

**2/S13**  
v 3.3 (en)

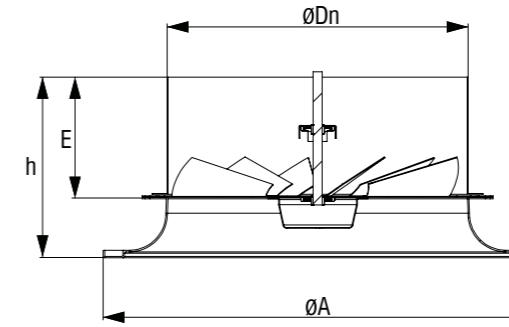
**ADJUSTABLE SWIRL DIFFUSER**

DKZ



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**DKZ**

- Ceiling diffuser for room heights from 4 to 10m.
- Made out of steel sheet, standard RAL 9010
- Adjustable discharge direction

Options

- RAL...
- Plenum box
- Motor drive

• Vertical discharge (warm jet)



• Discharge at an angle (isothermal jet)



• Horizontal discharge (cold jet)



Table 1: Diffuser dimensions

DKZ	V <sub>min</sub> [m <sup>3</sup> /h]	V <sub>max</sub> [m <sup>3</sup> /h]	ØA [mm]	ØD <sub>n</sub> [mm]	E [mm]	h [mm]	ØK [mm]	H [mm]	Ød [mm]
315	300	1200	464	313	143	205	384	340	248
400	600	2200	567	398	158	238	484	405	313
630	1000	4300	871	628	258	383	790	490	398
800	1400	5200	1077	798	408	568	950	590	498

Definition of symbols:

V [m <sup>3</sup> /h]	- Airflow rate	v <sub>Lmax</sub> [m/s]	- Maximal air velocity at distance L(m) from diffuser
V <sub>n</sub> [m <sup>3</sup> /h]	- Nominal airflow rate	v <sub>h</sub> [m/s]	- Average air velocity between two diffusers at distance h (m) from diffuser
V <sub>uk</sub> [m <sup>3</sup> /h]	- Total airflow rate	Δp [Pa]	- Total pressure drop
h [m]	- Distance between ceiling and occupied zone	t <sub>r</sub> [°C]	- Room temperature
H [m]	- Room height	t <sub>p</sub> [°C]	- Supply air temperature
A,B [m]	- Distance between diffusers	t <sub>m</sub> [°C]	- Air-stream core temperature
x [m]	- Distance between diffuser and wall	Δt <sub>z</sub> [°C]	- (t <sub>z</sub> - t <sub>p</sub> )
y [m]	- Vertical jet throw	Δt <sub>L</sub> [°C]	- (t <sub>m</sub> - t <sub>p</sub> )
L [m]	- Throw distance (x+h)	i	- Induction V <sub>uk</sub> /V
A <sub>ef</sub> [m <sup>2</sup> ]	- Effective outlet area	L <sub>WA</sub> [dB(A)]	- Sound power level
v <sub>ef</sub> [m/s]	- Effective air discharge velocity		
v <sub>L</sub> [m/s]	- Average air velocity at distance h from diffuser		

ADJUSTABLE SWIRL DIFFUSER

ADJUSTABLE SWIRL DIFFUSER

Ordering key:

Adjustable industrial swirl diffuser **DKZ - 630 - M230 - OZ - A - H - ∅d - Z**

Size  
**M230** - motor drive 230V  
**M24** - motor drive 24V  
**R** - manual drive  
**OZ** - two positions  
**K** - continuous  
**A** - supply air  
**B** - exhaust air  
**H** - horizontal connection  
 Connection diameter  
 Insulation

\*Screws are not delivered  
 \*\*Ordering key for Plenum box on page 184  
 \*\*\*Only plenum box UPK2

SELECTION DIAGRAMS

Diagram 1.0 - Effective discharge velocity

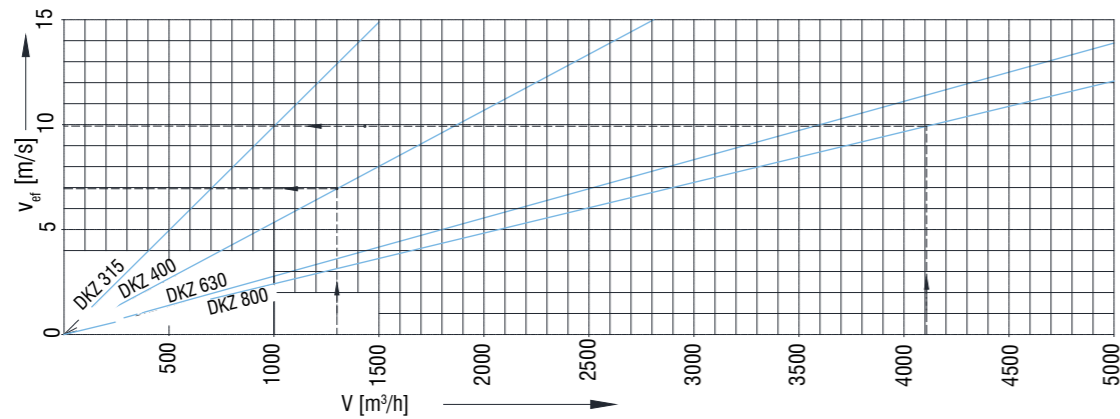


Table 3: Sound power levels

Average octave frequency (Hz)	$v_{ef} = 8 \text{ m/s}$			
	$\Delta L$	$L_{WA}$	$L_{WA} = L_{WA} + \Delta L$	
63	4	53	57	
125	1	53	54	
250	0	53	53	
500	-2	53	51	
1000	-5	53	48	
2000	-9	53	44	
4000	-14	53	39	
8000	-23	53	30	

Table 4: Effective outlet area

DKZ	$A_{ef}$ [m²]	$v_{ef}$ [m/s]
315	0,028	
400	0,052	
600	0,100	
800	0,115	

$$v_{ef} = \frac{\dot{V} \text{ (m³/h)}}{A_{ef} \text{ (m²)} \times 3600}$$

**Example 1:**  
 GIVEN  
 Model DKZ V 400 with plenum  
 $V = 1300 \text{ (m³/h)}$

**SOLUTION**  
**Diagram 1.0**  
 $v_{ef} = 6,95 \text{ (m/s)} \approx 7 \text{ (m/s)}$   
**Diagram 1.2**  
 $\Delta p = 51 \text{ (Pa)}$   
 $L_{WA} = 53 \text{ (dB(A))}$   
 $L_w = L_{WA} + \Delta L \text{ Table 3}$

Table 5: Relative sound power levels  $\Delta L$  for DKZ 315

Average octave frequency (Hz)	DKZ 315	DKZ	DKZ-H	DKZ	DKZ-H	DKZ	DKZ-H	DKZ	DKZ-H
	$v_{ef}$ (m/s)	3 (m/s)		5 (m/s)		8 (m/s)		12 (m/s)	
63	10	10	7	8	5	6	1	3	
125	2	6	1	5	0	3	-1	1	
250	2	2	1	1	0	-1	-2	-3	
500	-1	-1	-2	-1	-3	-2	-5	-4	
1000	-5	-6	-4	-5	-5	-5	-6	-5	
2000	-18	-18	-14	-13	-9	-9	-7	-7	
4000	-28	-28	-20	-21	-15	-14	-8	-10	
8000	-37	-30	-30	-25	-21	-23	-17	-18	

Table 6: Relative sound power levels  $\Delta L$  for DKZ 400

Average octave frequency (Hz)	DKZ 315	DKZ	DKZ-H	DKZ	DKZ-H	DKZ	DKZ-H	DKZ	DKZ-H
	$v_{ef}$ (m/s)	3 (m/s)		5 (m/s)		8 (m/s)		12 (m/s)	
63	6	7	4	5	1	2	-1	-1	
125	4	7	4	5	3	3	2	0	
250	2	0	1	-1	0	-3	-1	-5	
500	-1	-1	-1	-2	-2	-3	-3	-5	
1000	-5	-5	-5	-4	-4	-4	-5	-5	
2000	-21	-15	-16	-11	-11	-8	-8	-6	
4000	-36	-26	-28	-19	-21	-13	-15	-9	
8000	-44	-30	-36	-25	-29	-21	-23	-19	

