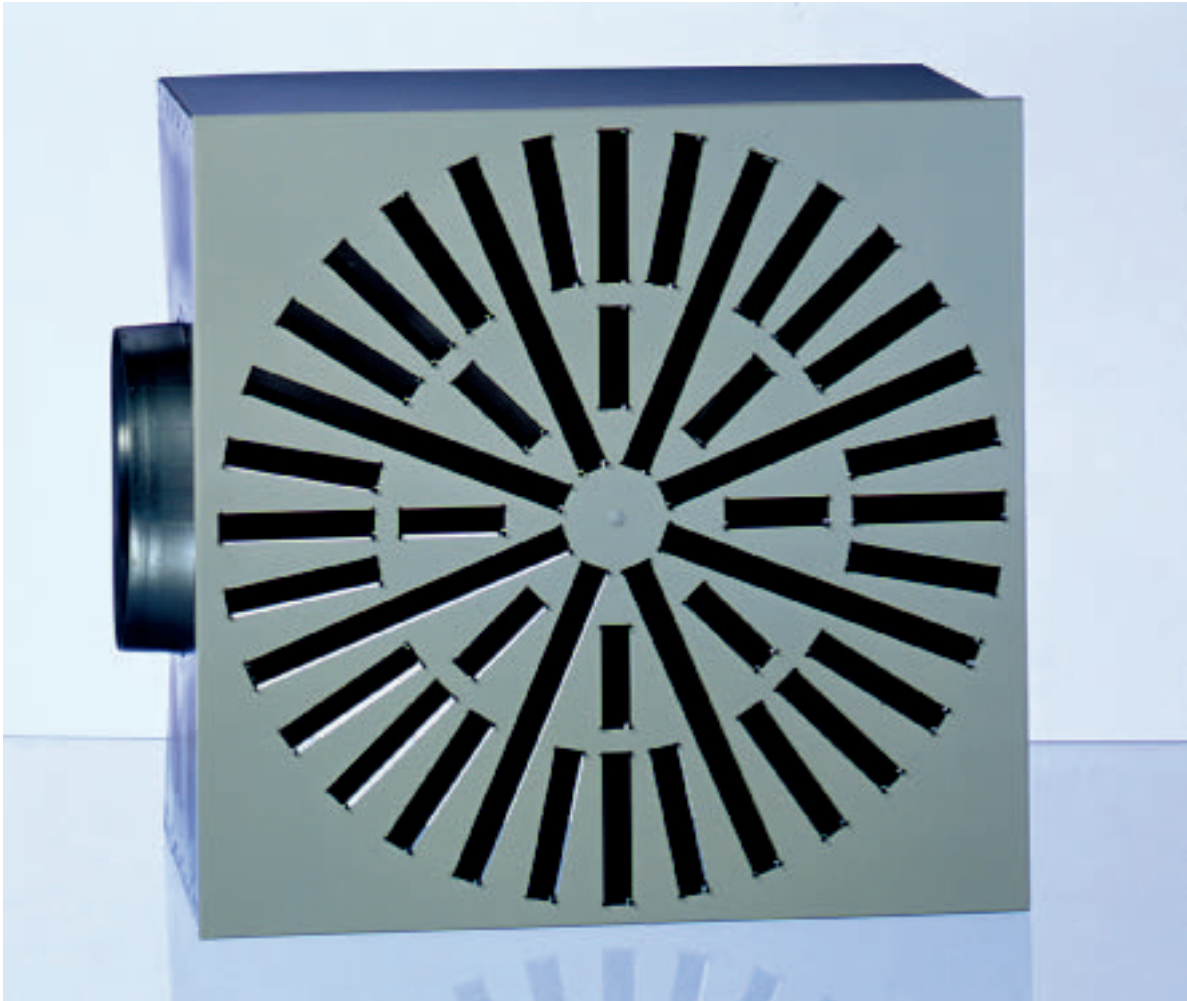




3.7 Swirl Outlets



BerlinerLuft.

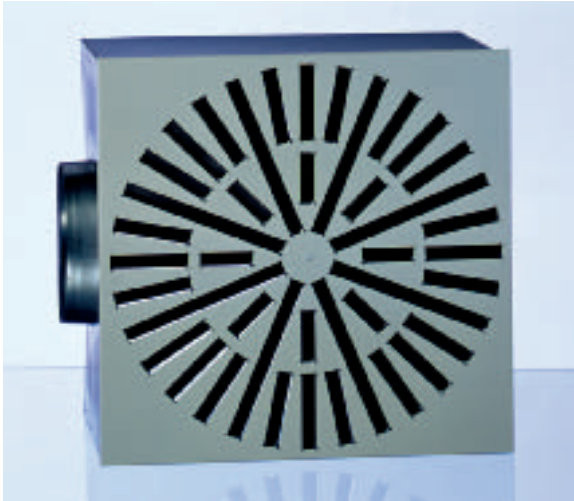


3.7 Swirl Outlets

3.7.3 Swirl Outlet Round and Square

DRA 3

Product description



DRA 3

The DRA 3 is a highly inductive swirl outlet with adjustable air deflection lamellas. The aerodynamic wing-shaped air deflection lamella is the result of a flow technical design of the technical laboratory at the BerlinerLuft. Group. With angling of all lamellas (airstream form A) a highly inductive ceiling flow is achieved (Coanda Effect), with angled setting and proportional horizontal setting (airstream form B) a ceiling flow with a slightly horizontal component is generated. The adjustment possibility allows easy adaptation of the airstream shape in the event of a later change in the room geometry. The DRA 3 is designed for room heights from 2.5 m to 4.0 m and an inlet air temperature difference up to 12 Kelvin. The square dimensions are designed for installation in a suspended ceiling grid. The air deflection lamellas and clamps are available in both black and white. The swirl outlet is delivered with a warded hole for central fastening as well as the corresponding screw and cap. The connection box is adapted flow technically and acoustically to the DRA 3.

Special designs

- Choice of RAL colour

Recommended range

Size	\dot{V}_{\min}		\dot{V}_{\max}	
	l/s	m ³ /h	l/s	m ³ /h
300	41	150	105	380
400	47	170	140	500
625/400	47	170	140	500
500	83	300	250	900
600, 625	111	400	305	1100
825	166	600	416	1500

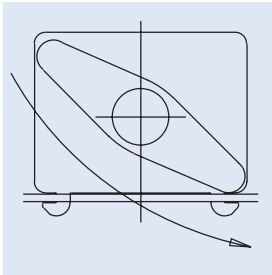


3.7 Swirl Outlets

3.7.3 Swirl Outlet Round and Square

DRA 3

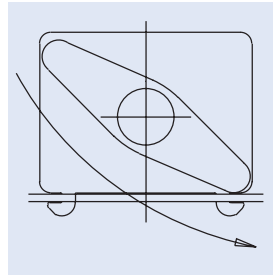
Air flow version A



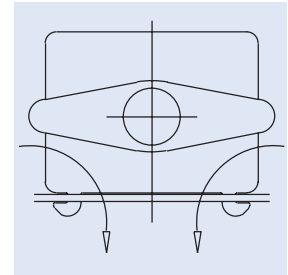
Lamella setting „s“

All air deflection lamellas are set in the lamella setting “s” (angled).

