

14 CONSTANT VOLUME ADJUSTABLE FLOW PATTERN RADIAL DIFFUSERS

APPLICATIONS

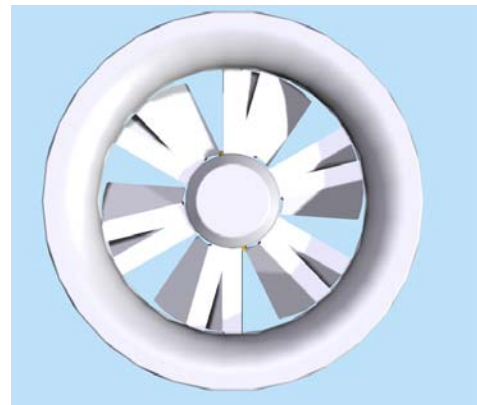
- ◆ AREAS WITH CEILING VOID HEIGHTS GREATER THAN 3.80m
- ◆ RADIAL SWIRL FLOW COOLING
- ◆ VERTICAL FLOW HEATING
- ◆ AUTOMATIC OR MANUAL FLOW PATTERN CHANGE OVER
- ◆ PROPORTIONAL TERMINAL REHEAT

ADVANTAGES

- ◆ ELECTRONIC, THERMAL OR MANUAL FLOW PATTERN ADJUSTMENT
- ◆ CIRCULAR DUCT CONNECTION
- ◆ HIGH INDUCTION FOR LARGE OCCUPIED SPACE APPLICATIONS
- ◆ TERMINAL HEATING OPTIONS
- ◆ EASE OF INSTALLATION
- ◆ NO REGULAR MAINTENANCE



COOLING MODE



INTERMEDIATE MODE 45°
DOWNWARD DISCHARGE



HEATING MODE
VERTICAL DISCHARGE

INTRODUCTION

The RICKARD Constant Volume Adjustable Radial Swirl/Vertical Flow Diffusers (Type RVD) are primarily intended for use in buildings where good air mixing is required for installations with ceiling voids in excess of 3.8m where improved occupant comfort is called for in both heating & cooling modes. Due to their ability to achieve a rapidly spreading swirled throw pattern with fast velocity decay & high induction rates, the diffusers are best suited to provide high air volume flow rates without drafts at occupant levels. The flow pattern may be adjusted electronically, thermally or manual from a radial swirl pattern to vertical downward. The radial swirl pattern is used for the cooling mode with cold or isothermal air & the vertically downward jet for heating applications for air temperature differentials varying from -10K to +15K..

The RVD diffuser range maybe equipped with electric, thermal or manual pattern adjustment. When fitted with an electric actuator, flow pattern adjustment will be performed automatically from an onboard supply air temperature sensor & electronic controller. If equipped with a thermal actuator, pattern change over is performed automatically without the need for any external power source - the actuator incorporates thermal elements which sense supply air temperature. The position of the diffuser swirl vanes are varied by means of the actuator wax filled thermal elements which respond to change in sensed supply air temperature. The wax contained within the thermal element melts or is solidified at formulated temperatures to expand or contract. With a rise in sensed temperature the expanding wax extends a plunger, causing the amplifying lever-arms mechanism to move the diffuser swirl vanes such that supply air is discharged vertically downwards . When the wax cools down, as a result of cold air being supplied, the plunger retracts under the action of a return spring, causing the swirl vanes to move in the opposite direction to the position whereby flow is returned to the radial swirl pattern.

SELECTING RVD DIFFUSERS

The most important practical factors to consider in internal zones are noise levels and uniform air distribution without "dumping" or

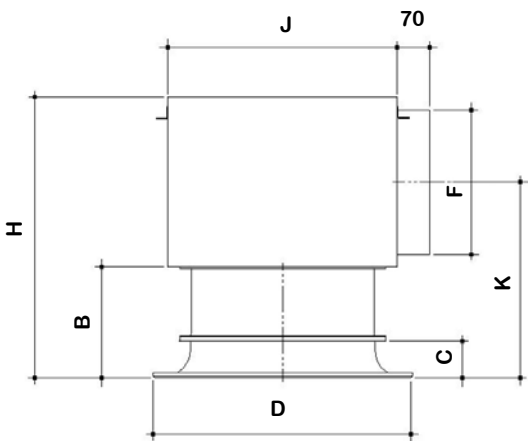
"coning" effects. The effect of dumping is to overcool the person immediately below the diffuser while the person further away will not be cooled enough. "Dumping" is the tendency for cold, dense air to leave the diffusers as a vertical column similar to a waterfall. The effect of dumping is to overcool the person immediately below the diffuser while the person further away will not be cooled enough.