Table 7: Relative sound power levels  $\Delta L$  for DKZ 600

Average octave frequency (Hz)	DKZ 315	DKZ	DKZ-H	DKZ	DKZ-H	DKZ	DKZ-H	DKZ	DKZ-H
	$v_{ef}$ (m/s)	3 (m/s)		5 (m/s)		8 (m/s)		12 (m/s)	
63	7	9	5	7	3	4	0	1	
125	3	6	3	5	2	3	2	0	
250	2	1	1	0	0	-2	-1	-4	
500	-1	-1	-1	-1	-2	-3	-3	-5	
1000	-5	-6	-4	-5	-4	-4	-5	-5	
2000	-20	-16	-15	-12	-11	-9	-8	-7	
4000	-33	-27	-25	-20	-18	-14	-12	-10	
8000	-41	-30	-33	-25	-26	-21	-20	-19	

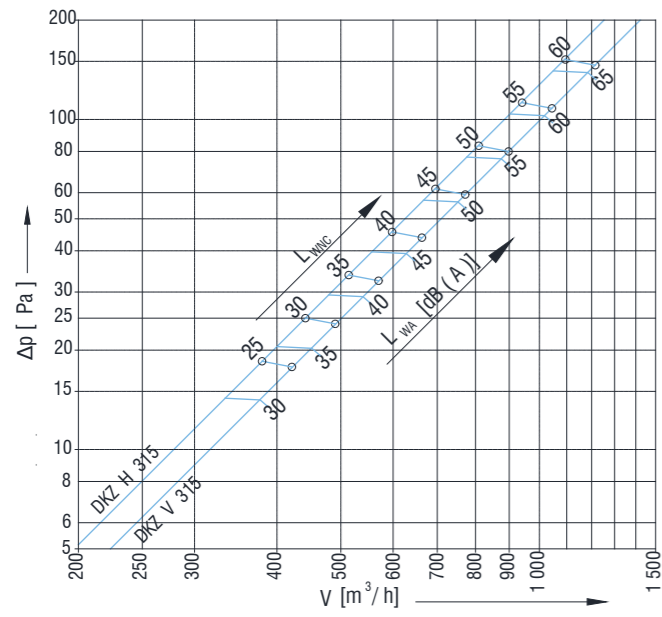
Table 8: Relative sound power levels  $\Delta L$  for DKZ 800

Average octave frequency (Hz)	DKZ 315	DKZ	DKZ-H	DKZ	DKZ-H	DKZ	DKZ-H	DKZ	DKZ-H
	$v_{ef}$ (m/s)	3 (m/s)		5 (m/s)		8 (m/s)		12 (m/s)	
63	7	4	5	12	3	9	0	6	
125	3	6	3	4	2	3	1	1	
250	2	3	1	2	0	1	-1	0	
500	-1	-1	-1	-1	-2	-2	-3	-3	
1000	-5	-7	-5	-6	-4	-5	-5	-5	
2000	-20	-20	-15	-15	-11	-11	-8	-8	
4000	-33	-31	-25	-23	-18	-17	-13	-12	
8000	-42	-31	-35	-27	-26	-21	-22	-17	

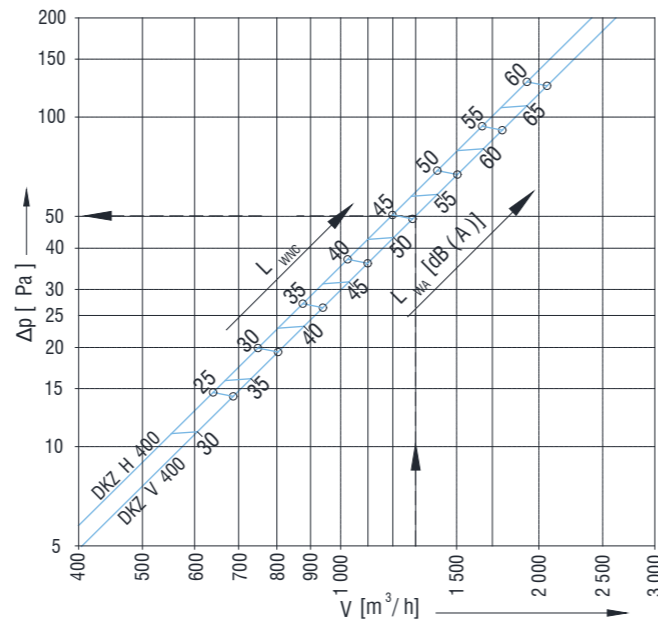


For determining total sound power levels in a room, number of diffusers and absorption properties should be considered.

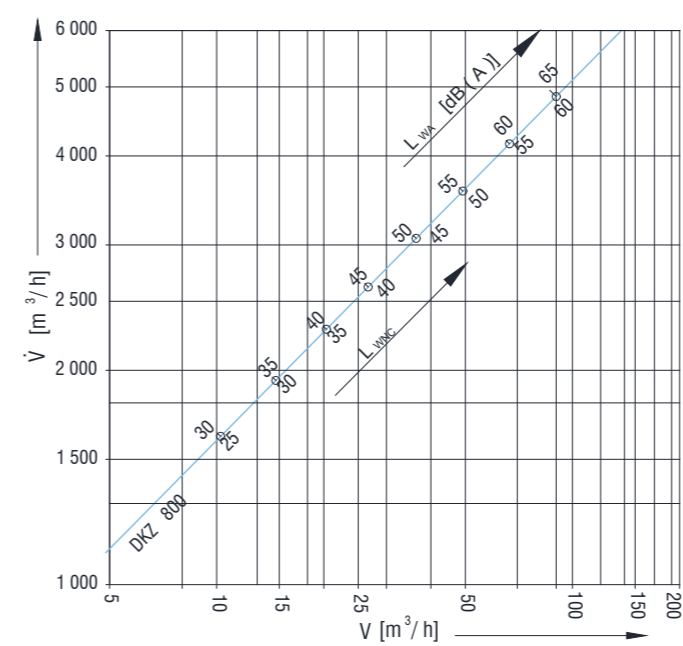
1.1 Total pressure drop and sound power level for DKZ 315 - with plenum box



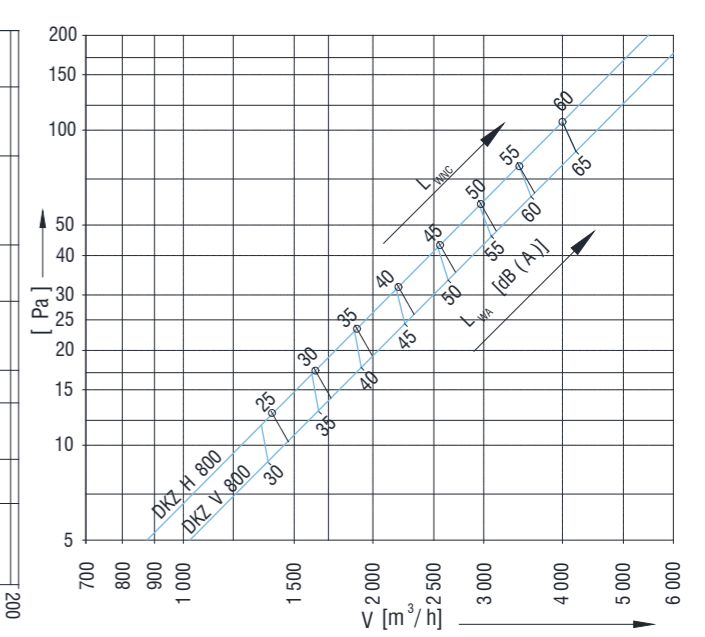
1.2 Total pressure drop and sound power level for DKZ 400 - with plenum box