Air flow version B

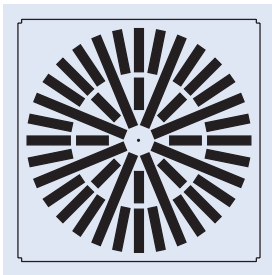


Lamella setting „s“

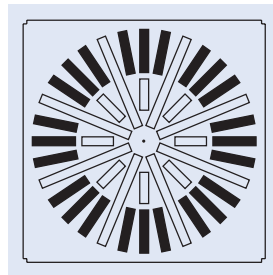


Lamella setting „h“

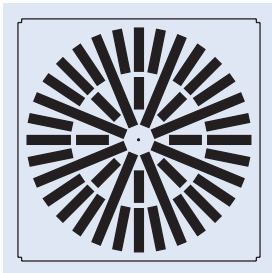
According to the diagrams, the air deflection lamellas are set in lamella setting “s” and lamella setting “h” (horizontal)



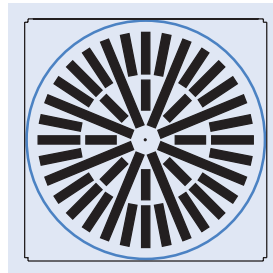
□ 825



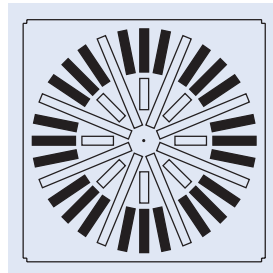
□ 825



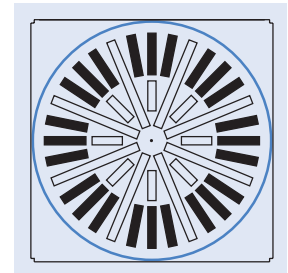
□ 625



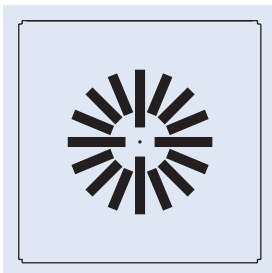
□ 600



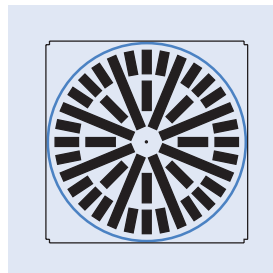
□ 625



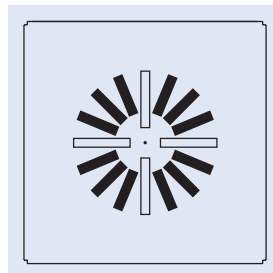
□ 600



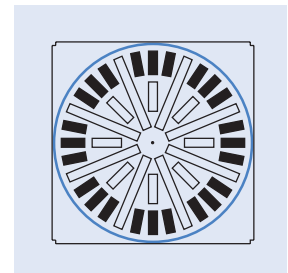
□ 625/400



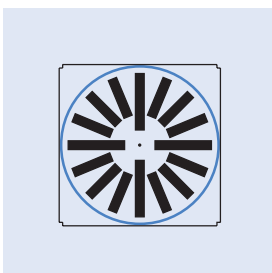
□ 500



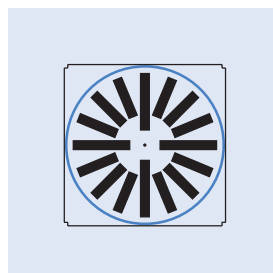
□ 625/400



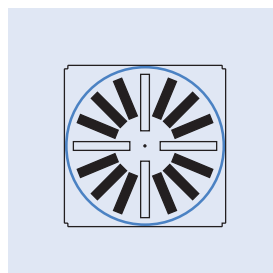
□ 500



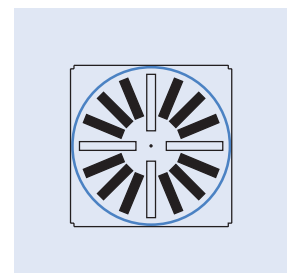
□ 400



□ 310



□ 400



□ 310

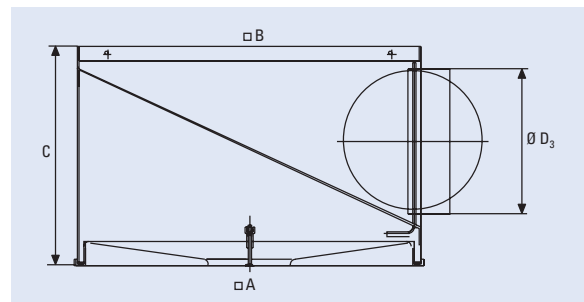
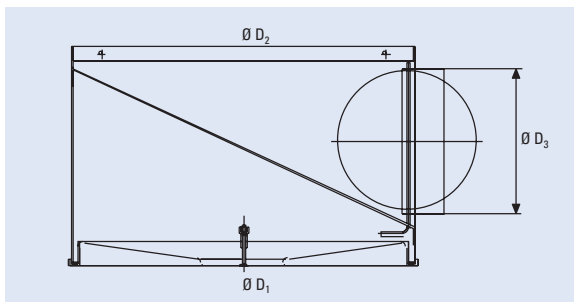
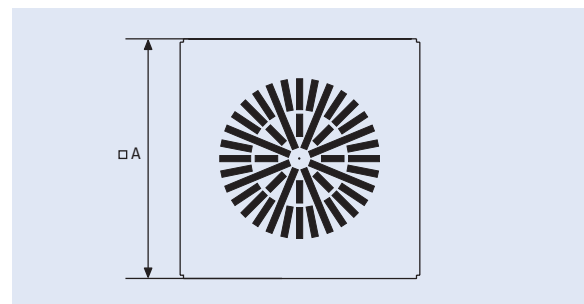
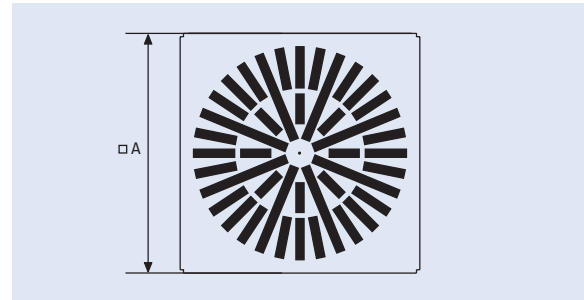
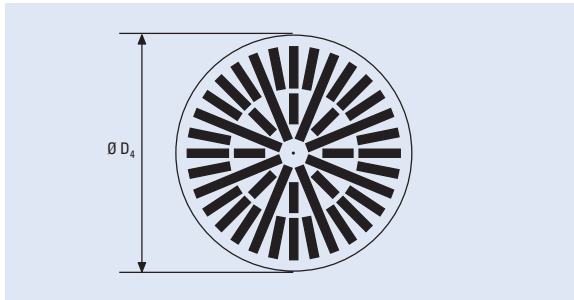


