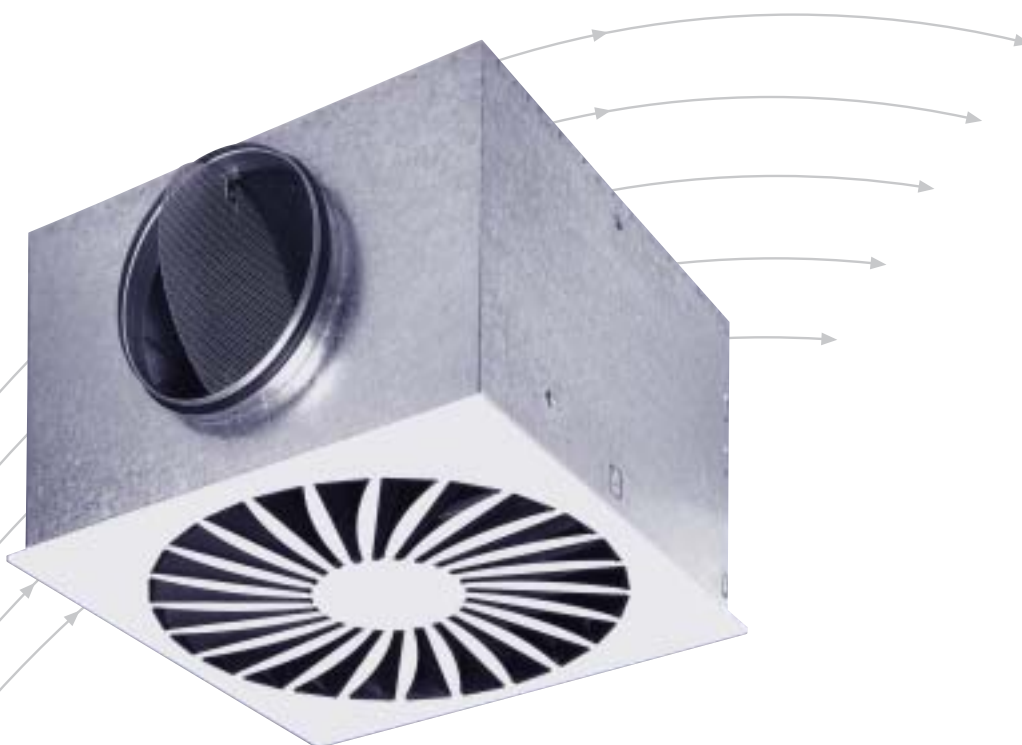


Swirl Diffusers

with adjustable air-control blades

Type TDV-SilentAIR

recommended for room heights from approx. 2.60 . . . 4.00 m



TROX[®] TECHNIK

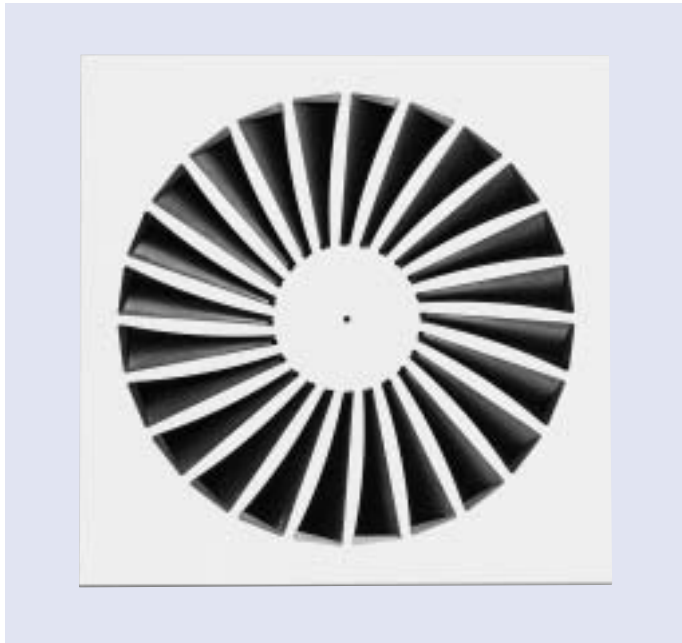
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Contents· Description

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Type TDV-SilentAIR-Q



In addition to the already well-known TROX Swirl Diffusers, manually adjustable swirl diffusers of the type TDV-SilentAIR have been developed. This makes it possible to alter the discharge direction at any time to match changes to building layout.

The diffuser face of the type TDV SilentAIR offers a high volume flow rate at low sound power levels. The horizontal swirl-type discharge of the supply air ensures high induction and hence rapid reduction in jet velocity and temperature differential. Suitable for supply air temperature differentials up to ± 10 °K.

Type TDV-SilentAIR-R

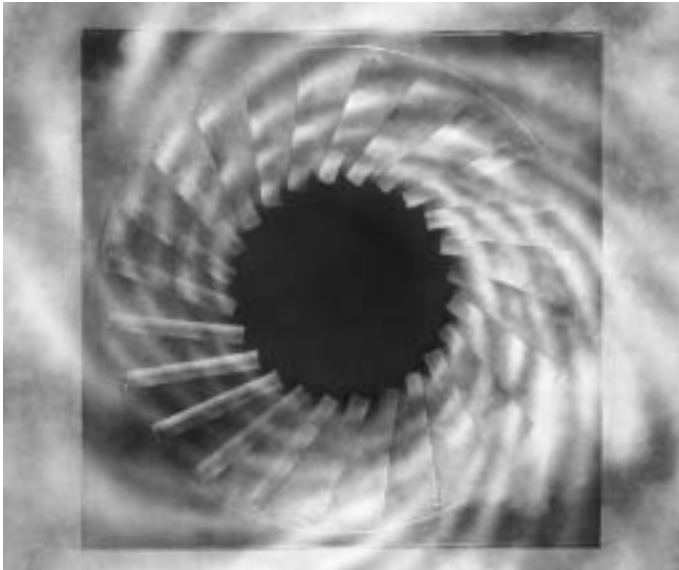


Depending on architectural requirements, the diffuser can be supplied with a circular or square face and with either white or black air control blades. For the air connection, a plenum box is used. The connection can be on the top or side entry.

The type TDV-SilentAIR can be used for supply or extract applications.

In the extract version, the air control blades of the supply version are not necessary.

