	L_1 mm	L_2 mm	W mm	H mm	Weight kg
AVB06	150	110	460	220	220	9
AVB08	200	110	460	270	270	11
AVB10	250	110	460	320	320	12
AVB12	300	110	460	370	370	14
AVB14	350	110	460	420	420	16
AVB16	400	110	460	470	470	18

VAV TERMINAL BOX

Model AVB

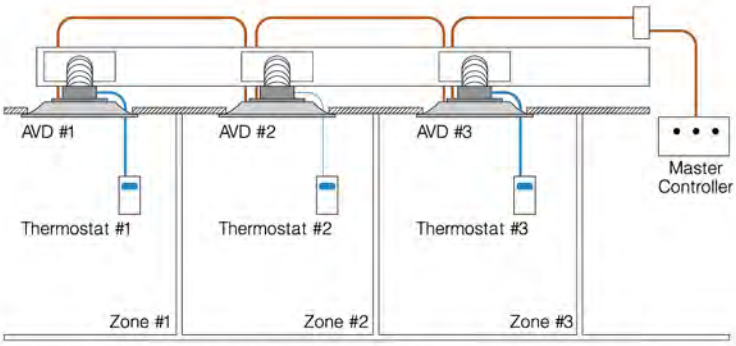
PERFORMANCE DATA

Model	Air Flow		Basic Unit Across Unit				Discharge NC At Δ Static Pressure		
			Min. Δ Static Pressure		Min. Δ Total Pressure		0.5" w.g.	1.5" w.g.	3.0" w.g.
	cfm	l/s	in w.g.	Pa	in w.g.	Pa	125 Pa	375 Pa	750 Pa
	200	94	0.01	2	0.04	10	<15	<15	16
	225	118	0.03	7	0.11	26	<15	<15	18
AVB06	300	142	0.07	17	0.19	46	<15	16	23
	350	165	0.09	22	0.25	61	<15	19	25
	400	189	0.12	30	0.32	80	<15	21	27
	450	212	0.16	40	0.42	103	20	25	29
	400	189	0.01	2	0.06	15	<15	22	26
	500	236	0.02	3	0.09	22	<15	22	29
AVB08	600	283	0.02	5	0.12	30	<15	24	31
	700	330	0.04	8	0.19	47	<15	25	33
	800	378	0.06	15	0.32	80	22	28	34
	550	260	0.01	2	0.07	16	<15	17	27
	675	319	0.01	2	0.08	19	<15	20	29
AVB10	750	354	0.02	4	0.12	28	<15	24	30
	950	448	0.03	6	0.17	42	<15	24	32
	1150	543	0.04	9	0.23	57	<15	25	34
	1350	637	0.07	16	0.36	90	24	26	35
	900	425	0.01	2	0.07	17	<15	22	30
	1050	496	0.01	2	0.08	20	<15	24	31
AVB12	1300	613	0.01	2	0.12	29	<15	24	32
	1500	708	0.02	3	0.16	40	<15	25	33
	1700	802	0.04	9	0.26	63	22	26	34
	2100	991	0.05	12	0.38	95	26	28	37
	1200	566	0.01	2	0.08	18	<15	20	30
	1600	755	0.01	2	0.11	27	<15	22	32
AVB14	2200	1038	0.02	3	0.20	50	<15	26	35
	2700	1274	0.04	9	0.34	84	22	28	36
	3200	1510	0.07	16	0.48	120	27	28	37
	1500	708	0.01	2	0.08	18	<15	18	29
	2000	944	0.01	2	0.10	24	<15	20	32
AVB16	2500	1802	0.01	2	0.15	36	<15	25	34
	3000	1416	0.02	4	0.21	52	<15	27	35
	3500	1652	0.02	5	0.28	70	24	28	36
	4000	1888	0.05	12	0.44	110	28	29	38

VAV DIFFUSER
AVD

AVD is an alternative way to control the supply air volume and engineer to maintain the coanda effect (draft free) of discharge air along the ceiling, sustained air discharge velocity throughout the air flow volume range via a wall-mounted thermostat.

Operating the diffuser from an individual wall-mounted thermostat enables users to choose their own desired comfort level. The wall-mounted thermostat will give closer temperature control and eliminate the need for a step ladder to adjust the temperature setpoint at the diffuser itself.



System Network Operation or Individual Zone Operation



FEATURES

- Wall mounted thermostatic control.
- Temperature is controlled within an individual one.
- Powerful, low voltage actuator.
- Floating-point actuators are available with LonMark® and BACnet® interface to new or existing BAS systems.
- Regulates the amount of supply air into each zone to achieve true VAV control in cooling & heating system.
- Automatic changeover from heating to cooling.
- Maximum air volume range is from 100 to 1000 CFM.
- Suitable for lay-in ceilings.
- Adjustable minimum and maximum air flows.
- Steel construction with baked enamel finish.
- 4-way discharge pattern or perforated faced.

VAV DIFFUSER

Model AVD

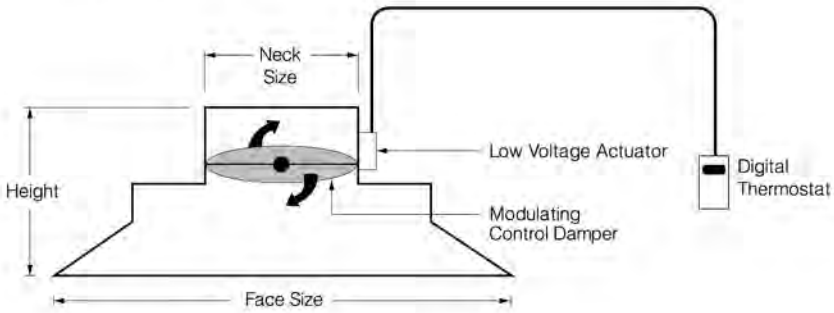
OPERATION

Diffusers incorporate an integral modulating control damper that continually regulates the volume of supply air in response to a wall-mounted thermostat.

Diffuser control options

- Electronic actuator
- LonMark® and BACnet® compatible controller
- Custom mounting of BAS controls
- Manually adjustable volume controller
- Up to 5 on/off or floating type dampers may be connected

PHYSICAL DIMENSION



Model	Neck Size mm Ø	Air Volume l/s	Height mm	Face size mm
AVD08	200	95 to 315	300	600 x 600
AVD10	250	125 to 495	300	600 x 600
AVD12	300	175 to 705	300	600 x 600
AVD14	350	165 to 840	300	600 x 600
AVD16	400	180 to 925	300	600 x 600

DIRECT DIGITAL CONTROLLER SYSTEM

AVB and AVD can be featured with LonMark® and BACnet® compliant DDC system designed to communicate on the LonTalk® and BACnet® MSTP open system using twisted pair network. It is an application specific Digital Controller for pressure-independent VAV terminal box. A differential pressure pitot-tube sensor within the DDC enables the on-board differential pressure transducer to measure the rate of air flowing through it. Temperature set-point adjustment and space temperature value can input via a wall-mounted thermostat.

Inputs

- An on-board pressure transducer
- A 10k ohms thermistor point for zone temperature control
- A digital point for occupancy sensor
- An anolog point for either air quality sensor, time extension or smoke sensor.