3.7 Swirl Outlets

3.7.3 Swirl Outlet Round and Square

DRA 3

Dimensions



Delivery sizes

Size	$\varnothing D_1$	$\varnothing D_2$	$\varnothing D_3$	H
400	400	386	198	320
500	500	486	198	345
600	600	586	248	370

Delivery sizes

Size	A	B	C	$\varnothing D_3$	$\varnothing D_4$
310	308	300	300	198	--
400	398	390	320	198	--
500	498	490	345	198	--
600	598	590	370	248	--
625	623	615	370	248	--
625/400	623	615	370	198	360
825	823	815	450	355	--

sound level reduction L_w with insulated connection box

ΔL_w (dB)							
63	125	250	500	1000	2000	4000	8000
1	3	3	11	15	15	15	15



3.7 Swirl Outlets

Notes

DRA 3



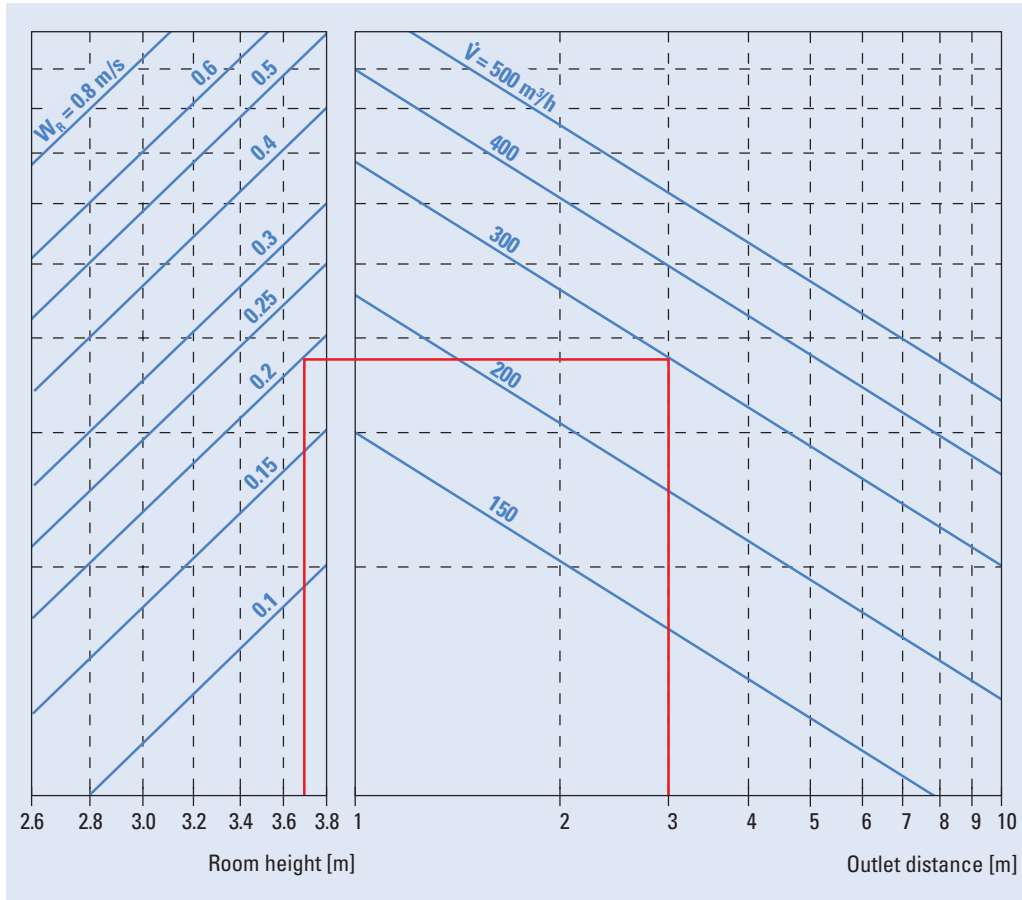
3.7 Swirl Outlets

3.7.3 Swirl Outlet Round and Square

DRA 3

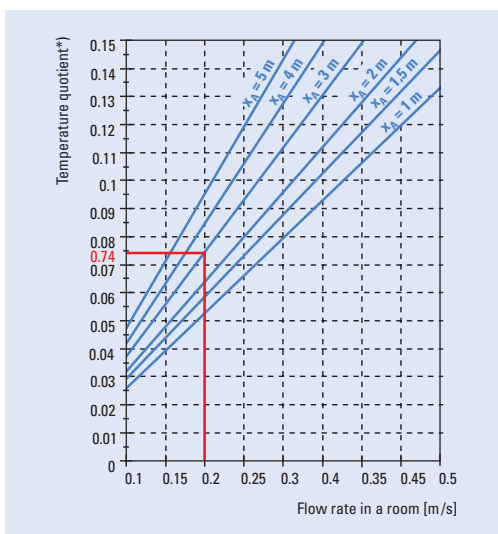
Air flow version A

Flow rate in a room, outlet distance [diagram 1]

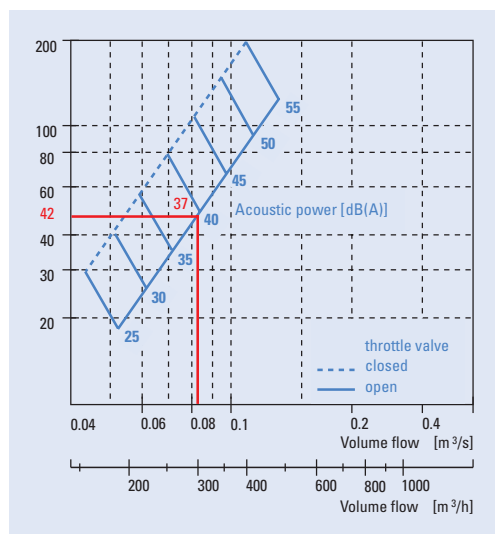


DRA 3 □ 400, □ 400, □ 625/400, measuring under isothermal temperature conditions with multiple-row square outlet arrangement

Temperature quotient [diagram 2]



Acoustic power, pressure loss [diagram 3]





