

by Sean Badenhorst



- ❑ Established Krantz in the Asia-Pacific Region: 1995
- ❑ Established Krantz in Australia: 2001
- ❑ Development of air diffusion products for Asia-Pacific: 2005 - present
- ❑ Established manufacture in China: 2006
- ❑ Company name change to SMARTEMP: 2015
- ❑ LTG SMARTEMP partnership: 2017



SMARTEMP factory - China





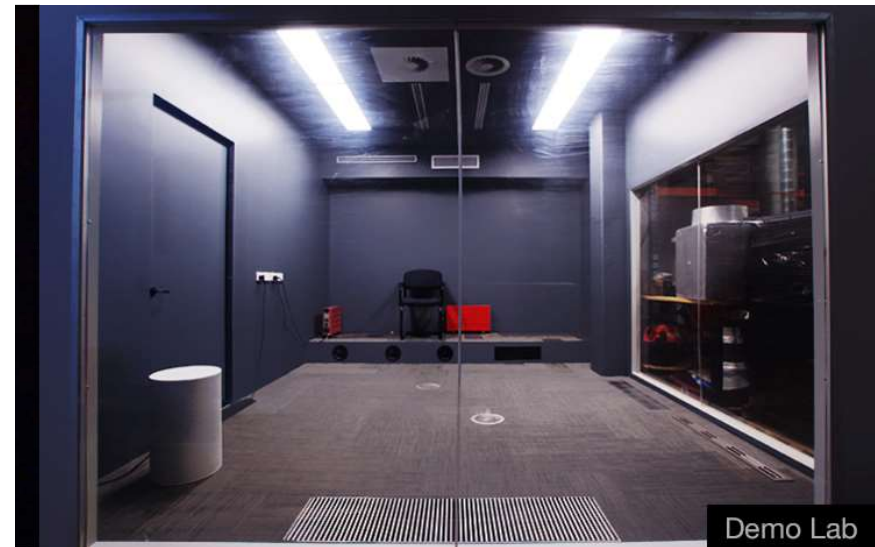
Jet Swirl Smoke Test



HSC-FD Heating Test



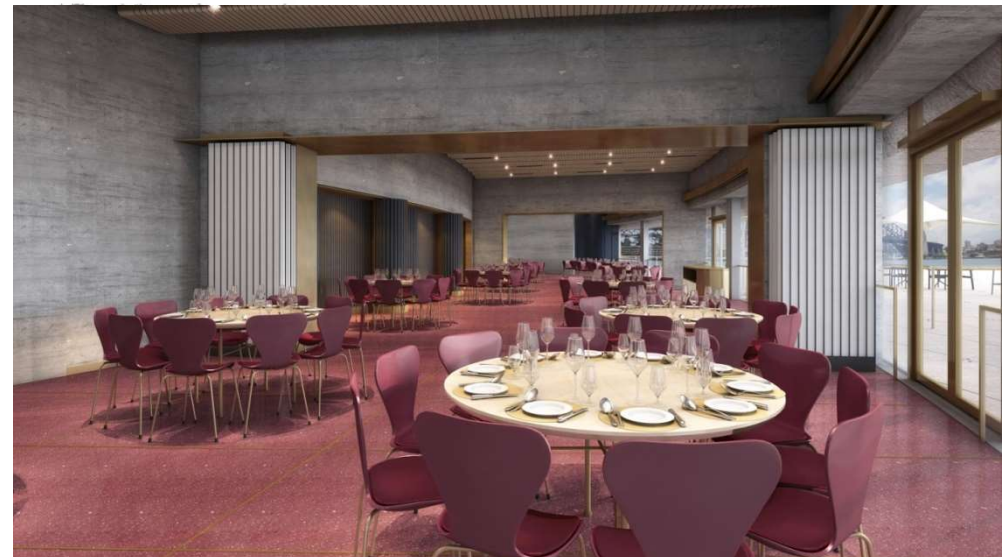
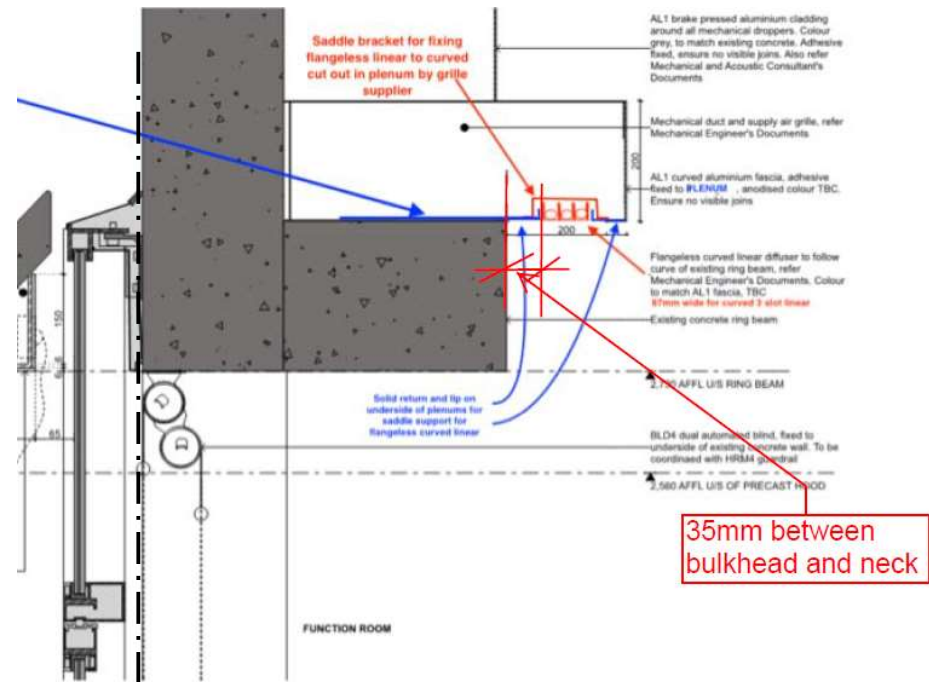
HSC-FD Laser Test



