



CHAN CHUAN CHANG METAL WORKS

CCC-WR SIDEWALL DOUBLE DEFLECTION GRILLES
DETAILS & DESCRIPTIONS



曾 泉 江 鐵 器 廠

CHAN CHUAN CHANG METAL WORKS

BLOCK 5055, ANG MO KIO INDUSTRIAL PARK 2, #01-1141,
SINGAPORE 569558 TEL : 64817736 FAX : 64813517
Email: sales@ccc.com.sg Website: <http://www.ccc.com.sg>
Reg. No. 204949/00M



DOUBLE DEFLECTION GRILLES



Brand : CCC

**AIR DIFFUSION EQUIPMENT
SIDEWALL DOUBLE DEFLECTION GRILLES
Series : CCC-WR**





CHAN CHUAN CHANG METAL WORKS



VISION

"To produce high quality products, high standard of creativity in design and excellent credibility in reputation"

MISSION

"Serve customer with satisfactory and reliable works and products"

Chan Chuan Chang Metal Works was established in 1975, committed to the vision to manufacture good quality Air Diffusion Equipment. After building up its reputation in the industry as a top manufacturer, the company registered the logo with the Registry of Trade and Patents (Singapore). From then onwards, all equipment which has the trade mark symbolise our commitment to serve our customer with satisfactory and reliable works and products.

Our products have been tested by VIPAC, testing laboratory at Victorian technology Centre, Port Melbourne, Victoria. Furthermore, the results are NATA Certified (National Association of Testing Authorities, Australia) to ADC 10623 R3 (Air Diffusion Council, USA) and are officially endorsed in countries which are signatories to the I.L.A.C agreement-namely, Australia, New Zealand, Britain, USA and Malaysia.


We were proud to introduce the **Heavy Duty Aluminium Computer Floor Grille**, Series : CR to the industry in 1991. This has been a breakthrough as the grille are able to provide adequate air flow whilst maintaining the weight of any person or equipment. This is verified by the Comprehensive Loading Test performed by Singapore Institute of Standard & Industrial Research (SISIR), currently known as Spring Singapore. Series : CR has since then been installed in many computer rooms, wafer manufacturing plant and places which require the product.





COMPANY MILESTONE

1975 Established with the vision to manufacture high quality Air Diffusion Equipment to meet future needs and demands. Together with a team of experienced Engineers & Craftsman dedicated to Chan Chuan Chang's Motto – Commitment, Creativity & Credibility, we produced good quality products with high standard of creativity in design and maintained excellent credibility in reputation.

1982 Registered with the Registry of Trade and Patents (Singapore), CCC Trade Mark  has since became a household name in its industry.

1986 Chan Chuan Chang (CCC) products are tested by VIPAC, a testing laboratory at Victorian Technology Centre, Port Melbourne, Victoria. These results are NATA Certified (National Association of Testing Authorities, Australia) to ADC 10623 R3 (Air Diffusion Council, USA) and are officially endorsed in countries which are signatories to the I.L.A.C agreement – namely, Australia, New Zealand, Britain, USA and Malaysia.

1991 CCC Aluminium Computer Floor Air Grille was sent for Comprehensive Loading Test conducted by Singapore Institute of Standard & Industrial Research (SISIR) and achieved excellent results.

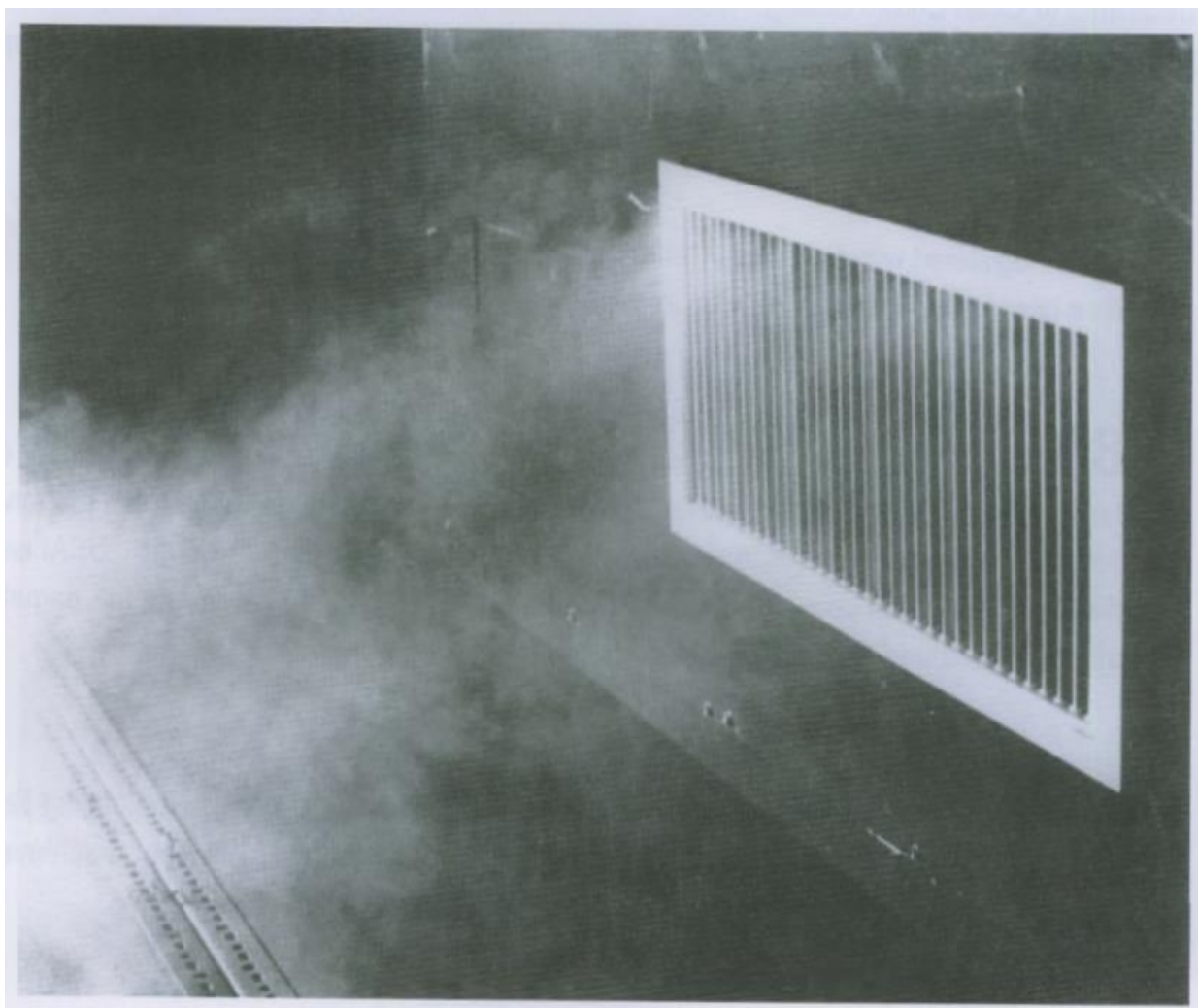
1997 CCC was awarded ISO 9002 Certification. Our impressive list of satisfied clients is testimony to CCC's motto – Commitment, Creativity and Credibility.