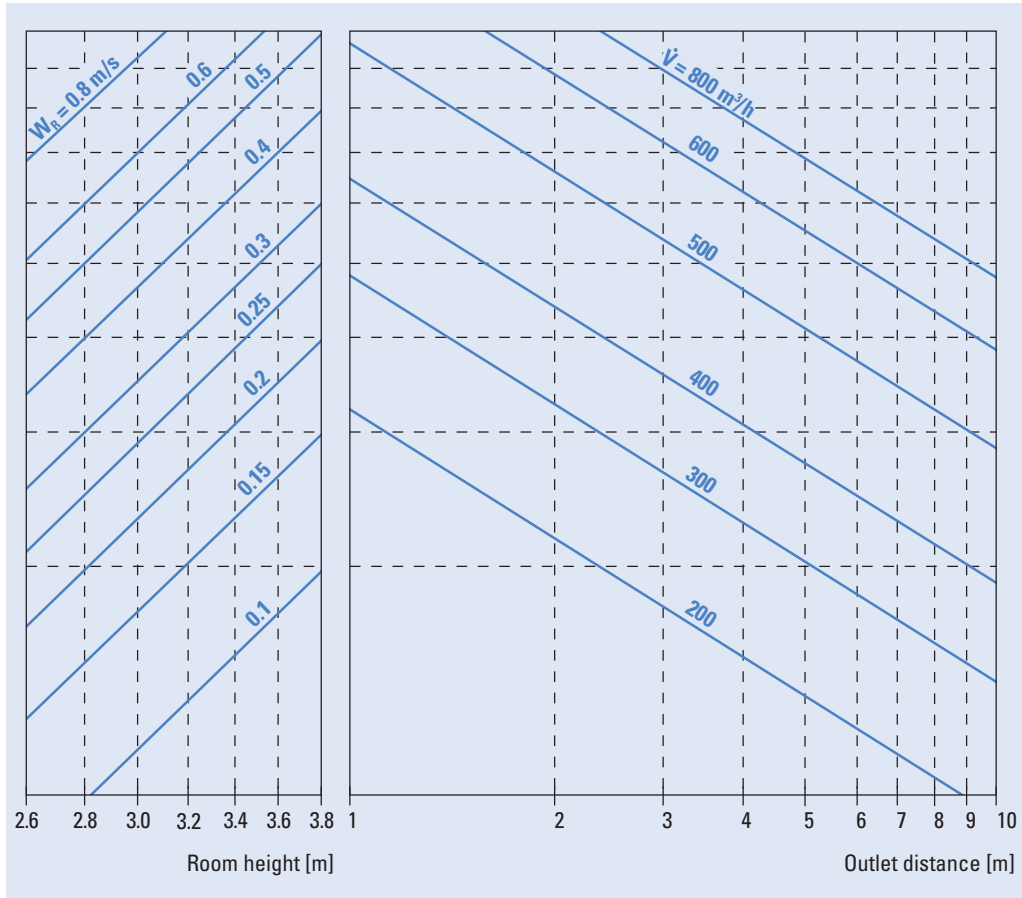
3.7 Swirl Outlets

3.7.3 Swirl Outlet Round and Square

DRA 3

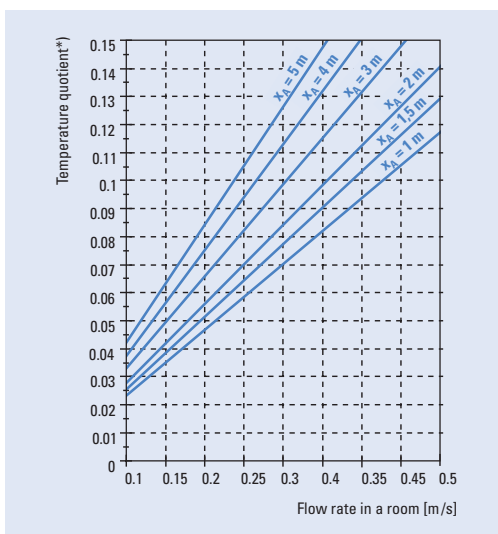
Air flow version A

Flow rate in a room, outlet distance [diagram 1]

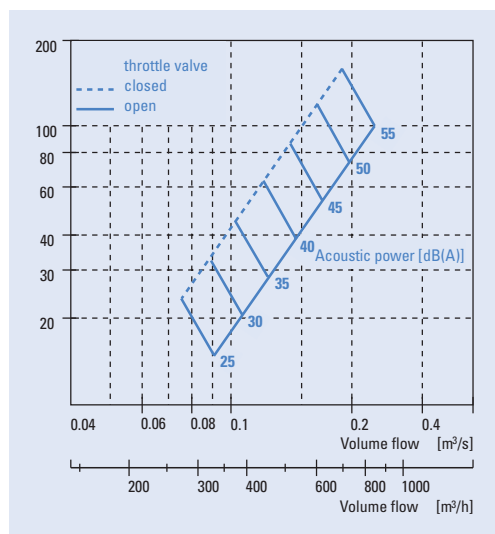


DRA3 □500, ∅500, measuring under isothermal temperature conditions with multiple-row square outlet arrangement

Temperature quotient [diagram 2]



Acoustic power, pressure loss [diagram 3]