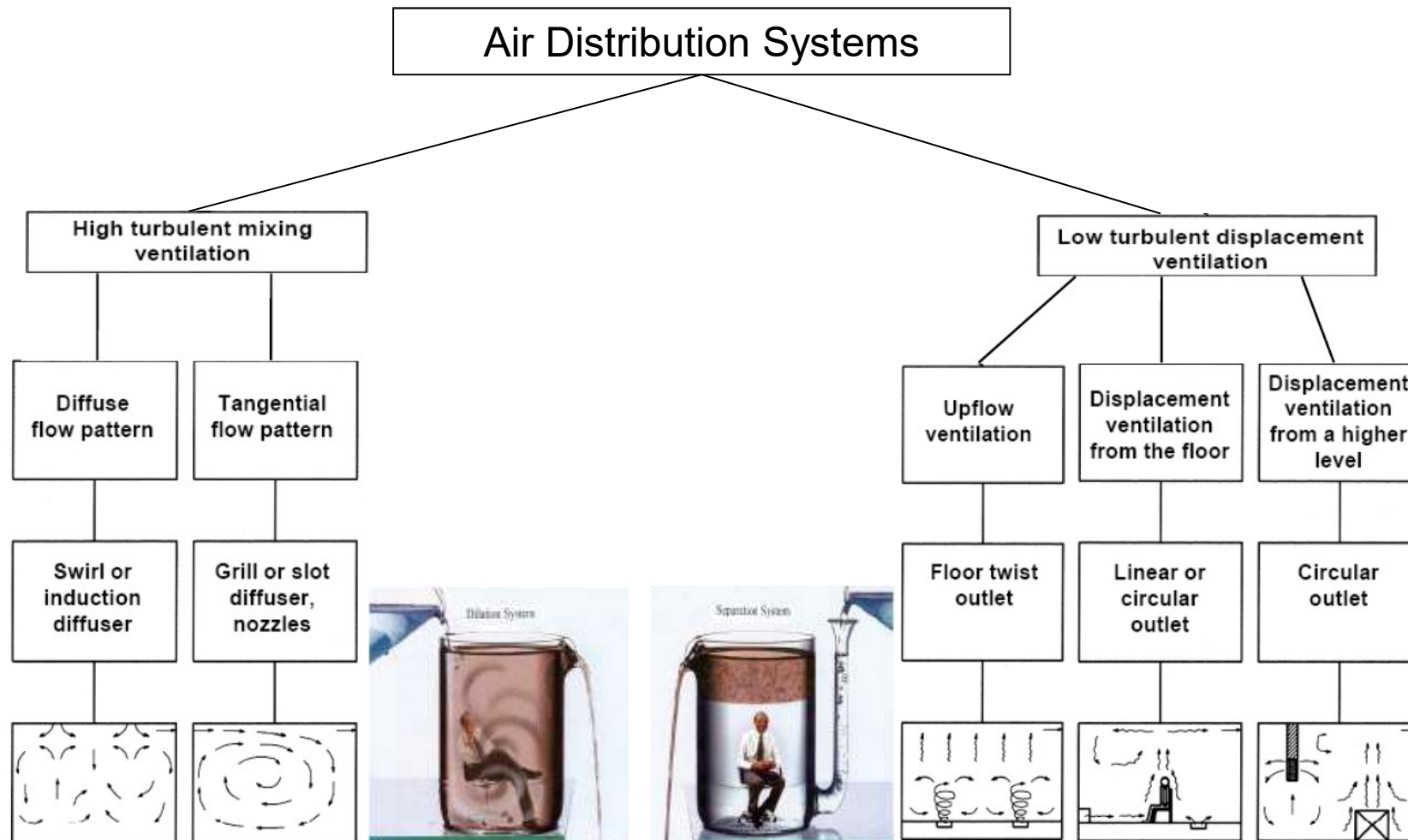
Demo Lab

# Sydney Opera House – Mock-up

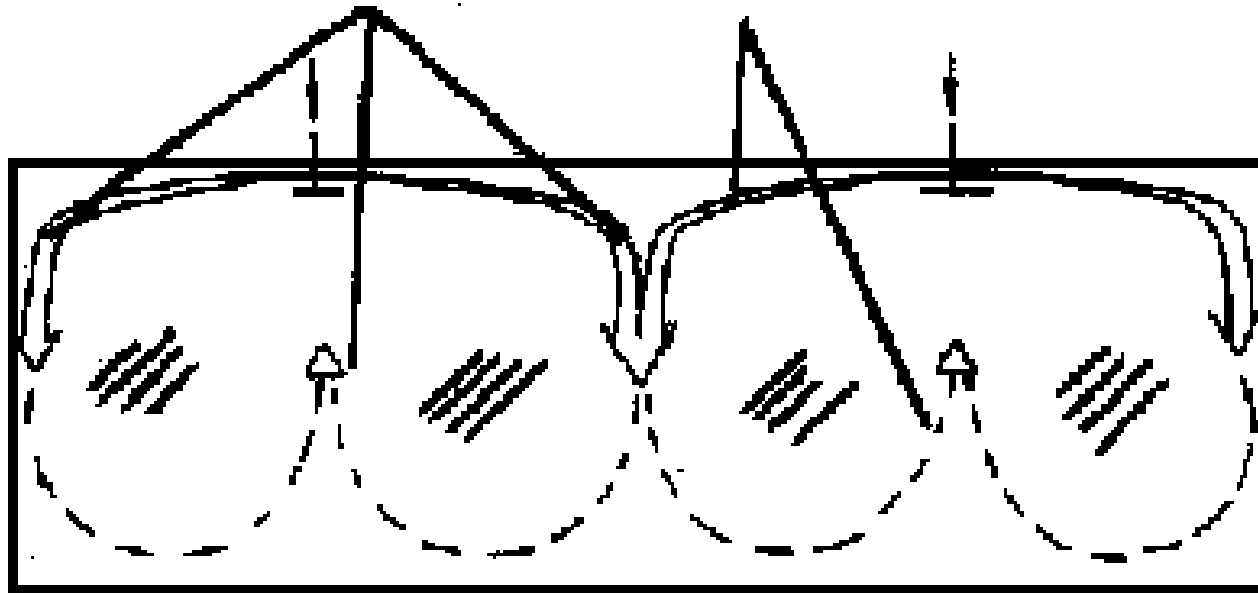
# SMARTAIR DIFFUSION







## High Velocities Air Circulation



Stagnation

- Coanda attachment
- Stagnation
- Unstable pattern
- Poor mixing
- Poor heating
- Narrow throw band
- Draughts
- Poor ventilation effectiveness
- Poor VAV

## Test 4

$$\dot{V} = 300 \text{ m}^3/\text{h}$$

$$\Delta\theta_{(\text{supply-room})} = -14.9 \text{ K}$$

# Swirl – High Induction

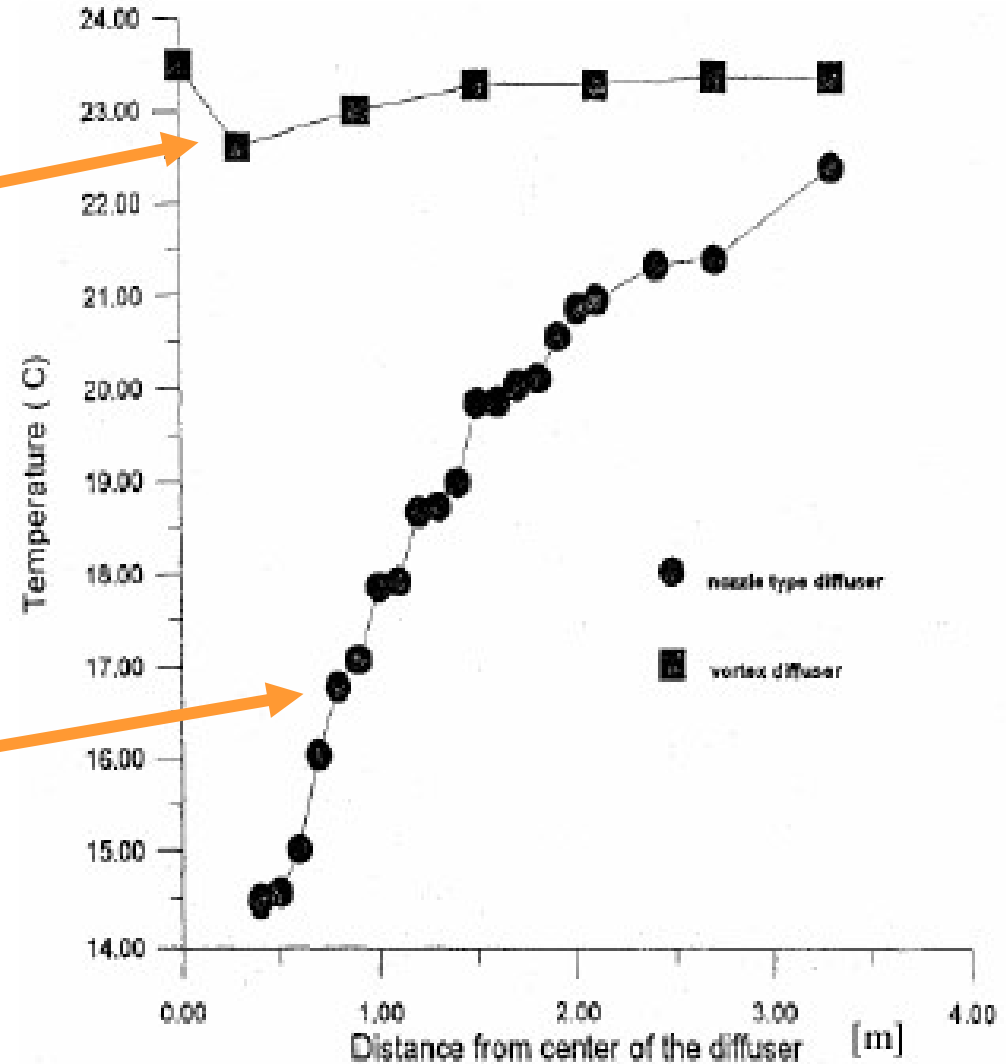
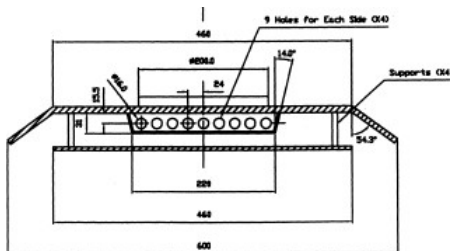
COLD AIR DIFFUSION COMPARISON: Shih Cheng Hu, Ph.D. John Michael Barber, P.E. C.Eng. Hsucheng Chiang, Ph.D., ASHRAE Transactions 1999

$$T_{\text{supply}} = 8^{\circ}\text{C}; T_{\text{room}} = 24^{\circ}\text{C}$$

Swirl – highest induction



Multi-nozzle – 2<sup>nd</sup> best induction





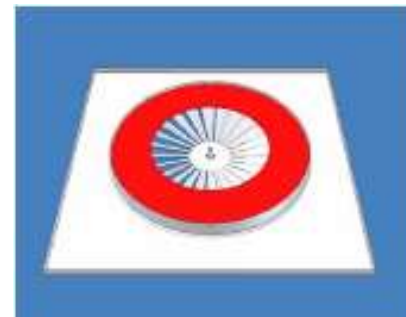


Commercial office with open ceiling (ie no Coanda effect)

## HARMONY SD Ceiling Swirl Diffuser

formerly  
Krantz RA-N3

- ❑ Designed for cold air with  $\Delta T = -15$  K
- ❑ Suitable for VAV with turndown to 32-38% @ -15 K & ADPI  $\geq 90\%$
- ❑ 24 radial vanes – pleasant aesthetic with small gaps between vanes
- ❑ Robust design – face and vanes pressed from one metal sheet
- ❑ Quiet – sound pressure  $\leq$  NC30 per diffuser (10 dB room absorption)
- ❑ 4 neck sizes – provides uniform aesthetic
  - DN200 for 20 to 60 L/s
  - DN250 for 30 to 100 L/s
  - DN350 for 12 L/s to 175 L/s
  - DN500 for 45 L/s to 400 L/s
- ❑ Optional collars
  - to match required airflow range
  - 2-way blow
  - 3-way blow
- ❑ Optional Round Face



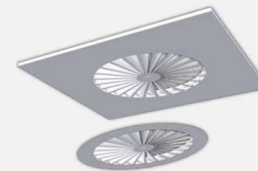
## HARMONY PRODUCT SELECTION CALCULATOR Swirl Diffuser [SD-200/250/350/500]



v 1.3 [11/2016]

### Inputs

ΔT supply-room (cooling)  K    ≤ 0 K and ≥ -15 K  
 Max Selected Airflow Rate  L/s    Enter AUTO or diffuser airflow rate  
 Selected Turndown to     Enter VAV minimum % (eg 100% for CV)



### Results

	DN200			DN250			mm
	4w	3w	2w	4w	3w	2w	
Discharge Pattern							
Min Spigot Diameter	150	125	100	200	175	150	
Max Selected Airflow	61.0	45.8	30.5	105.0	78.8	52.5	L/s
Max Recommended Airflow	61.0	45.8	30.5	105.0	78.8	52.5	L/s
Min Selected Airflow	20.6	15.4	10.3	30.4	22.8	15.2	L/s
Min Permissible Airflow							
Selected Turndown to	100%	100%	100%	100%	100%	100%	%
Min Permissible Turndown to	34%	34%	34%	29%	29%	29%	%
Min C/L Distance	2.1	1.8	1.5	2.7	2.3	1.9	m
Max C/L Distance	10.5	9.1	7.4	13.8	12.0	9.8	m
Pst - Max STATIC Pressure (incl connection box)	32.1	30.9	30.2	37.5	37.8	38.9	Pa
Pt - Max TOTAL Pressure (incl connection box)	39.3	39.3	39.3	44.2	44.2	44.2	Pa
Lw - Max SOUND POWER Level per Diffuser	45	43	42	45	44	42	dB(A)
Lp - Max SOUND PRESSURE Level per Diffuser	30	28	27	28	27	25	NC

