

MANDÍK®

WHIRLING ANEMOSTAT
WITH FIXED BLADES

VAPM



These technical conditions state a row of the manufactured sizes and models of ceiling whirling anemostat of small dimensions with fixed blades (further only whirling anemostat) VAPM 250,300,400,500,600 and ceiling whirling anemostat of small dimensions with fixed pull-out blades (further only whirling pull-out anemostat) VAPM-V 160, 200, 250, 315. It is valid for a production, designing, ordering, delivery, assembly and operation.

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II. GENERAL

1. Description

- 1.1. Whirling anemostats are the end point of an air conditioning system, which distributes the air led into the room for ventilation or cooling.

Whirling output of air ensures intensive mixing with the internal air.

This greatly reduces the temperature and speed of the airflow.

Depending on the required volumetric airflow, location and noise suppression, the terminal units are delivered with or without diffusers.

VAPM-V are delivered in only round-type with diffuser.

Whirling anemostats are suitable for small rooms (ca 2.6 to 4 m) and for up to 30 air exchanges per hour. Whirling pull-out anemostats VAPM-V are delivered in sizes 160 to 315.

- 1.2. Working conditions

Temperature in the place of installation is permitted to range from - 20°C to + 70°C.

Anemostats are designed for macroclimatic areas with mild climate according to EN 60 721-3-3.

Anemostats are suitable for systems without abrasive, chemical and adhesive particles.

2. Design

- 2.1. Depending on customer's requirement, whirling anemostats VAPM are delivered with rectangular or circular front plate with or without diffuser. Front plates include radial fixed blades.

- 2.2. For VAPM connection to the duct is possible as follows:

- horizontal connection (via connection box with circular spigot connections on the part - as required with or without control valve)
- vertical connection (via connection box with circular spigot connections from the top - as required with or without control valve)
- horizontal lowered connection (with recessed front plate into the connection box - as required with or without control valve)

- 2.3. Anemostats VAPM-V are delivered only with round front panels with diffuser.

- 2.4. Anemostats VAPM-V are delivered in these design according to connection to the piping.

Connection via connection box:

- horizontal connection (via square connection box with circular spigot connections on the part - as required with or without control valve)
- vertical connection (via circular connection box with circular spigot connections from the top - as required with or without control valve)

Fig. 1 Horizontal connections VAPM xxx C/-V/P/R

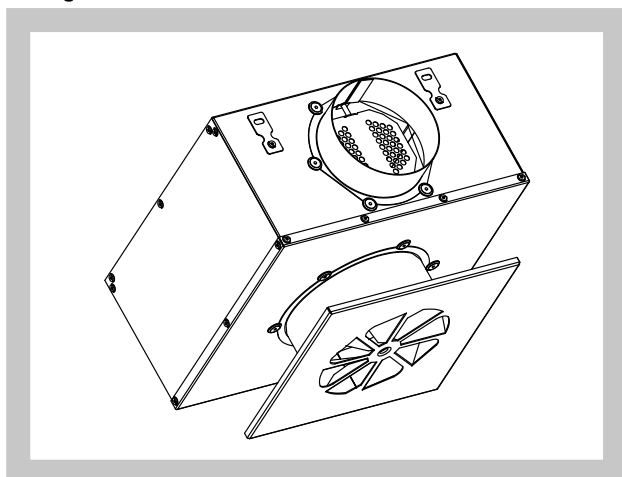
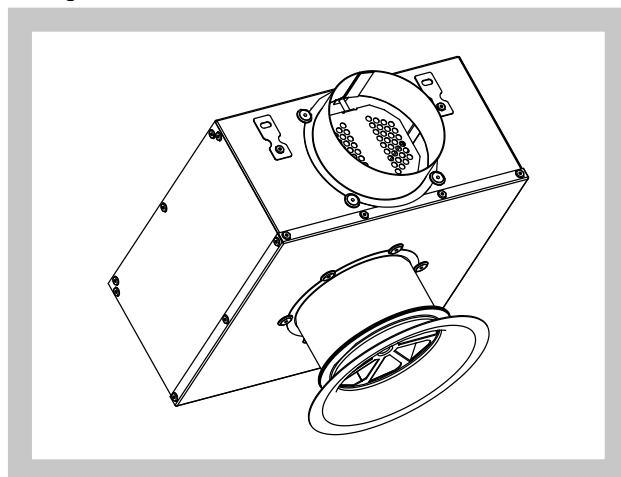