2005 CCC has improved its quality management system with respect to the ISO 9001:2000 standard due to our commitment towards quality improvement in our products and customer satisfaction. We thank you for your faith and support in our products. We will continue to strive harder to exceed your demand & satisfaction.

2012 CCC was awarded ISO 9001:2008 Certification by BVQI Accreditation. CCC also became a certified member of Air Movement and Control Association International (AMCA). Our Low Leakage dampers were tested according to AMCA standards and received certifications.



SERIES CCC-WR

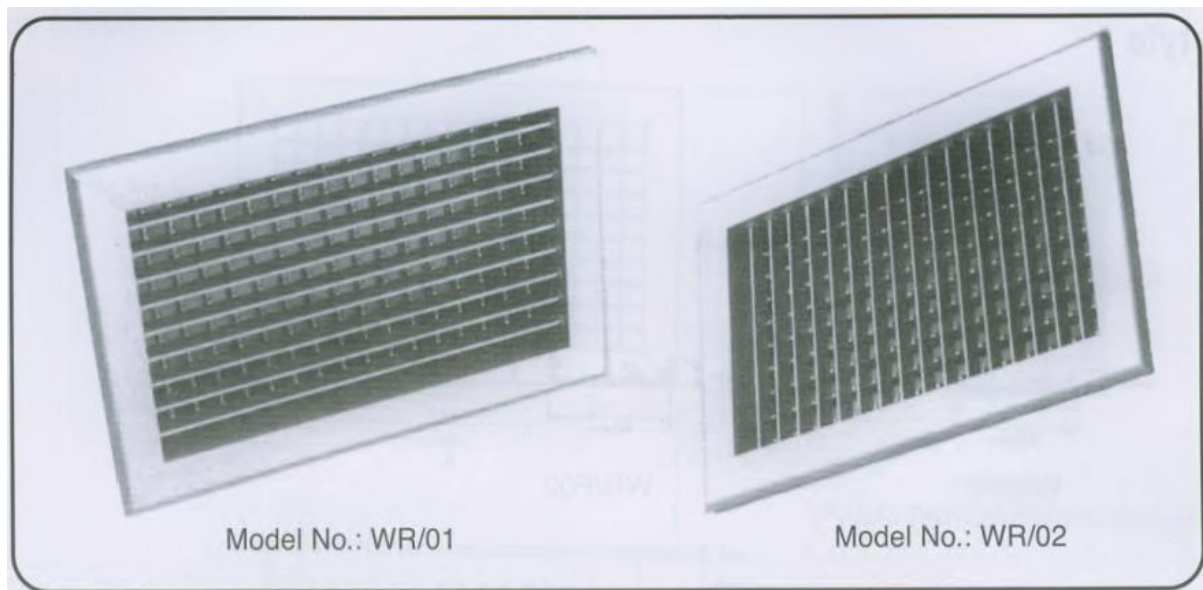


**Installed double deflection grille in laboratory for testing.
Ceiling is painted black to facilitate witnessing smoke pattern.**





Series CCC-WR



Description

- A double deflection grille is commonly referred to as a supply register, a universal register or simply a side wall grille.
- The complete range allows for each hand adjustment of blade settings to give the required air diffusion pattern whilst retaining firmness of setting to ensure the angles of the blades remain at the adjusted settings under all recommended air quantities.
- Double deflection grilles are highly recommended for supply air applications.
- All grilles feature are manufactured from high quality extruded aluminium.
- Aerodynamic design allows optimum air flow and low sound performance.

Finishing/Material

- Standard finish will be in white powder coating. Other colours may be requested.
- Other materials such as stainless steel 304/316 can be requested.

Accessories

- Opposed blade damper
- Plenum boxes
- Adaptor & collars
- Filters

Other Features

- Suggestions are also available on request from your CCC specialist.



Series CCC-WR



CCC's double deflection are manufactured from high quality extruded aluminium section.