	DN350							mm
	R0-4w	R1-4w	R2-4w	R3-4w	R4-4w	R5-4w	R6-4w	
Reducer Size - 4 way blow								
Min Spigot Diameter	250	225	200	175	150	125	125	
Max Selected Airflow	180.0	139.0	118.0	95.0	75.0	54.0	38.0	L/s
Max Recommended Airflow	180.0	139.0	118.0	95.0	75.0	54.0	38.0	L/s
Min Selected Airflow	180.0	139.0	118.0	95.0	75.0	54.0	38.0	L/s
Min Permissible Airflow	49.2	39.4	34.0	29.5	21.5	16.1	12.5	L/s
Selected Turndown to	100%	100%	100%	100%	100%	100%	100%	%
Min Permissible Turndown to	27%	28%	29%	31%	29%	30%	33%	%
Min C/L Distance	3.5	3.1	2.9	2.6	2.3	1.9	1.6	m
Max C/L Distance	16.0	15.9	14.6	13.1	11.7	9.9	8.3	m
Pst - Max STATIC Pressure (incl connection box)	28.0	30.9	35.8	35.0	33.1	32.7	38.6	Pa
Pt - Max TOTAL Pressure (incl connection box)	36.1	38.2	44.3	44.4	43.9	44.3	44.3	Pa
Lw - Max SOUND POWER Level per Diffuser	44.2	46.7	44.9	38.1	41.1	38.7	36.5	dB(A)
Lp - Max SOUND PRESSURE Level per Diffuser	29.7	29.9	29.9	27.3	26.0	23.7	21.3	NC

	DN500						mm
	R0-4w	R1-4w	R2-4w	R3-4w	R4-4w	R5-4w	
Reducer Size - 4 way blow							
Min Spigot Diameter	350	325	300	275	250	225	
Max Selected Airflow	400.0	320.0	290.0	229.0	179.0	145.0	L/s
Max Recommended Airflow	400.0	320.0	290.0	229.0	179.0	145.0	L/s
Min Selected Airflow	400.0	320.0	290.0	229.0	179.0	145.0	L/s
Min Permissible Airflow	116.3	107.3	89.4	67.1	53.7	44.7	L/s
Selected Turndown to	100%	100%	100%	100%	100%	100%	%
Min Permissible Turndown to	29%	34%	31%	29%	30%	31%	%
Min C/L Distance	5.3	4.7	4.5	4.0	3.5	3.2	m
Max C/L Distance	16.0	16.0	16.0	16.0	16.0	16.0	m
Pst - Max STATIC Pressure (incl connection box)	27.7	28.9	30.2	35.7	36.5	36.4	Pa
Pt - Max TOTAL Pressure (incl connection box)	38.1	37.9	40.3	44.6	44.5	44.4	Pa
Lw - Max SOUND POWER Level per Diffuser	44.5	45.5	45.2	43.7	42.0	42.7	dB(A)
Lp - Max SOUND PRESSURE Level per Diffuser	29.7	28.7	29.5	28.2	26.3	26.9	NC

### KEY

< min permissible
> max recommended
< min permissible
Turndown too low
Draught Stagnation
> 35   > 45   > 55
> 45   > 55   > 65
≤ 45   > 50   > 55
≤ 30   > 30   > 35

< min permissible
> max recommended
< min permissible
Turndown too low
Draught Stagnation
> 35   > 45   > 55
> 45   > 55   > 65
≤ 45   > 50   > 55
≤ 30   > 30   > 35

< min permissible
> max recommended
< min permissible
Turndown too low
Draught Stagnation
> 35   > 45   > 55
> 45   > 55   > 65
≤ 45   > 50   > 55
≤ 30   > 30   > 35

**Notes:**  
 Maximum airflow rate valid for Pt ≤ 45 Pa and Lp ≤ NC30.  
 Max Sound Pressure Level per Diffuser based on 10 dB sound absorption in the room ref 10<sup>-2</sup> × 12 W.  
 For distances to walls halve C/L distances.  
 Recommended C/L distances between diffusers are based on satisfying an ADPI of at least 90% for 2.7 m discharge height.  
 Return air openings at the same height as the diffuser should be at a distance of at least 5 × DN from the diffuser to prevent short circuiting.

## SMARTEMP HSC-FD - Fixed Helical Swirl Diffuser





### □ Optimised swirl vanes

- Cambered leading edges:
  - low noise
  - increased airflow
- Helical twist, bell mouth & long trailing edges:
  - $V_{min} \approx 25-28\%$  of  $V_{max}$  @ -16 K
  - $V_{min\ sp} \approx 1\text{ L/s/m}^2$  for  $ADPI \geq 90\%$

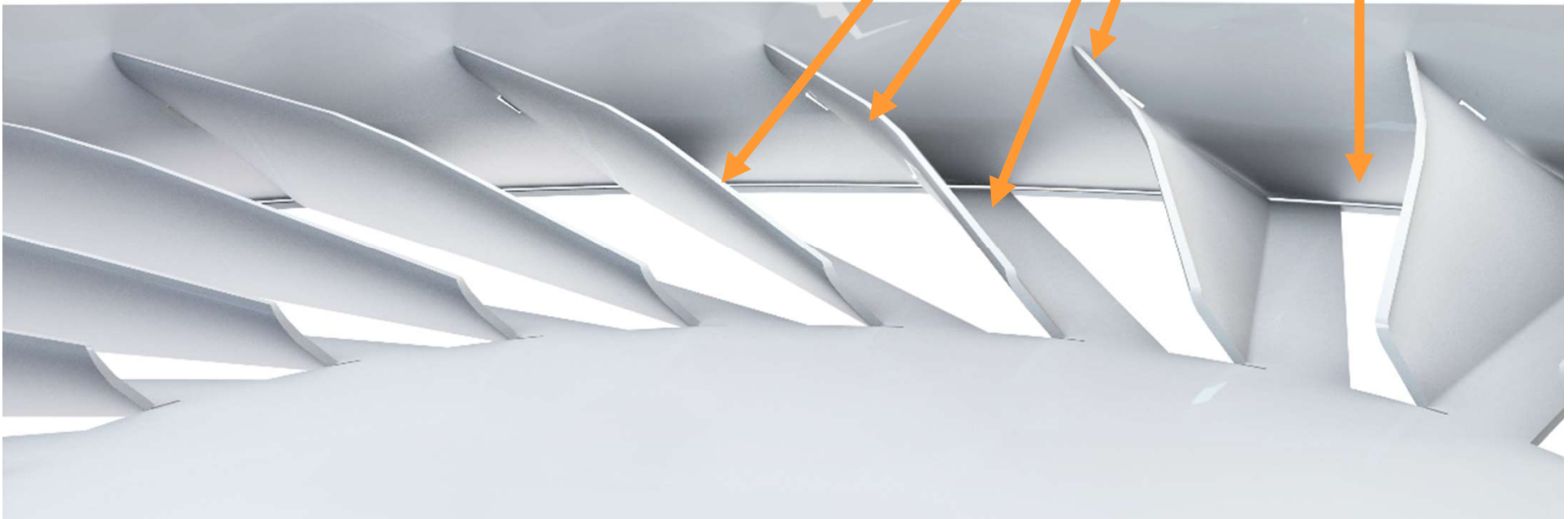
Offset radial vanes

Vanes with helical twist

Long trailing edge

Cambered leading edge

Bell mouth opening



- ❑ 20 fixed swirl vanes
- ❑ Square or circular face
- ❑ Optional: reducer rings for VAV systems
- ❑ Optional: segment covers for 3-way / 2-way air patterns
- ❑ Sizes & Airflows
  - DN250 (27 – 108 L/s; 98 m<sup>3</sup>/h – 389 m<sup>3</sup>/h)
  - DN355 (48 – 221 L/s; 173 m<sup>3</sup>/h – 796 m<sup>3</sup>/h)
  - DN500 (96 – 439 L/s ; 346 m<sup>3</sup>/h – 1580 m<sup>3</sup>/h)

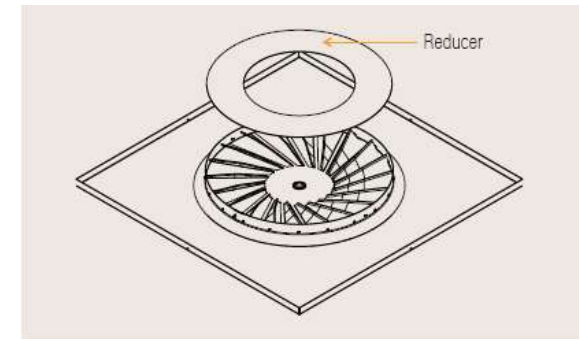
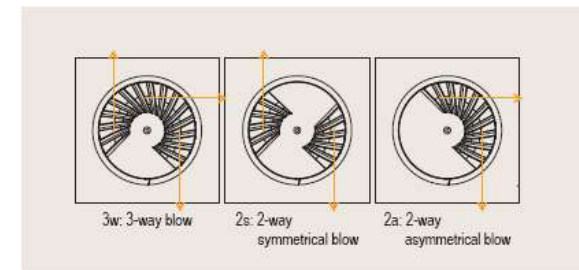
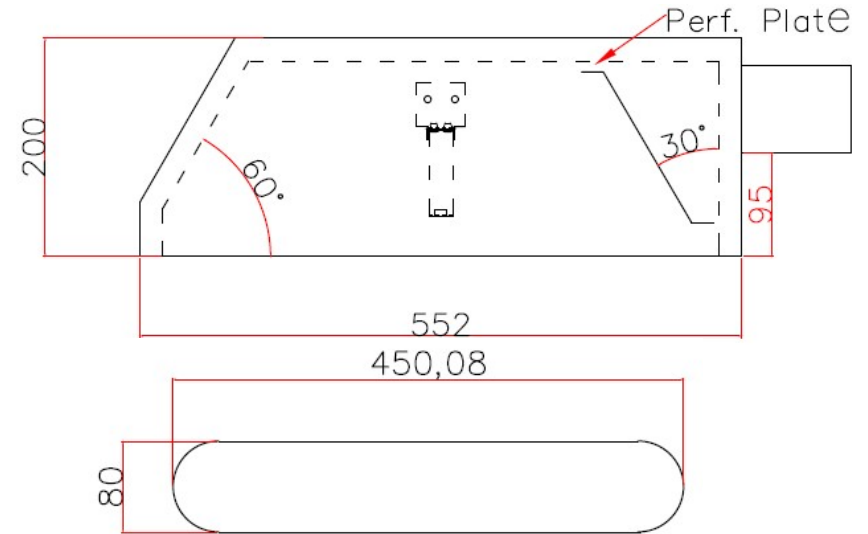


Figure 2



- ❑ HSC-FD-DN355
- ❑ Design Airflow:  $\leq 110$  L/s
- ❑ VAV Range: 40% to 100
- ❑ Temp Differential: -12 K
- ❑ ADPI: 90%
- ❑ **Low Profile Plenum:** 200 mm



- Selection is extremely flexible
- Choice of ADPI comfort criteria
- Safe download – Excel spreadsheet & no macros

**SMARTEMP PRODUCT SELECTION CALCULATOR**  
Fixed Helical Swirl Diffuser [HSC-FD DN250/DN355/DN500]

**SMARTEMP**  
IN COMFORT

v 1.9 [12/2016]

**Inputs**

Neck Size:  in

Maximum Airflow Rate:  L/s

VAV (turndown to):  %  
use 100% for no turndown

Maximum Permissible Total Pressure:  Pa  
default: 35 Pa

$\Delta T$  (cooling):  K  
-8 K to -16 K

Diffuser Height:  m  
2 m to 5 m

**Optional**

Discharge Direction:

Specific Airflow Rate (heating):  L/s/m<sup>2</sup>  
2 to 10 L/s/m<sup>2</sup> (default 5 L/s/m<sup>2</sup>)

ADPI  $\geq$ :  %  
default  $\geq$  90%

% Low Level Return (heating):  %  
0% to 100% (default 0%)

Diffuser Location:  Closed Ceiling  Freely Suspended

**Normal Comfort Guide**

ADPI  $\geq$  95%;  $\downarrow \leq$  0.20 m/s: Premium comfort, sedentary activity, such as in auditoria.