Flow Directions

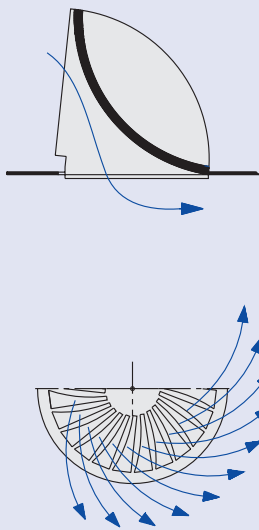


Because of the manually adjustable control blade of the type TDV-SilentAIR, architectural changes, such as changes in position of lightweight partition walls and the associated changes in air flow pattern, can be achieved at any time. Subsequent adjustments of discharge directions can be affected by changing the relevant blade positions. As a standard, the air control blades are set to external swirl.

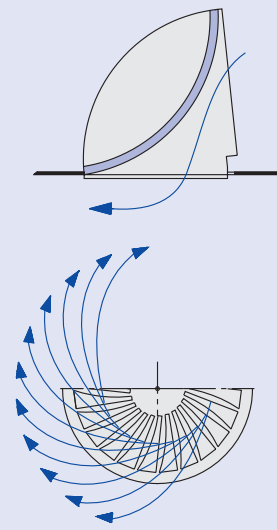
The flow visualisations opposite shows the air discharge characteristics, control blades set for external swirl.

Positions of the air control blades

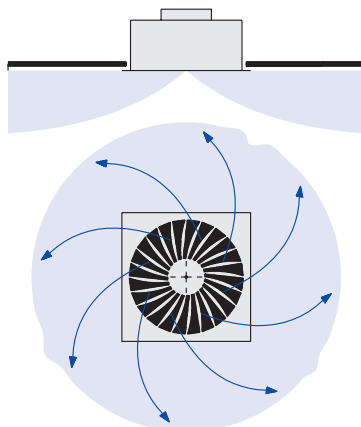
External swirl



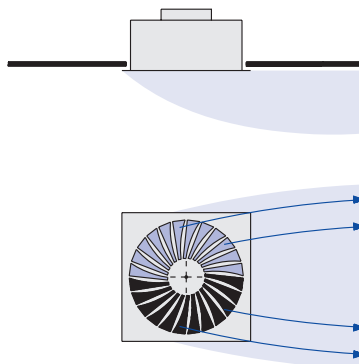
Internal swirl



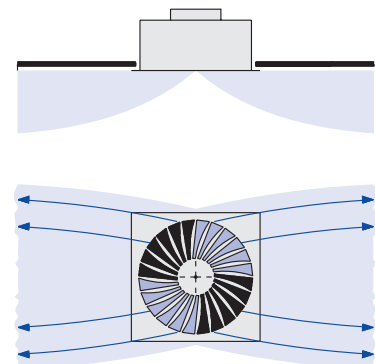
Discharge Characteristics



All air control blades set to external swirl



Air control blades set half to external swirl and half to internal swirl



Air control blades in each quartile of the face set in the same direction adjacent quartiles set one internal and one external swirl

Construction · Dimensions

Construction

TDV-SilentAIR swirl diffusers are available in five sizes. To meet architectural requirements, the face plate can be circular or square. The adjustable air control blades of the diffuser face are positioned radially. The diffuser face can be fixed to and removed from the plenum box by means of a central screw. The head of the fixing screw is covered by a decorative cap. The plenum box can be supplied with a top or side entry and upon request with a volume control damper and/or a lip seal.

If a circular diffuser face is ordered, the plenum box with a side entry spigot has a 35 mm extension piece fitted to the plenum.

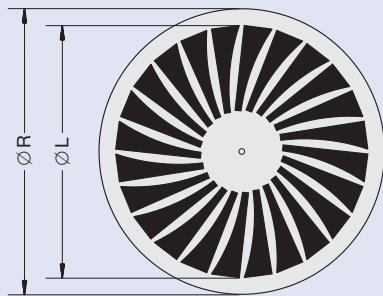
The plenum box with side entry spigot can be used with several TROX diffusers on the basis of the technical data.

Measuring the Reference Pressures

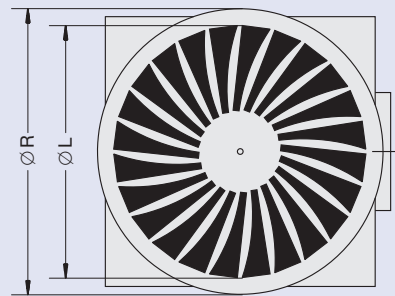
For simple adjustment of volume flow on request the plenum box can be provided with a test connection for measurement of a reference pressure and a volume control damper operated by sheathed cables. The characteristic curve of the pressure reading versus volume flow rate for each size of plenum box is supplied.

Size	Ø B	Ø D	Ø L	□ Q	Ø R	H ₂	□ K	Ø P	AK code ¹⁾	
									Square diffuser face	Circular diffuser face
300	280	158	254	298	300	250	290	278	AK001	AK013
400	364	198	336	398	400	295	372	362	AK002	AK014
500	462	198	440	498	500	295	476	460	AK003	AK015
600	559	248	530	598	600	345	567	557	AK004	AK016
625	559	248	530	623	625	345	567	557	AK004	AK016