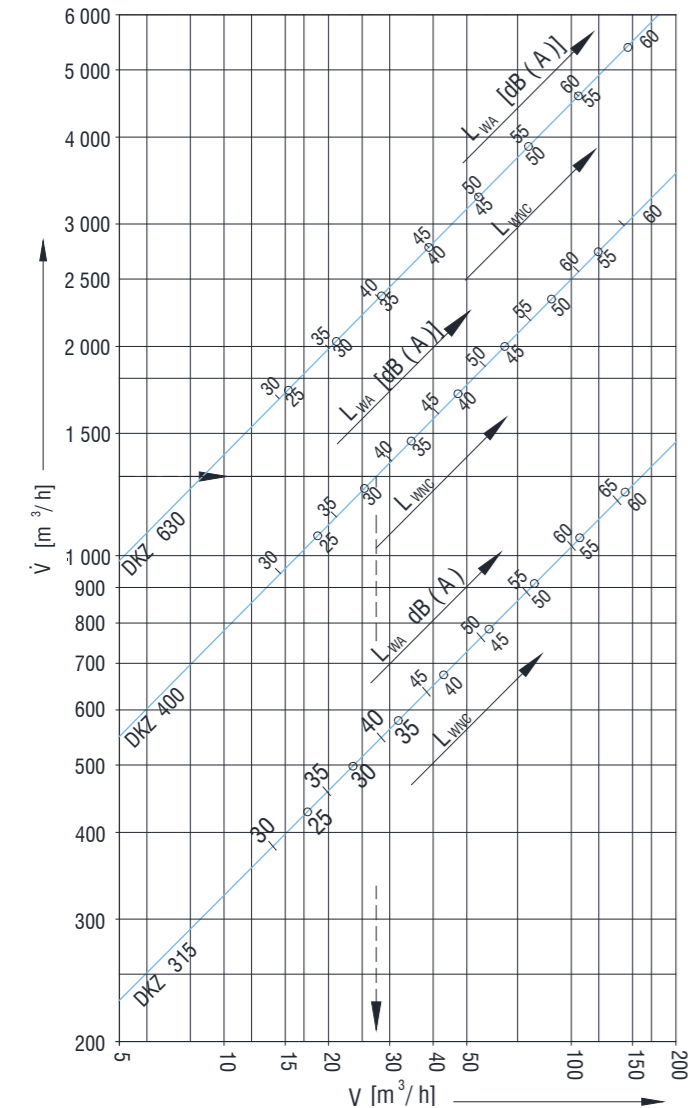
1.5 Total pressure drop and sound power level for DKZ 800 - with plenum box



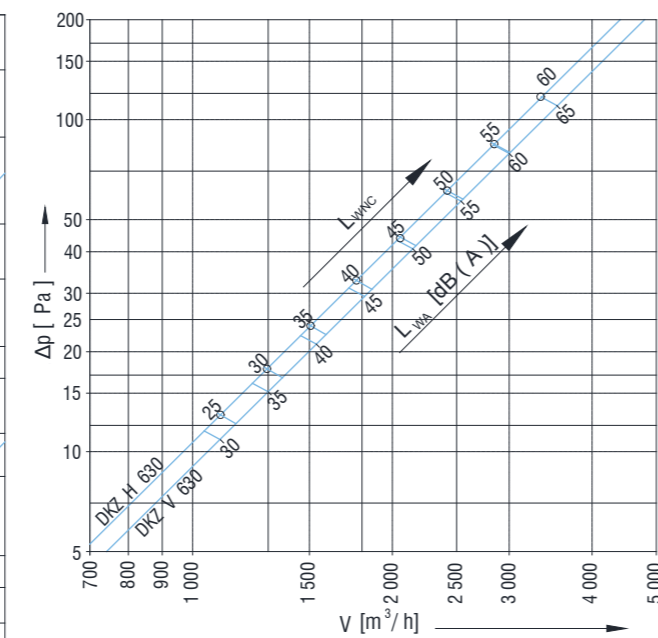
1.6 Total pressure drop and sound power level for DKZ 800 - without plenum box



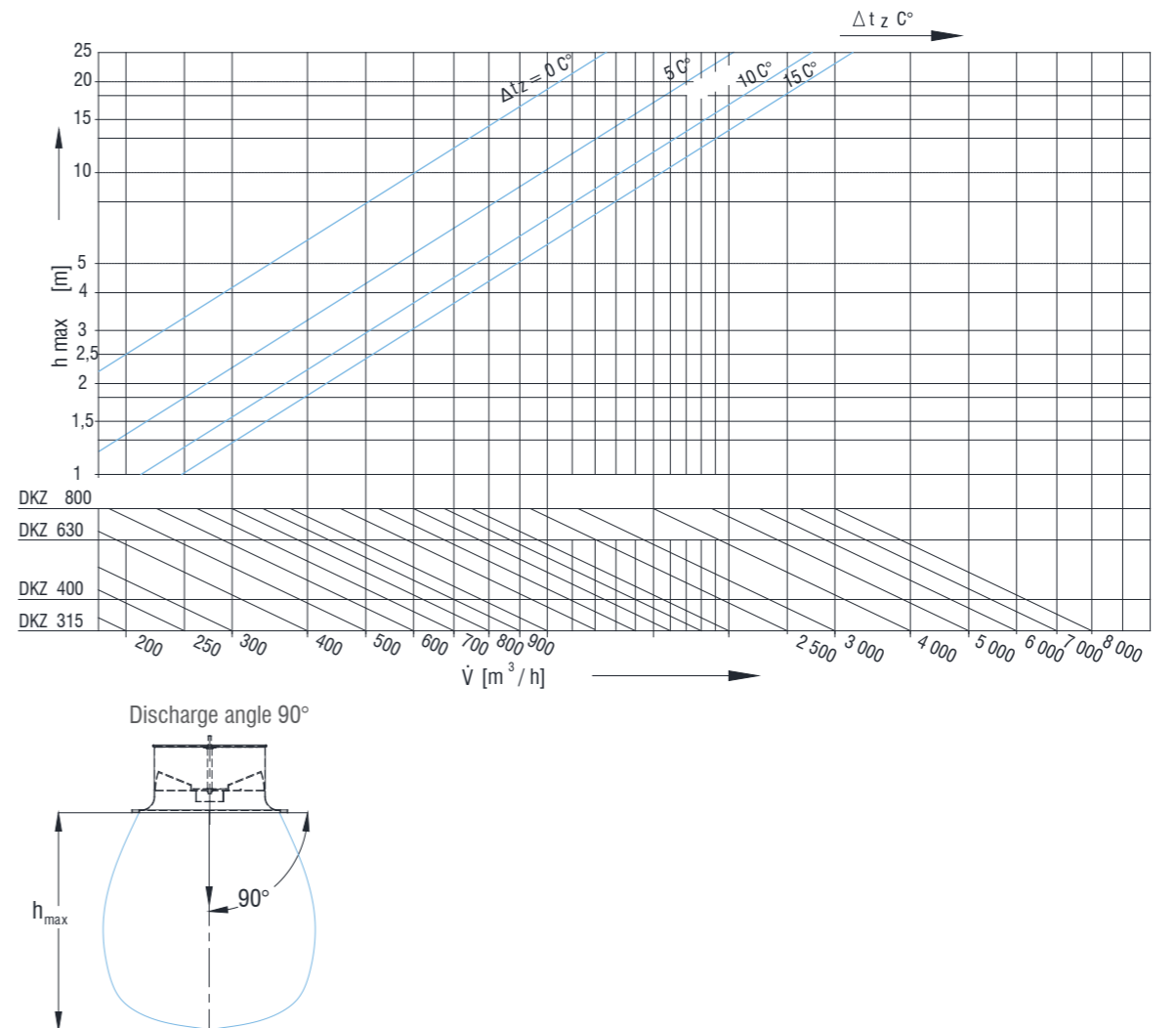
1.4 Total pressure drop and sound power level for DKZ 630 - with plenum box