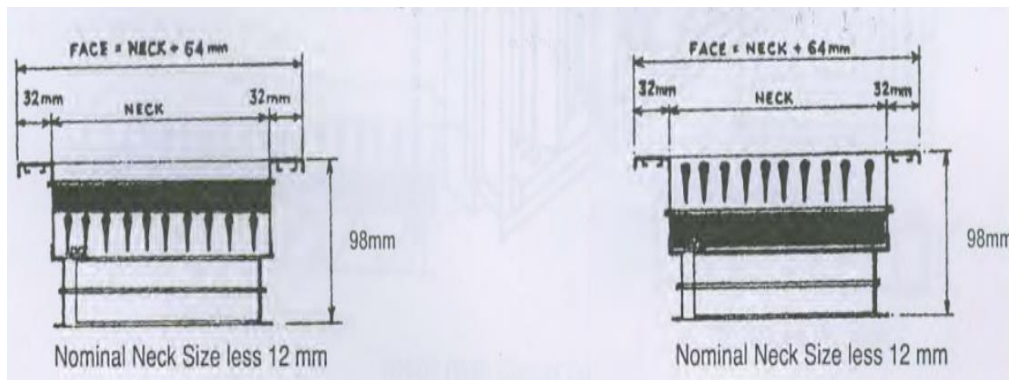
The front blades may be either horizontal or vertical. The grille is suitable for sidewall and may be used for supply or extract applications.

We have various type of materials such as Aluminium, Stainless Steel, Steel and Natural Anodized. We can meet your requirements on how many sections you required. Optional accessories (additional charges) are available upon request, so do know your requirements before you submit enquires to us.