Fig. 2 Vertical connections VAPM xxx K/D/V/P/R



Front plates delivered separately without any connection boxes:

- Separate with the dispersal sheet or without (Fig. 21)
- Into connection boxes with the dispersal sheet or without (Fig. 22)
- On spiro piping including the dispersal sheet or without (Fig. 23)

Fig. 3 Design VAPM xxx C without diffuser, the front panel square

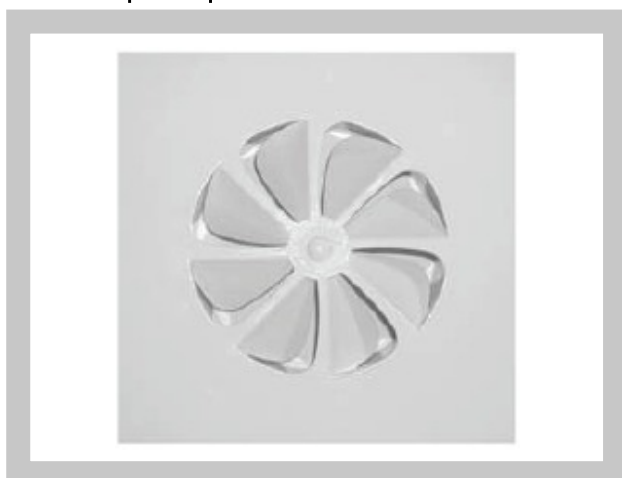


Fig. 4 Design VAPM xxx C/D with diffuser, the front panel square

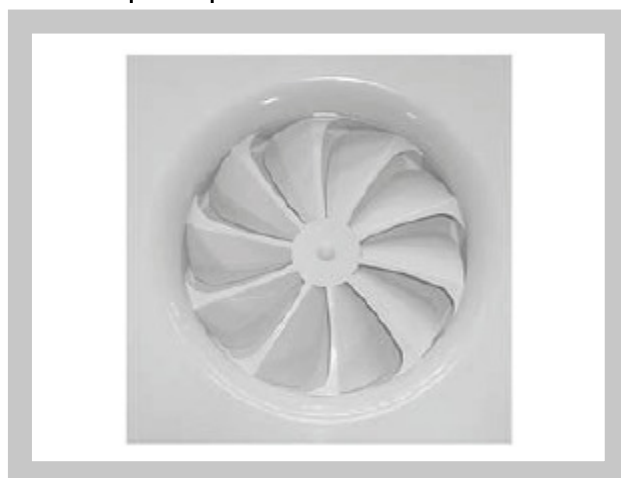


Fig. 5 Design VAPM xxx K without diffuser, circular front panel



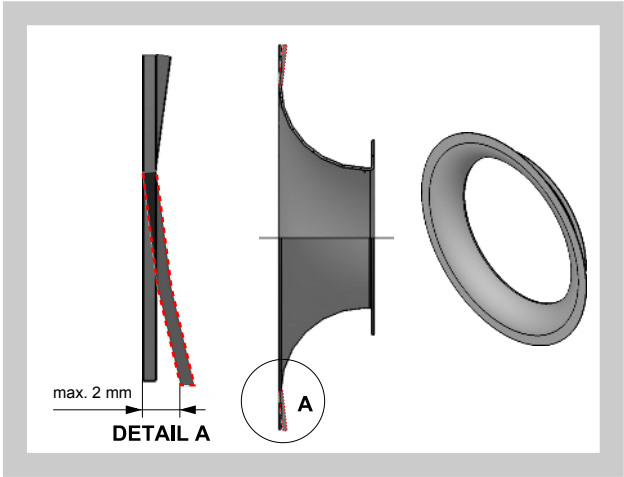
Fig. 6 Design VAPM xxx K/D with diffuser, circular front panel