ADPI  $\geq$  90%;  $\downarrow \leq$  0.25 m/s: High comfort near-sedentary activity, such as in board rooms, high end offices and libraries.

ADPI  $\geq$  80%;  $\downarrow \leq$  0.29 m/s: Good comfort near sedentary activity, such as open-plan offices and meeting rooms.

ADPI  $\geq$  70%;  $\downarrow \leq$  0.33 m/s: Standard comfort medium activity, such as in transient spaces, retail and lobbies.

**Results**

	Reducer 0	Reducer 1	Reducer 2	Reducer 3	Reducer 4	Reducer 5	Reducer 6
Max Airflow (L/s)	120.0	120.0	120.0	120.0	120.0	120.0	120.0
Max Permissible Airflow (L/s)	221.0	192.2	157.7	122.0	89.8	62.2	43.7
Min Airflow (L/s)	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Min Permissible Airflow (L/s)	47.8	41.6	34.1	26.4	19.4	13.5	9.5
Min % Turndown to	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Min Permissible % Turndown to	39.9%	34.7%	28.5%	22.0%	16.2%	11.2%	7.9%
Max Total Pressure (Pa)	10.3	13.6	20.3	33.9	62.5	130.4	263.4
Max Permissible Total Pressure	35.0	35.0	35.0	35.0	35.0	35.0	35.0
Sound Power Level (dBA)	28.2	33.3	37.0	40.8	46.0	54.0	60.1
Sound Pressure Level (NC)	13.2	18.3	22.0	25.8	31.0	39.0	45.1
Max Permissible $\Delta T$ (heating) (K)	+ 8.1	+ 8.5	+ 9.5	+ 10.5	+ 11.8	+ 13.1	+ 14.6
Min Permissible Diffuser Height (m)	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Min Centreline Distance (m)	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Max Centreline Distance (m)	5.4	5.4	5.4	5.4	5.4	5.4	5.4

Key:  Suitable  Not Suitable  Warning

Refer to 'Notes HSC-FD' worksheet for selection tool notes

click to see product on smartair.asia

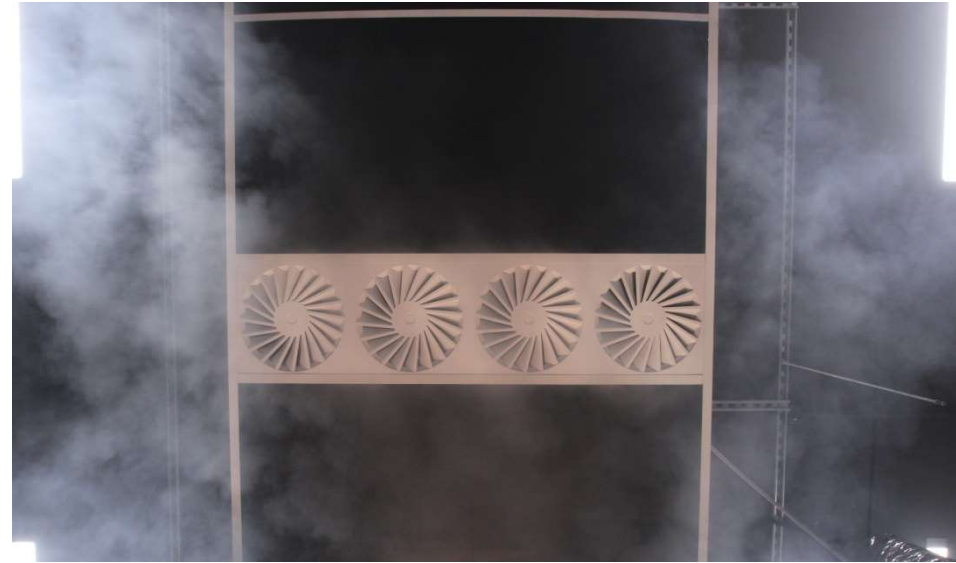
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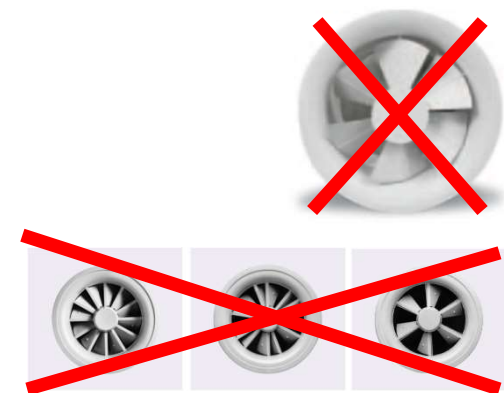


Acoustic Tests - Germany



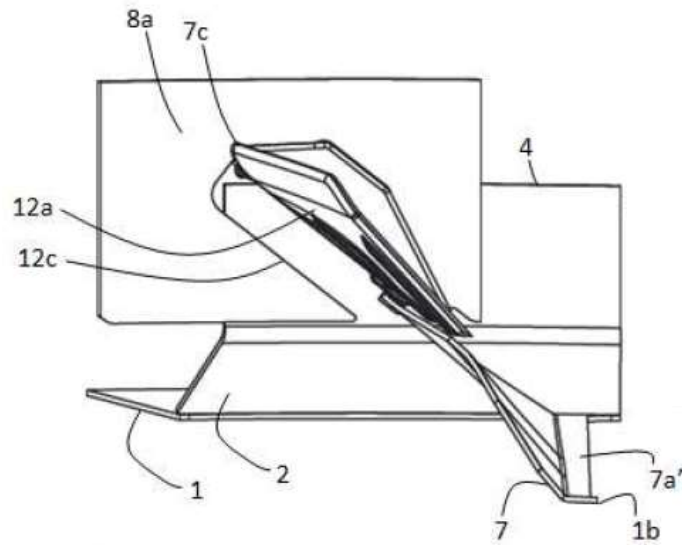
Airflow Tests - Australia

## SMARTEMP HSC-AD - Adjustable Helical Swirl Diffuser





Approx 30% flow decrements between reducer and full face.  
 Approx 50% flow decrements between DN sizes.

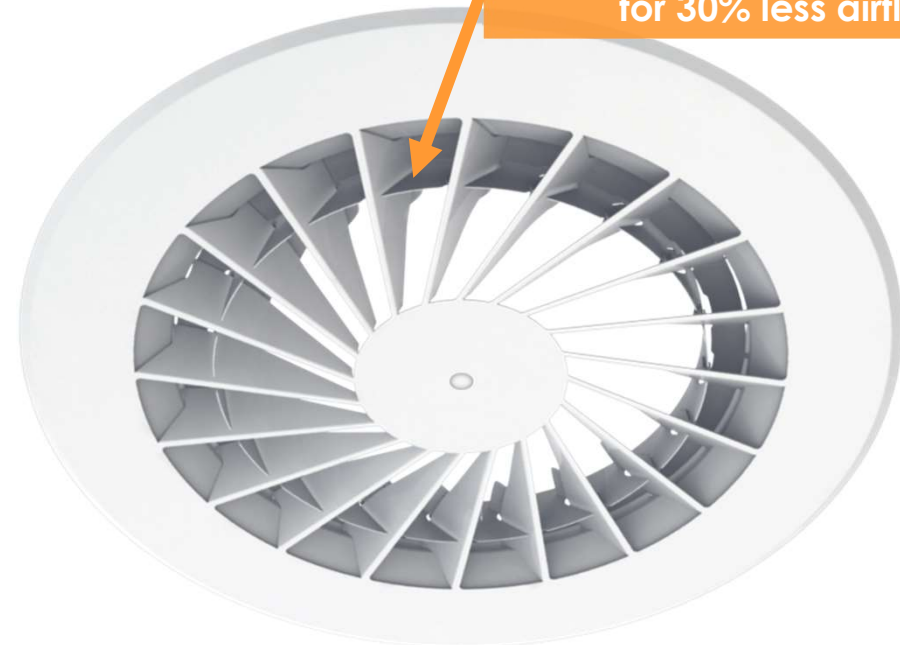

**Typical airflow rates:**

- **DN250-R1**    **90 – 175 L/s** (324 – 630 m<sup>3</sup>/h; 191 – 371 cfm)
- **DN250-R0**    **130 – 250 L/s** (468 – 900 m<sup>3</sup>/h; 275 – 530 cfm)
- **DN355-R1**    **180 – 350 L/s** (648 – 1260 m<sup>3</sup>/h; 381 – 742 cfm)
- **DN355-R0**    **260 – 500 L/s** (936 – 1800 m<sup>3</sup>/h; 551 – 1059 cfm)
- **DN500-R1**    **360 – 700 L/s** (1296 – 2520 m<sup>3</sup>/h; 763 – 1483 cfm)
- **DN500-R0**    **510 – 1000 L/s** (1836 – 3600 m<sup>3</sup>/h; 1080 – 2120 cfm)
- **DN710-R1**    **720 – 1400 L/s** (2592 – 5040 m<sup>3</sup>/h; 1526 – 2966 cfm)
- **DN710-R0**    **1100 – 2000 L/s** (3960 – 7200 m<sup>3</sup>/h; 2331 – 4238 cfm)
- **DN1000-R1**    **1500 – 2800 L/s** (5400 – 10080 m<sup>3</sup>/h; 3178 – 5933 cfm)
- **DN1000-R0**    **2100 – 4000 L/s** (7560 – 14400 m<sup>3</sup>/h; 4450 – 8476 cfm)