Outputs

- 2 x 24 VAC Triac Output for integrated damper control
- 3 x 24 VAC Triac Output for electric reheat
- 1 x 24 VAC Triac Output for serial / parallel fan

SPECIFICATIONS

Supply
- 24 VAC +/- 5%, 50-60 Hz
- Power consumption: < 6.0 VA

Communication channel
- LonWorks® : TP/FT-10 Transceiver @ 78 kbps
- BACnet® : MSTP RS-485 selectable speed 9600 / 19200 / 38400 / 76800 bps

Communication protocol
- LonTalk®
- BACnet® MSTP

Conformance to standards
- Emission : EN50081-1 (CISPR 22 Class B)
- Immunity : EN50082-1 (IEC 801-2, IEC 801-3 & IEC 801-4)

Operating Environment
- 0 to 50 degrees Celsius
- 0 to 95% RH (non-condensing)

Air Flow Sensor
- 0-3 mBar differential pressure ceramic diaphragm type
- 0 to 2.0 in. H2O (0 to 0.5 kPa) maximum for onboard flow sensor

LonMark® Functional Profile
- Supports the LonMark® Functional Profile number 8010 VAV controller

BACnet® Device Profile
- BACnet® Application Specific Controller (B-ASC)

Environmental Rating
- Operating Temperature : 32 to 125 °F (0 to 50 °C)
- Shipping Temperature : -40 to 150 °F (-40 to 65.6 °C)

Relative Humidity
- 5% to 95% non-condensing

Vibration
- V2 level

Corrosion
- Office environment

SPECIALISED

SILENCERS



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RECTANGULAR ABSORPTIVE SILENCERS

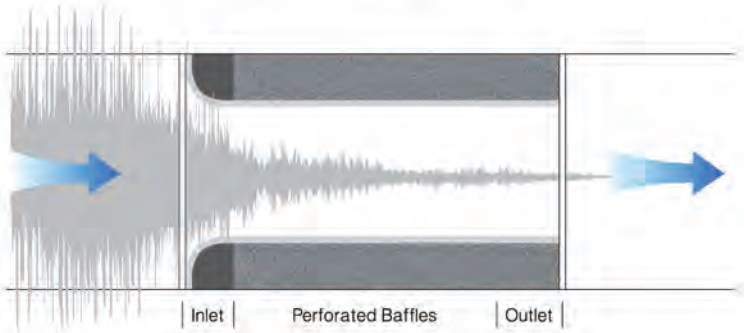
ARAS

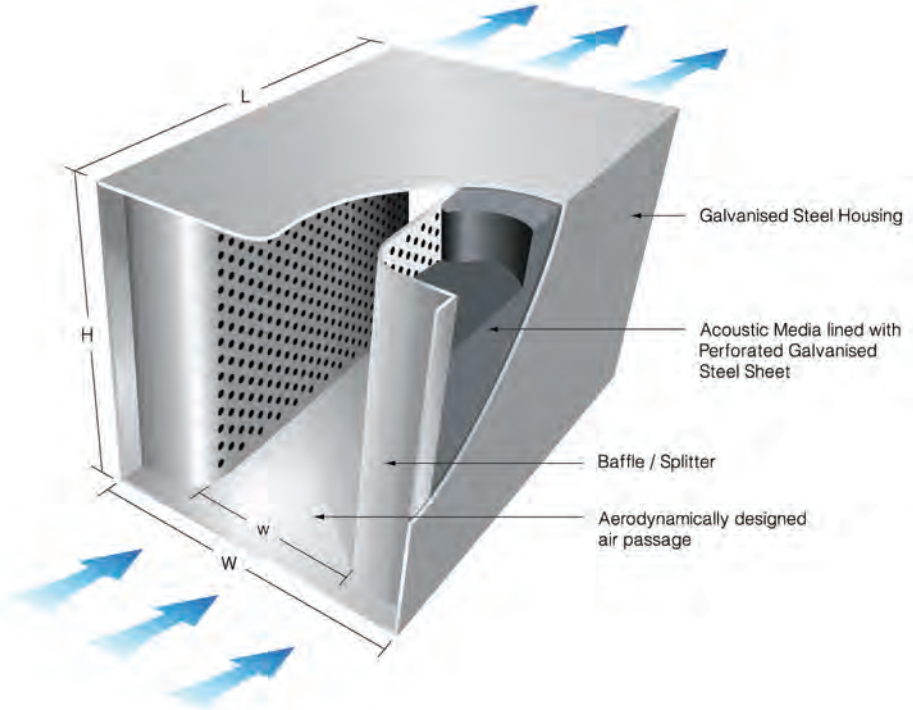
CONSTRUCTION

ADF Rectangular Absorptive Silencers, ARAS, are of high performance design in terms of sound absorption and pressure losses. This range of silencers are constructed of an external galvanised steel duct housing sets of round-ended splitters forming the air passage. The splitters are internally filled with effective sound absorbent material then lined with perforated galvanised sheet. For easy connection to the supply and/or extract rectangular ductwork system, the silencers are complete with sets of 50 mm flanges at both inlet and outlet openings.

FEATURES

- Heavy gauge hot dip galvanised steel casing.
- Round-ended splitters generate aerodynamic air flow.
- Excellent sound suppression.
- Low pressure losses.
- Economic way of noise attenuation.
- Multiple unit arrangement functions as one.





RECTANGULAR ABSORPTIVE SILENCERS

Model ARAS

PHYSICAL DIMENSION & AIR VOLUME

Model	Airway w	Unit W	Unit H	Free Area	Face Area	Face Velocity, m/s									
						4	5	6	7	8	9	10	15	20	25
	mm	mm	mm	SQ.M.	SQ.M.	Air Volume, L/s									
ARAS06	150	250	300	0.045	0.075	300	375	450	525	600	675	750	1125	1500	1875
			600	0.09	0.15	600	750	900	1050	1200	1350	1500	2250	3000	3750
			900	0.135	0.225	900	1125	1350	1575	1800	2025	2250	3375	4500	5625
ARAS08	200	300	300	0.06	0.09	360	450	540	630	720	810	900	1350	1800	2250
			600	0.12	0.18	720	900	1080	1260	1440	1620	1800	2700	3600	4500
			900	0.18	0.27	1080	1350	1620	1890	2160	2430	2700	4050	5400	6750
ARAS10	250	350	300	0.075	0.105	420	525	630	735	840	945	1050	1575	2100	2625
			600	0.15	0.21	840	1050	1260	1470	1680	1890	2100	3150	4200	5250
			900	0.225	0.315	1260	1575	1890	2205	2520	2835	3150	4725	6300	7875
ARAS12	300	400	300	0.09	0.12	480	600	720	840	960	1080	1200	1800	2400	3000
			600	0.18	0.24	960	1200	1440	1680	1920	2160	2400	3600	4800	6000
			900	0.27	0.36	1440	1800	2160	2520	2880	3240	3600	5400	7200	9000
ARAS24	600	700	300	0.18	0.21	840	1050	1260	1470	1680	1890	2100	3150	4200	5250
			600	0.36	0.42	1680	2100	2520	2940	3360	3780	4200	6300	8400	10500
			900	0.54	0.63	2520	3150	3780	4410	5040	5670	6300	9450	12600	15750