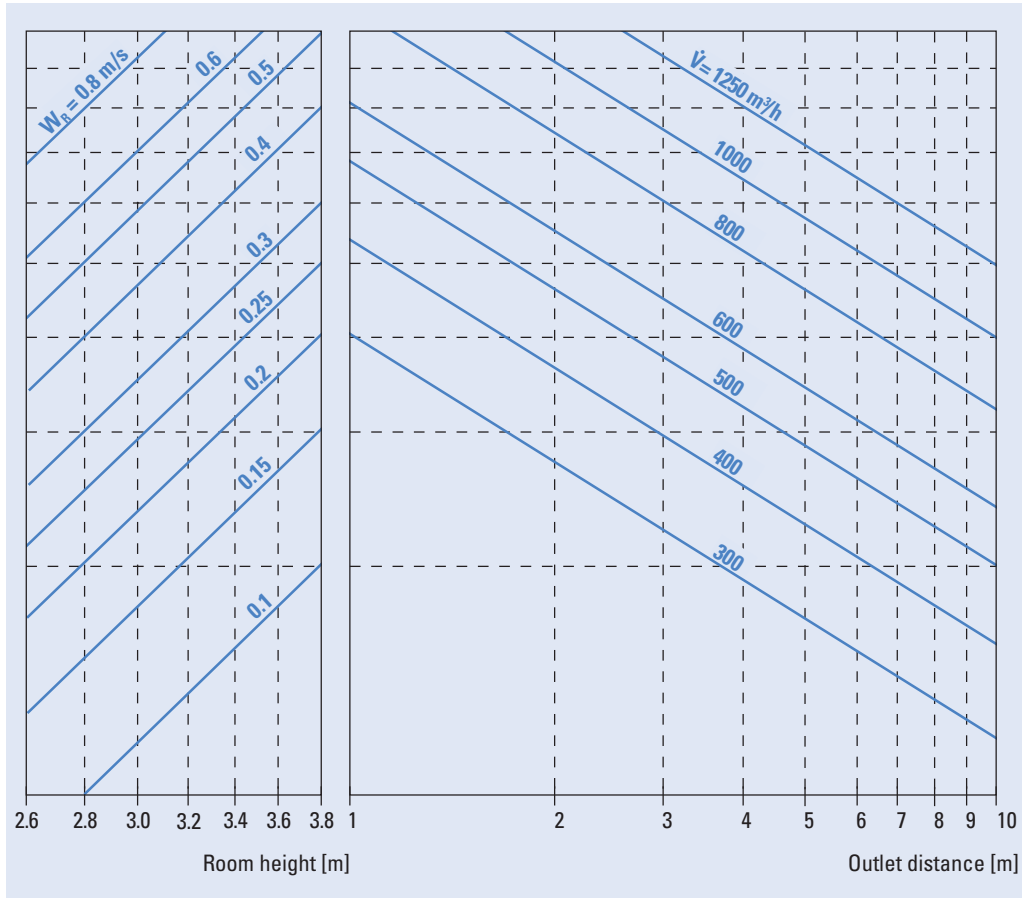
3.7 Swirl Outlets

3.7.3 Swirl Outlet Round and Square

DRA 3

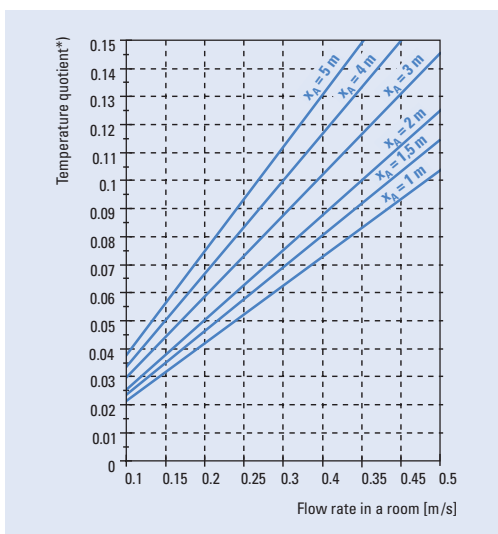
Air flow version A

Flow rate in a room, outlet distance [diagram 1]

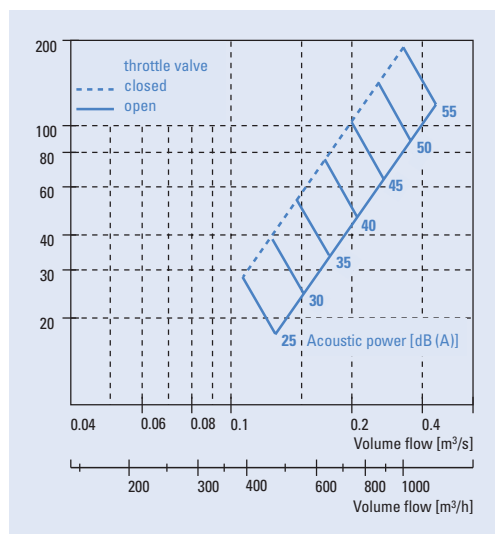


DRA 3 □ 600, □ 600, □ 625, measuring under isothermal temperature conditions with multiple-row square outlet arrangement

Temperature quotient [diagram 2]



Acoustic power, pressure loss [diagram 3]



Example:

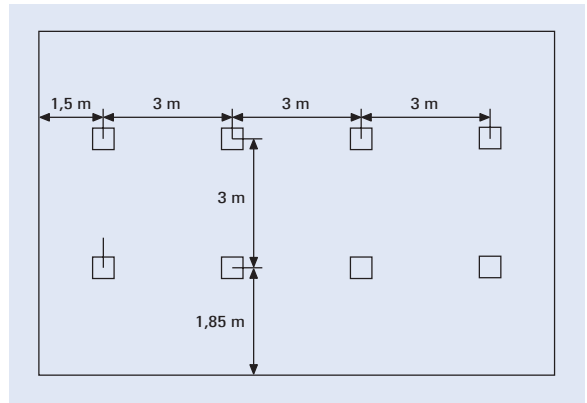
The following cafeteria should be ventilated:

Given:

room length	$L = 12,0 \text{ m}$
room width	$B = 6,75 \text{ m}$
room height	$H = 3,7 \text{ m}$
ceiling grid	$625 \times 625 \text{ mm}$
air change	$n = 8 \text{ h}^{-1}$
room temperature	$t_R = 22 \text{ }^\circ\text{C}$
inlet air temperature	$t_Z = 16 \text{ }^\circ\text{C}$
max. speed in the operational area	$W_R = 0,2 \text{ m/s}$

Found:

room volume	$V_R = 300 \text{ m}^3$
total volume flow	$V_{ges} = 2400 \text{ m}^3/\text{h}$
number and size of outlet systems	8, $625/400 \text{ mm}$
volume flow per outlet system	$V = 300 \text{ m}^3/\text{h}$
acoustic power level	$L_W = 39 \text{ dB(A)}$
pressure loss	$\Delta p = 48 \text{ Pa}$
outlet distance	$x_A = 3,0 \text{ m}$
– from diagram 1	$x_A = 3,0 \text{ m}$
– selected	
temperature quotient	$\Delta t / \Delta t_Z = 0,074$
– from diagram 2	



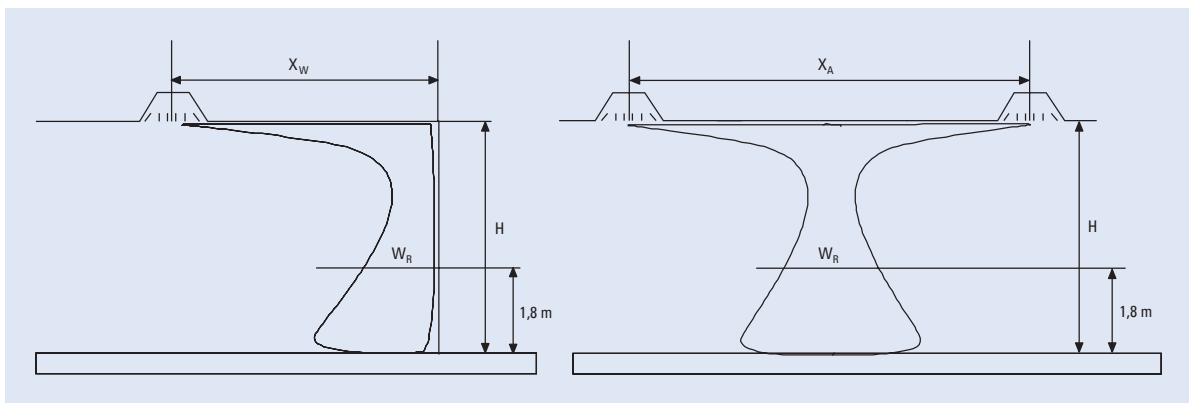
Calculated:

actual temperature in the operational area

$$t_A = (\Delta t / \Delta t_Z) \times (t_Z - t_R) + t_R$$

$$= 0,074 \times (16^\circ\text{C} - 22^\circ\text{C}) + 22^\circ\text{C} = 21,6^\circ\text{C}$$

Ceiling flow



adjust lamella line horizontally towards the wall

Legend

- X_A – distance between two outlet systems (m)
- X_w – distance to the wall (m), $X_w = X_A/2$
- W_R – operational area according to DIN 1946-2
- Δt_Z – inlet air temperature difference
- Δt_L – temperature difference between room air and incident air stream at a distance $-x = x_{A/2} + H_1$