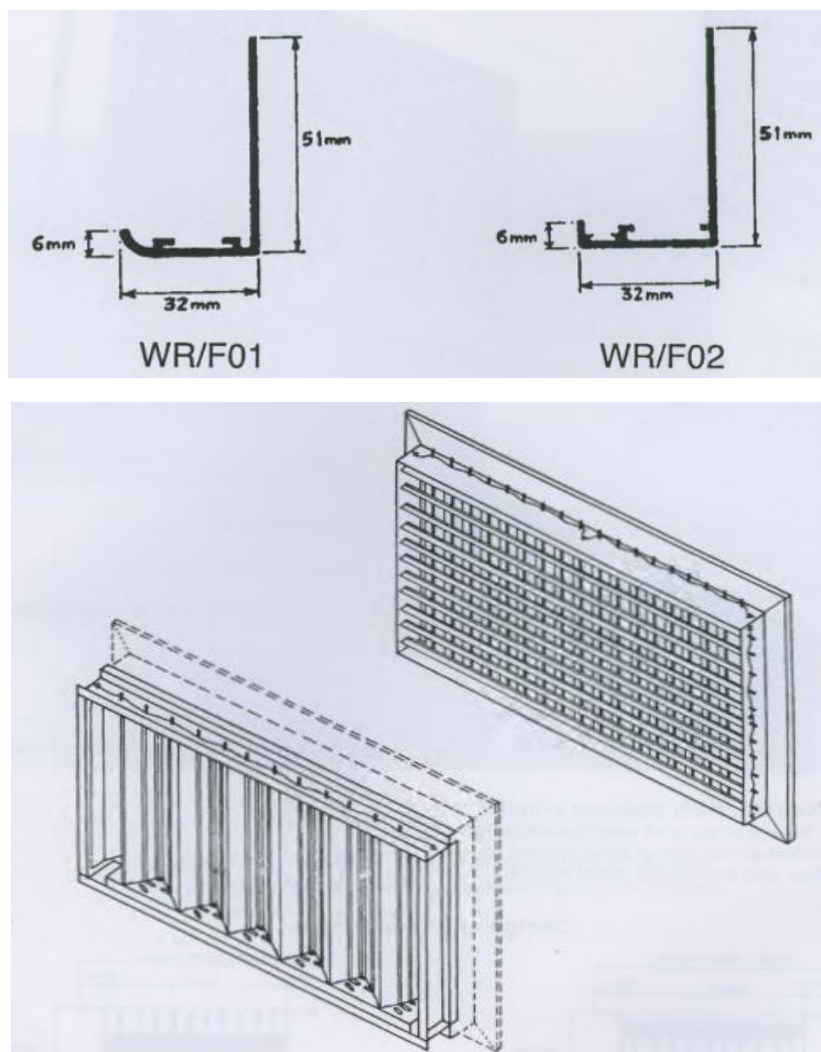




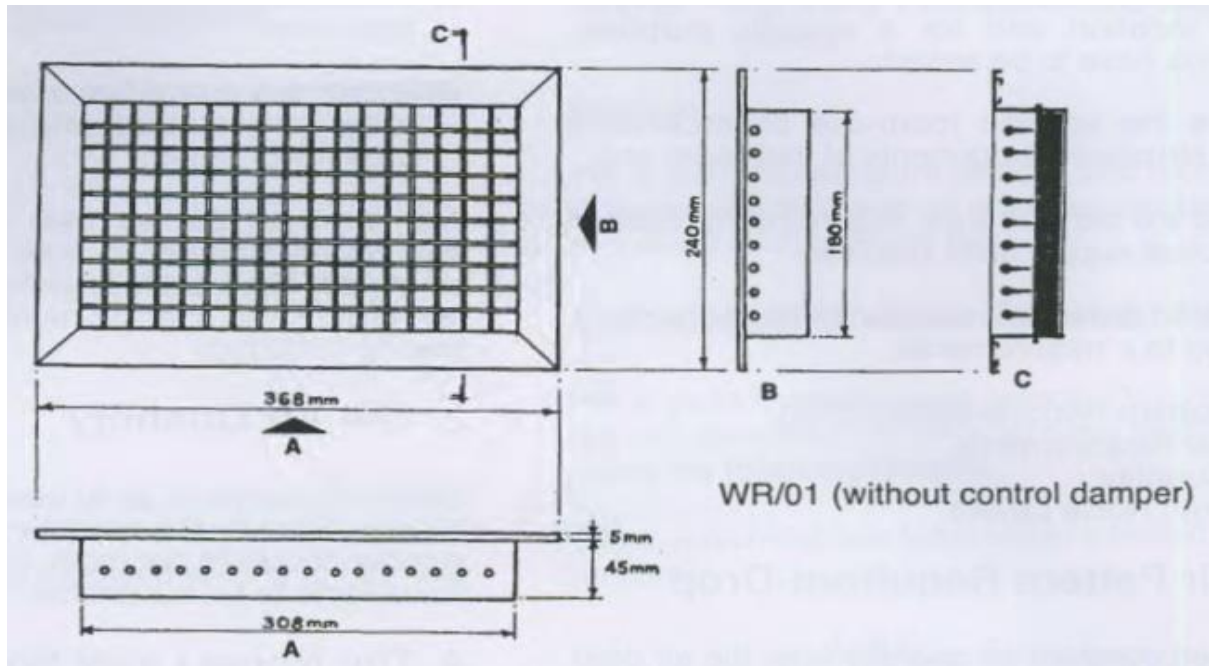
Designs and Dimensions



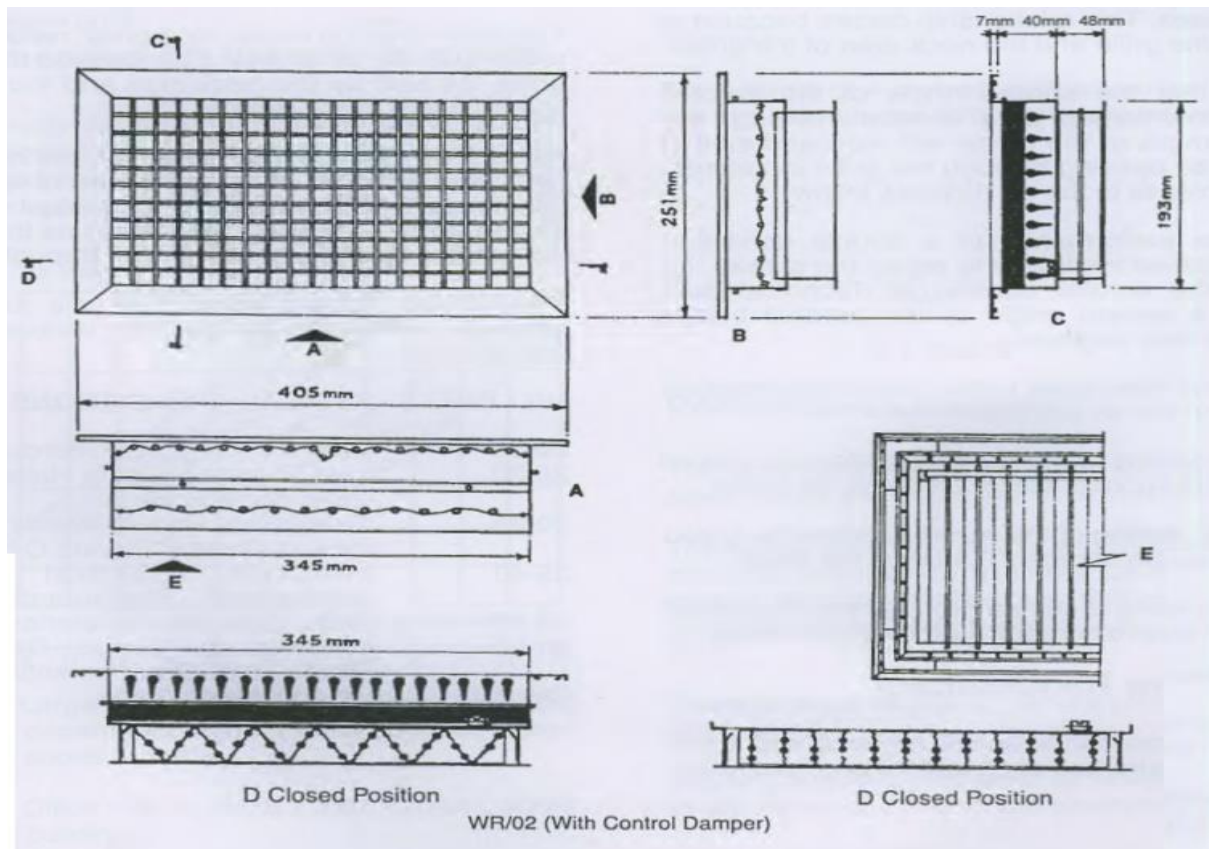
Frame Style



Type WR/01



Type WR/02





Selecting A Double Deflection Grille

When selecting a Series WR Grille to be used in a specific location and for a specific purpose, two questions have to be asked:

- (i) What are the specific room-use characteristics and the structure components of that room and,
- (ii) What are the performance requirements required of the actual supply grille required.

The answer to these questions can be found from the following four requirements:

1. The air pattern requirements.
2. The throw requirements.
3. The air quantity.
4. The desired noise levels.

1. The Air Pattern Requirement

For any given constant air quantity, the air drop will increase as the area of the neck of the specific grille increases. This relationship occurs because of the face of the grille and the neck area of the grille.