Fig. 7 Design VAPM-V xxx K/D



Fig. 8 Tolerance bend diffuser



3. Dimensions and weights

3.1. Horizontal connection VAPM

Tab. 3.1.1. Dimensions

Size	□C	□C _D	ØK	ØK _D	ØD	ØB	□A	A ₁	A ₂	H	H ₁	H ₃	H ₅	E	F	G
125	198	198	198	200	98	128	297	260	260	150	220	250	150	130	62	30
160	248	248	248	250	123	163	320	320	320	170	240	270	175	160	75	30
200	298	298	298	300	158	203	390	370	350	205	275	305	210	175	95	30
250	348	348	298	350	198	253	455	440	420	265	335	375	250	195	115	40
315	398	398	398	450	248	318	500	560	540	300	370	410	300	255	150	40
400	498	498	498	570	313	403	600	700	680	360	430	470	365	325	182	40

Fig. 9 VAPM xxx C/-V/x/R

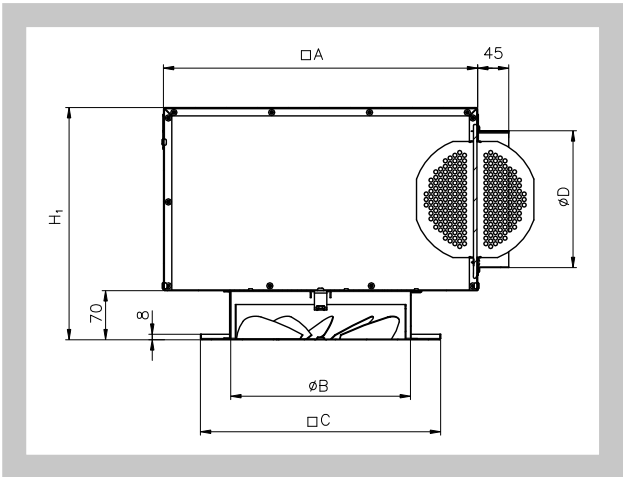


Fig. 10 VAPM xxx C/D/V/x/R