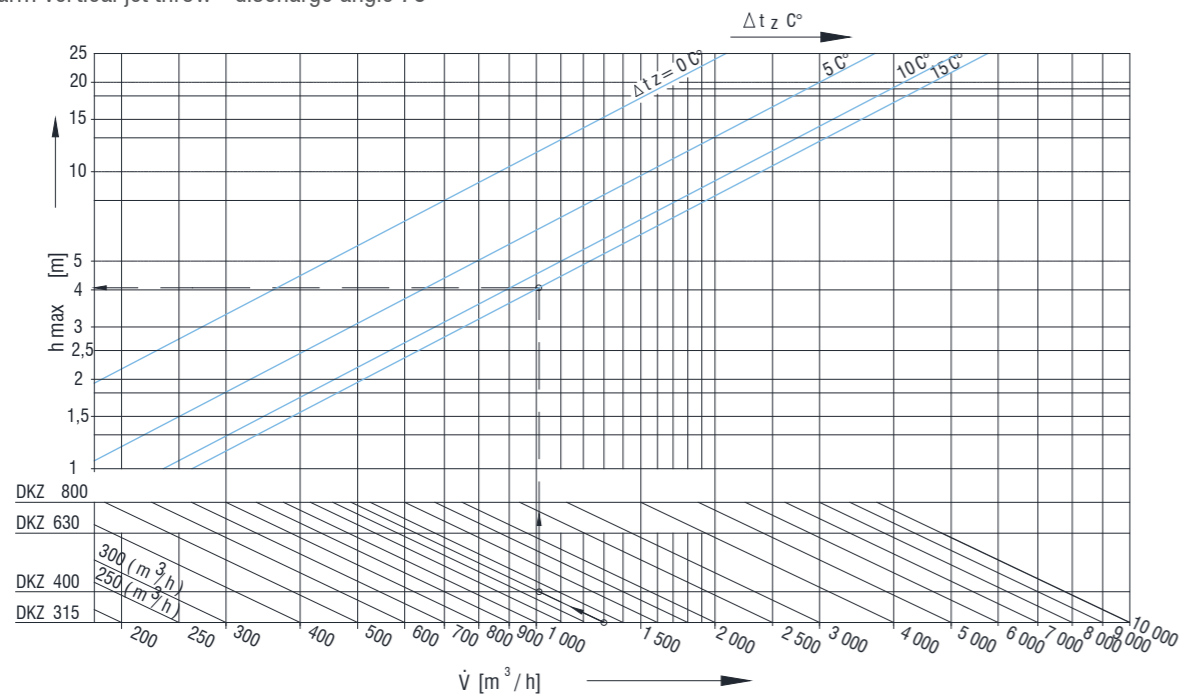
1.3 Total pressure drop and sound power level for DKZ 315, 400, 630 - without plenum box



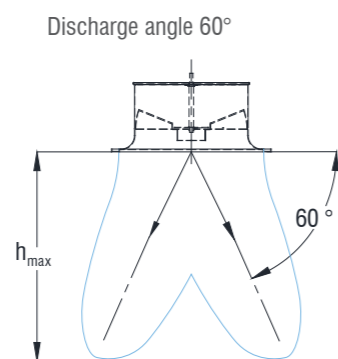
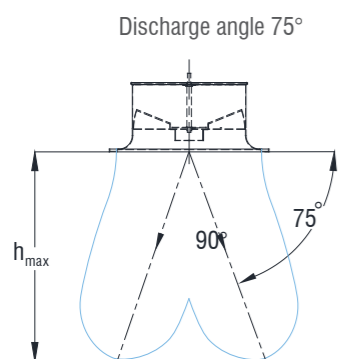
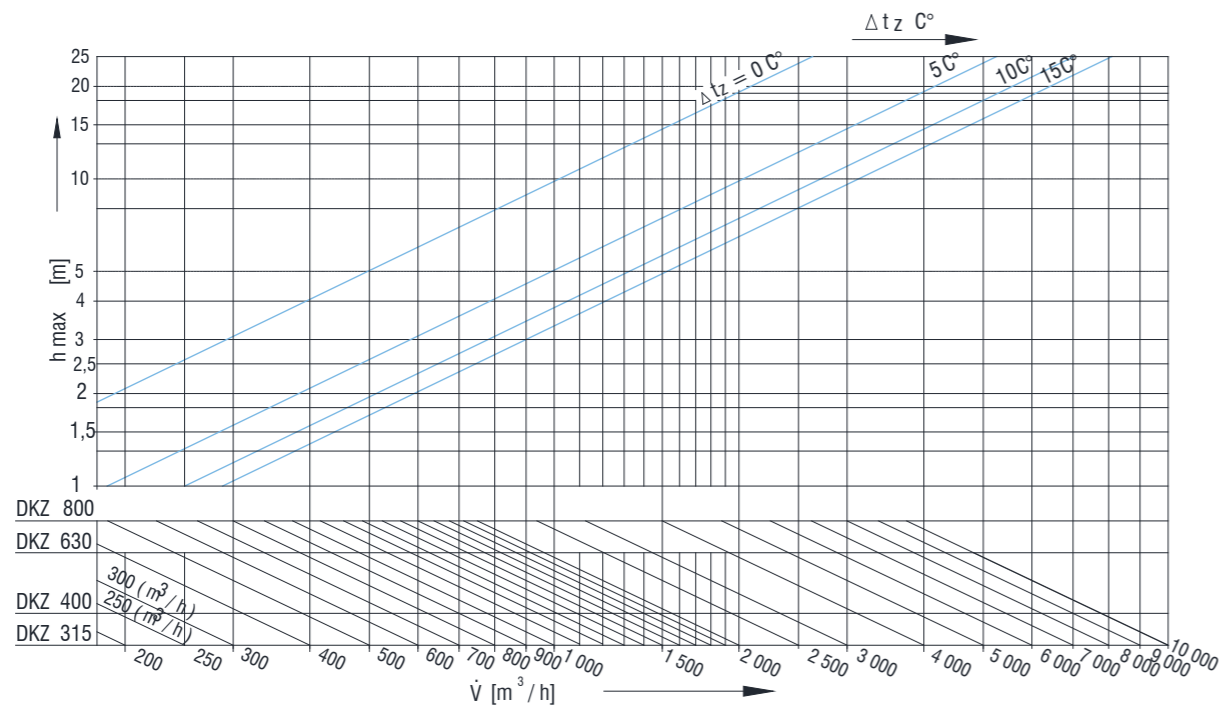
1.7 Warm vertical jet throw - discharge angle 90°



1.8 Warm vertical jet throw - discharge angle 75°

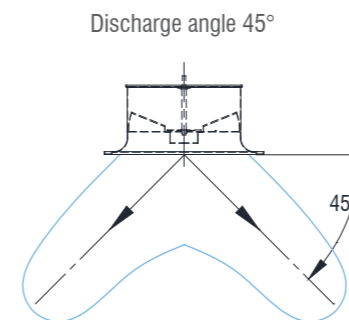
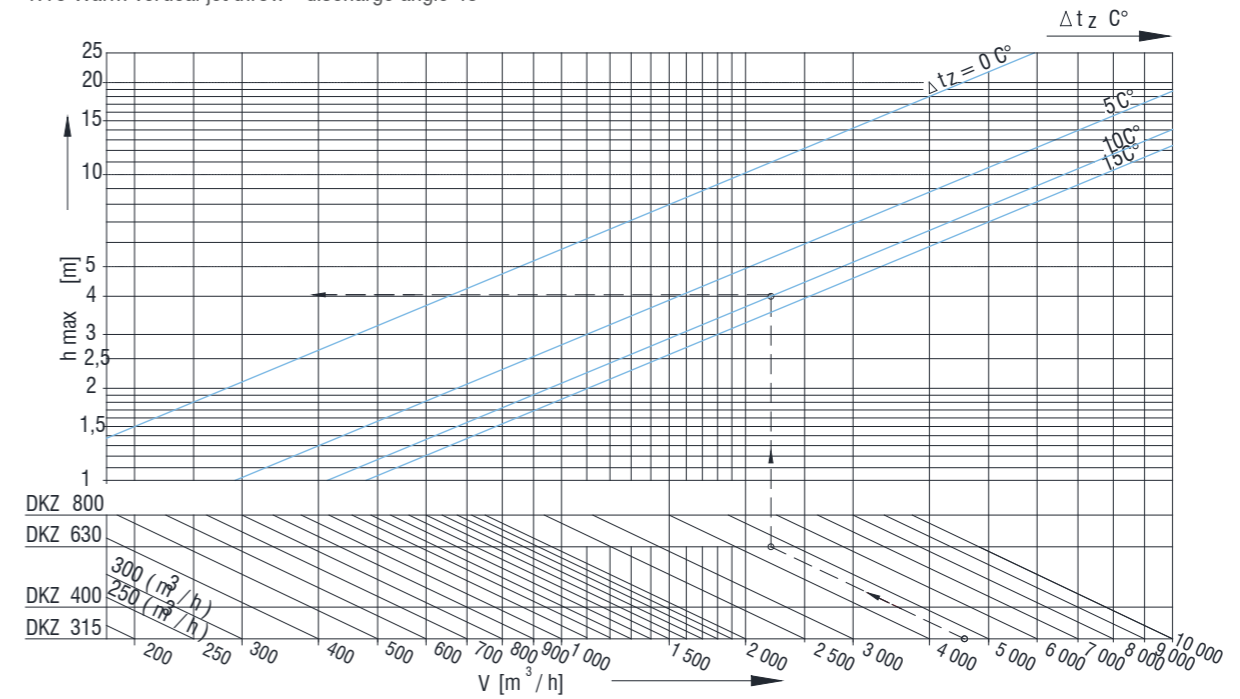