Assuming that the spread angle of the aerofoil blades is maintained at a constant setting, the resulting length of the throw will increase as the quantity of air passing through the grille increases. Thus an increase in the air drop will follow.

To alter the performance of a double deflection grille, the easiest method is to adjust the spread of the angles of the aerofoil blades. (All technical data applies to a spread angle of the aerofoil blades being set at zero degrees).

- (i) of a 45° setting of the aerofoil blades the spread of the air is approximately 1.5 times the throw.
- (ii) At a 22.5° setting of the aerofoil blades the speed of the air is approximately 0.5 times the throw.
- (iii) At a 0° setting of the aerofoil blades the speed of the air is approximately 0.35 times the throw.

2. The Throw Requirement

The proper throw condition will be achieved, if the two following extremes of conditioning do

not arise:

- i. Inadequate conditioning which fails to cover the total area.
- ii. Excessive air quantities relative to the capacity and positioning of the diffuser, thus creating drafts.

The throw of the air from the grille being used should be limited to ensure the drop of the air stream does not fall below a reasonable working level within the specific room being conditioned at around 1500mm.

3. The Air Quantity

The total volume of air to be delivered to each area, is determined by the overall system design. Thus the number of outlets per room, determines the volume to be transmitted through each outlet.

4. The Noise Level Specification

The noise level produced by a grille relates directly to the quantity of air being transmitted through the grille, as well as the neck size and the louvre blade spread angle of the register.

For a given constant air quantity, the noise level (N.R.) will increase as the core area of the register decreases. Similarly again for a constant quantity of air, the noise level (N.R.) increases as the angle of the aerofoil blades closes from 0° through 90°.

The following table may be used as a guide to the generally acceptable NR levels for various common use situations:

NR LEVELS	TYPICAL APPLICATIONS
20 – 25	Radio, TV, Studios, Churches.
25 - 30	Live Theatres, Opera Halls, Concert Halls, Band Rooms
30 - 35	Conference Rooms, Movie Theatres, Lecture Rooms, Private Offices.
35 - 40	Libraries, General Offices, Laboratories, Restaurants.
40 - 45	Halls, Corridors, Cafeterias.
45 - 50	Storerooms, Large Department Stores and Supermarkets.
Over 50	Manufacturing Areas.



Selecting A Double Deflection Grille

Air Velocity in a Duct System

Air velocity can be calculated using the following expressions:

$$V = \frac{q}{A}$$

Or

$$V = \frac{q \times 4}{d^2 \times \pi}$$

Where

q = airflow l/s

A = area m²

D = diameter m

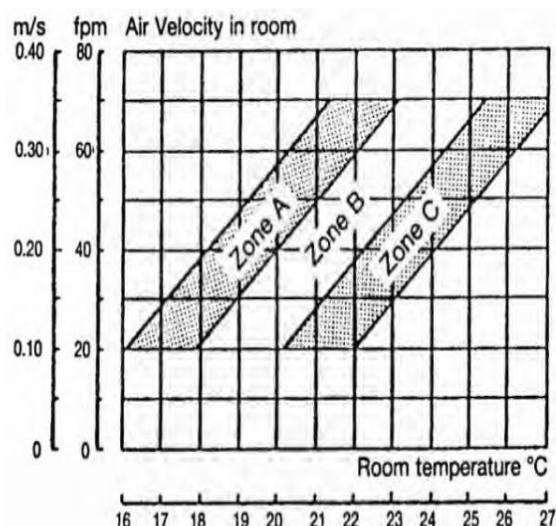
V = air velocity m/s

To convert air velocity expressed in m/s, to fpm use the following formula:

$$V \text{ (fpm)} = 197 \times v \text{ (m/s)}$$

Recommended Air Velocity in Rooms

It is generally accepted that room air velocities should be limited according to room temperature. The following graphs shows recommended air velocities for different applications.



Zone A: Large spaces, people in motion eg. Big department stores, hotel lobbies, indoor sports activities.

Zone B: Office space, small shops, schools, public buildings.

Zone C: Hospitals, individual hotel rooms, private offices.

Example:

For a room temperature of 20 °C and rooms in Zone B, recommended room air velocities are between 0.10m/s and 0.20m/s (20-40 fpm).

Calculation of other Terminal Velocities

For a given throw (L₁) and velocity (V₁), other throws can be calculated for other terminal velocities (V₂,L₂) using the following formula.

(Note: Assuming one stays within a limited zone of the jet core)

$$L_2 = \frac{L_1 \times V_1}{V_2}$$

Example:

For a throw of 4 metres, with a terminal velocity of 0.5m/s, what is the throw with a terminal velocity of 0.3m/s?

$$\begin{aligned} L_2 &= \frac{L_1 \times V_1}{V_2} \\ &= \frac{4 \times 0.5}{0.3} \\ &= 6.7 \text{ metres} \end{aligned}$$