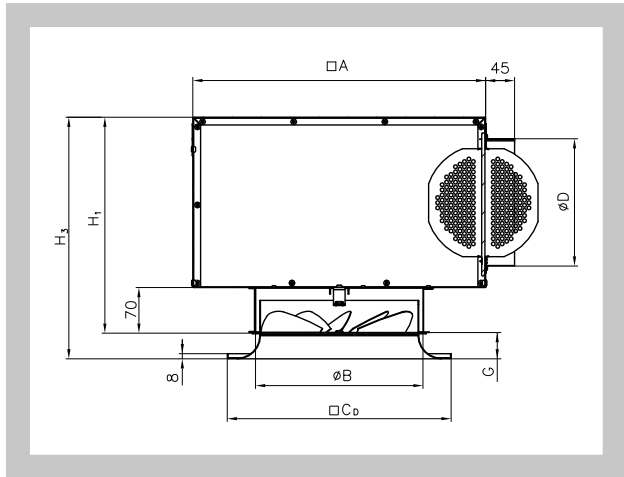


Fig. 11 VAPM xxx K/-V/x/R

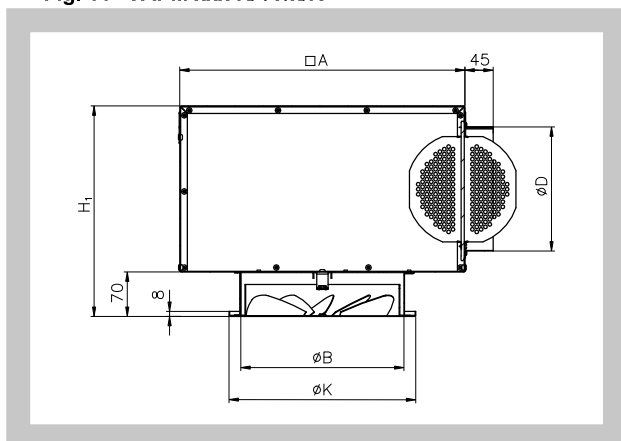


Fig. 12 VAPM xxx K/D/V/x/R

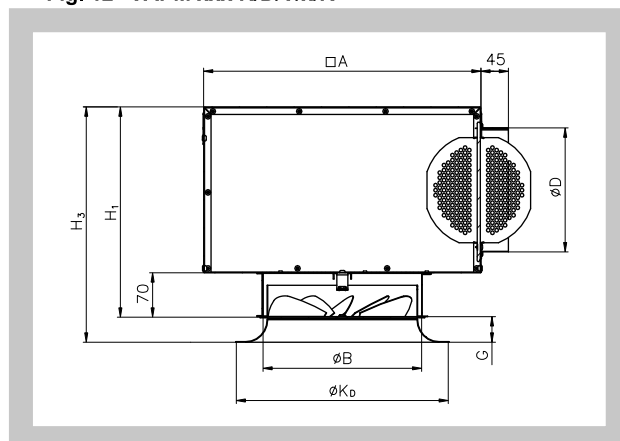
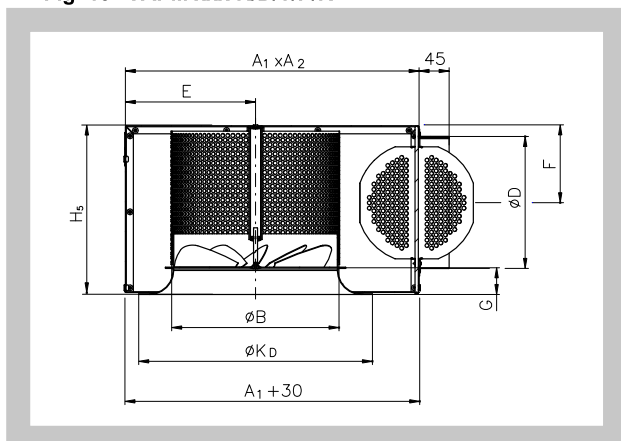


Fig. 13 VAPM xxx K/D/T/P/R



3.2. Vertical connection VAPM

Tab. 3.2.1. Dimensions

Size	ØE	□C	□C _D	ØK	ØK _D	ØD	ØB	H	H _D	H ₂	H ₄	H ₆	H ₇	G
125	123	198	198	198	200	98	128	50	80	100	175	130	205	30
160	158	248	248	248	250	123	163	50	80	110	185	140	215	30
200	198	298	298	298	300	158	203	50	80	115	190	145	220	30
250	248	348	348	298	350	198	253	50	90	120	205	165	250	40
315	313	398	398	398	450	248	318	50	90	135	220	185	270	40
400	398	498	498	498	570	313	403	50	90	160	245	220	305	40