1.9 Warm vertical jet throw - discharge angle 60°



**Example 2:**  
**GIVEN**  
 Model: DKZ 400  
 $V = 1400 \text{ m}^3/\text{h}$   
 Discharge angle 60°  
 $\Delta t_z = +15 \text{ }^\circ\text{C}$   
**SOLUTION**  
**Diagram 1.6**  
 $h_{\text{max}} = 3,8 \text{ m}$

1.10 Warm vertical jet throw - discharge angle 45°



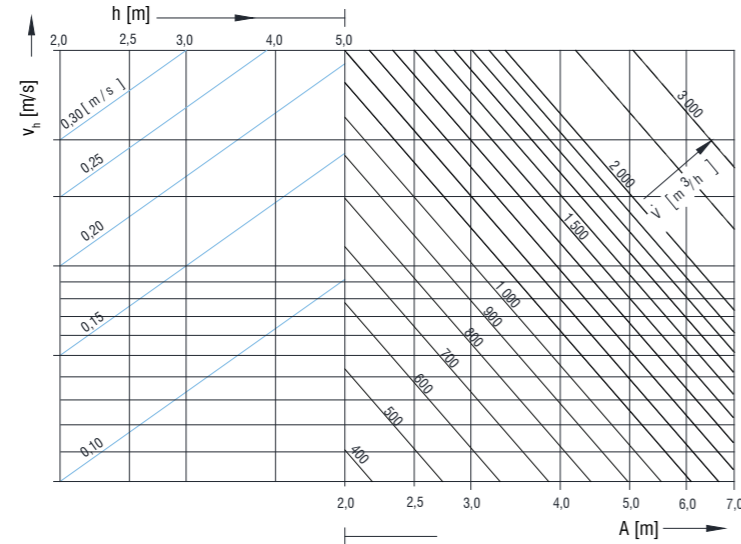
Average velocity  $v_n$  diagrams at distance  $B \geq 5 \text{ m}$

Valid for:  
 - horizontal cold throw discharge  
 - free-hanging diffuser installation  
 -  $\Delta t_z = 0$  do  $-10 \text{ }^\circ\text{C}$

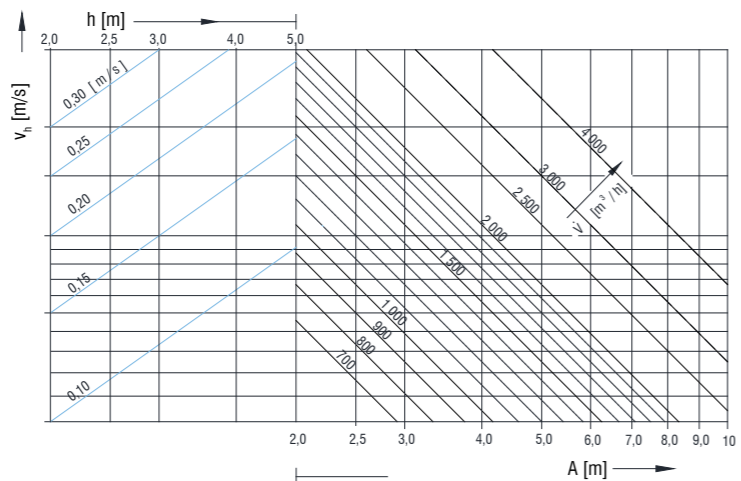
**Example 3:**  
**GIVEN**  
 Model: DKZ 630  
 $V = 4600 \text{ m}^3/\text{h}$   
 Discharge angle 45°  
 $\Delta t_z = +10 \text{ }^\circ\text{C}$

**SOLUTION**  
**Diagram 1.7**  
 $h_{\text{max}} = 4,0 \text{ m}$

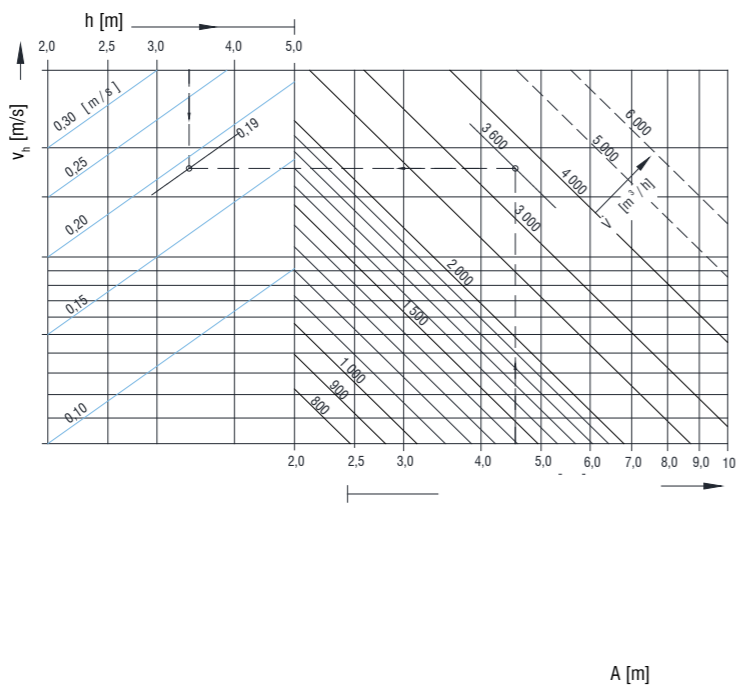
1.11 Average velocity  $v_h$  at  $B \geq 5$  m for DKZ 315



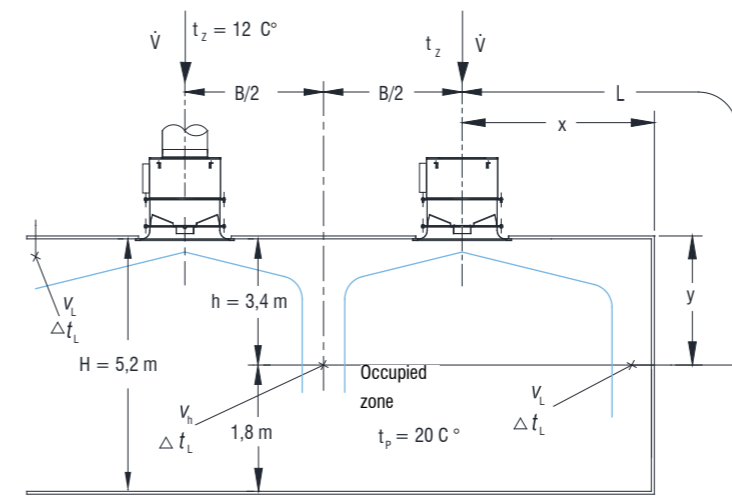
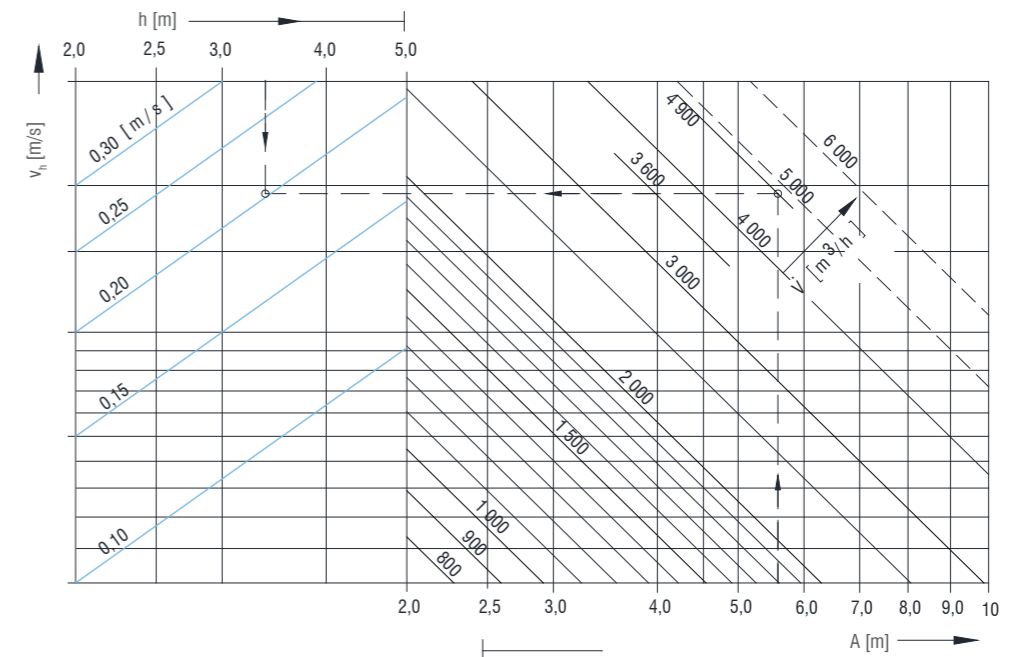
1.12 Average velocity  $v_h$  at  $B \geq 5$  m for DKZ 400