Standard guide ring (R0)  
without reducer

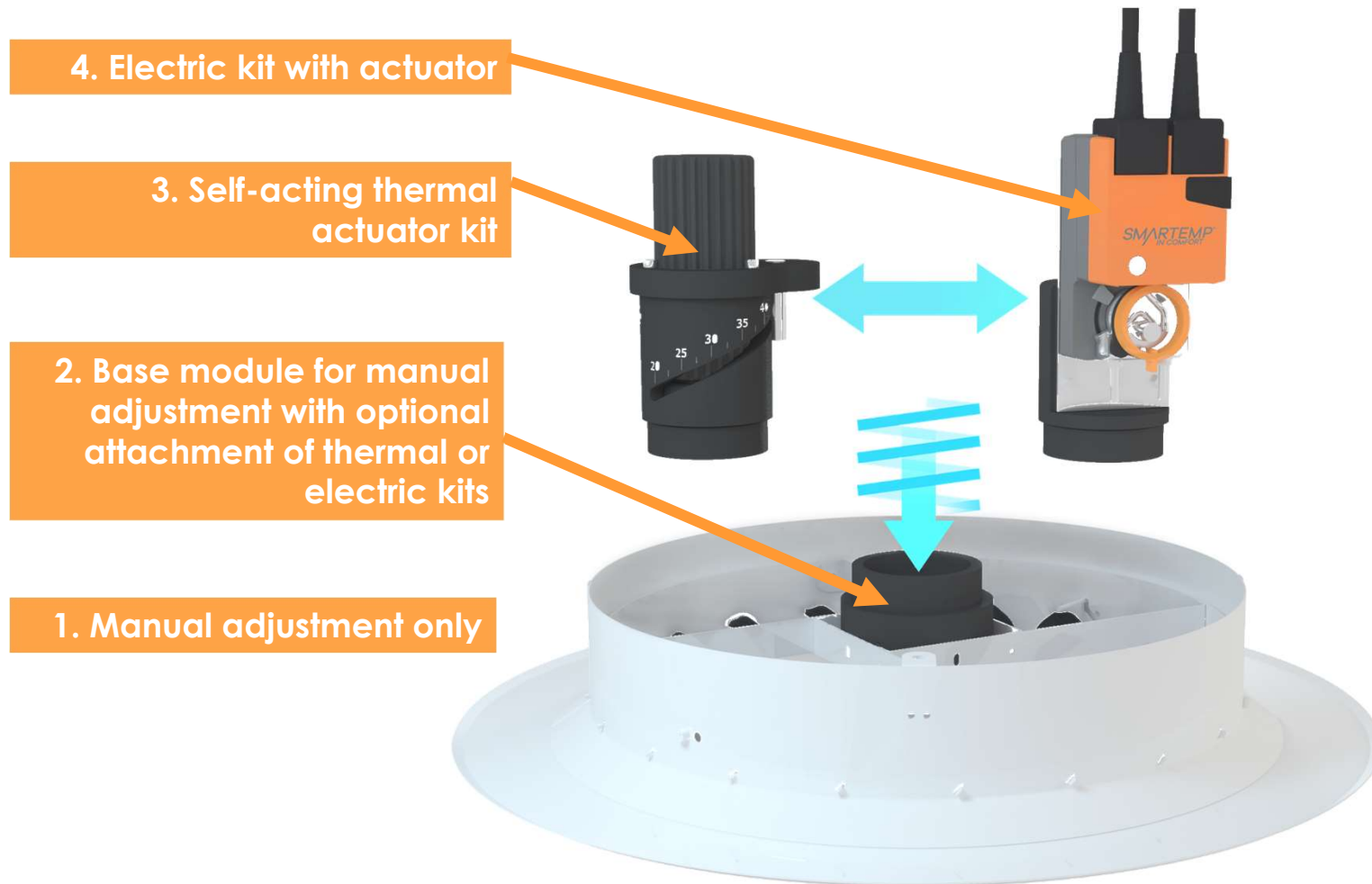


Reduced guide ring (R1)  
for 30% less airflow





## □ 4 versions:



## Smoke test:

### ☐ Heating –

Vertical Discharge

Size = DN500

$V = 650 \text{ L/s}$

$\Delta T = +7.5 \text{ K}$

$H = 6.3 \text{ m}$



**SMARTEMP PRODUCT SELECTION CALCULATOR**  
Adjustable Helical Swirl Diffuser [HSC-AD]

Project: <Project Name>

**Inputs**

Diffuser Airflow Rate:  [L/s]  [L/s]  [m³/h] (1440 m³/h)

Maximum Total Pressure:  Pa (default 60 Pa)

Diffuser Height:  m (≥ 2 m)

ΔT (cooling):  K (0 K to -13 K (default -12 K))

**Optional** → 3.10 [11/17]

ADPI:  (default 90%)

**Draught Rating & Heating**

- Diffuser Distance ~ Average (Max, Min) Centreline Distance OR average distance = 3.4 m (size rows 47 and 48 centreline distance between diffusers)
- Max Recommended Diffuser Distance:  m
- Specials Airflow Rate:  L/m² (≤ 30 L/m²)
- ΔT (heating)  K (check for manual input)
- Room Temperature (cooling):  °C (20 °C to 26 °C)
- Room Temperature (heating):  °C (check for manual input)
- Room Temp. @ heating startup:  °C (night setback temperature)
- % Low Level Return (heating):  % (0% to 100% (default 0%))

**Thermal Comfort Guide**

ADPI ≥ 90% / 4 & 6.29 m/s: Premium comfort, sedentary activity, such as in auditoria.

ADPI ≥ 80% / 4 & 6.23 m/s: High comfort near sedentary activity, such as in board rooms, high end offices and libraries.

ADPI ≥ 60% / 4 & 6.29 m/s: Good comfort near sedentary activity, such as open plan offices and meeting rooms.

ADPI ≥ 70% / 4 & 6.31 m/s: Standard comfort medium activity, such as in transient spaces, retail and hotels.

**Results**

	DN250-R1	DN250-R0	DN355-R1	DN355-R0	DN500-R1	DN500-R0	DN710-R1	DN710-R0	DN1000-R1	DN1000-R0
Max Airflow [L/s]	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0
Max Permissible Airflow [L/s]	138.0	197.2	291.4	416.3	651.8	931.1	1122.6	1603.7	2311.9	3302.8
Min Permissible Airflow [L/s]	59.1	84.4	118.9	169.6	234.6	335.0	471.8	672.6	930.7	1328.8
Total Pressure @ Airflow Rate [Pa]	503.9	246.9	113.1	55.4	22.6	< 15	< 15	< 15	< 15	< 15
Max Permissible Total Pressure [Pa]	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Sound Power Level [dB(A)]	75.2	66.4	54.8	44.6	36.0	25.7	< 25	< 25	< 25	< 25
Max Permissible ΔT (heating) [K]	+36.0 K	+25.2 K	+12.5 K	+8.8 K	+4.5 K	+3.2 K	< +2 K	< +2 K	< +2 K	< +2 K
Room Temp. @ heating startup [°C]	16.0	18.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
Min Recommended Diffuser Height [m]	2.8	2.8	2.8	3.3	3.9	4.4	5.0	5.5	6.1	6.6
Max Recommended Centreline Dist. [m]	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4
Min Recommended Centreline Dist. [m]	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
Mean Room Air Velocity [m/s] (cooling)	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Mean Draught Rating (DR) (cooling)	14.6%	14.6%	14.6%	14.6%	14.6%	14.6%	14.6%	14.6%	14.6%	14.6%
Mean PPD (cooling)	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%	7.7%
Satisfies PPD Category (ISO7730) (cooling)	B	B	B	B	B	B	B	B	B	B
Thermal Element Setting [°C]	n.r.	n.r.	33	29	25	23	n.r.	n.r.	n.r.	n.r.

Warning: Selected 'Diffuser Height' < 'Min Recommended Height'

Key: Satisfiable Not Satisfiable Warning  
Note: R0 - no reducer; R1 - with reducer

Note: 'n.r.' - thermal element not recommended

**Product Code & Control Voltage Generator**

Select Size & Reducer:  DN250-R1  DN250-R0  DN355-R1  DN355-R0  DN500-R1  DN500-R0  DN710-R1  DN710-R0  DN1000-R1  DN1000-R0

Adjustment Type:  M\*  BE1  BE2  BE n.r.  F1/2/3/4  F1/2/3/4/5

Colour:  RAL9003\* (signal white)  RAL9005 (jet black)  other\*

Order Code:

Product Description:

\* indicates standard/default option  
\* more detailed options available in the HSC-AD product brochure  
\* contact Smartair Diffusion for custom colours  
refer to 'HSC-AD Selection Summary' for a printable summary

**DN355-R0 Electric Control Voltage (V) & Guide Ring Position (mm)**

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[click to see product on smartair.asia](#)