Fig. 14 VAPM xxx C

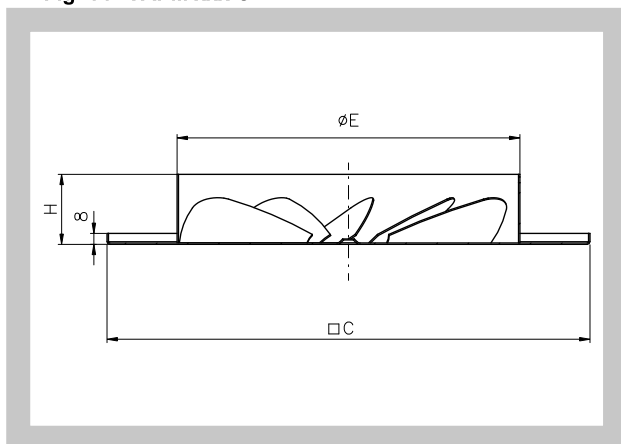


Fig. 15 VAPM xxx C/D

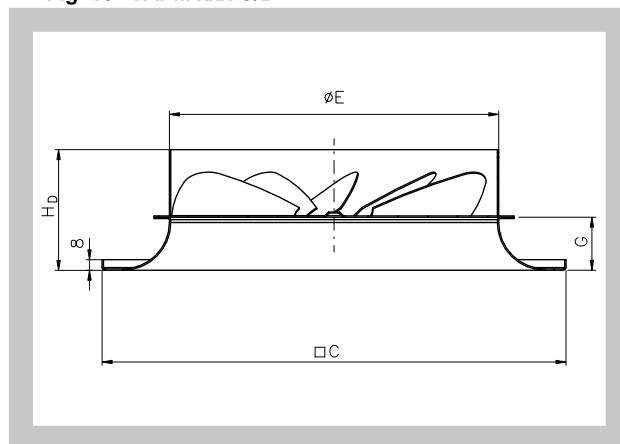


Fig. 16 VAPM xxx K

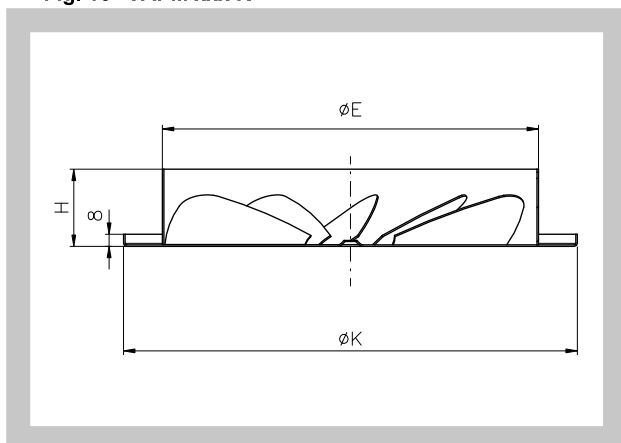


Fig. 17 VAPM xxx K/D

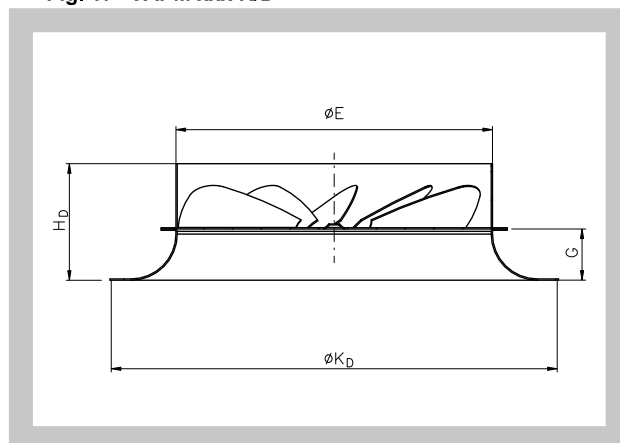


Fig. 18 VAPM xxx C/-S/x

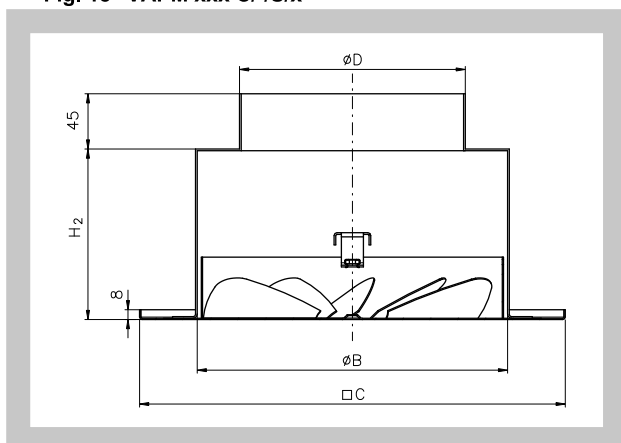


Fig. 19 VAPM xxx C/D/S/x

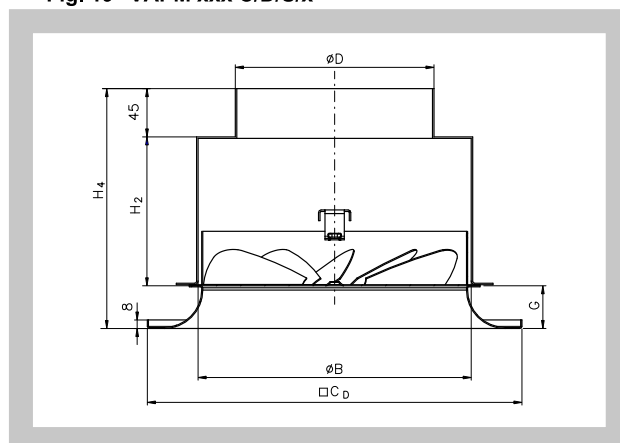


Fig. 20 VAPM xxx K/-S/x