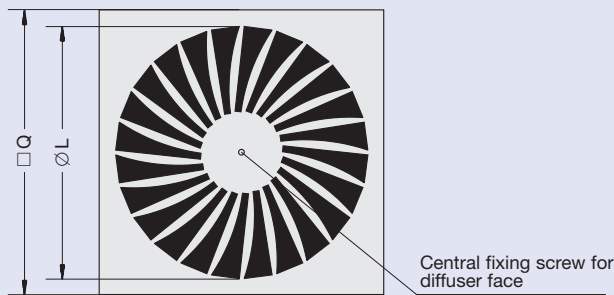
1) Valid only for TDV-SilentAIR-...-H



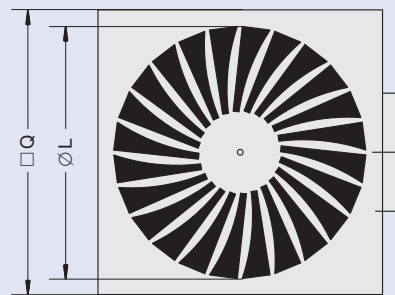
TDV-SilentAIR-R-...-V



TDV-SilentAIR-R-...-H

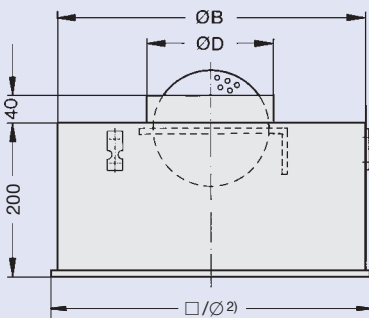


TDV-SilentAIR-Q-...-V

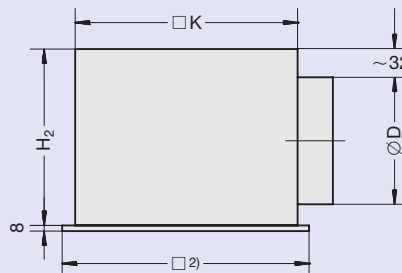


TDV-SilentAIR-Q-...-H

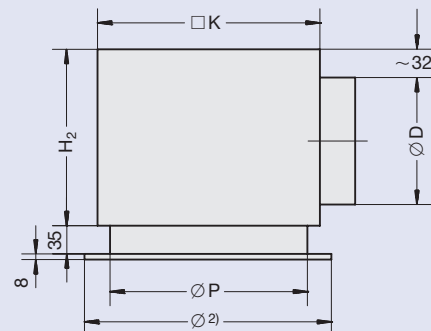
Plenum boxes



TDV-SilentAIR-...-V



TDV-SilentAIR-Q-...-H



TDV-SilentAIR-R-...-H

2) Dimensions overall diffuser face

Material · Installation · Assembly

Materials

The diffuser face is made of sendzimir galvanised sheet steel. The surface is pretreated and powder-coated "pure white" (RAL 9010). The plenum box is made of sendzimir galvanised sheet steel, the lip seal of rubber. The air control blades are made of plastic, as standard black (similar to RAL 9005) or, upon request, white (similar to RAL 9010).

Installation

All sizes are suitable for flush mounting into a ceiling. If the diffuser is installed below a closed ceiling (i.e., freely suspended) a stable discharge can be achieved if a peripheral collar > 50 mm is provided – available upon request.

Assembly

The plenum box is suspended by wires or slotted strips using the drilled holes in the plenum return edge or by hanging brackets when provided. For the side entry plenum box, a self adhesive seal, supplied loose, must be fitted by the client.

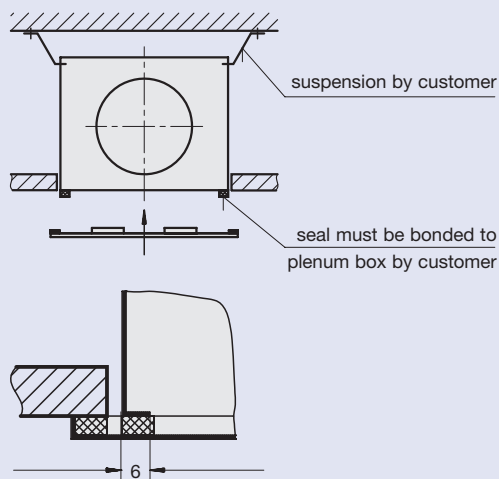
The diffuser face is fitted to the plenum box by means of a centre fix screw located in a cross channel in the plenum box.

Weights

Size	Diffuser face		Plenum box with side entry			
	square in kg	circular in kg	square AK-No.	square in kg	circular AK-No.	circular in kg
300	0.40	0.55	AK001	~ 2.8	AK013	~ 3.2
400	0.65	0.95	AK002	~ 4.2	AK014	~ 4.8
500	1.00	1.45	AK003	~ 6.0	AK015	~ 6.5
600	1.40	2.35	AK004	~ 7.5	AK016	~ 8.0
625	1.60	2.60	AK004	~ 7.5	AK016	~ 8.0

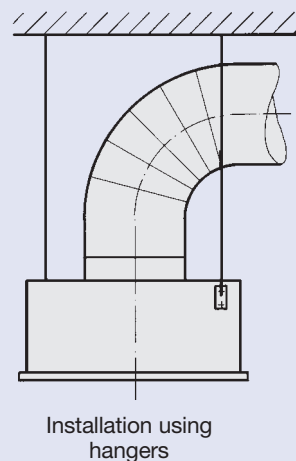
Size	Plenum box with top entry in kg
300	2.0
400	3.0
500	4.0
600	5.5
625	7.0

Surface mounting on ceiling



Fixing the diffuser face using centre screw

Freely suspended

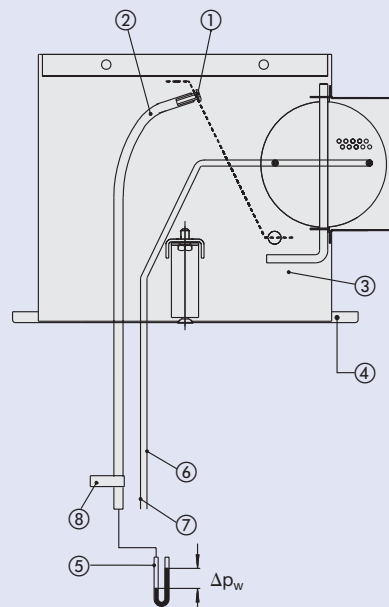


Installation using hangers

Installation flush to ceiling



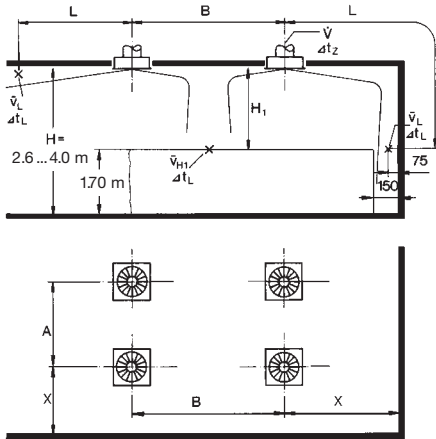
Measuring the reference pressures



- ① Test nipple
- ② Plastic tube
- ③ Plenum box
- ④ Diffuser face
- ⑤ Inclined manometer
- ⑥ Green sheathed cable for closing the damper
- ⑦ White sheathed cable for opening the damper
- ⑧ Code

Nomenclature · Quick Selection Type TDV-SilentAIR

Nomenclature



L_{pA} , L_{pNC} : A weighting or NC rating respectively of room sound pressure level
 $L_{pA} \approx L_{WA} - 8 \text{ dB}$
 $L_{pNC} \approx L_{WNC} - 8 \text{ dB}$