Dumping is eliminated by ensuring that the discharge air energy from the diffuser is adequate to distribute conditioned air evenly throughout the conditioned area and at the same time provide good secondary room air induction rates. Providing the total pressure in the neck of the RICKARD RVD diffuser selected is not too low, dumping of conditioned cold air will not take place. The RVD is designed to avoid the tendency to dump.

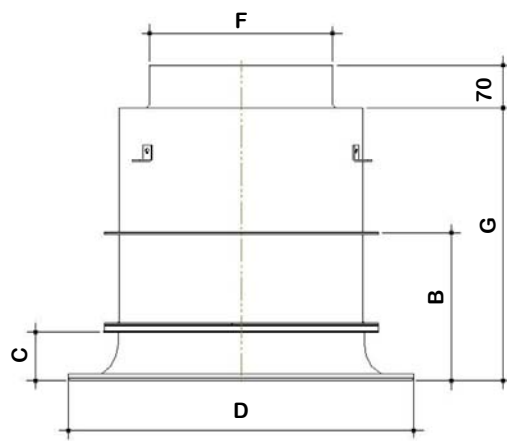
In the context of radial discharge ceiling diffusers, 'coning' occurs when two air streams traveling in opposite directions meet. As a result a downward moving cone of air is produced which will have a similar effect to dumping. Coning is substantially reduced with the use of swirl diffusers, but it can be avoided completely by ensuring that RVD diffusers are placed far enough apart to eliminate drafts in the conditioned spaces. The Table that follows shows the distance from the centre of a RVD at which air velocity has reduced to 0.25 m/s (the 'throw' of the diffuser). Using this information, RVD diffusers should be situated in the ceiling such that two adjacent diffusers are separated by slightly less than the sum of their throws. Exactly how much less depends largely on the ceiling height and the amount of air movement desired in the conditioned spaced.

As warm air is more buoyant than cold air, for high ceiling applications it is necessary that diffusers are able to provide vertically downward air flow to ensure that air reaches the occupied zone and hence the heating change over facility has been incorporated into the RICKARD RVD diffuser design.

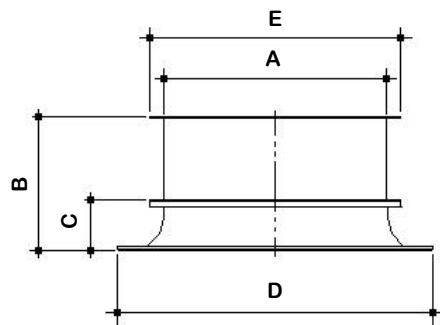
UNIT SIZE	DIMENSIONS mm									
	A	B	C	D	E	F	G	H	J	K
315	315	203	63	480	380	250	425	480	435	340.0
400	400	238	80	565	464	300	530	600	500	419.0
630	630	383	125	871	708	400	750	850	750	615.5
800	800	568	160	1077	871	500	1000	1130	1000	850.5



RVD-SP



RVD-CP



RVD-NP

VOLUMETRIC & ACOUSTIC PERFORMANCE DATA

SIZE	TOTAL PRESS. (Pa)	MODEL RVD-NP			MODEL RVD-CP			MODEL RVD-SP		
		FLOW l/s	THROW m (0.25 m/s)	NC LEVEL	FLOW l/s	THROW m (0.25 m/s)	NC LEVEL	FLOW l/s	THROW m (0.25 m/s)	NC LEVEL
315	25	141	2.10	35	136	2.0	34	122	1.80	34
	50	200	2.95	44	192	2.80	43	173	2.55	43
	75	245	3.60	49	235	3.50	48	211	3.10	48
	100	283	4.20	53	271	4.0	52	244	3.60	52
	125	319	4.70	56	303	4.50	55	273	4.0	55
	150	346	5.10	58	332	4.90	57	299	4.40	57
	200	400	5.90	62	383	5.60	61	345	5.10	61
400	25	338	3.80	34	245	2.75	37	229	2.60	37
	50	477	5.40	43	347	3.90	46	324	3.65	46
	75	585	6.60	48	425	4.80	51	397	4.50	51
	100	675	7.60	52	491	5.50	55	458	5.20	55
	125	755	8.50	55	548	6.20	58	512	5.80	58
	150	827	9.30	57	601	6.80	60	561	6.30	60
	200	955	10.80	61	694	7.80	64	648	7.30	64
630	25	613	4.90	36	452	3.60	39	408	3.25	39
	50	866	6.90	45	639	5.10	48	577	4.60	48
	75	1061	8.50	50	783	6.30	53	707	5.60	53
	100	1225	9.80	54	904	7.20	57	816	6.50	57
	125	1370	10.90	57	1010	8.10	60	912	7.30	60
	150	1500	12.0	59	1107	8.80	62	1000	8.0	62
	200	1730	13.80	63	1278	10.20	66	1154	9.20	66
800	25	711	5.10	41	639	4.60	44	547	3.90	39
	50	1006	7.20	50	904	6.50	53	773	5.50	48
	75	1232	8.80	55	1107	7.90	58	947	6.80	53
	100	1423	10.20	59	1278	9.20	62	1093	7.80	57
	125	1591	11.40	62	1429	10.30	65	1223	8.80	60
	150	1742	12.50	64	1565	11.20	67	1339	9.60	62
	200	2012	14.40	67	1807	12.90	71	1546	11.10	66