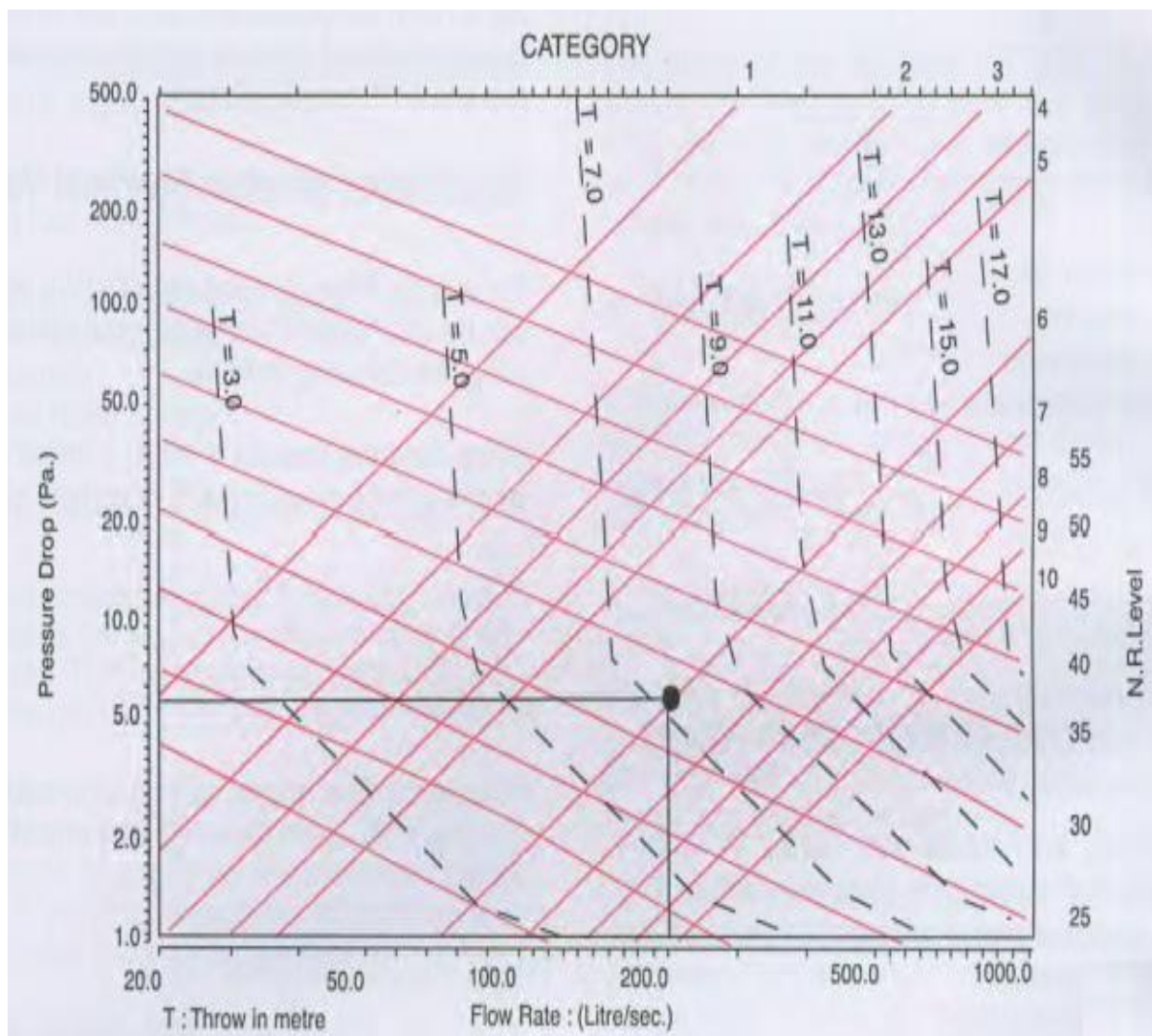
Performance Graphs

The performance graphs show Airflow, pressure drop sound levels and throws for each size of the product.

The throws are established to a terminal velocity of 0.5m/s (100 fpm) and are in metres. On the performance graphs, there are marked in as dashed lines, with the particular throw value marked on as follows: i.e. T=04

Pressure drops are shown as total pressure in Pascals (Pa).

Sound Levels are presented as Noise Ratings (N.R.) in dB, including a 6 dB room absorption.





Performance Graphs

Aspect Table

Aspect table shows number for actual grille size. The corresponding number gives the technical data in the data graphs.

HEIGHT	WIDTH (MM)													
MM	200	250	300	350	400	450	500	550	600	700	800	900	1000	1200
100	1	1.25	1.5	1.75	2	2.25	2.5	2.75	3	3.5	4	4.5	5	5.25
150	1.5	2	2.25	2.5	3	3.25	3.75	4	4.5	5	5	5.25	5.25	5.5
200	2	2.5	3	3.5	4	4.5	5	5	5.25	5.5	5.5	5.75	6	6.5
250	2.5	3	3.75	4.5	5	5	5	5.5	5.5	5.75	6	6.25	6.5	7
300	3	3.75	4.5	5	5	5.5	5.5	5.5	5.75	6	6.5	6.75	7	7.5
350	3.5	4.5	5	5.25	5.5	5.5	5.75	6	6	6.5	6.75	7	7.5	8.25
400	4	5	5	5.5	5.5	5.75	6	6	6.5	6.75	7	7.5	8	8.75
450	4.5	5	5.5	5.5	5.75	6	6.25	6.5	6.75	7	7.5	8	8.8	9.5
500	5	5	5.5	5.75	6	6.25	6.5	6.75	7	7.5	8	8.5	9	10

Example:

An airflow of 200 l/s (424 cfm) using a category number 6 will give a pressure drop of 6Pa (0.025 inwg) and a throw of 7.25m, for an air velocity of 0.5m/s. Using a category number 6 grille gives the opportunity to choose any of the following grilles 200x1000, 250x800, 500x400 and 450x450.