- $L_{0.5}/L_{0.3}$ in m: Throw referred to jet velocities of 0.3 m/s and 0.5 m/s respectively
- \dot{V} in l/s: Volume flow rate per diffuser
- \dot{V} in m^3/h : Volume flow rate per diffuser
- A, B in m: Spacing between two diffusers
- X in m: Distance between diffuser centre and wall
- H_1 in m: Distance between ceiling and occupied zone
- \bar{v}_{H1} in m/s: Time average air velocity between two diffusers at distance H_1 from ceiling
- Δt_z in K: Temperature difference between supply-air and room-air
- Δt_L in K: Differential between core and room temperatures at distance $L = A/2 + H_1$ or $L = B/2 + H_1$ or $L = X + H_1$
- A_{eff} in m^2 : Effective outlet area
- Δp_t in Pa: Total pressure drop (supply air)
- L_{WA} in dB(A): A weighted sound power level
- L_{WNC} : NC rating of sound power level
 $L_{WNC} = L_{WA} - 6 \text{ dB}$
- L_{WNR} : $L_{WNR} = L_{WNC} + 2$

Quick Selection

Size	A_{eff} (m^2)	\dot{V} (l/s) \dot{V} (m^3/h)	30		50		70		100		125		150		180		200		250			
			108	180	252	360	450	540	648	720	900											
300	0.0120	$L_{0.5}/L_{0.3}$ in m	-	1.4	-	1.8	1.5	2.5	2.1	3.6												
		L_{WA} in dB(A)	16		30		41		52													
		Δp_t in Pa	6		17		33		67													
		$\bar{v}_{H1} 1.2 \text{ m}$ in m/s	-	< 0.1	-	0.10	0.15	0.15	0.24	0.23												
400	0.0210	$L_{0.5}/L_{0.3}$ in m					-	1.9	1.6	2.7	2.0	3.4	2.4	4.0								
		L_{WA} in dB(A)					31		40		45		50									
		Δp_t in Pa					13		26		41		60									
		$\bar{v}_{H1} 1.2 \text{ m}$ in m/s					-	0.11	0.17	0.17	0.22	0.22	0.27	0.25								
500	0.0310	$L_{0.5}/L_{0.3}$ in m					-	1.6	1.3	2.2	1.7	2.8	2.0	3.3	2.4	4.0						
		L_{WA} in dB(A)					17		30		37		42		47							
		Δp_t in Pa					8		16		26		37		53							
		$\bar{v}_{H1} 1.2 \text{ m}$ in m/s					-	0.10	0.13	0.13	0.17	0.17	0.21	0.21	0.26	0.25						
600/ 625	0.0440	$L_{0.5}/L_{0.3}$ in m						-	1.9	1.4	2.3	1.7	2.8	2.0	3.3	2.2	3.7	2.8	4.6			
		L_{WA} in dB(A)							10		22		30		36		39		46			
		Δp_t in Pa							8		12		17		24		30		47			
		$\bar{v}_{H1} 1.2 \text{ m}$ in m/s							-	0.11	0.14	0.14	0.18	0.18	0.21	0.21	0.25	0.24	0.31	0.25		

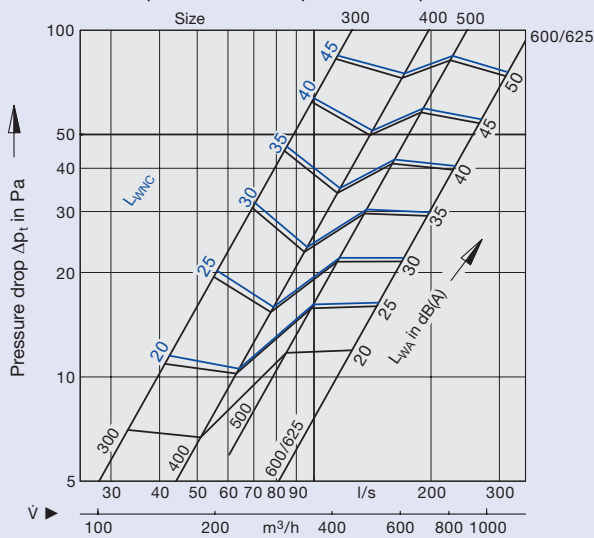
\bar{v}_{H1} referred to $A = L + H_1$, applicable to $B \geq 4.00 \text{ m}$
L see table
 $H_1 = 1.2 \text{ m}$
 L_{WA} or Δp_t : with TDF-SilentAIR-Q-...-H

Correction to diagram 1: Volume control damper position				
Size	Damper angle	0°	45°	90°
300	Δp_t	x 1.0	x 1.4	x 3.1
	L_{WA}/L_{WNC}	+ 0	+ 0	+ 2.5
400	Δp_t	x 1.0	x 1.3	x 3.1
	L_{WA}/L_{WNC}	+ 0	+ 0	+ 1.3
500	Δp_t	x 1.0	x 1.5	x 4.2
	L_{WA}/L_{WNC}	+ 0	+ 1.0	+ 5.2
600/625	Δp_t	x 1.0	x 1.4	x 3.7
	L_{WA}/L_{WNC}	+ 0	+ 0	+ 6.3

Correction to diagram 2: Volume control damper position				
Size	Damper angle	0°	45°	90°
300	Δp_t	x 1.0	x 1.3	x 3.0
	L_{WA}/L_{WNC}	+ 0	+ 0	+ 1.0
400	Δp_t	x 1.0	x 1.3	x 3.0
	L_{WA}/L_{WNC}	+ 0	+ 0	+ 1.0
500	Δp_t	x 1.0	x 1.5	x 4.3
	L_{WA}/L_{WNC}	+ 0	+ 0	+ 4.0
600/625	Δp_t	x 1.0	x 1.3	x 3.7
	L_{WA}/L_{WNC}	+ 0	+ 0	+ 4.0

1 TDV-SA-R-...-H

Sound power level and pressure drop

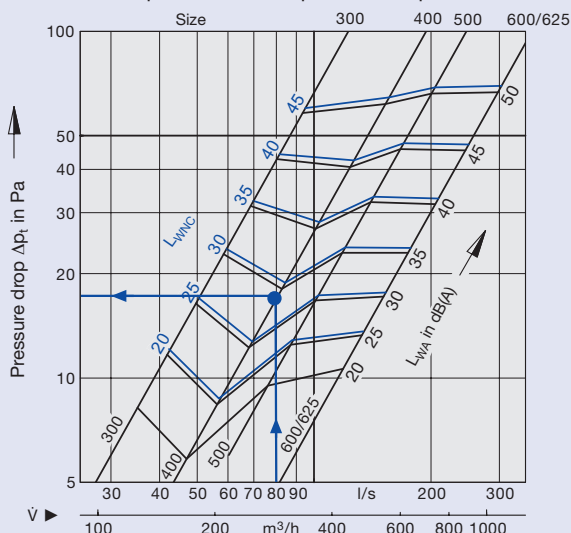


Correction to diagram 3: Volume control damper position

Size	Damper angle	0°	45°	90°
300	Δp_t	x 1.0	x 1.2	x 2.8
	L_{WA}/L_{WNC}	+ 0	+ 1.0	+ 1.5
400	Δp_t	x 1.0	x 1.3	x 3.1
	L_{WA}/L_{WNC}	+ 0	+ 1.0	+ 2.5
500	Δp_t	x 1.0	x 1.6	x 4.4
	L_{WA}/L_{WNC}	+ 0	+ 3.5	+ 7.5
600/625	Δp_t	x 1.0	x 1.4	x 3.6
	L_{WA}/L_{WNC}	+ 0	+ 3.5	+ 8.0