1.13 Average velocity  $v_h$  at  $B \geq 5$  m for DKZ 630



1.14 Average velocity  $v_h$  at  $B \geq 5$  m for DKZ 800



Example 4:

GIVEN  
Model: DKZ 630

$A = 4,5$  m       $t_z = 12$  °C  
 $B \geq 5$  m       $t_p = 20$  °C  
 $V = 3600$  m<sup>3</sup>/h       $x = 4,0$  m  
 $h = 3,4$  m       $L = 7,4$  m  
 $\Delta t_z = -8$  °C

Installation in suspended ceiling

SOLUTION

Diagram 1.10

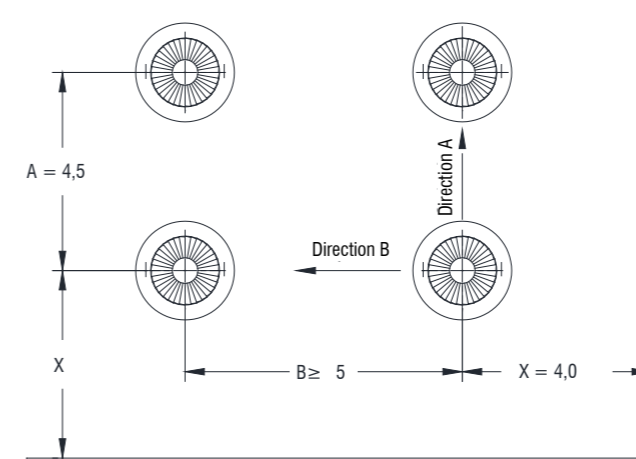
$v_h = 0,19$  m/s  
Ceiling influence on horizontal discharge  
 $v_h \times 1,4 = 0,26$  m/s

Diagram 2.1

$v_L = 0,37$  (m/s)  
Ceiling influence on horizontal discharge  
 $v_L \times 1,4 = 0,52$  m/s

$$\frac{\Delta t_L}{\Delta t_z} = 0,06 \times 1,4 = 0,084$$

$t_L = 19,33$  °C  
 $i = 11,9$



Average velocity  $v_L$  diagrams

2.0 Average velocity  $v_L$  and temperature ratio for DKZ 315

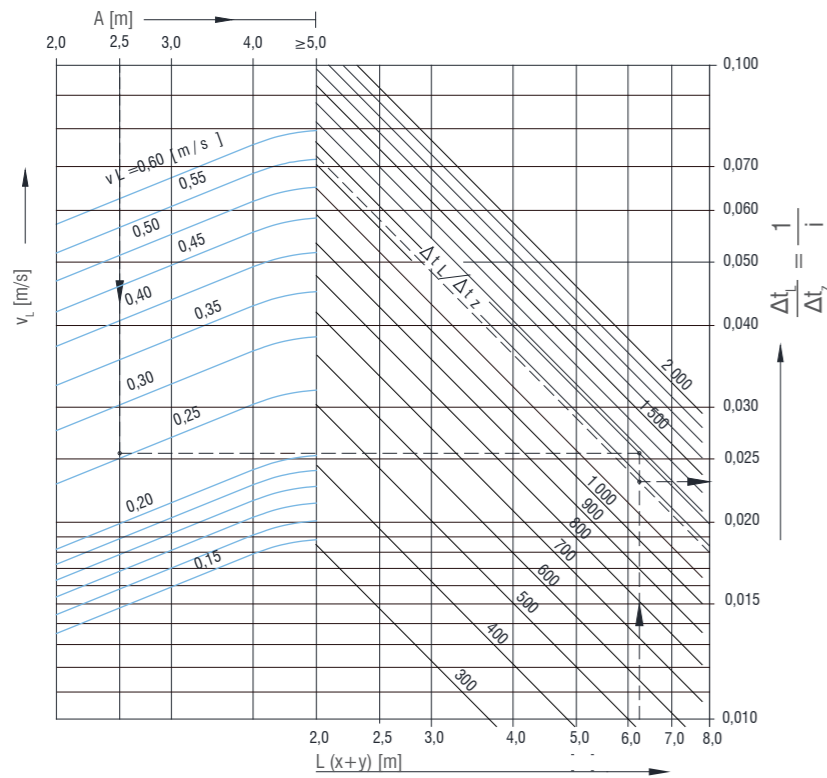
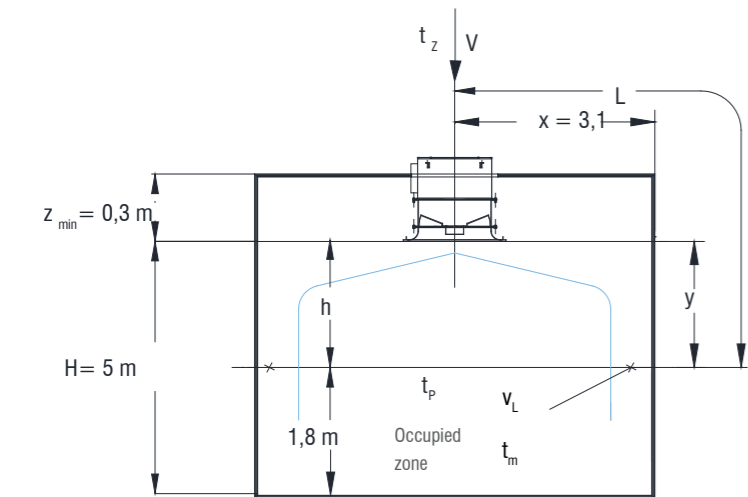


Diagram data valid for:

- cold horizontal air discharge
- free-hanging diffuser installation
- $\Delta t_z = 0$  do  $-10^\circ\text{C}$

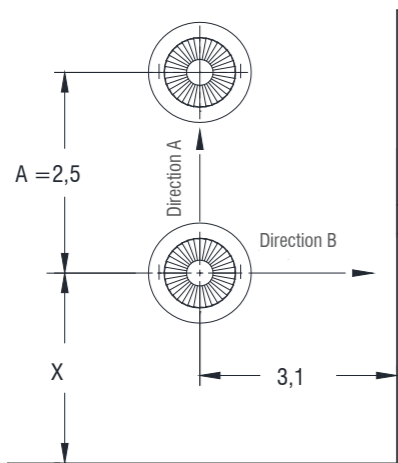


When installing diffuser at suspended ceiling level,  $v_L$ ;  $v_h$ ;  $\frac{\Delta t_L}{\Delta t_z}$  should be multiplied by a factor of 1,4