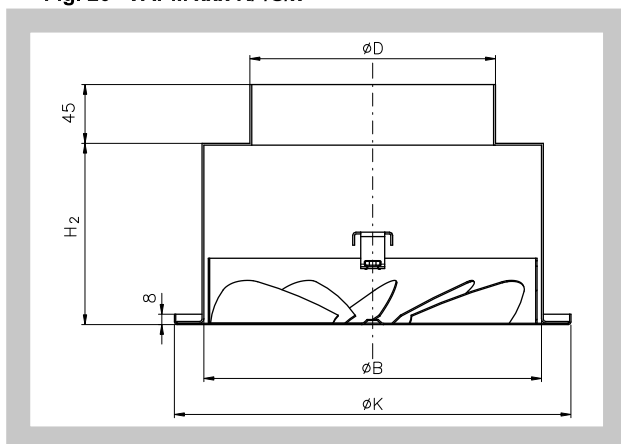


Fig. 21 VAPM xxx K/D/S/x

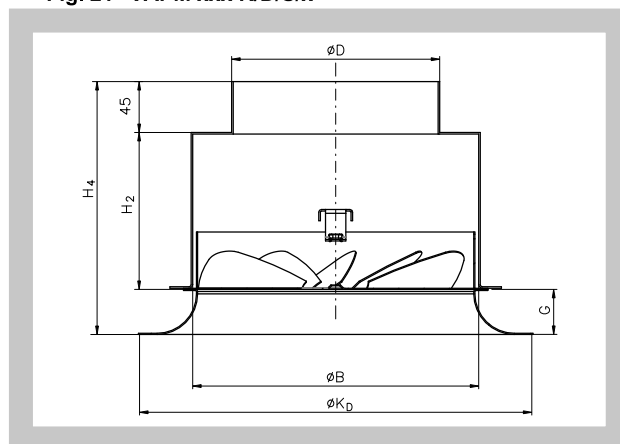


Fig. 22 VAPM xxx C/-S/x/R

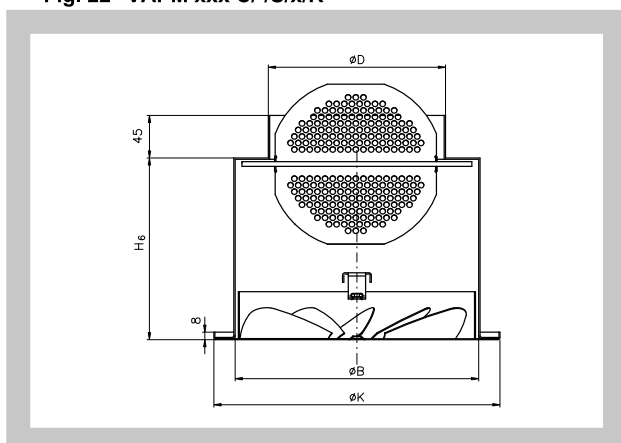


Fig. 23 VAPM xxx C/D/S/x/R

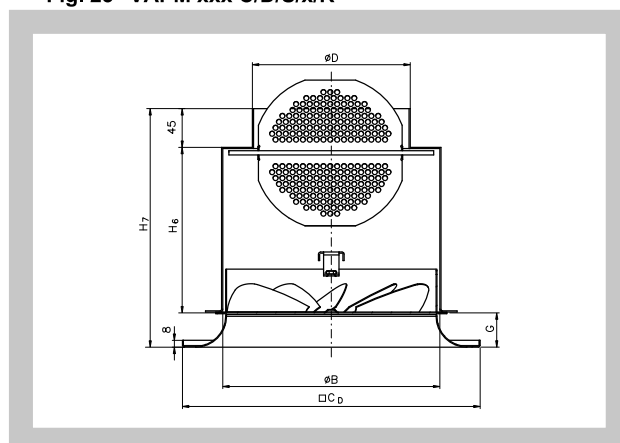


Fig. 24 VAPM xxx K/-S/x/R

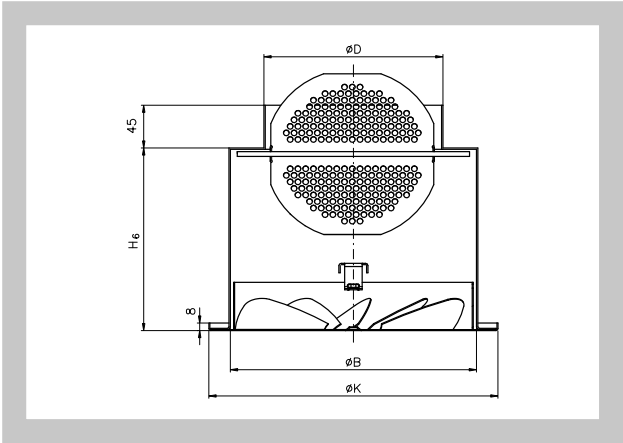
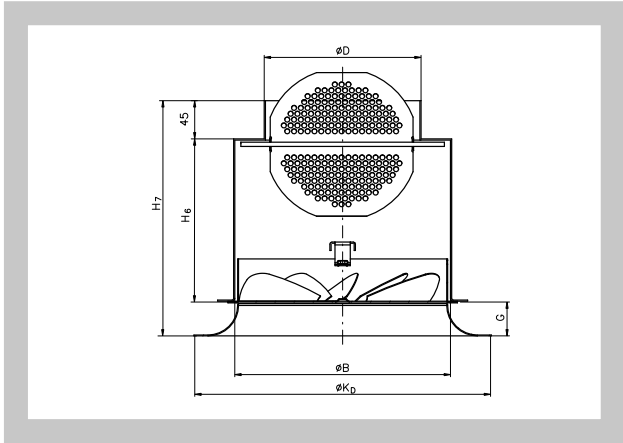


Fig. 25 VAPM xxx K/D/S/x/R