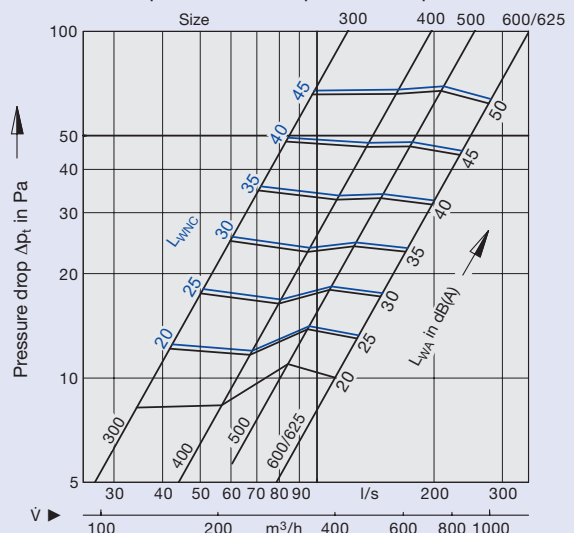
2 TDV-SA-Q-...-H

Sound power level and pressure drop



3 TDV-SA-...-V

Sound power level and pressure drop



Acoustic Data

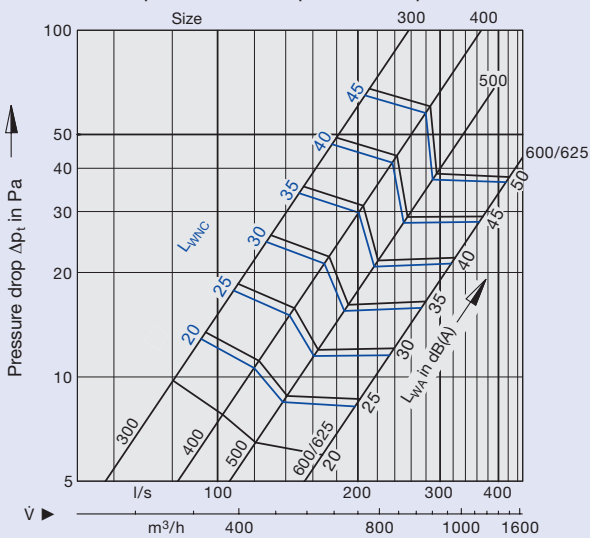
Extract Air

Correction to diagram 4: Volume control damper position				
Size	Damper angle	0°	45°	90°
300	Δp_t	x 1.0	x 2.3	x 7.9
	L_{WA}/L_{WNC}	+ 0	+ 4.0	+ 15.0
400	Δp_t	x 1.0	x 3.4	x 12.1
	L_{WA}/L_{WNC}	+ 0	+ 5.0	+ 14.0
500	Δp_t	x 1.0	x 2.7	x 12.3
	L_{WA}/L_{WNC}	+ 0	+ 2.0	+ 13.0
600/625	Δp_t	x 1.0	x 3.0	x 9.6
	L_{WA}/L_{WNC}	+ 0	+ 1.0	+ 10.0

Correction to diagram 5: Volume control damper position				
Size	Damper angle	0°	45°	90°
300	Δp_t	x 1.0	x 1.7	x 4.8
	L_{WA}/L_{WNC}	+ 0	+ 3.0	+ 12.0
400	Δp_t	x 1.0	x 1.9	x 6.3
	L_{WA}/L_{WNC}	+ 0	+ 3.0	+ 12.0
500	Δp_t	x 1.0	x 2.6	x 9.6
	L_{WA}/L_{WNC}	+ 0	+ 2.0	+ 14.0
600/625	Δp_t	x 1.0	x 2.0	x 7.8
	L_{WA}/L_{WNC}	+ 0	+ 1.5	+ 13.0