North Lakes Sports Club – Australia





Alexander Theatre, Monash University – Australia



01

# V&A Museum, Scotland, UK: 2018

**SMARTEMP**<sup>®</sup>  
IN COMFORT

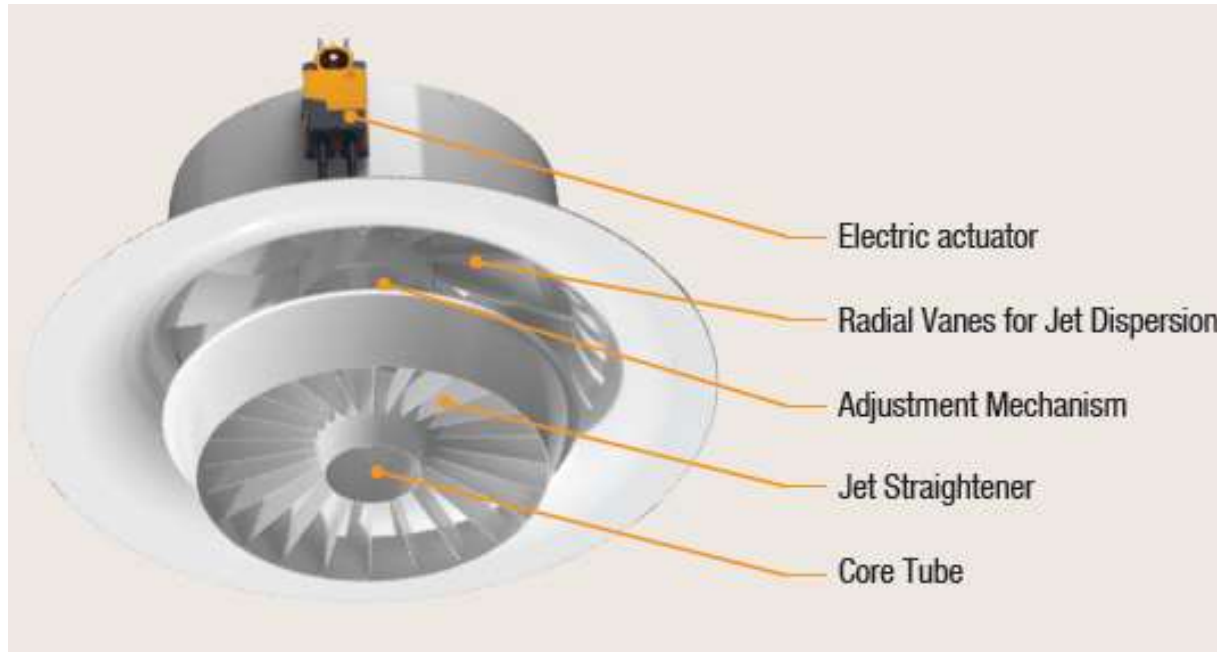
## Smartemp HSC-AD Diffusers





Jet Swirl Diffuser

**JSC-AD**

**Key Performance Parameters:**

- **Nominal Sizes**            **DN400; DN630**
- **Airflow Rate**            **300 – 2400 L/s**
- **Discharge Height**        **8 – 25 m**



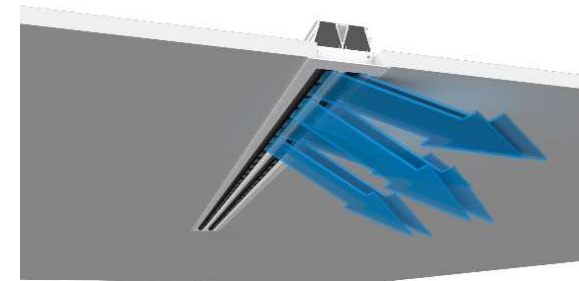
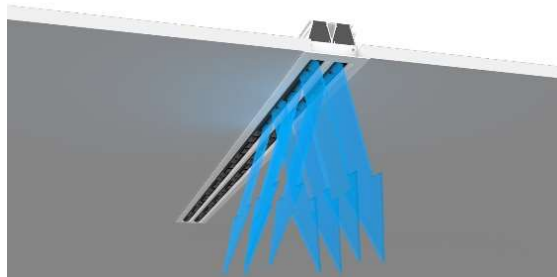
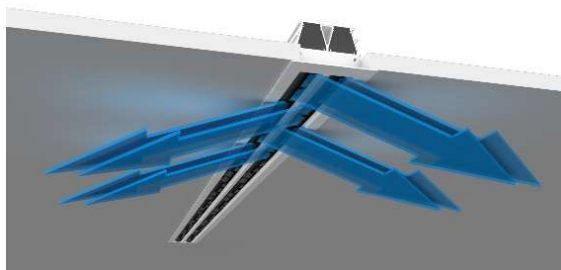


Sydney Opera House

## SMARTEMP LMC-AD – Linear Multistream Diffuser



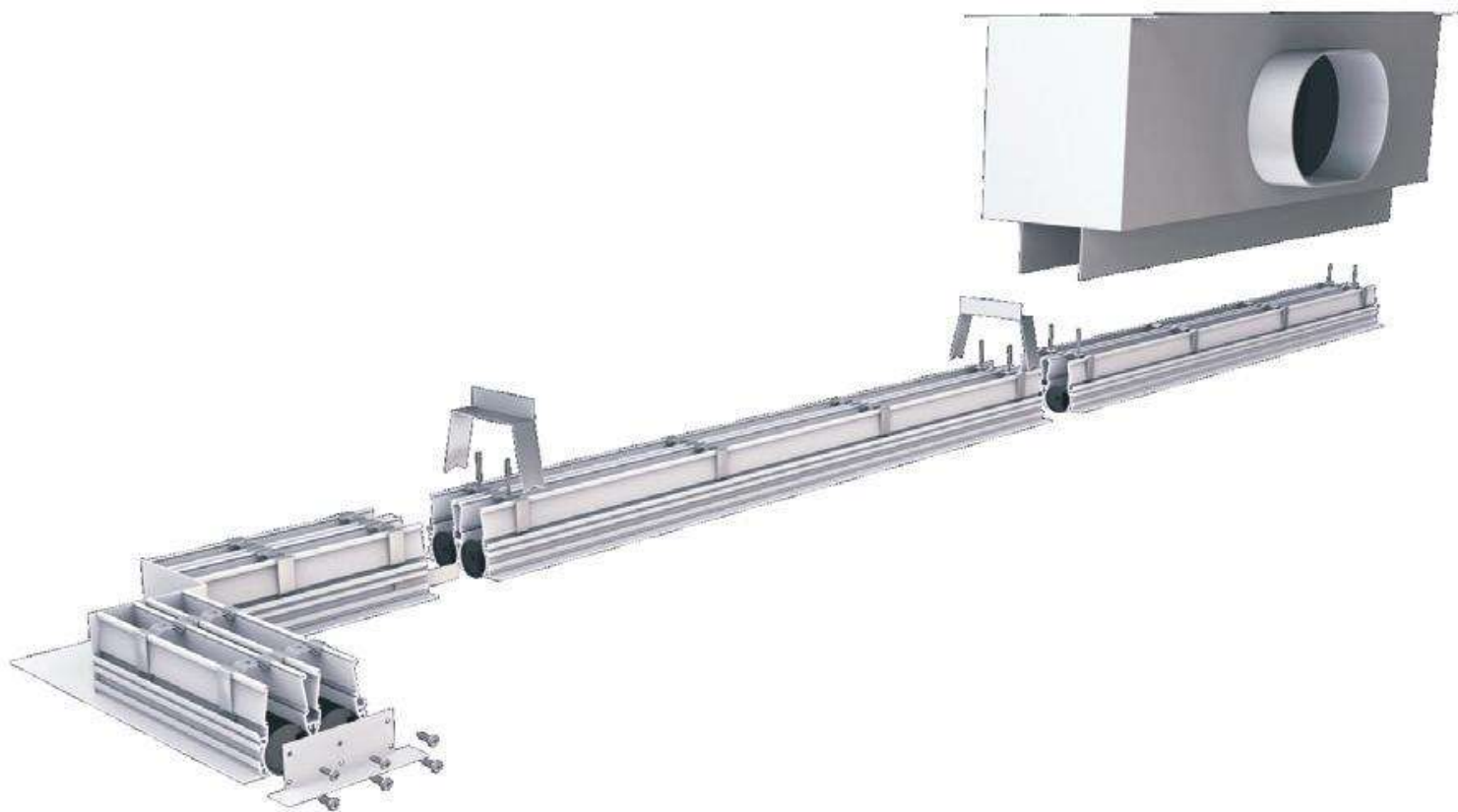
- ❑ High induction
- ❑ Adjustable discharge direction
- ❑ Cooling  $\Delta T$  up to -16 K
- ❑ Heating to +10 K (3 m), +6 K (5 m)
- ❑ VAV turndown to 25% @ -16 K



03

## LMC-AD – Application

**SMARTEMP**<sup>®</sup>  
IN COMFORT





**Smoke test:**

- ❑ Cooling – Horizontal Discharge



**Smoke test:**

- Heating – Vertical Discharge





**SMARTEMP PRODUCT SELECTION CALCULATOR**  
**Linear Multistream Ceiling Diffuser [LMC-AD]**

**SMARTEMP**  
IN COMFORT

**Project:** <Project Name>

**Inputs**

Maximum Airflow Rate:  • (L/s/m) ○ (l/h/h/m)

VAV (Turndown to):  % 10% to 100% (see 100% Air CAV)

Maximum Permissible Total Pressure:  Pa default: 25 Pa

ΔT (cooling):  K 2K to 20K (default: -12 K)

Diffuser Height:  m 2 m to 3 m

Active Length Ratio:  \* 0.1 to 1.0 (default: 0.5)

\* Refer to Notes LMC-AD worksheet for definition

**Optional** v4.5 (01/2017)

Air Pattern:  2-Way  1-Way

ADR:  default: 32%

Diffuser Location:  Closed Ceiling  Freely Suspended

**Draught Rating & Heating**

Diffuser Distance = Average (Max, Min) C Distance see "Min C Distance" in "Drawings" tab (tab)

Maximal Diffuser Distance:  m distance between diffusers

Specific Airflow Rate:  L/s/m<sup>2</sup> < 30 L/s/m<sup>2</sup>

Room Temperature (draught rating):  °C 20 °C to 26 °C (default: 23 °C)

Low Level Return (heating):  % 10% to 100% (default: 0%)

Thermal Comfort Guide

ADR < 30%, 1 to 0.25 m/s<sup>2</sup>. Perceived comfort, sedentary activity, typical in auditoria.

ADR < 30%, 1 to 0.25 m/s<sup>2</sup>. High comfort, moderate to low activity, typical in board rooms, high end office and homes.

ADR < 30%, 1 to 0.25 m/s<sup>2</sup>. Good comfort, low to medium activity, such as open plan office and meeting rooms.

ADR < 30%, 1 to 0.25 m/s<sup>2</sup>. Standard performance activity, such as in classrooms, shops and hotels.