Test Certificates for Various Sizes

VIPAC ENGINEERS & SCIENTISTS APPLIED INDUSTRIAL RESEARCH

VIPAC HOLDINGS PTY LTD (INCORPORATED IN VICTORIA)
 HEAD OFFICE:
 VICTORIAN TECHNOLOGY CENTRE
 275-283 Norrmans Road, Port Melbourne, Phone (03) 845 2144, Telex A832111,
 117 Majors Bay Road, Concord, N.S.W. 2137, Australia, Phone (02) 736 5011,
 6 Miller Street, Lindsmere, S.A. 5007, Australia, Phone (08) 46 5291,
 5 Havelock Road, Rivervale, W.A. 6103, Australia, Phone (09) 361 7311,
 1st Floor, 65 Sherrwood Road, Toowoomba, Qld. 4300, Australia, Phone (07) 371 8100,
 03-172, Bk 125, Alexandra Village, Bukit Merah Lane 1, Singapore, 0315, Phone: 278 3257, Telex: R533901

Please Reply to:

TEST CERTIFICATE

DESCRIPTION
 The device under test was a SIDE WALL DOUBLE DEFLECTION GRILLE
 manufactured by CHAN CHUAN CHANG METAL WORKS
 The diffuser is categorised as Model: 600 x 250

RESULTS:

Airflow (l/s)	Pressure Drop (Pa)	Throw At 0.5m (m)	Octave Sound Power Level (dB re 10 ⁻¹² W) (Centre Frequency, Hz)							
			125	250	500	1000	2000	4000	8000	
385	31.5	11	57.5	54.5	50.5	50.5	47	42	33.5	
300	24	10	52.5	44	45.5	42.5	37	33.0		
280	19.5	9	53	50	48	42	39	34	32	
250	15.5	8.75	52.5	48.5	40.5	40	36.5	35.5		

Greg Tump
Test Engineer

Michael J. Smith
NATA Signatory

This laboratory is registered by the National Association
 of Testing Authorities, Australia.
 The tests reported herein have been performed in accordance
 with its terms of registration.

DIRECTORS
 Michael J. Smith, B. Mech.E., M.I.E. Aust.
 Ian G. Jones, B. Mech.E., M.I.E. Aust., F.R.M.I.T.

ASSOCIATE DIRECTORS
 John C. Brannan, B. Mech.E., M.I.E. Aust.
 Trevor R. Phipps, B. Mech.E., M.I.E. Aust.
 David C. Brannan, B.Sc., Ph.D., M.I.E. Aust.
 Norman Brimmer, B. Mech.E., Ph.D. (Lond), M.I.E. Aust.
 John F. Howell, B. Eng., M.I.E. Aust., Dip. Mech. Eng.
 John F. Howell, Dip. C.E., B.E.Sc., M. Eng., Ph.D., M.I.E. Aust.

600 x 250 Double Deflection Grille

VIPAC ENGINEERS & SCIENTISTS APPLIED INDUSTRIAL RESEARCH

VIPAC HOLDINGS PTY LTD (INCORPORATED IN VICTORIA)
 HEAD OFFICE:
 VICTORIAN TECHNOLOGY CENTRE
 275-283 Norrmans Road, Port Melbourne, Phone (03) 845 2144, Telex A832111,
 117 Majors Bay Road, Concord, N.S.W. 2137, Australia, Phone (02) 736 5011,
 6 Miller Street, Lindsmere, S.A. 5007, Australia, Phone (08) 46 5291,
 5 Havelock Road, Rivervale, W.A. 6103, Australia, Phone (09) 361 7311,
 1st Floor, 65 Sherrwood Road, Toowoomba, Qld. 4300, Australia, Phone (07) 371 8100,
 03-172, Bk 125, Alexandra Village, Bukit Merah Lane 1, Singapore, 0315, Phone: 278 3257, Telex: R533901

Please Reply to:

TEST CERTIFICATE

DESCRIPTION
 The device under test was a SIDEWALL DOUBLE DEFLECTION GRILLE
 manufactured by CHAN CHUAN CHANG METAL WORKS
 The diffuser is categorised as Model: 400 x 100

RESULTS:

Airflow (l/s)	Pressure Drop (Pa)	Throw At 0.5m (m)	Octave Sound Power Level (dB re 10 ⁻¹² W) (Centre Frequency, Hz)							
			125	250	500	1000	2000	4000	8000	
200	280	8	55	60.5	65.5	60	59.5	58.5	51.5	
175	217	7.5	54.5	58	62.5	64	65	64.5	57.5	
162	155	7.0	51.5	56.5	59.5	60.5	62	61.5	55	
135	119	6.5	53.0	59	59	58.0	58.5	57	49	
127	95.5	6	53	53.5	54	55	55.5	53.5	43.5	
104	73	4	52	53	50	51	50.5	47.5	37.0	
98	52.5	3.5	51.5	44	46.0	46	45.5	42.5		
68	34	3.0	50.2	40.5	41.5	37.5	33.5	31.5		

Greg Tump
Test Engineer

Michael J. Smith
NATA Signatory

This laboratory is registered by the National Association
 of Testing Authorities, Australia.
 The tests reported herein have been performed in accordance
 with its terms of registration.

DIRECTORS
 Michael J. Smith, B. Mech.E., M.I.E. Aust.
 Ian G. Jones, B. Mech.E., M.I.E. Aust., F.R.M.I.T.

ASSOCIATE DIRECTORS
 John C. Brannan, B. Mech.E., M.I.E. Aust.
 Trevor R. Phipps, B. Mech.E., M.I.E. Aust.
 David C. Brannan, B.Sc., Ph.D., M.I.E. Aust.
 Norman Brimmer, B. Mech.E., Ph.D. (Lond), M.I.E. Aust.
 John F. Howell, B. Eng., M.I.E. Aust., Dip. Mech. Eng.
 John F. Howell, Dip. C.E., B.E.Sc., M. Eng., Ph.D., M.I.E. Aust.