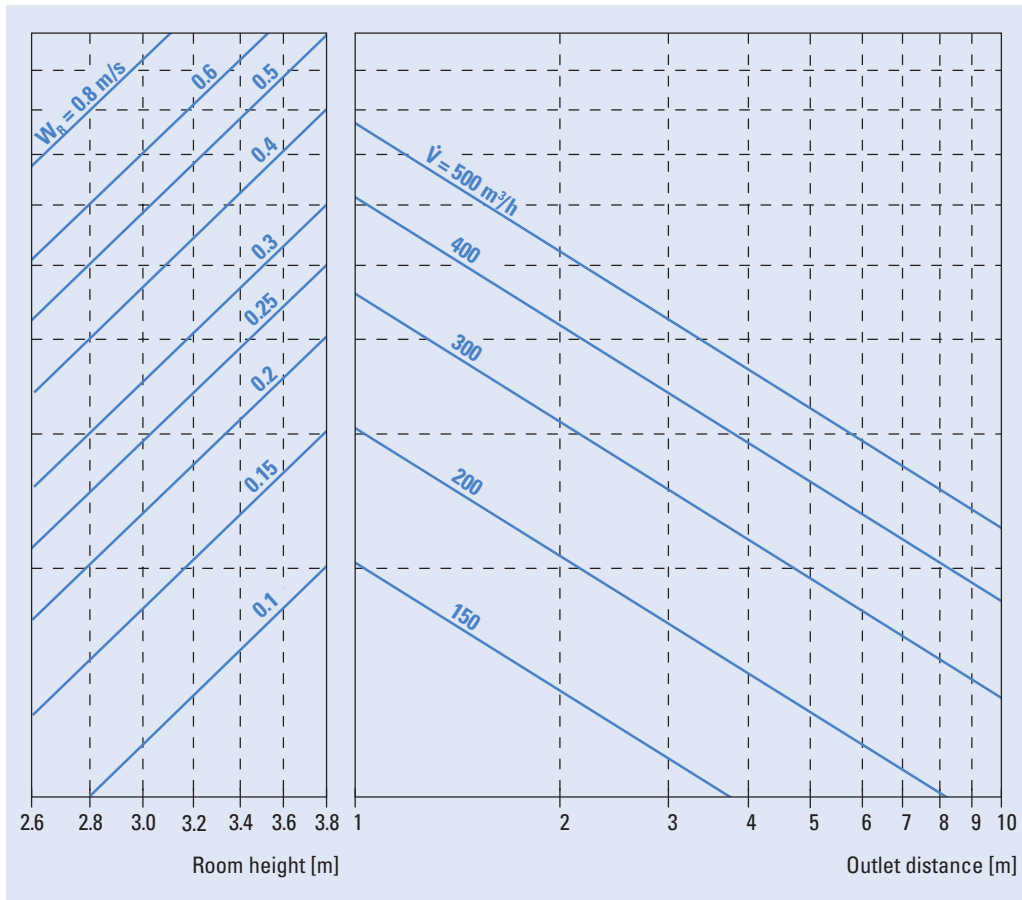
3.7 Swirl Outlets

3.7.3 Swirl Outlet Round and Square

DRA 3

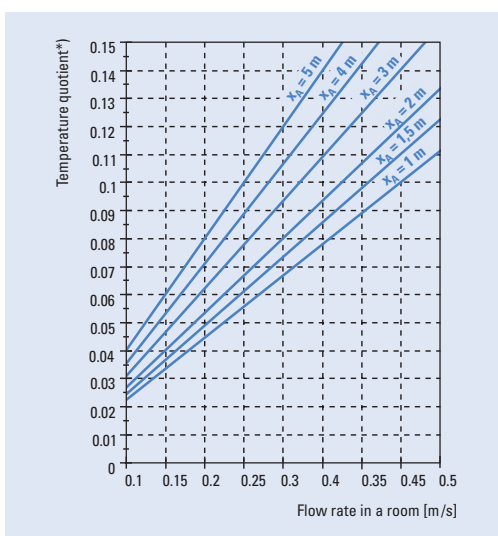
Air flow version B

Flow rate in a room, outlet distance [diagram 1]

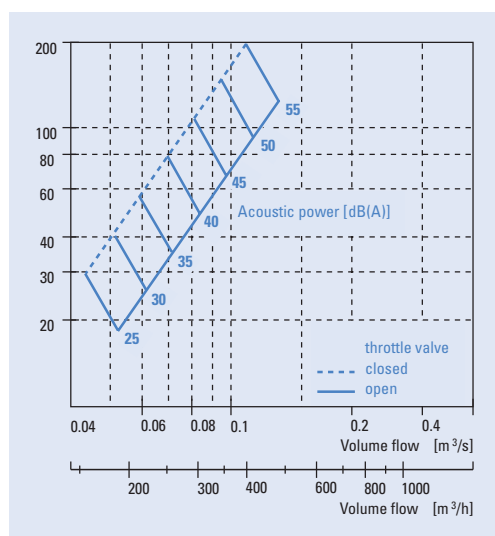


DRA 3 □ 400, □ 400, □ 625/400, measuring under isothermal temperature conditions with multiple-row square outlet arrangement

Temperature quotient [diagram 2]



Acoustic power, pressure loss [diagram 3]