Noise criteria levels apply to a single diffuser mounted in a room having a Sound Absorption of 10dB in octave bands having centre frequencies from 125Hz to 8000Hz (ie. the difference between Sound Pressure Level (dB re: 10⁻⁶ Pa) and Sound Pressure Level (dB re: 10⁻¹² Pa) is equal to 10dB). These levels represent only the noise generated by the diffuser and do not take into account any duct-borne noise. Throw data quoted in the above is for a horizontally discharging diffuser in free space ie. no ceiling. Should the installation be such that diffusers are flush mounted in a continuous flat ceiling, throw values should be multiplied by a factor of 1.40.

VERTICAL PENETRATION DATA - HEATING MODE - 45° & VERTICAL DISCHARGE

UNIT SIZE	VOLUME l/s	MAXIMUM PENETRATION DEPTH @ VARIOUS SUPPLY AIR TO ROOM TEMPERATURE DIFFERENTIALS					
		+5°C/45°	+10°C/45°	+15°C/45°	+5°C/VERT	+10°C/VERT	+15°C/VERT
315	150	1.9	1.4	1.2	3.1	2.0	1.7
	200	2.3	1.7	1.5	4.9	3.0	2.5
	300	3.1	2.3	2.0	7.5	5.0	4.0
	400	4.0	3.0	2.6	10.0	6.7	5.4
400	200	1.9	1.4	1.2	3.1	2.0	1.6
	300	2.6	1.9	1.5	5.2	3.5	2.9
	400	3.0	2.5	2.0	7.5	5.0	4.0
	600	4.1	3.2	2.9	13.8	8.0	6.8
630	750	3.6	2.7	2.5	10.0	6.5	5.2
	1000	4.5	3.4	2.9	14.0	8.0	7.0
	1250	5.0	3.8	3.3	17.0	10.0	8.3
	1500	6.0	4.5	3.8	20.0	13.0	11.0
	1750	7.0	5.5	4.5	-	19.0	15.0
800	750	3.1	2.5	2.0	7.4	5.0	4.0
	1000	3.6	2.7	2.3	10	6.7	5.2
	1250	4.4	3.2	2.9	14.0	8.0	7.5
	1500	5.0	3.8	3.2	16.0	10.2	7.4
	1750	6.0	4.5	3.8	20.0	13.0	10.2
	2000	6.3	4.6	4.0	21.0	15.0	12.0

For performance data not reflected on any of the preceding tables, kindly call your local Rickard sales representative.

RICKARD AIR DIFFUSION (PTY) LTD RESERVES THE RIGHT TO CHANGE SPECIFICATIONS AND DATA WITHOUT PRIOR NOTICE.

RVD DIFFUSER CONSTRUCTION

The RICKARD RVD Radial Swirl/Vertical diffusers are available in four standard sizes from 315 to 800. Each include adjustable vanes, a discharge bell mouth & a circular inlet housing. The vanes may be adjusted manually or by means of electric, thermal or pneumatic actuators. In addition, an inlet plenum with either side or vertical entry spigots.

If the vanes are required to adjusted automatically, actuators of the engineer's choice may be factory fitted - please contact your nearest RICKARD representative.

MATERIALS OF CONSTRUCTION

RICKARD RVD Diffuser vanes, discharge bell mouth & inlet housing are constructed of sheet steel, degreased, primed & power coated in our standard textured semi-matt white finish. Other colours & finishes are available on application for which your nearest RICKARD representative should be contacted.

Entry plenums are constructed from coated or uncoated mill or electro galvanized sheet steel are available as an optional extra.