3.3. Horizontal and vertical connection VAPM-V

Tab. 3.3.1. Dimensions

Size	□ A	Ø B	Ø D ₁	Ø D ₂	H ₂	H ₃	H ₄	H ₅	H ₆	G
160	320	163	210	123	268	80	240	270	253	30
200	390	203	250	158	303	100	275	305	273	30
250	455	253	315	198	353	120	335	373	303	40
315	500	318	390	248	403	145	380	418	333	40

Fig. 26 VAPM-V xxx K/D/V/x/R

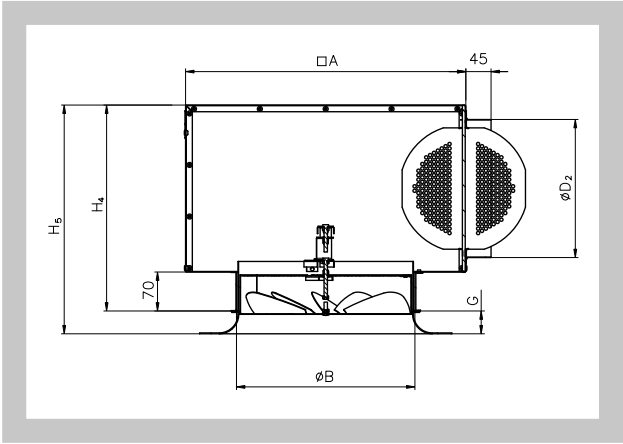
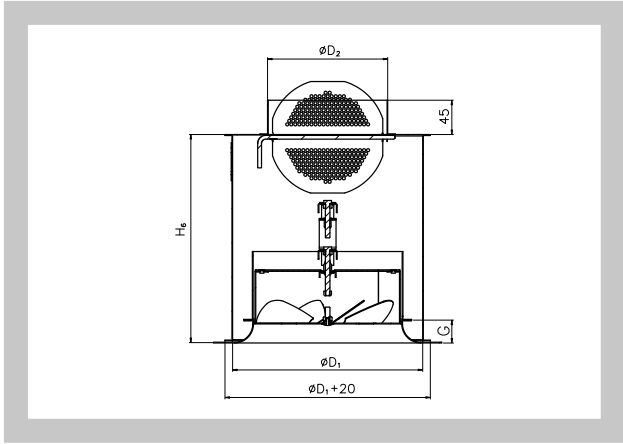