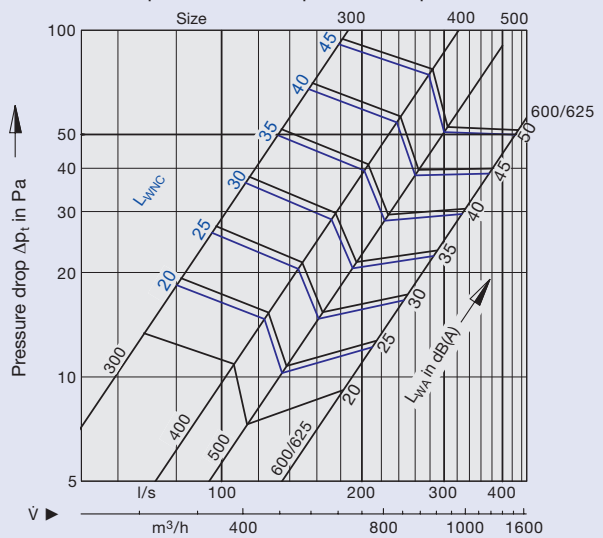
4 TDV-SA-...-V

Sound power level and pressure drop



5 TDV-SA-...-H

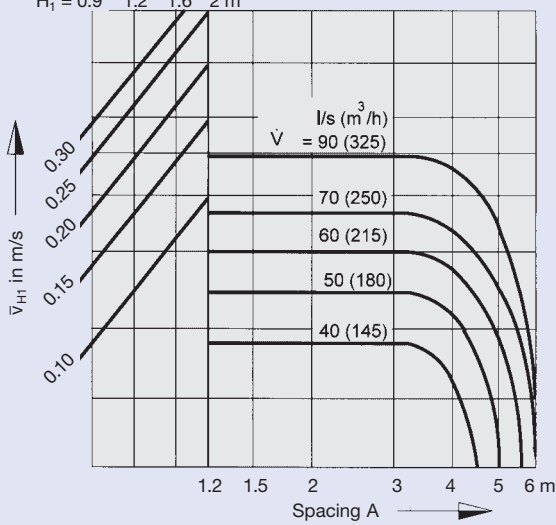
Sound power level and pressure drop



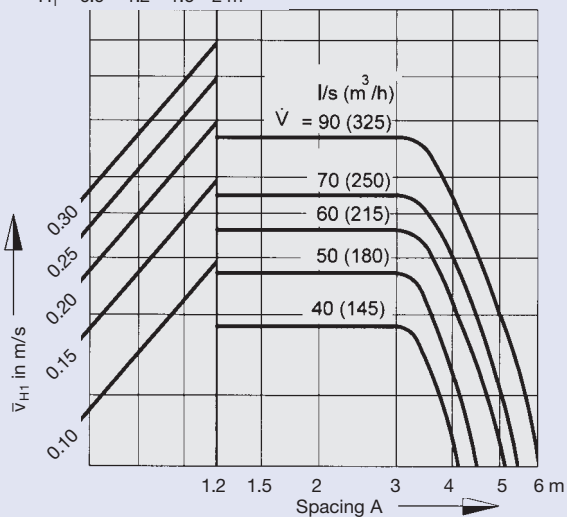
Correction:

If the diffuser is installed below the ceiling values \bar{v}_{H1} , \bar{v}_L and $\Delta t_L / \Delta t_z$ must be multiplied by 0.71!

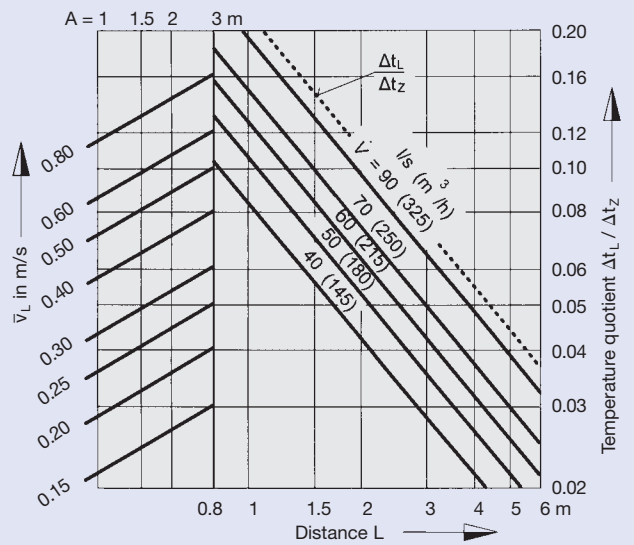
6 Diffuser arrangement:
single-row or more than one row if $B \geq 4.00$ m
 $H_1 = 0.9 \quad 1.2 \quad 1.6 \quad 2$ m



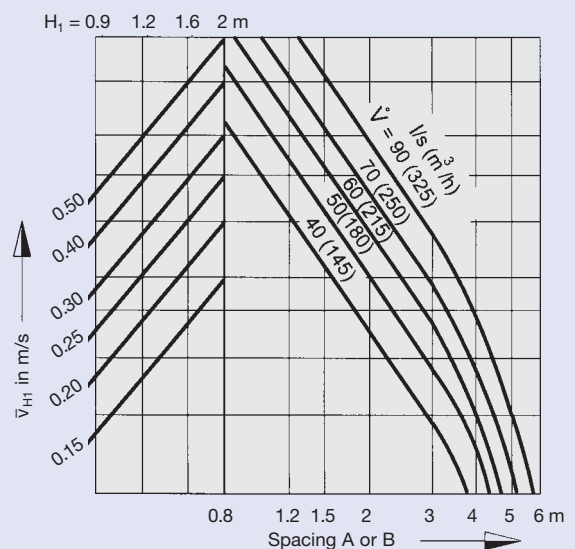
7 Diffuser arrangement:
More than one row if $B = 3.00$ m
 $H_1 = 0.9 \quad 1.2 \quad 1.6 \quad 2$ m



8 Temperature quotient



9 Square arrangement of diffusers



Aerodynamic Data TDV-SilentAIR

Size 400

Example

Data given:
2 off Type TDV-SilentAIR - Q - H - Z / 400

Volume flow rate per diffuser $\dot{V} = 80$ l/s
Supply-air temperature differential $\Delta t_z = -8$ K
Spacing between two diffusers $A = 1.50$ m
Distance from diffuser centre to side wall $X = 1.50$ m
Distance from ceiling to occupied zone $H_1 = 1.20$ m

Diagram 2: Sound power level and pressure drop

$L_{WA} = 34$ dB(A) ($L_{WNC} = 29$ NC)
 $\Delta p_t = 18$ Pa

Diagram 10: Diffuser arrangement single-row or more than one row

$\bar{v}_{H1} = 0.13$ m/s

Diagram 12:

Temperature quotient

$$L = A/2 + H_1 = 0.75 + 1.20 + 1.95$$

$$\Delta t_L / \Delta t_z = 0.15$$

$$\Delta t_L = -8 \times 0.15 = -1.2 \text{ K} \quad \text{between two diffusers}$$

$$L = X + H_1 = 1.50 + 1.20 = 2.70 \text{ m}$$

$$\Delta t_L / \Delta t_z = 0.10$$

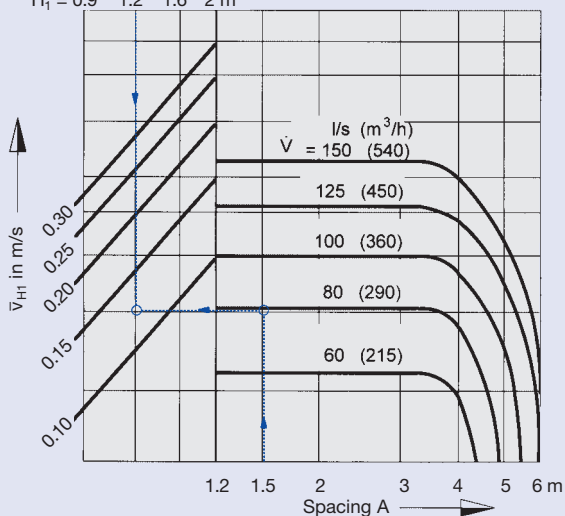
$$\Delta t_L = -8 \times 0.10 = -0.8 \text{ K} \quad \text{at the wall}$$