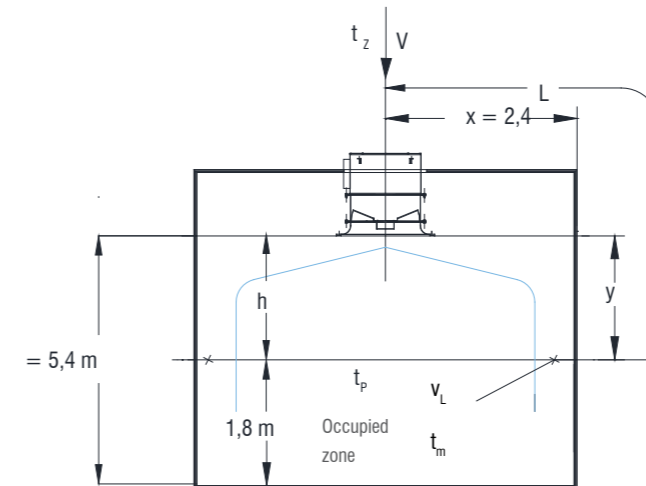
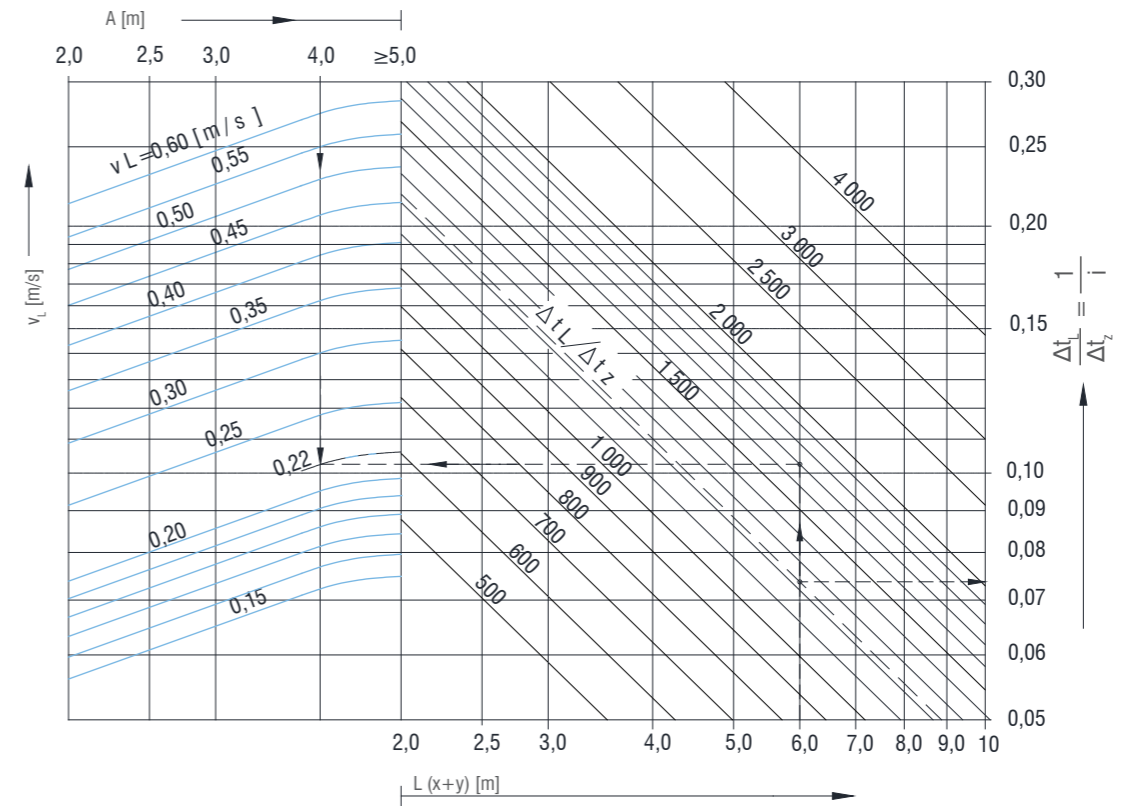


**Example 5:**  
 GIVEN  
 Size: DKZ 315  
 $t_p = 20^\circ\text{C}$   
 $\dot{V} = 1300 \text{ m}^3/\text{h}$   
 $H = 5 \text{ m}$   
 $A = 2,5 \text{ m}$   
 $x = 3,1 \text{ m}$   
 $h = 3,2 \text{ m}$   
 $L = 6,3 \text{ m}$   
 $z_{\min} = 0,3 \text{ m}$   
 SOLUTION  
**Diagram 2.2**  
 $v_L = 0,25 \text{ m/s}$   
 $\frac{\Delta t_L}{\Delta t_z} = 0,0235$   
 $i = 42,55$   
 $t_L = 19,88^\circ\text{C}$

Free-hanging installation



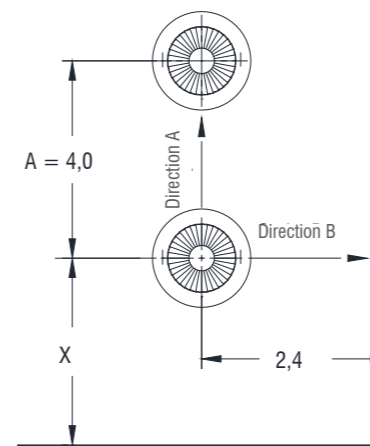
2.2 Average velocity  $v_L$  and temperature ratio for DKZ 400



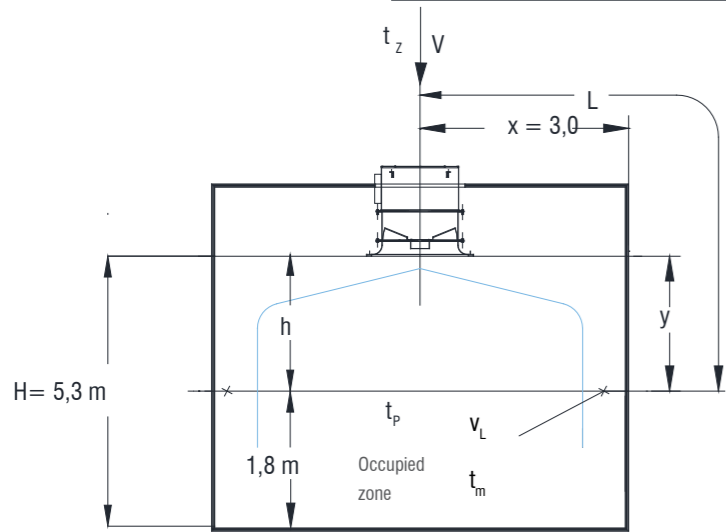
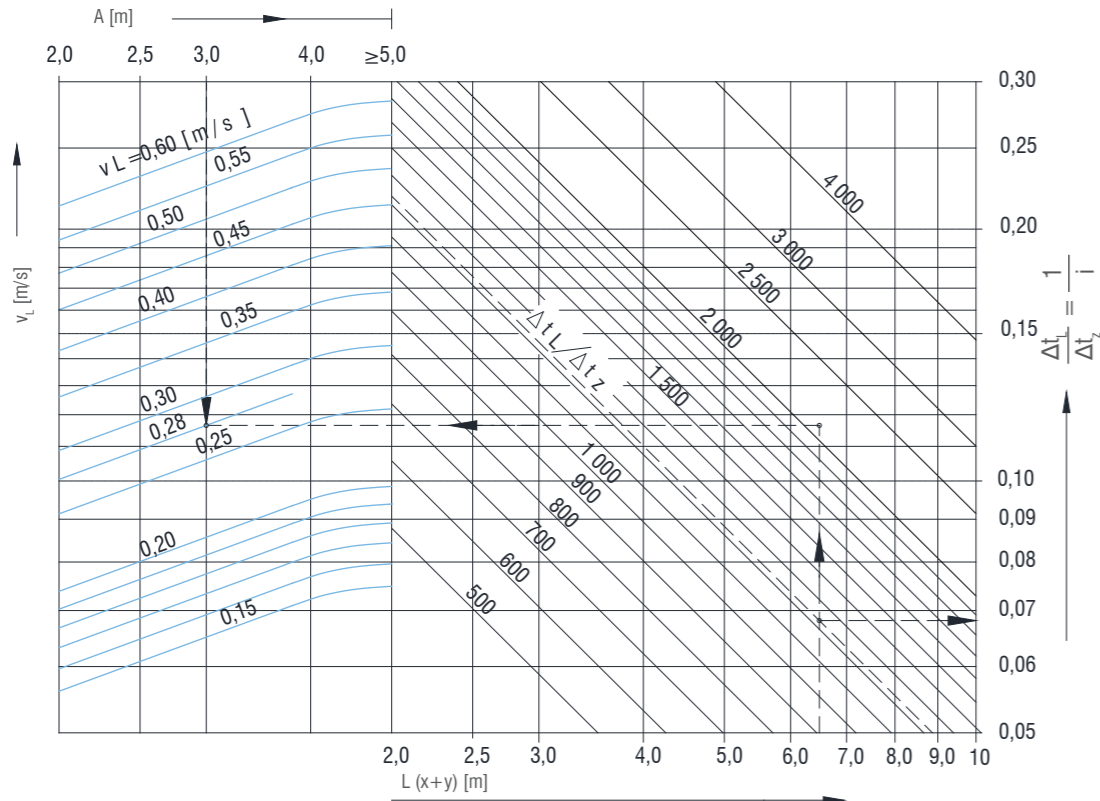
**Example 6:**  
 GIVEN  
 Size: DKZ 400  
 $\dot{V} = 1700 \text{ m}^3/\text{h}$   
 $H = 5,4 \text{ m}$   
 $A = 4,0 \text{ m}$   
 $x = 2,4 \text{ m}$   
 $h = 3,6 \text{ m}$   
 $L = 6,0 \text{ m}$