PHYSICAL WEIGHT

Model	Unit W	Unit H	Silencer Approx. Weight, Kg							
			Unit L, mm							
	mm	mm	600	900	1200	1500	1800	2100	2400	2700
ARAS06	250	300	2	3	4.5	5.6	6.8	7.9	9	10.1
		600	5	7	9	11.3	13.5	15.8	18	20.3
		900	7	10	13.5	16.9	20.3	23.6	27	30.4
ARAS08	300	300	3	4	5.4	6.8	8.1	9.5	10.8	12.2
		600	5	8	10.8	13.5	16.2	18.9	21.6	24.3
		900	8	12	16.2	20.3	24.3	28.4	32.4	36.5
ARAS10	350	300	3	5	6.3	7.9	9.5	11.0	12.6	14.2
		600	6	9	12.6	15.8	18.9	22.1	25.2	28.4
		900	9	14	18.9	23.6	28.4	33.1	37.8	42.5
ARAS12	400	300	4	5	7.2	9	10.8	12.6	14.4	16.2
		600	7	11	14.4	18	21.6	25.2	28.8	32.4
		900	11	16	21.6	27	32.4	37.8	43.2	48.6
ARAS24	700	300	6	9	12.6	15.8	18.9	22.1	25.2	28.4
		600	13	19	25.2	31.5	37.8	44.1	50.4	56.7
		900	19	28	37.8	47.3	56.7	66.2	75.6	85.1

RECTANGULAR ABSORPTIVE SILENCERS

Model ARAS

PERFORMANCE DATA

All data obtained from acoustic measurement procedures performed in general accordance with ISO 7235:1991(E)

Model	L	Attenuation in Octave Band							
		Sound Power Level, dB							
	mm	63	125	250	500	1K	2K	4K	8K
ARAS06	600	4	6	9	12	13	12	10	8
	900	5	9	13	18	20	19	14	12
	1200	8	11	18	25	26	24	18	16
	1500	9	15	22	30	33	30	23	20
	1800	10	17	26	36	40	37	28	24
	2100	12	20	31	42	46	42	32	28
	2400	15	22	35	48	53	48	37	32
	2700	16	25	40	54	59	54	41	36
ARAS08	600	3	3	8	10	12	11	9	7
	900	3	6	12	17	19	18	12	9
	1200	6	8	17	24	25	20	14	11
	1500	8	10	20	28	31	24	17	12
	1800	8	12	25	36	40	32	21	14
	2100	10	16	28	40	44	37	30	24
	2400	12	18	33	46	50	45	33	27
	2700	15	22	37	51	55	50	39	34
ARAS10	600	2	3	7	8	10	10	8	6
	900	2	5	11	15	18	14	9	6
	1200	6	8	15	20	22	17	12	9
	1500	7	9	17	25	29	22	13	9
	1800	7	11	21	30	35	29	16	10
	2100	9	13	25	37	40	31	16	10
	2400	10	14	27	40	44	33	17	12
	2700	11	13	28	35	39	30	18	14
ARAS12	600	2	3	4	6	7	6	6	4
	900	2	5	7	9	10	10	7	6
	1200	6	6	9	13	13	12	9	8
	1500	6	8	11	15	17	15	12	10
	1800	8	8	13	18	20	19	14	12
	2100	8	10	15	21	23	21	16	14
	2400	10	11	18	24	26	24	18	16
	2700	10	13	20	27	30	27	21	18
ARAS24	600	1	2	2	3	3	3	3	2
	900	2	3	3	5	5	6	3	3
	1200	3	3	4	7	7	6	5	4
	1500	3	5	6	8	8	8	6	5
	1800	4	4	7	9	10	10	7	6
	2100	4	5	8	11	12	11	8	7
	2400	6	6	9	12	13	12	9	8
	2700	55	6	10	14	15	14	10	9

RECTANGULAR ABSORPTIVE SILENCERS

Model ARAS

PERFORMANCE DATA

Model	L	Face Velocity, m/s									
		4	5	6	7	8	9	10	15	20	25
	mm	Pressure Loss, Pa									
ARAS06	600	15	23	35	50	68	81	100	-	-	-
	900	20	28	40	55	73	86	105	-	-	-
	1200	25	33	45	60	88	91	110	-	-	-
	1500	30	38	50	65	93	96	115	-	-	-
	1800	35	43	55	70	98	101	120	-	-	-
	2100	40	48	60	75	103	106	125	-	-	-
	2400	45	50	65	80	108	111	130	-	-	-
	2700	50	53	70	85	113	116	135	-	-	-
ARAS08	600	-	13	19	25	35	44	55	130	-	-
	900	12	18	24	30	40	49	60	135	-	-
	1200	17	23	29	35	45	54	65	140	-	-
	1500	22	28	34	40	50	59	70	145	-	-
	1800	27	33	39	45	55	64	75	150	-	-
	2100	32	38	44	50	60	69	80	155	-	-
	2400	37	43	49	55	65	74	85	160	-	-
	2700	42	48	54	60	70	79	90	165	-	-
ARAS10	600	-	-	12	17	24	27	35	80	160	-
	900	-	12	17	22	29	32	40	85	165	-
	1200	12	17	22	27	34	37	45	90	170	-
	1500	17	22	27	32	39	42	50	95	175	-
	1800	22	27	32	37	44	47	55	100	180	-
	2100	27	32	37	42	49	52	60	105	185	-
	2400	32	37	42	47	54	57	65	110	190	-
	2700	37	42	47	52	59	62	70	115	195	-
ARAS12	600	-	-	-	12	15	19	25	60	110	152
	900	-	-	12	17	20	24	30	65	115	157
	1200	-	12	17	22	25	29	35	70	120	162
	1500	12	17	22	27	30	34	40	75	125	167
	1800	17	22	27	32	35	39	45	80	130	172
	2100	22	27	32	37	40	44	50	85	135	177
	2400	27	32	37	42	45	49	55	90	140	182
	2700	32	37	42	47	50	54	60	95	145	187
ARAS24	600	-	-	-	-	-	10	28	50	80	130
	900	-	-	-	-	10	15	33	55	85	135
	1200	-	-	-	10	15	20	38	60	90	140
	1500	-	-	10	15	20	25	43	65	95	145
	1800	-	10	15	20	25	30	48	70	100	150
	2100	10	15	20	25	30	35	53	75	105	155
	2400	15	20	25	30	35	40	58	80	110	160
	2700	20	25	30	35	40	45	63	85	115	165

TUBULAR ABSORPTIVE SILENCERS

ATAS / PATAS

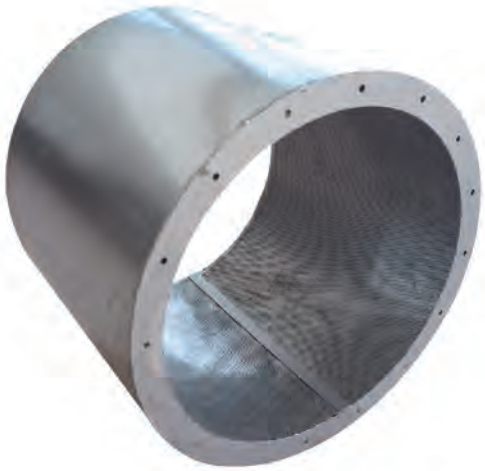
ADF Tubular Absorptive Silencers, ATAS, are rigidly constructed of an outer tubular galvanised steel casing, internally lined with effective sound absorbent material and perforated galvanised sheet which form an inner tubular air passage.