$$\bar{v}_L = 0.29 \text{ m/s}$$

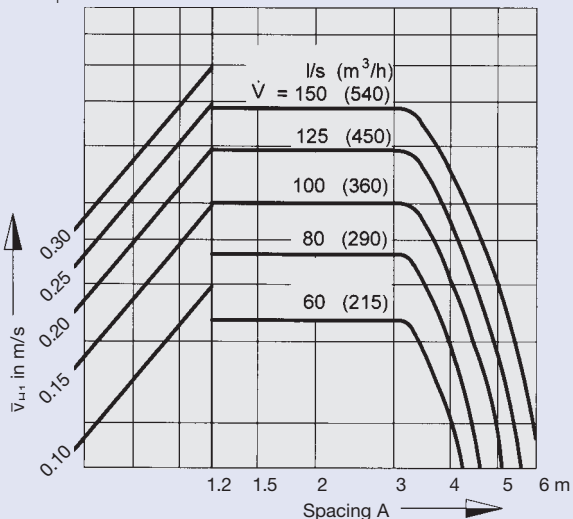
Correction:

If the diffuser is installed below the ceiling values \bar{v}_{H1} , \bar{v}_L and $\Delta t_L / \Delta t_z$ must be multiplied by 0.71!

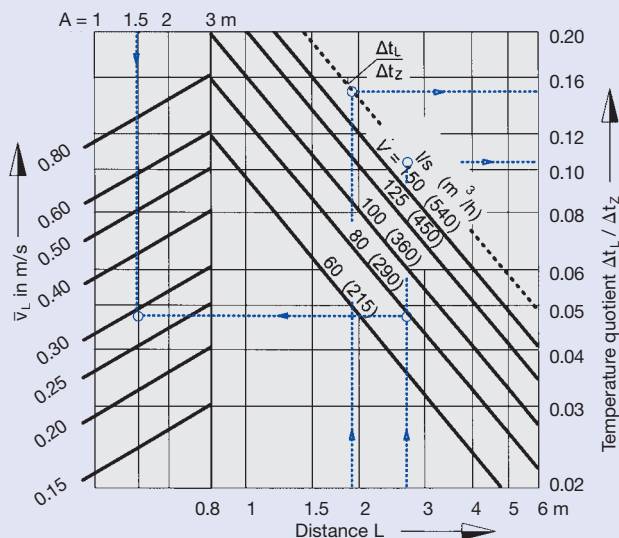
10 Diffuser arrangement:
single-row or more than one row if $B \geq 4.00$ m
 $H_1 = 0.9 \quad 1.2 \quad 1.6 \quad 2$ m



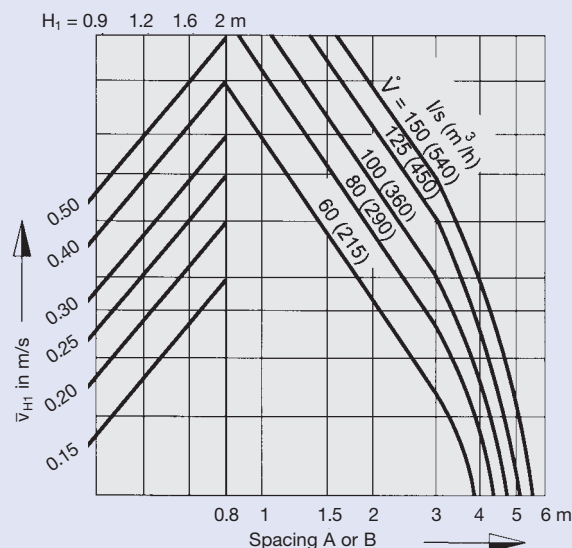
11 Diffuser arrangement:
More than one row if $B = 3.00$ m
 $H_1 = 0.9 \quad 1.2 \quad 1.6 \quad 2$ m



12 Temperature quotient



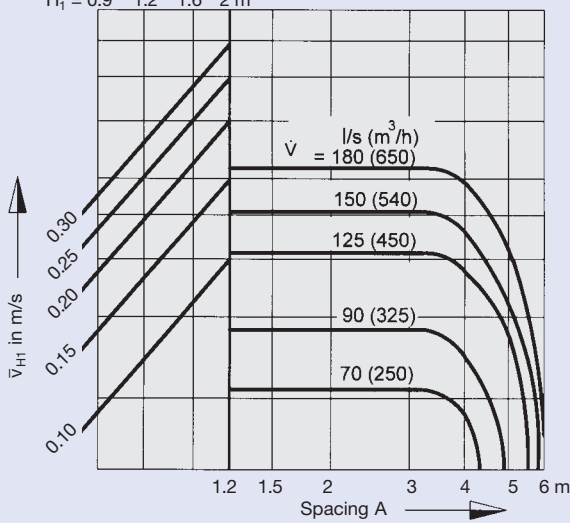
13 Square arrangement of diffusers



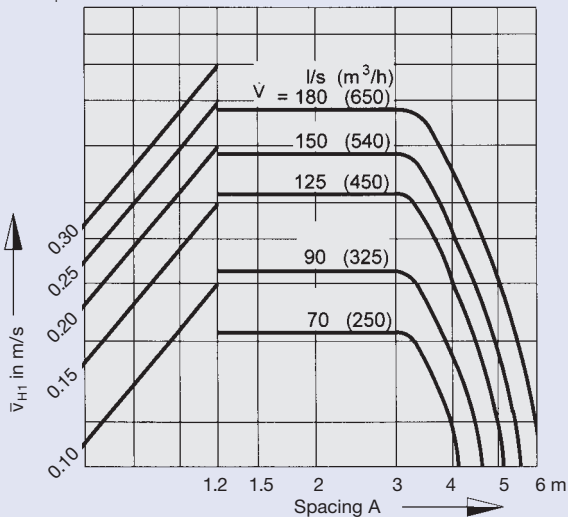
Correction:

If the diffuser is installed below the ceiling values \bar{v}_{H1} , \bar{v}_L and $\Delta t_L / \Delta t_z$ must be multiplied by 0.71!