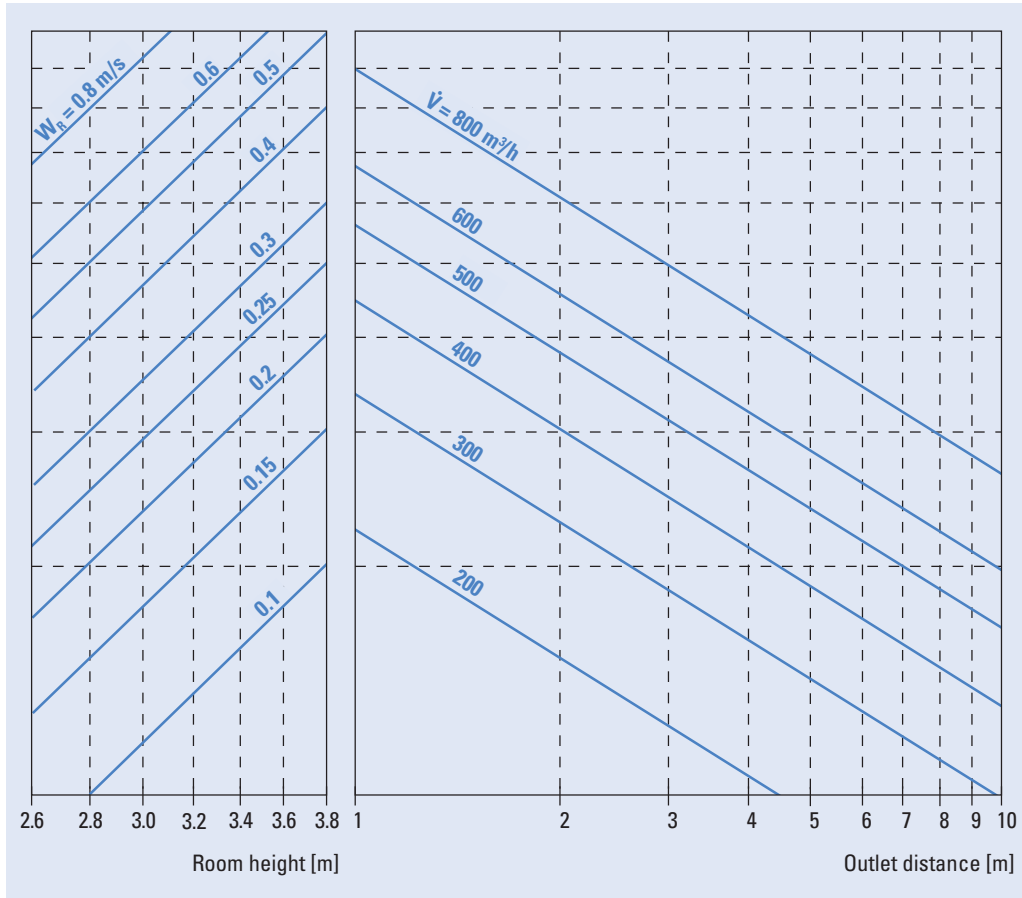
3.7 Swirl Outlets

3.7.3 Swirl Outlet Round and Square

DRA 3

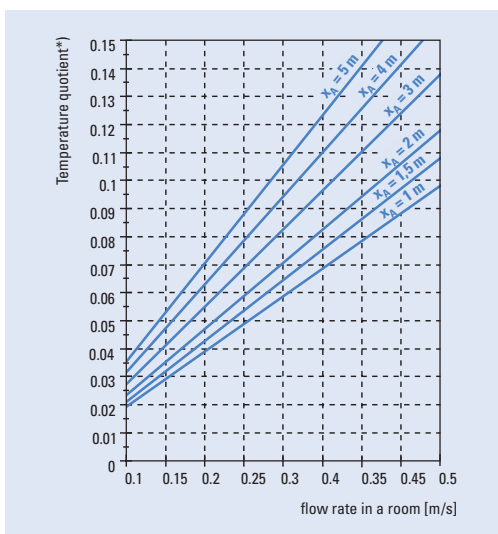
Air flow version B

Flow rate in a room, outlet distance [diagram 1]

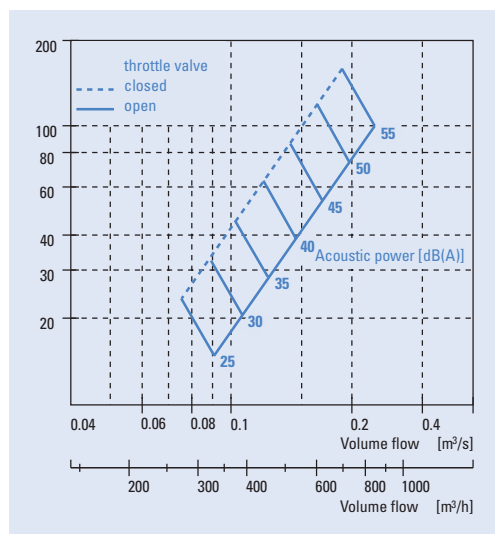


DRA 3 □ 500, ∅ 500, measuring under isothermal temperature conditions with multiple-row square outlet arrangement

Temperature quotient [diagram 2]



Acoustic power, pressure loss [diagram 3]





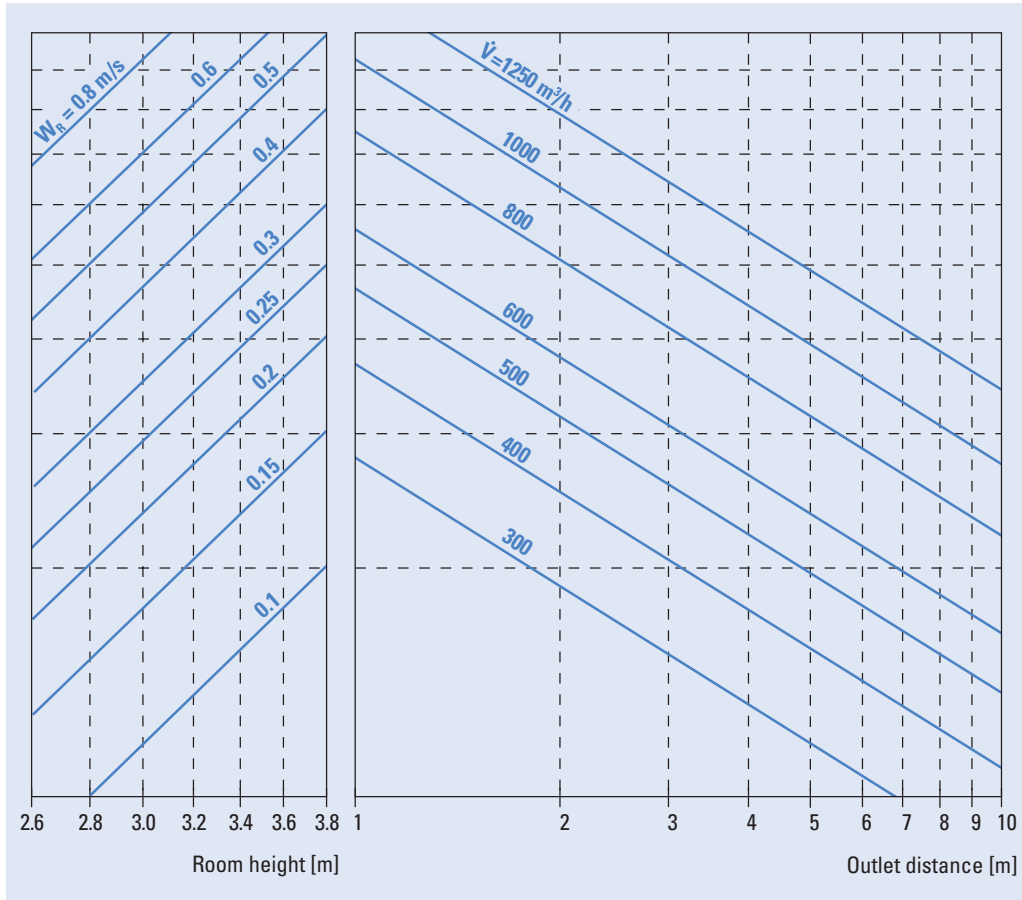
3.7 Swirl Outlets

3.7.3 Swirl Outlet Round and Square

DRA 3

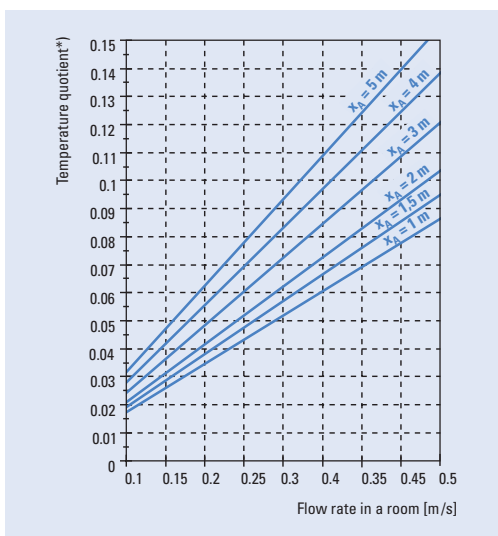
Air flow version B

Flow rate in a room, outlet distance [diagram 1]