**SOLUTION**  
**Diagram 2.1**  
 $v_L = 0,22 \text{ m/s}$

$\frac{\Delta t_L}{\Delta t_z} = 0,074$   
 $t_p = 20^\circ\text{C}$   
 $t_z = 12^\circ\text{C}$   
 $\Delta t_z = 12 - 20 = -8^\circ\text{C}$   
 $H = h + 1,8$   
 $L = x + h$   
 Ceiling influence:  
 $z < 0,3 \text{ m}$   
 Ceiling influence:  
 $v_L \times 1,4 = 0,31 \text{ m/s}$   
 $\frac{\Delta t_L}{\Delta t_z} \times 1,4 = 0,1036$   
 $i = 9,65$   
 $t_L = 19,17^\circ\text{C}$



2.3 Average velocity  $v_L$  and temperature ratio for DKZ 630



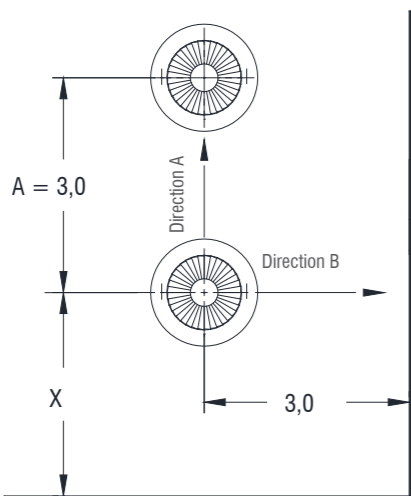
Example 7:  
GIVEN  
Size: DKZ 630

$V = 2100 \text{ m}^3/\text{h}$   
 $H = 5,3 \text{ m}$   
 $A = 3,0 \text{ m}$   
 $x = 3,0 \text{ m}$   
 $h = 3,5 \text{ m}$   
 $L = 6,5 \text{ m}$

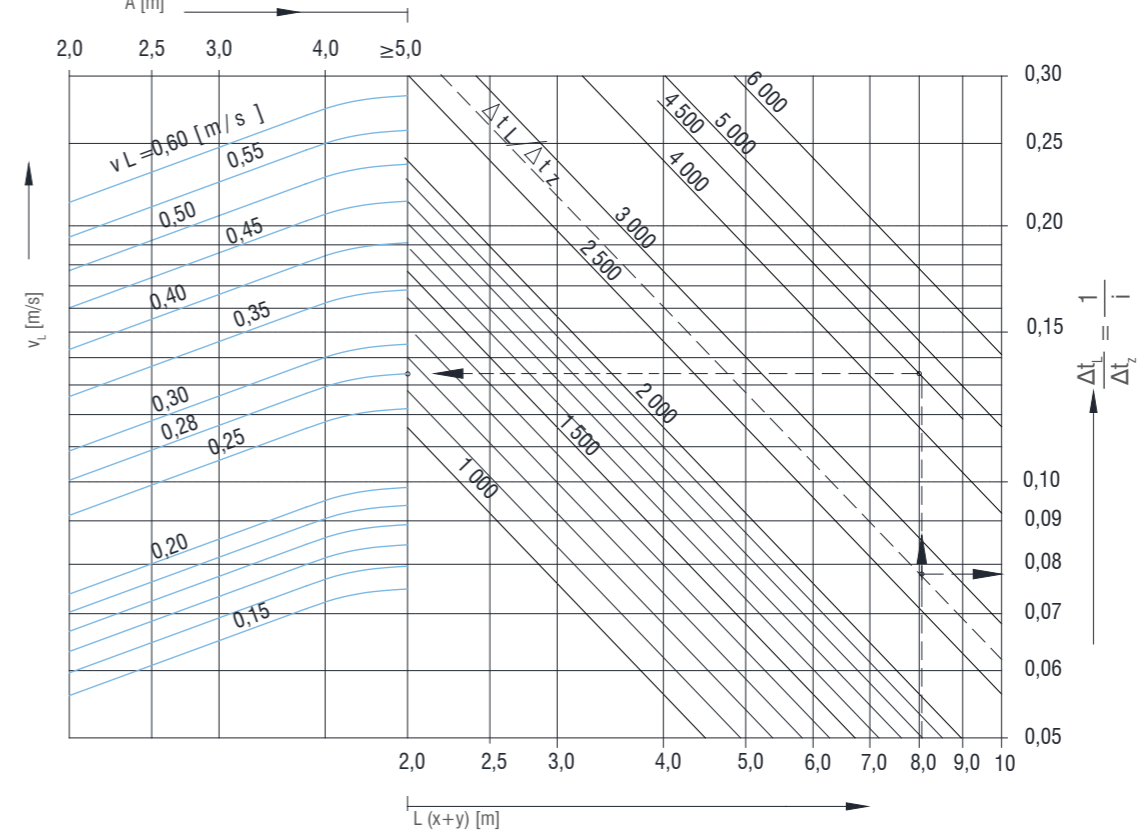
$t_p = 20 \text{ }^\circ\text{C}$   
 $t_z = 14 \text{ }^\circ\text{C}$   
 $H = h + 1,8$   
 $L = x + h$

SOLUTION  
Diagram 2.2

$v_L = 0,28 \text{ m/s}$   
 $\frac{\Delta t_L}{\Delta t_z} = 0,068$   
Ceiling influence:  
 $v_L \times 1,4 = 0,39 \text{ m/s}$   
 $\frac{\Delta t_L}{\Delta t_z} \times 1,4 = 0,0952$   
 $i = 10,5$   
 $t_L = 19,43 \text{ }^\circ\text{C}$



2.4 Average velocity  $v_L$  and temperature ratio for DKZ 800



Example 8:  
GIVEN  
Size: DKZ 800

$V = 4500 \text{ m}^3/\text{h}$   
 $H = 6,0 \text{ m}$   
 $A = 5,0 \text{ m}$   
 $x = 3,8 \text{ m}$   
 $h = 4,2 \text{ m}$   
 $L = 8,0 \text{ m}$

$t_p = 20 \text{ }^\circ\text{C}$   
 $t_z = 14 \text{ }^\circ\text{C}$   
 $H = h + 1,8$   
 $L = x + h$   
 $\Delta t_z = -6 \text{ }^\circ\text{C}$

SOLUTION  
Diagram 2.3

$v_L = 0,28 \text{ m/s}$   
 $\frac{\Delta t_L}{\Delta t_z} = 0,078$   
Ceiling influence:  
 $v_L \times 1,4 = 0,39 \text{ (m/s)}$   
 $\frac{\Delta t_L}{\Delta t_z} \times 1,4 = 0,1092$   
 $i = 9,16$   
 $t_L = 19,3 \text{ }^\circ\text{C}$