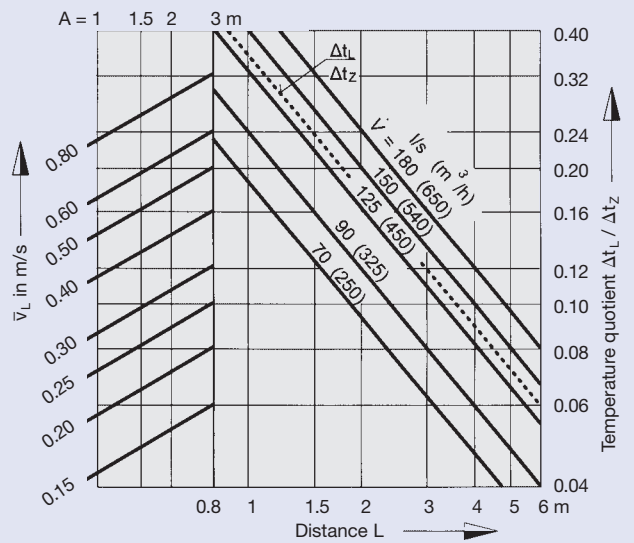
14 Diffuser arrangement:
single-row or more than one row if $B \geq 4.00$ m
 $H_1 = 0.9 \quad 1.2 \quad 1.6 \quad 2$ m



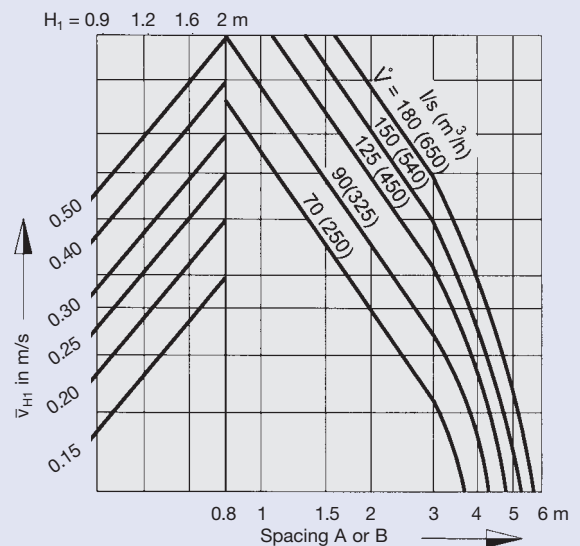
15 Diffuser arrangement:
More than one row if $B = 3.00$ m
 $H_1 = 0.9 \quad 1.2 \quad 1.6 \quad 2$ m



16 Temperature quotient



17 Square arrangement of diffusers



Aerodynamic Data TDV-SilentAIR

Sizes 600 and 625

Example

Data given:

4 off Type TDV-SilentAIR - Q - Z - H / 600

Volume flow rate per diffuser

$\dot{V} = 100 \text{ l/s}$

Spacing between two diffusers

$A = B = 2.00 \text{ m}$

Distance from ceiling to occupied zone

$H_1 = 160$

Required:

Air velocity in the occupied zone

Diagram 21:

Square arrangement of diffusers

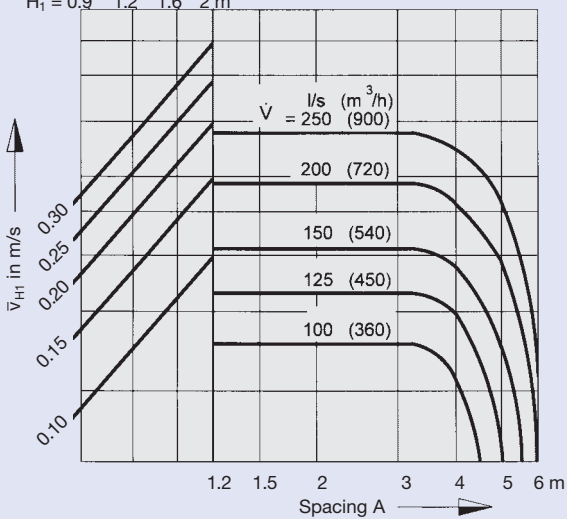
$\bar{v}_{H1} = 0.20 \text{ m/s}$

Correction:

If the diffuser is installed below the ceiling values \bar{v}_{H1} , \bar{v}_L and $\Delta t_L / \Delta t_z$ must be multiplied by 0.71!

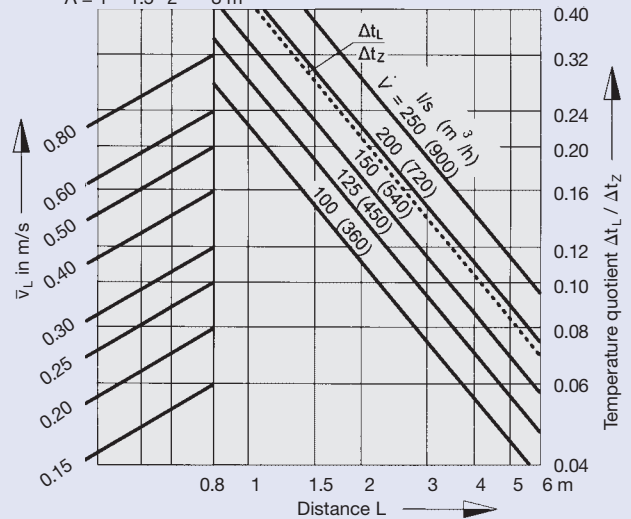
18 Diffuser arrangement:
single-row or more than one row if $B \geq 4.00 \text{ m}$

$H_1 = 0.9 \quad 1.2 \quad 1.6 \quad 2 \text{ m}$



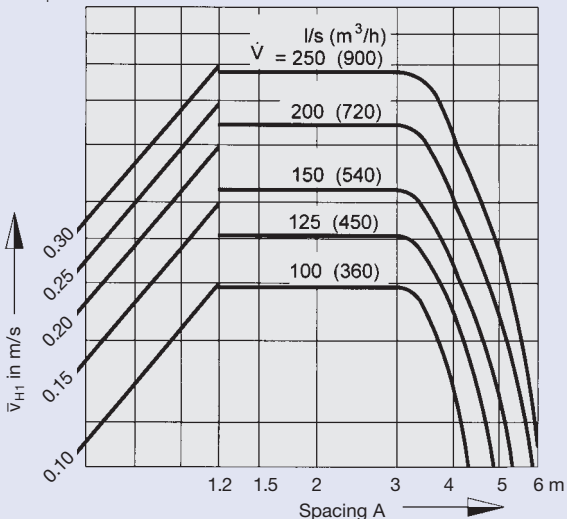
20 Temperature quotient

$A = 1 \quad 1.5 \quad 2 \quad 3 \text{ m}$



19 Diffuser arrangement
More than one row if $B = 3.00 \text{ m}$

$H_1 = 0.9 \quad 1.2 \quad 1.6 \quad 2 \text{ m}$



21 Square arrangement of diffusers

$H_1 = 0.9 \quad 1.2 \quad 1.6 \quad 2 \text{ m}$