Series PATAS of the same range of products are specially fitted with a concentric pod bracketed firmly at the tubular air passage. This central pod is of same acoustic material in purpose to provide higher attenuation performance.

This range of silencers are fabricated with sets of special flanges for direct and easy connection to fan unit or ductwork.

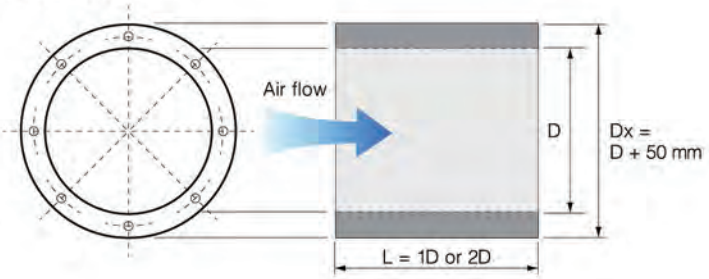
FEATURES

- Good sound suppression.
- Low pressure losses.
- Easy connection to fan or duct.
- Suitable for high pressure fan or duct system.

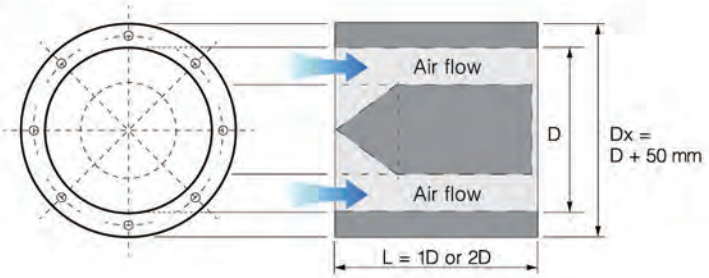




Model ATAS



Model PATAS



TUBULAR ABSORPTIVE SILENCERS

Model ATAS / PATAS

PHYSICAL DIMENSIONS & WEIGHT

Unit Model	Internal	External	ATAS / PATAS		ATAS		PATAS	
	D	Dx	1D L	2D L	1D Weight	2D Weight	1D Weight	2D Weight
	mm Ø	mm Ø	mm	mm	Kg	Kg	Kg	Kg
250	250	300	250	500	7.1	14.1	8.2	16.5
300	300	350	300	600	9.9	19.8	11.5	23.1
350	350	400	350	700	13.2	26.4	15.4	30.8
380	380	430	380	760	15.4	30.8	18.0	35.9
400	400	450	400	800	17.0	33.9	19.8	39.6
450	450	500	450	900	21.2	42.4	24.7	49.5
500	500	550	500	1000	25.9	51.8	30.2	60.5
560	560	610	560	1120	32.2	64.4	37.6	75.1
600	600	650	600	1200	36.8	73.5	42.9	85.8
630	630	680	630	1260	40.4	80.8	47.1	94.2
710	710	760	710	1420	50.9	101.7	59.3	118.7
800	800	850	800	1600	64.1	128.2	74.8	149.5
900	900	950	900	1800	80.6	161.2	94.0	188.0
960	960	1010	960	1920	91.4	182.8	106.6	213.2
1000	1000	1050	1000	2000	99.0	197.9	115.5	230.9
1150	1150	1200	1150	2300	130.1	260.1	151.7	303.5
1200	1200	1250	1200	2400	141.4	282.7	164.9	329.9
1250	1250	1300	1250	2500	153.2	306.3	178.7	357.4
1300	1300	1350	1300	2600	165.4	330.8	193.0	385.9
1400	1400	1450	1400	2800	191.3	382.6	223.2	446.4
1500	1500	1550	1500	3000	219.1	438.3	255.6	511.3
1530	1530	1580	1530	3060	227.8	455.7	265.8	531.6
1600	1600	1650	1600	3200	248.8	497.6	290.3	580.6
1750	1750	1800	1750	3500	296.9	593.8	346.4	692.7
1800	1800	1850	1800	3600	313.8	627.7	366.2	732.3
2000	2000	2050	2000	4000	386.4	772.8	450.8	901.6
2400	2400	2450	2400	4800	554.2	1108.4	646.5	1293.1

TUBULAR ABSORPTIVE SILENCERS

Model ATAS / PATAS

PERFORMANCE DATA

All data obtained from acoustic measurement procedures performed in general accordance with ISO 7235:1991(E)

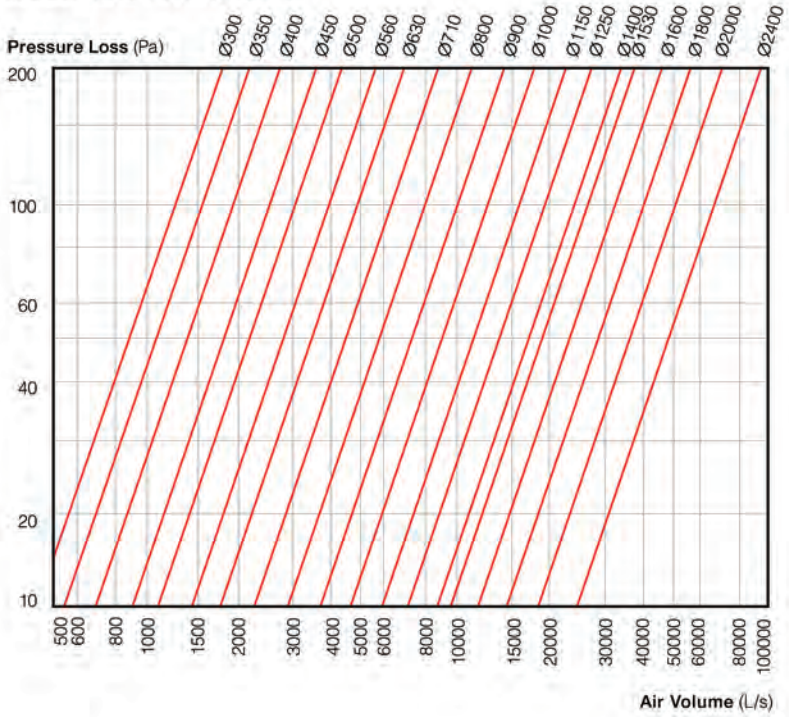
Model			Attenuation in Octave Band							
Nominal Fan mm	Type	L D = Fan Ø	63	125	250	500	1k	2k	4k	8k
250, 300, 350, 380	ATAS	1D	1	2	4	8	12	9	7	6
	PATAS		2	5	7	12	19	18	16	13
	ATAS	2D	3	5	9	14	20	16	13	12
	PATAS		5	8	13	20	27	26	25	20
400, 450, 500, 560, 600, 630	ATAS	1D	2	3	6	12	14	10	8	7
	PATAS		3	6	9	15	21	19	15	12
	ATAS	2D	5	8	11	21	23	17	15	10
	PATAS		6	10	15	26	30	32	28	22
710, 800, 900, 960	ATAS	1D	3	4	7	13	14	8	7	5
	PATAS		5	6	10	18	24	17	15	11
	ATAS	2D	6	8	13	22	20	13	12	10
	PATAS		8	11	19	27	29	27	23	19
1000, 1150, 1200, 1250	ATAS	1D	3	4	9	14	14	8	7	6
	PATAS		4	6	11	19	19	13	12	11
	ATAS	2D	6	9	15	21	18	11	11	10
	PATAS		9	12	20	27	28	27	22	17
1300, 1400, 1500, 1530	ATAS	1D	4	6	11	13	10	7	5	4
	PATAS		5	7	12	17	17	12	10	8
	ATAS	2D	8	9	15	21	18	11	11	10
	PATAS		0	13	21	26	28	25	18	15
1600, 1750, 1800, 2000, 2400	ATAS	1D	4	6	11	13	9	6	5	5
	PATAS		5	7	12	17	16	12	10	8
	ATAS	2D	8	9	15	20	17	10	9	8
	PATAS		10	14	21	26	28	26	19	15