**Results**

	1 Slot	2 Slots	3 Slots	4 Slots	5 Slots	6 Slots
* Width Flangeless Face [mm]	31	50	67	115	143	171
* Width Flanged Face [mm]	48	76	104	132	160	188
* Width of Diffuser Throat [mm]	27	55	83	111	139	167
Max Airflow [L/s/m]	60.0	60.0	60.0	60.0	60.0	60.0
Max Recommended Airflow [L/s/m]	35.0	24.0	13.0	14.0	18.0	22.0
Min Airflow [L/s/m]	18.0	18.0	18.0	18.0	18.0	18.0
Min Permissible Airflow [L/s/m]	7.8	19.0	24.2	32.1	40.2	49.4
Min % Turndown to	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%
Min Permissible % Turndown to	12.6%	26.7%	60.8%	53.8%	67.8%	82.3%
Total Pressure @ 100% Airflow [Pa]	102.9	23.0	10.0	5.7	3.6	2.4
Max Selected Total Pressure [Pa]	35.0	35.0	35.0	35.0	35.0	35.0
Sound Power Level [dB(A)/m]	45.1	29.6	< 25	< 25	< 25	< 25
Sound Pressure Level [NC/m]	30.1	14.6	< 10	< 10	< 10	< 10
Max Permissible ΔT (heating) [K]	+12.0	+9.2	+7.3	+6.3	+5.3	+4.7
Min Permissible Diffuser Height [m]	2.5	2.5	2.5	2.5	2.5	2.5
** Max C Distance [m]	16.2	16.2	16.2	16.2	16.2	16.2
** Min C Distance [m]	3.8	3.8	3.8	3.8	3.8	3.8
** Air Direction Setting (A, B or C)	A	A	A	A	A	A
Mean Room Air Velocity [m/s]	0.16	0.16	0.16	0.16	0.16	0.16
Mean Draught Rating (DR)	15.7%	15.7%	15.7%	15.7%	15.7%	15.7%
Mean PPD	8.2%	8.2%	8.2%	8.2%	8.2%	8.2%
Satisfies PPD Category (ISO7730)	A	B	B	B	B	B

Key:  Subtle  Not Subtle  Warning

\* Based on 10 dB room absorption

\*\* Refer to Dimensions LMC-AD worksheet for details  
\*\* Refer to Notes LMC-AD worksheet for definitions

**Product Selection & Code Generator**

Select model to create product code:  1 slot  2 slots  3 slots  4 slots  5 slots  6 slots

Nominal Length:  1200 mm (neck)  1195 mm\* (face)  custom\* (face) ≤ 1500 mm

Air Pattern Setting:  2-way blow is selected - see Colix

Air Direction Setting:  auto\*  vertical, short  vertical, long

Side Profile:  with side flanges\*  flangeless

Profile Colour:  RAL9003\* (signal white)  RAL9005 (jet black)  other ^ \* contact SmarTemp Diffuser for custom lengths and colours

Barrel Colour:  black\*  white \* indicates standard/default option

Product Code: \_\_\_\_\_ Please select length and number of slots

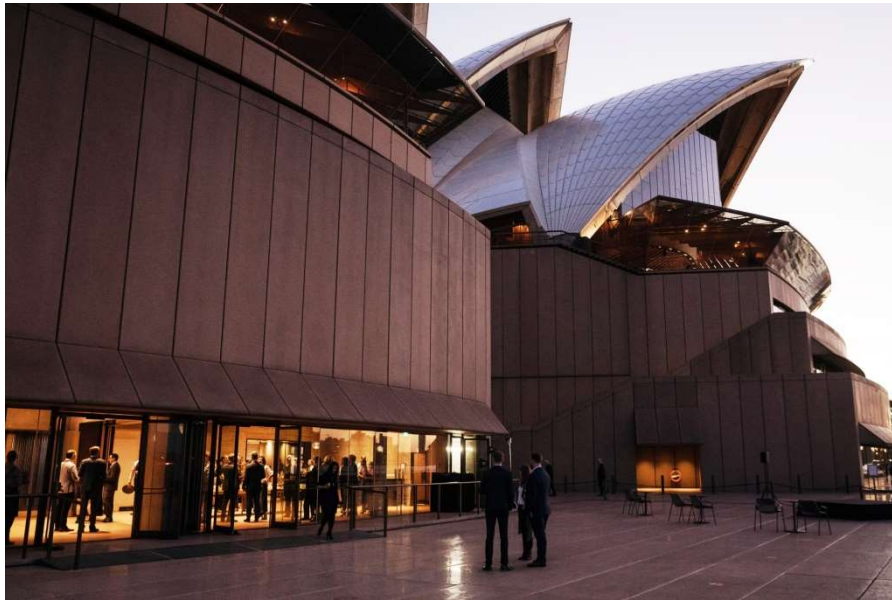
- more detailed options available in the LMC-AD product brochure  
go to LMC-AD Selection Print Summary\* for a printable summary of the selection

[click here to see product on smartemp.aes](#) Copyright © 2017 SMARTEMP DIFFUSION

01

# Sydney Opera House, Australia: 2019

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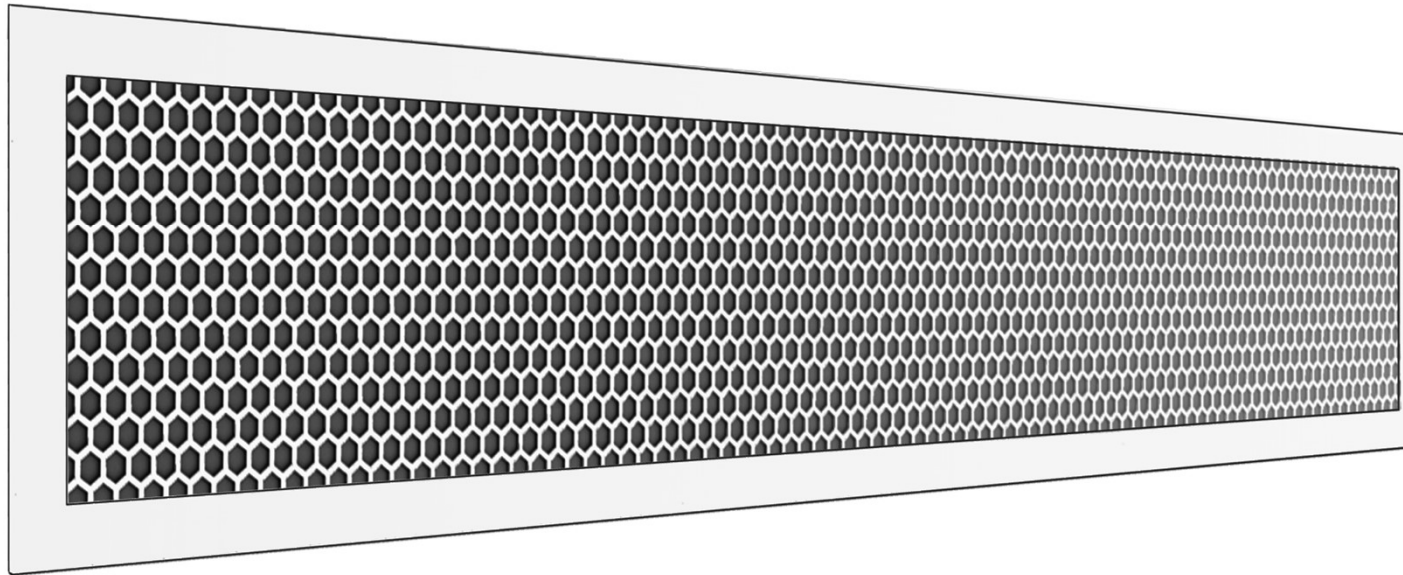


## Smartemp LMC-AD Diffusers





## SMARTEMP PMW-AD – Perforated Multistream Diffuser



formerly  
Krantz BF-A

- ❑ Draught-free air supply from side-wall
- ❑ Breaks up supply air into a multitude of individual air streams
- ❑ Each hexagonal nozzle cluster manually adjustable to 6 positions
- ❑ Adjustment via an Allen key inserted through the front face of the diffuser
- ❑ Patents pending

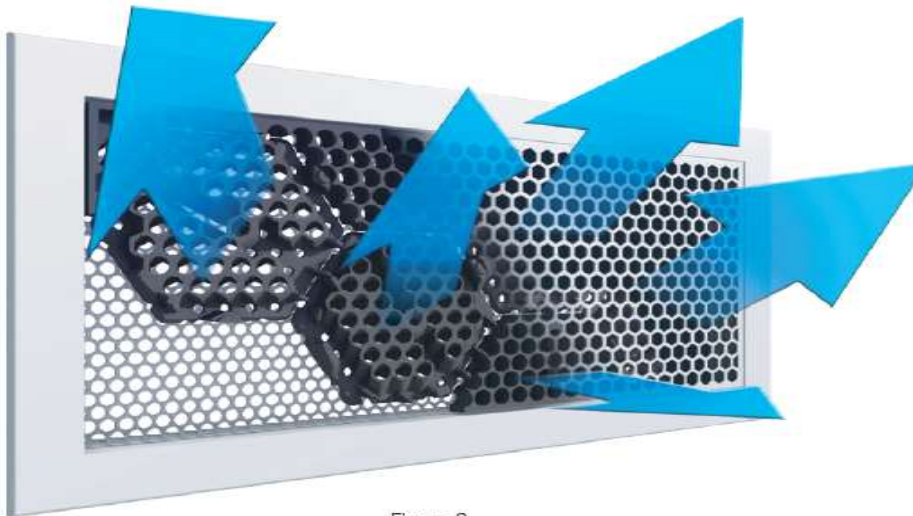


Figure 2

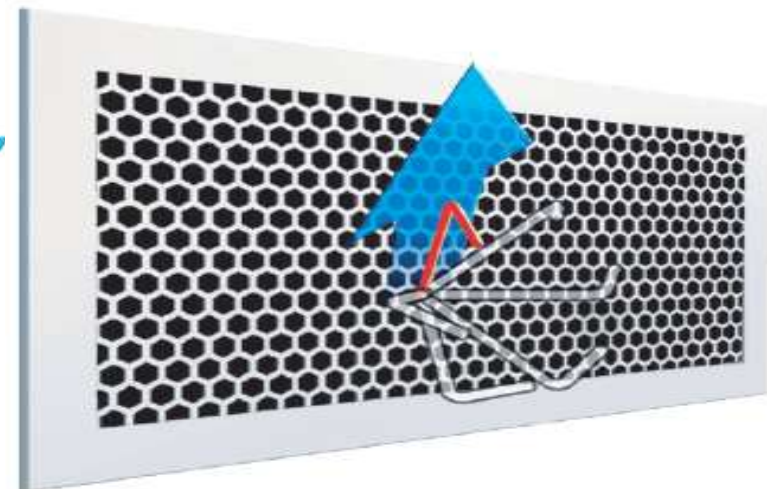


Figure 3

Air volume flow rate : 100 l/s  
(360 m<sup>3</sup>/h)

Temperature difference: - 10 K  
(Supply - Room)

- High comfort
- Hotels, apartments
- Schools, universities
- Offices, meeting rooms
- Throws: 3-15 m – adjustable
- Typical airflow: 50 – 500 L/s

## Conrad Hilton - Maldives



Sofitel - Brisbane



LinkedIn - Sydney



SMARTEMP  
IN COMFORT

**SMARTEMP PRODUCT SELECTION CALCULATOR**  
Perforated Multistream Diffuser [PMW-AD]

Project: <Project Name>

**Inputs**

Maximum Airflow Rate:  m<sup>3</sup>/h

Maximum Total Pressure:  Pa (default 30 Pa)

Diffuser Height:  m (2.0 m to 5.5 m)

ΔT (cooling):  K (1 K to -12 K (default))

**Optional**

ADR:  (default > 90%)

**Draught Rating & Heating**

Throw (length = Average (Lmax, Lmin),  
Throw Breadth = Average (Bmax, Bmin))

Manual Throw Length:  m  
Manual Throw Breadth:  m

Specific Airflow Rate:  L/s/m<sup>2</sup>

Room Temperature:  °C (20 °C to 26 °C (default 23 °C))

Thermal Comfort Guide  
ADR 90% to 95% mid: medium comfort, sedentary activity, such as in lecture halls.  
ADR 95% to 98% mid: high comfort, sedentary activity, such as in board rooms, high end offices and libraries.  
ADR 98% to 99% mid: ideal comfort for sedentary activity, such as open plan offices and meeting rooms.  
ADR 99% to 99.99% mid: standard comfort, sedentary activity, such as in transient accommodation and schools.