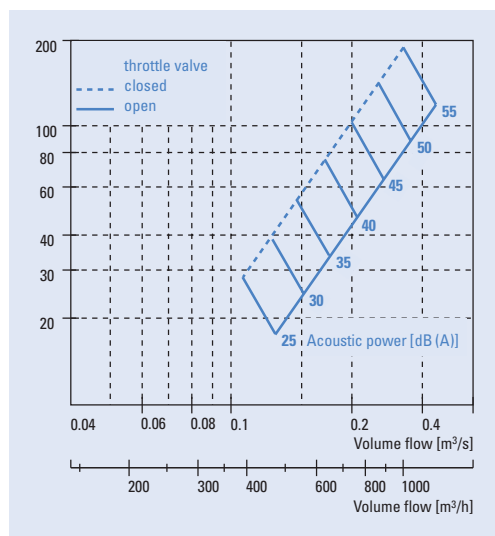


DRA 3 □ 600, □ 600, □ 625, measuring under isothermal temperature conditions with multiple-row square outlet arrangement

Temperature quotient [diagram 2]



Acoustic power, pressure loss [diagram 3]



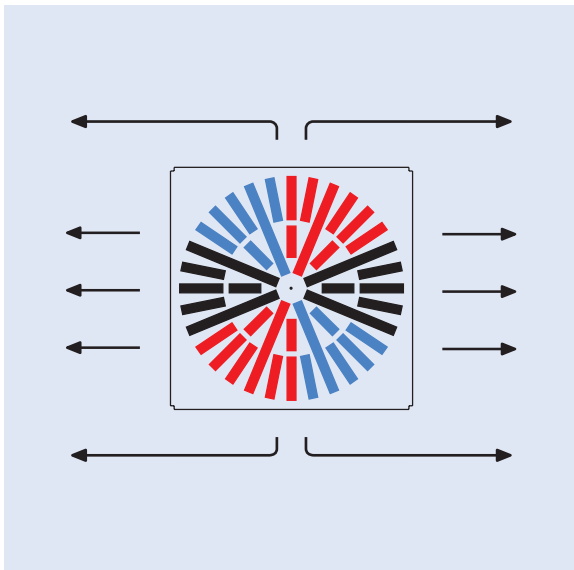


3.7 Swirl Outlets

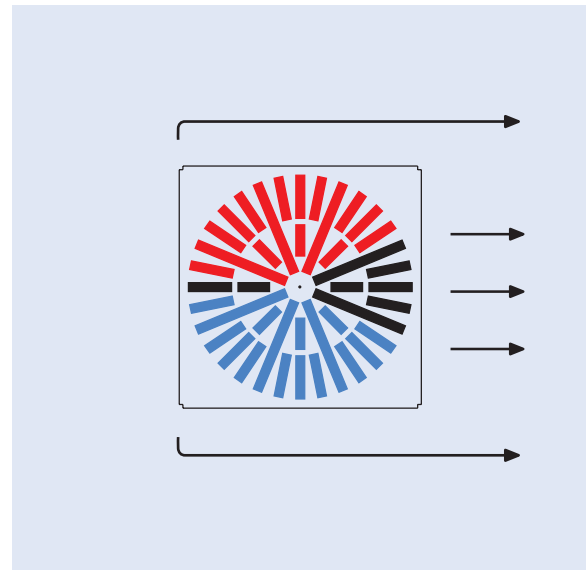
3.7.3 Swirl Outlet Round and Square

DRA 3

Possibilities of different stream forms



two-sided blow-out



one-sided blow-out

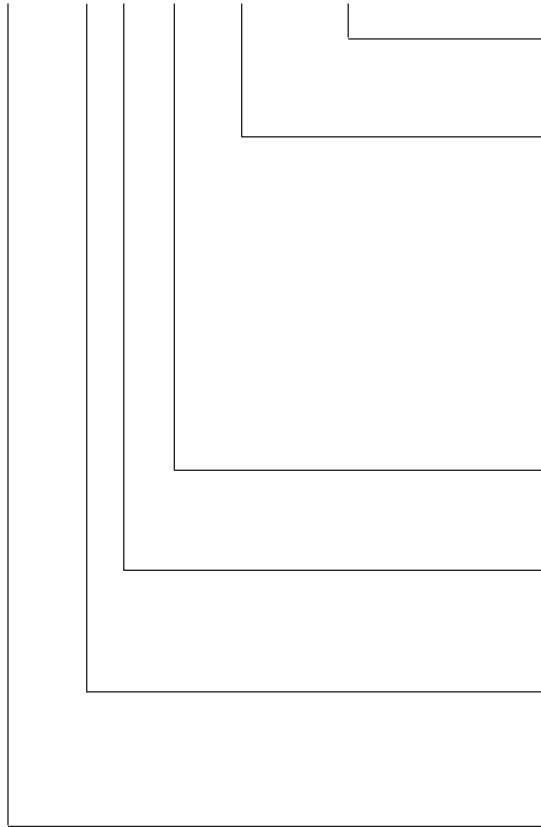
- lamella setting „5“
(angled) clockwise
- lamella setting „5“
(angled) counterclockwise
- lamella slots covered
(after lamellas removed)



Type code

DRA 3

DRA 3 - Q/W - Gr. - AK - RAL xxxx



Colour

RAL xxxx (Standard RAL 9010)

Accessories

- AK – terminal box (inlet air)
- AKdk – terminal box with throttle valve and perforated plate (inlet air)
- AKdkiso – terminal box with throttle valve and perforated plate (inlet air) and insulation
- AKiso – terminal box (inlet air) and insulation
- AKA – terminal box (outlet air)
- AKAdk – terminal box (outlet air) with throttle valve

Delivery size

Gr – Size 310, 400, 500, 600, 625/400, 625, 825

Lamella colour

- S – set of lamellas black
- W – set of lamellas white

Design

- Q – square
- R – round

Swirl outlet type

swirl outlet with adjustable air deflection lamellas

Ordering example:

Square ceiling outlet system with black lamellas, size 600, terminal box with throttle valve and perforated plate, ordering code: DRA3-Q/S-Gr. 600-AKdk



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