TUBULAR ABSORPTIVE SILENCERS

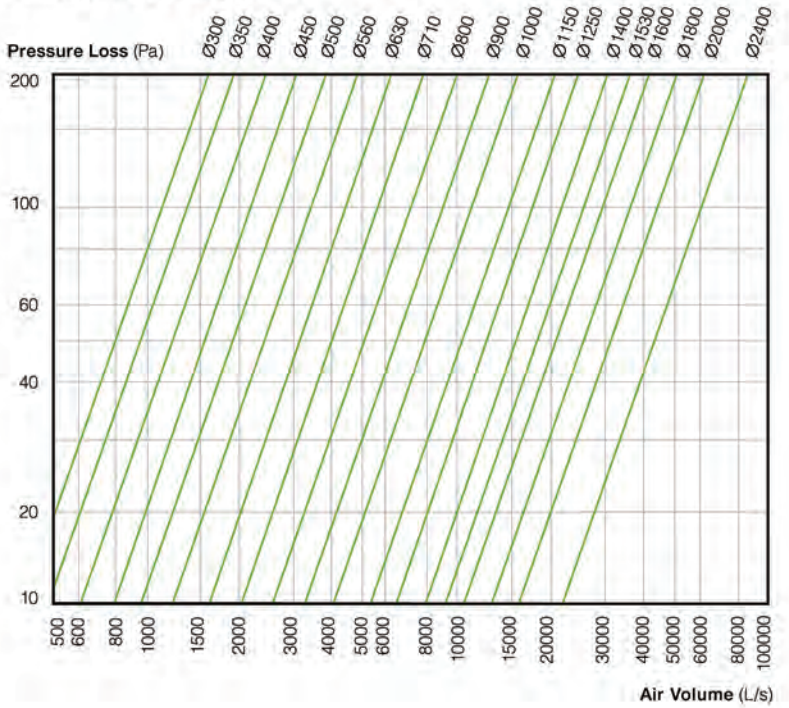
Model ATAS / PATAS

PRESSURE LOSS NOMOGRAPH

Model ATAS / PATAS (L=1D)



Model ATAS / PATAS (L=2D)



ABSORPTIVE SILENCERS

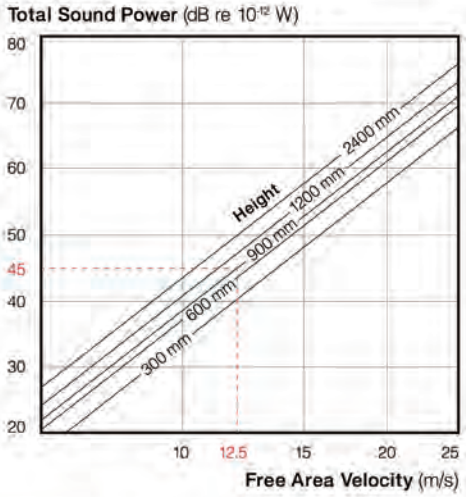
Model ARAS
Model ATAS / PATAS

FLOW GENERATED NOISE

A silencer is considered the source for a series of flow transitions which may be abrupt and resulted a set of flow generated noise. This flow generated noise can be predicted in terms of Free Area Velocity or Face Velocity :

Method 1 : Free Area Velocity

$$\text{Free Area Velocity (m/s)} = \frac{\text{Air Volume (L/s) x 1000}}{\text{Face Area (m}^2\text{)}}$$



No. of Airways	Correction Factors
2	+3 dB
3	+5 dB
4	+6 dB
5	+7 dB
6	+8 dB
8	+9 dB
10	+10 dB

Octave Band	63	15	50	500	1K	2K	4K	8K
Sound Power, dB	45	45	45	45	45	45	45	45
Correction	-2	-2	-8	-12	-21	-23	-27	-21
Flow Generated Noise, dB	43	43	37	33	24	22	18	24

**Example in RED

Method 2 : Face Velocity

$$\text{Face Velocity (m/s)} = \frac{\text{Air Volume (L/s) x 1000}}{\text{Face Area (m}^2\text{)}}$$

Frequency, Hz	125	250	500	1k	2k	4k	8k
Silencer Face Velocity m/s	Silencer Flow Generated Noise Sound Power Level, dB						
5	32	36	34	31	32	29	21
7.5	47	45	43	40	42	40	34
10	54	52	50	47	48	47	44
15	64	60	58	56	58	59	57
20	72	67	65	63	64	67	67

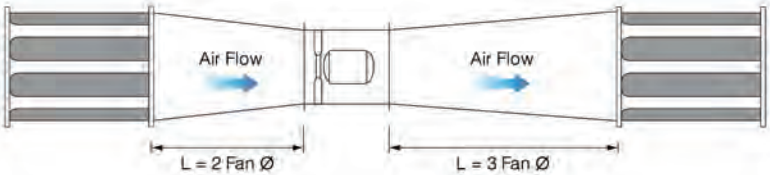
ABSORPTIVE SILENCERS

Model ARAS
Model ATAS / PATAS

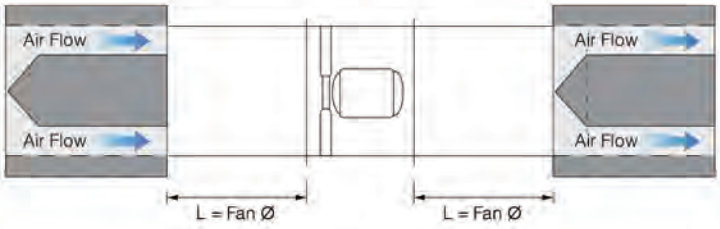
TECHNICAL CONSIDERATION

Recommended connection details to ensure effective performance of silencers:

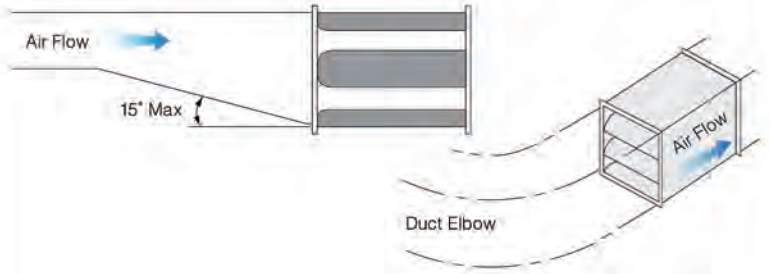
Fan Unit Connection for Rectangular Silencers