400 x 100 Double Deflection Grille

VIPAC ENGINEERS & SCIENTISTS APPLIED INDUSTRIAL RESEARCH

VIPAC HOLDINGS PTY LTD (INCORPORATED IN VICTORIA)
 HEAD OFFICE:
 VICTORIAN TECHNOLOGY CENTRE
 275-283 Norrmans Road, Port Melbourne, Phone (03) 845 2144, Telex A832111,
 117 Majors Bay Road, Concord, N.S.W. 2137, Australia, Phone (02) 736 5011,
 6 Miller Street, Lindsmere, S.A. 5007, Australia, Phone (08) 46 5291,
 5 Havelock Road, Rivervale, W.A. 6103, Australia, Phone (09) 361 7311,
 1st Floor, 65 Sherrwood Road, Toowoomba, Qld. 4300, Australia, Phone (07) 371 8100,
 03-172, Bk 125, Alexandra Village, Bukit Merah Lane 1, Singapore, 0315, Phone: 278 3257, Telex: R533901

Please Reply to:

TEST CERTIFICATE

DESCRIPTION
 The device under test was a SIDEWALL DOUBLE DEFLECTION GRILLE
 manufactured by CHAN CHUAN CHANG METAL WORKS
 The diffuser is categorised as Model: 1220 x 150

RESULTS:

Airflow (l/s)	Pressure Drop (Pa)	Throw At 0.5m (m)	Octave Sound Power Level (dB re 10 ⁻¹² W) (Centre Frequency, Hz)							
			125	250	500	1000	2000	4000	8000	
220	16	9	75	57.5	50.5	51.5	46.5	43	36.5	
200	9	7	52	47.5	42	41	39.5	36	26.5	
140	3	5	46.5	37	29.5	30.5	24	18	16.5	
96	1	3.5	41	35	23.5	22	19	17.5	16.5	

Greg Tump
Test Engineer

Michael J. Smith
NATA Signatory

This laboratory is registered by the National Association
 of Testing Authorities, Australia.
 The tests reported herein have been performed in accordance
 with its terms of registration.

DIRECTORS
 Michael J. Smith, B. Mech.E., M.I.E. Aust.
 Ian G. Jones, B. Mech.E., M.I.E. Aust., F.R.M.I.T.

ASSOCIATE DIRECTORS
 John C. Brannan, B. Mech.E., M.I.E. Aust.
 Trevor R. Phipps, B. Mech.E., M.I.E. Aust.
 David C. Brannan, B.Sc., Ph.D., M.I.E. Aust.
 Norman Brimmer, B. Mech.E., Ph.D. (Lond), M.I.E. Aust.
 John F. Howell, B. Eng., M.I.E. Aust., Dip. Mech. Eng.
 John F. Howell, Dip. C.E., B.E.Sc., M. Eng., Ph.D., M.I.E. Aust.

1220 x 150 Double Deflection Grille

VIPAC ENGINEERS & SCIENTISTS APPLIED INDUSTRIAL RESEARCH

VIPAC HOLDINGS PTY LTD (INCORPORATED IN VICTORIA)
 HEAD OFFICE:
 VICTORIAN TECHNOLOGY CENTRE
 275-283 Norrmans Road, Port Melbourne, Phone (03) 845 2144, Telex A832111,
 117 Majors Bay Road, Concord, N.S.W. 2137, Australia, Phone (02) 736 5011,
 6 Miller Street, Lindsmere, S.A. 5007, Australia, Phone (08) 46 5291,
 5 Havelock Road, Rivervale, W.A. 6103, Australia, Phone (09) 361 7311,
 1st Floor, 65 Sherrwood Road, Toowoomba, Qld. 4300, Australia, Phone (07) 371 8100,
 03-172, Bk 125, Alexandra Village, Bukit Merah Lane 1, Singapore, 0315, Phone: 278 3257, Telex: R533901

Please Reply to:

TEST CERTIFICATE

DESCRIPTION
 The device under test was a SIDEWALL DOUBLE DEFLECTION GRILLE
 manufactured by CHAN CHUAN CHANG METAL WORKS
 The diffuser is categorised as Model: 900 x 300

RESULTS:

Airflow (l/s)	Pressure Drop (Pa)	Throw At 0.5m (m)	Octave Sound Power Level (dB re 10 ⁻¹² W) (Centre Frequency, Hz)							
			125	250	500	1000	2000	4000	8000	
350	14.5	11	59	52.5	46	42	43	39.5	34.5	
305	11.0	9	57	49.7	43	43	39	36.5	31.5	
250	7.5	8	54.5	50	40	37.0	34	31.5	32	
190	4.0	5.5	52.5	47.5	38.5	33.0	28.5	25.5	28.5	

Greg Tump
Test Engineer

Michael J. Smith
NATA Signatory

This laboratory is registered by the National Association
 of Testing Authorities, Australia.
 The tests reported herein have been performed in accordance
 with its terms of registration.

DIRECTORS
 Michael J. Smith, B. Mech.E., M.I.E. Aust.
 Ian G. Jones, B. Mech.E., M.I.E. Aust., F.R.M.I.T.

ASSOCIATE DIRECTORS
 John C. Brannan, B. Mech.E., M.I.E. Aust.
 Trevor R. Phipps, B. Mech.E., M.I.E. Aust.
 David C. Brannan, B.Sc., Ph.D., M.I.E. Aust.
 Norman Brimmer, B. Mech.E., Ph.D. (Lond), M.I.E. Aust.
 John F. Howell, B. Eng., M.I.E. Aust., Dip. Mech. Eng.
 John F. Howell, Dip. C.E., B.E.Sc., M. Eng., Ph.D., M.I.E. Aust.

900 x 300 Double Deflection Grille