**Results**

		DN600				DN950				DN1500				
		1	2	3	4	1	2	3	4	1	2	3	4	
Neck Width	Wn [mm]	577				915				1455				
Face Width	Wf [mm]	612				950				1490				
Rows (Height)	Hr	1	2	3	4	1	2	3	4	1	2	3	4	
Neck Height	Hn [mm]	99	138	177	216	99	138	177	216	99	138	177	216	
Face Height	Hf [mm]	134	173	212	251	134	173	212	251	134	173	212	251	
Total Pressure	Pt [Pa]	36.4	18.6	11.2	7.5	14.3	7.3	4.4	<5	5.6	<5	<5	<5	
Sound Power Level	Lw [dB(A)]	44.9	35.7	28.8	23.3	32.1	22.9	16.0	<15	19.3	<15	<15	<15	
Sound Pressure Level	Lp* [NC]	29.9	20.7	13.8	8.3	17.1	7.9	<5	<5	<5	<5	<5	<5	
Min Diffuser Height	Hmin [m]	2.4	2.4	2.4	2.4	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	
Throw Setting	Short (S)	Lmin [m]	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
		Lmax [m]	6.3	5.3	4.7	4.3	5.0	4.2	3.8	3.4	4.0	3.4	3.0	2.7
		Bmin [m]	4.3	4.2	4.1	4.1	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1
		Bmax [m]	10.9	9.1	8.2	7.4	8.7	7.4	6.5	5.9	6.9	5.8	5.2	4.7
	Medium (M)	Lmin [m]	3.2	3.2	3.2	3.1	3.2	3.1	3.1	3.1	3.1	3.1	3.1	3.1
		Lmax [m]	8.3	6.9	6.2	5.6	6.6	5.6	4.9	4.5	5.2	4.4	3.9	3.5
		Bmin [m]	3.2	3.2	3.2	3.1	3.2	3.1	3.1	3.1	3.1	3.1	3.1	3.1
		Bmax [m]	8.3	6.9	6.2	5.6	6.6	5.6	4.9	4.5	5.2	4.4	3.9	3.5
	Long (L)	Lmin [m]	4.2	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
		Lmax [m]	10.8	9.0	8.1	7.3	8.6	7.3	6.4	5.8	6.8	5.8	5.1	4.6
		Bmin [m]	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
		Bmax [m]	6.2	5.1	4.7	4.3	5.0	4.2	3.7	3.4	4.0	3.4	3.0	2.7
Mean Room Air Velocity	v [m/s]	0.16	0.18	0.19	0.20	0.18	0.20	0.21	0.22	0.20	0.22	0.23	0.24	
Mean Draught Rating	DR [%]	15.8%	17.7%	18.9%	20.1%	18.2%	20.1%	21.7%	23.0%	20.9%	23.1%	24.8%	26.3%	
Mean PPD	PPD [%]	8.2%	9.0%	9.5%	10.0%	9.2%	10.1%	10.8%	11.4%	10.4%	11.4%	12.3%	13.0%	
Satisfies PPD Category	(ISO7730)	B	B	B	C	B	C	C	C	C	C	C	C	

**Product Selection & Code Generator**

Select a model to create product code: ○ DN600 ○ DN950 ○ DN1500

Throw Setting:  short  medium\*  long

Discharge Direction (in direction of airflow):  left  centre\*  right

Colour:  RAL9003\* (signal white)  RAL9005 (jet black)  other \* indicates standard/default option

Product Code: please select a valid model option

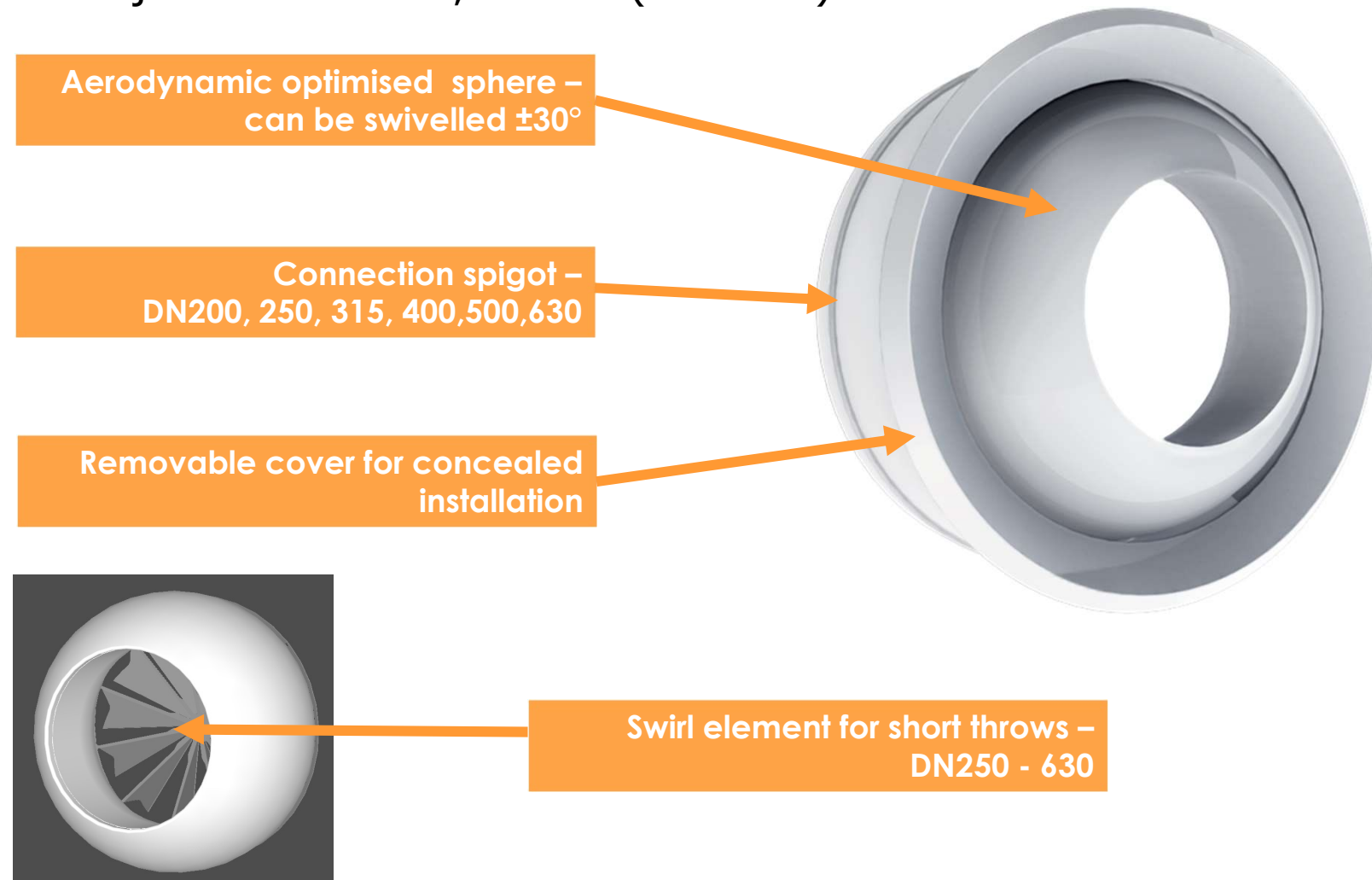
[click here to see product on smartair.asia](#) Copyright © 2017 SMARTAIR DIFFUSION

Key: Summable Not Summable Warning  
 \* Based on 10dB room absorption  
 Throw: Lmin/max : coverage length  
 Bmin/max : coverage breadth

## SMARTEMP CNW-AD - Circular Nozzle



- ❑ Sizes: DN200 – DN630
- ❑ Swivel adjustment: manual, thermal (mid-2017) or electric



**SMARTEMP** PRODUCT SELECTION CALCULATOR

**Circular Nozzle [CNW-AD]**

v 1.10 [08/2017]

**Inputs**

 Airflow Rate  • [L/s] ○ [m<sup>3</sup>/h]

 Maximum Permissible Pressure  Pa default 50 Pa

 Include Swirl Element [Type S1]

**Results**

	DN200 [S0]	DN250 [S0]	DN315 [S0]	DN400 [S0]	DN500 [S0]	DN630 [S0]
Throw (m)	73.5	57.3	43.5	30.9	24.0	17.5
Sound Power Level (dB(A))	68.2	56.9	44.9	31.1	21.9	< 20
Total Pressure (Pa)	889.1	346.3	133.7	41.3	19.7	< 10
Max Selected Total Pressure (Pa)	50.0	50.0	50.0	50.0	50.0	50.0
Min Centreline Distance (m)	0.300	0.375	0.473	0.600	0.750	0.945

 Key: Suitable Not Suitable Warning

\* Refer to 'Notes CNW-AD' worksheet for notes and diffuser sizing







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DIFFUSION



**Thank you**

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