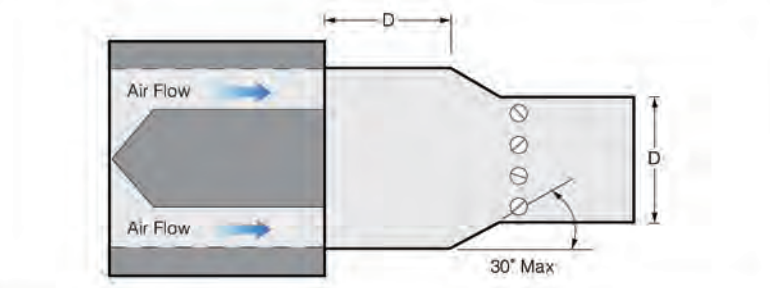
Fan Unit Connection for Tubular Silencers



Ductwork and Elbow Connection for Rectangular Silencers



Ductwork Connection



NOISE CRITERIA FOR VENTILATION NOISE CONTROL

Studios and Auditoriums :

Sound Broadcasting (drama)	15
TV Broadcasting (general), Recording Studio	20
Audience Studio	25
Concert Hall, Theatre	20 - 25
Lecture Theatre, Cinema	25 - 30

Hospitals:

Audiometric Room	20 - 25
Operating Theatre, Single Bed Ward	30 - 35
Multi-Bed Ward, Waiting Room	35
Corridor, Laboratories	35 - 40
Staff Room, Recreation Room	30 - 40
Wash Room, Toilet, Kitchen	35 - 45

Hotels:

Individual Room, Suite	20 - 30
Ballroom, Banquet Room	30 - 35
Corridor, Lobby	35 - 40
Kitchen, Laundry	40 - 45

Restaurants and Stores:

Restaurant, Departmental Stores	35 - 40
Night Club, Canteen, Cafeteria, Supermarket	40 - 45

Private Residence and Apartments:

Bedroom	25
Living Room	30

Offices:

Boardroom, Large Conference Room	25 - 30
Meeting Room, Executive Office, Reception	30 - 35
Open Concept Office	35
Computer Room, Drawing Room	35 - 45

Public Buildings:

Court Room	25 - 30
Assembly Hall	25 - 35
Library, Bank, Museum	30 - 35
Washroom, Toilet	35 - 45
Swimming Pool, Sports Arena	40 - 50
Garage, Car Park	55

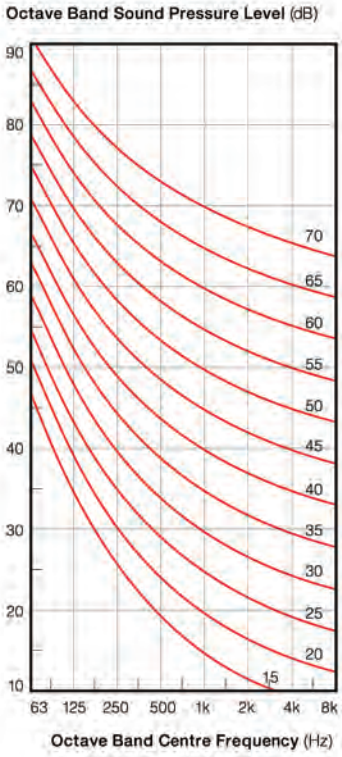
Churches and Academic Buildings:

Church	25 - 30
Classroom, Lecture Theatre	25 - 35
Laboratory, Workshop	35 - 40
Corridor, Gymnasium	35 - 45

Industrial:

Warehouse, Garage	45 - 50
Light Industrial Factory	45 - 55
Heavy Industrial Factory	50 - 65

Noise Rating Curves



ACCESSORIES







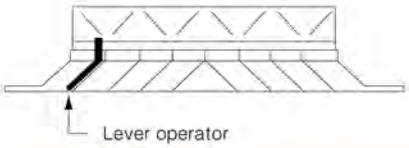
The information given in this document is based on data and knowledge correct at the time of printing. Data is subject to change without prior notice for continual product improvement. Applications or installations outside general guidelines and code of practice are beyond our product performance guarantees.

ACCESSORIES

Most accessories are auxiliary components, optional or independent to the air distribution products. However, their unique features and applications are important in facilitating, balancing and enhancing air movements to achieve specific requirements, or any other functions thereof.

OPPOSED BLADE DAMPER
Model OBD

This range of dampers helps to balance and control the air volume; they are generally mounted directly at the neck or with adaptors and sized to suit. Its blades can be easily adjusted from fully closed to fully opened via the face of air outlets, either of type S-Screwdriver operated or type L-Lever operated.





RADIAL BLADE DAMPER
Model RBD

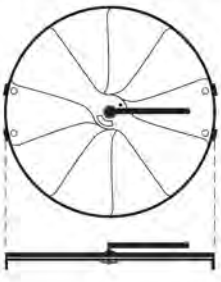
This range of dampers is generally mounted directly or with adaptors in round neck applications, to provide air volume control. The multiple radial blade are adjustable conveniently to offer minimum to maximum radial air flow.





RADIAL ROTATING DAMPER
Model RRD

This range of dampers is widely used in round neck applications, operating with minimum blade protrusion, and best suitable with flexible duct. Also called Radial Sliding Damper, its gang-operating blades can be slide to various angles via an extended lever to function effectively.





ACCESSORIES

ROUND FLAP DAMPER
Model RFD





OVAL FLAP DAMPER
Model OFD





DETACHABLE FRAME
Model DFF / DFS





ADAPTORS (Damper Optional)
Model AD-RS (Round-to-Square)
Model AD-SS (Square-to-Square)





ACCESSORIES

PLENUM BOX

Model PLR or PLO
Model PTR or PTO

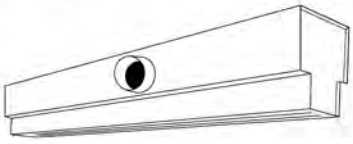


PHYSICAL DIMENSION

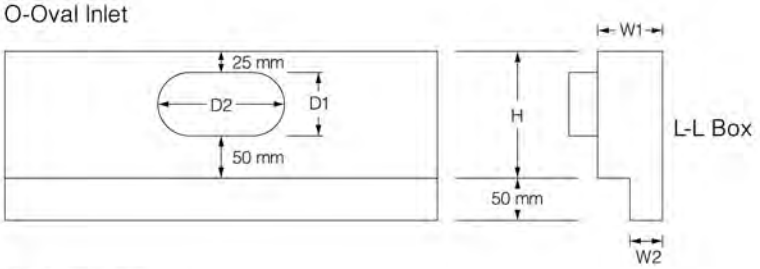
Model PLO



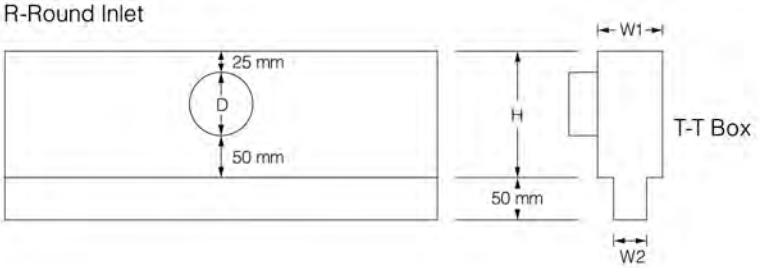
Model PTR



O-Oval Inlet



R-Round Inlet



ALD Slot	W1	W2	Round Inlet		Oval Inlet	
			D Ø	H	D1 x D2	H
	mm	mm	mm	mm	mm	mm
1	77	39	150	225	75 x 150	150
2	115	77	200	275	125 x 250	200
3	153	115	250	325	150 x 300	225
4	191	153	300	375	200 x 400	275
5	229	191	350	425	225 x 450	300
6	267	229	350	425	225 x 450	300
7	305	267	350	425	225 x 450	300
8	343	305	350	425	225 x 450	300

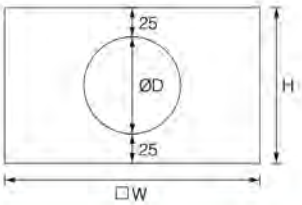
ACCESSORIES

PLENUM BOX PERFORMANCE DATA

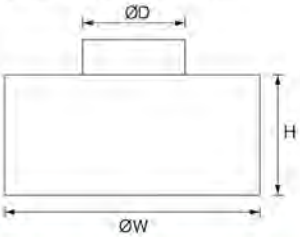
Inlet Velocity, m/s	1.5	2.0	2.5	3.0	3.5	4.0
ΔP, Pa	2	4	6	8	12	16
NR	15	20	25	30	35	40
Inlet Size, mm	Inlet Air Volume, L/s					
100 Ø	10	15	20	22	25	30
125 Ø	17	25	30	35	40	48
150 Ø	25	35	40	50	60	70
175 Ø	35	45	55	70	85	95
200 Ø	45	60	70	90	110	120
225 Ø	57	78	95	118	140	150
250 Ø	70	95	120	145	170	190
275 Ø	85	115	145	170	205	230
300 Ø	105	140	170	210	240	275
325 Ø	120	160	200	240	280	320
350 Ø	140	190	235	280	325	375
400 Ø	185	245	310	370	430	495
75 x 150	50	70	85	100	120	135
125 x 250	140	196	240	295	340	390
150 x 300	210	280	350	420	490	560
200 x 400	375	500	625	750	875	1000
225 x 450	480	640	800	960	1120	1280

CUSTOMISED PLENUM BOX

Code PSS
Square box-Side inlet

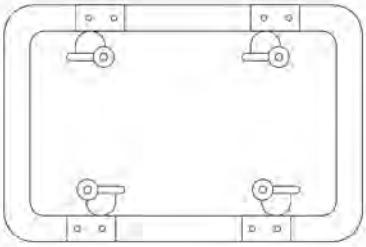


Code PCC
Circular box-Top inlet

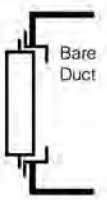


ACCESS DOOR-REMOVABLE HINGE

Model AD



Flush-Fit Type



Surface-Fit Type



Code	Door Opening Size mm	No. of Hinges
ADX	600 x 500	4
ADL	500 x 350	4
ADM	350 x 350	2
ADS	200 x 150	2

ACCESSORIES

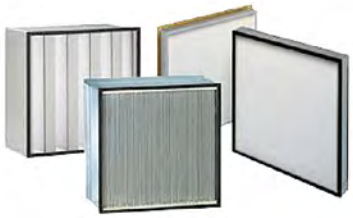
Insect Screen



Washable Filter



Hepa Filter



Worm Gear



Hand Lever



GENERAL GUIDE

PERFORMANCE NOTE

1. The information given in this document is based on data and knowledge correct at printing time.

2. Data is subject to change without prior notice due to continual products improvement.

3. Samples of each product are tested and data obtained in accordance with ADC Test code 1062:GRD-84 and Australian Standard 1217.2-1985; unless otherwise stated.

4. All data tabulated without balancing damper. Apply correction factors if in used:
   Pressure Drop – printed ΔP x 1.10
   Noise Rating – printed NR + 5

5. All readings and dimensions are in metric rounded to the nearest decimals, unless otherwise stated.

6. Air throw projections are tabulated at terminal velocity of 0.25 m/s under isothermal conditions.

7. NR values are based on a room absorption of 10 dB re 10^{-12} watts for each air outlet.

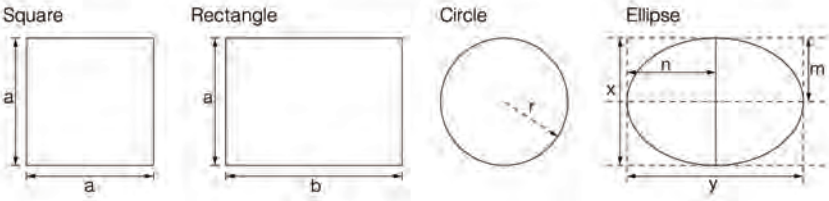
8. Applications or installations outside general guidelines and code of practice are beyond our product performance guarantees.

UNIT CONVERSION

	Metric Unit	Imperial (SI) Unit
Air Volume	L/s = CFM x 0.472	CFM = L/s x 2.119
	L/s = CMH x 0.278	CMH = L/s x 3.6
Air Velocity	m/s = FPM x 0.005	FPM = m/s x 197
Air Pressure	Pa = in.wg. x 249.5	in.wg. = Pa x 0.004
Area	M^2 = Ft^2 x 0.0929	Ft^2 = M^2 x 10.76
Volume	M^3 = Ft^3 x 0.0283	Ft^3 = M^3 x 35.3
Length / Width / Height / Radius	M = mm x 0.001	mm = M x 1000
Length / Width / Height / Radius	mm = Inch x 25.4	Inch = mm x 0.0393
Length / Width / Height	M = Ft x 0.305	Ft = M x 3.28
Temperature	°C = 5/9 x (°F - 32)	°F = 9/5 x (°C + 32)

BASIC CALCULATIONS

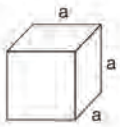
AREA



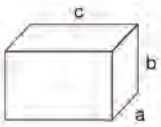
A = a² **A = ab** **A = πr²** **A = π/4yx = πmn**

Grille / Diffuser Face Area = Face (Width x Height)
Grille / Diffuser Neck Area = Neck (Width x Height)
Grille / Diffuser Free Area = Distance of air gap between adjacent blades x Rows of air gap x Height

VOLUME



cube = a³



rectangular prism = abc

AIR VOLUME

Q = Room Volume x (ACH)

Q = air volume
Room Volume = Room L x W x H
ACH = Air change per hour (refer ACH Table)

Q = A x V

Q = air volume
A = Room area = Room L x W
V = Air velocity

ACH TABLE

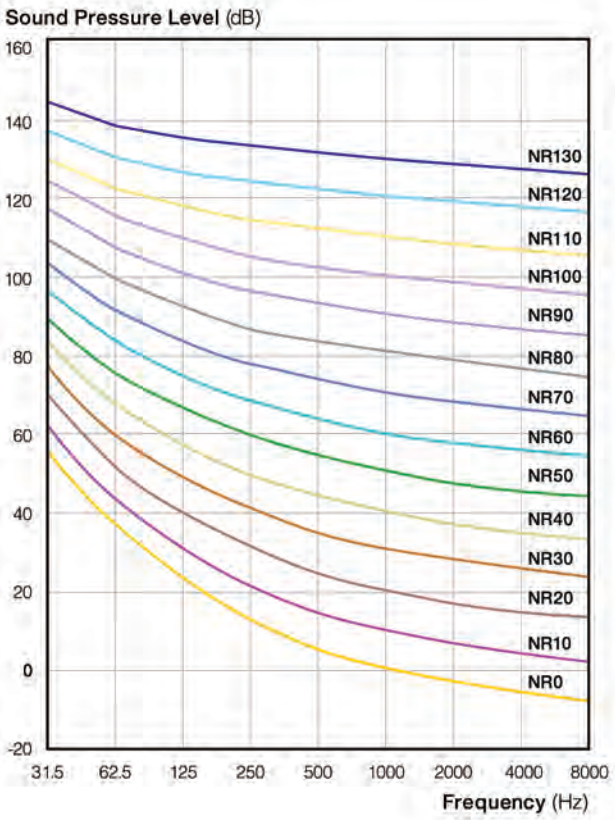
Ratings are based on ASHRAE guidelines; shall vary depending room's special conditions, activities, machine & human load.

Building / Room	Air Change / hr
All spaces in general	min 4
Factory / warehouse / store	2 - 4
General offices	3 - 4
Garages / repair workshop / engine rooms	4 - 6
Banks / court houses	4 - 10
Police stations / post offices	4 - 10
School classrooms	4 - 12
Departmental stores / malls / retail / shops	6 - 10
Medical centres / clinics / dental	8 - 12
Auditoriums / churches / theatres / cinemas	8 - 15
Public toilets / smoking room	10 - 15
Laundries	10 - 15
Bowling alleys	10 - 15
Museums	12 - 15
Cafeterias / foodcourts / dining halls / restaurants	12 - 15
Karaoke / club rooms	12
Basement car park	15 - 30
Computer rooms	15 - 20
Commercial kitchens	15 - 60
Precision manufacturing	10 - 50
Boiler rooms	15 - 20
Substation, electric / pump rooms	5 - 10

GENERAL ACCEPTABLE RANGE OF NOISE CRITERIA-NOISE RATING

Tabulated below are recommended design guidelines of NR for some commercial areas with ACMV applications.

Type of Room - Occupancy		Noise Criterion - NC -	Noise Rating - NR -	dB(A)
Very Quiet	Concert and opera halls, recording studios, laboratories, etc.	10 - 20	20	25 - 30
	Private bedrooms, movie theatres, television and radio studios, conference and lecture rooms, cathedrals and churches, libraries, etc.	20 - 25	25	25 - 30
	Hotel banquets, board rooms, conference and lecture rooms, hotel rooms, hospital wards, etc.	30 - 40	30	30 - 35
Quiet	Hotel function rooms, small offices, classrooms, courtrooms, etc.	30 - 40	35	40 - 45
Moderate noisy	Common offices, toilets, bathrooms, reception areas, lobbies, corridors, department stores, etc.	35 - 45	40	45 - 55
Noisy	Kitchens in hospitals and hotels, laundry rooms, computer rooms, canteens, supermarkets, public services & support areas, etc.	40 - 50	45	45 - 55



NOISE RATING CURVES

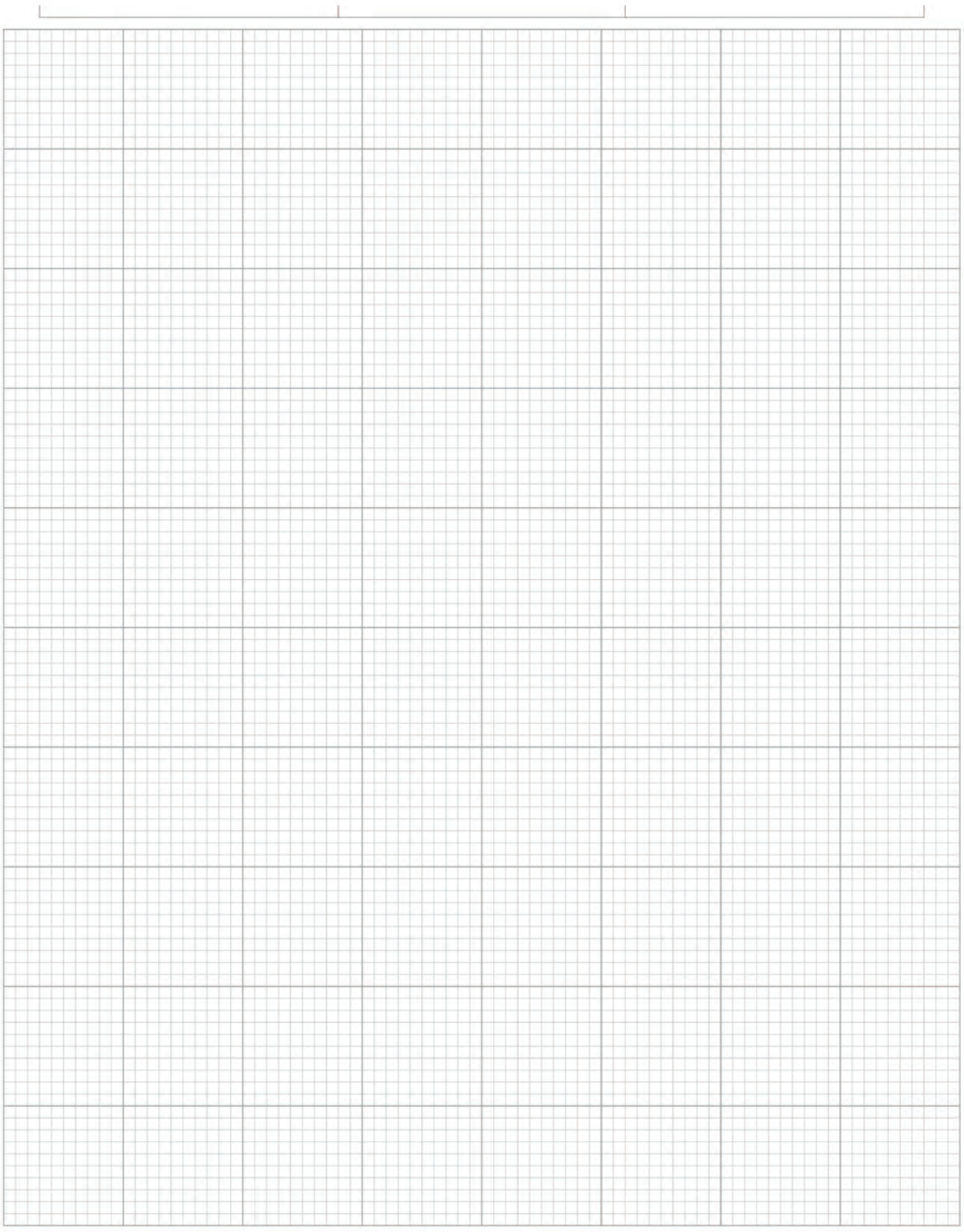
A single number NR is often seen to rate the noise of air outlets. NR is the Noise Rating that represents the allowances for various dB levels in each of the octave bands and human sensitivity to each of these bands.

All outlet sound data is usually tabulated for single outlet only, as such if multiple outlets of equal sound are installed in a room, direct summation of all outlets is not applicable but allowance of the noise rating can be calculated using the correction factor below:

Qty of Outlets	1	2	3	4	8	10	20	40
Add +	0	3	5	6	9	10	13	16

For example,
noise rating for 1 no. of Diffuser is NR 22,
if 8 nos. of the same diffusers are installed in an office and the estimation will be,
22 + 9 = 31 ...
therefore the overall noise rating is NR 31.

NOTE





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