Fig. 27 VAPM-V xxx K/D/S/x/R



3.4. Front plates VAPM-V

Tab. 3.4.1. Dimensions

Size	ØD	ØE	H	H ₁	s
160	158	250	120	150	25
200	198	300	120	150	25
250	248	350	130	160	35
315	313	450	130	160	35

Fig. 28 VAPM-V xxx K/D connection to the piping

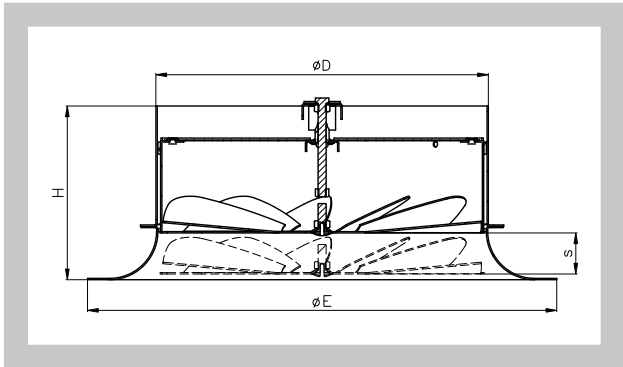


Fig. 29 VAPM-V xxx K/D connection into the connection box

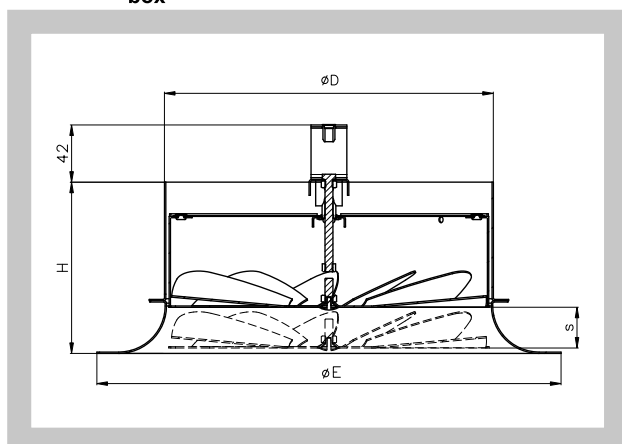
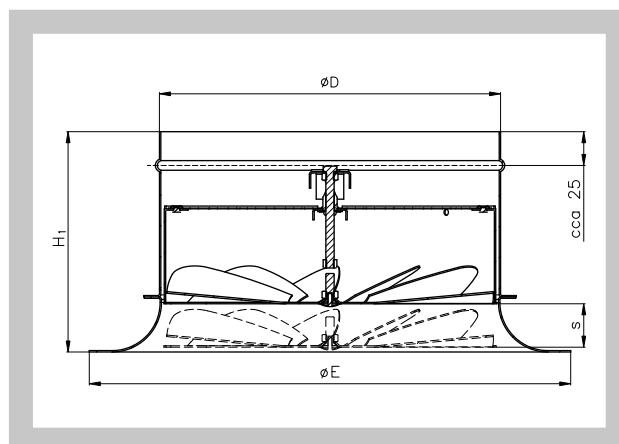


Fig. 30 VAPM-V xxx K/D connection to the spiro piping



3.5. Weights VAPM and VAPM-V

Tab. 3.5.1. Weights VAPM

Size	Connection		Separate front plate
	horizontal	vertical	
125	2,5	0,7	0,65
160	3,5	1,0	0,89
200	4,5	1,5	1,16
250	6,0	2,0	1,68
315	7,5	3,0	2,50
400	11,0	4,5	3,90

Tab. 3.5.2. Weights VAPM-V

Size	Connection		Separate front plate		
	horizontal	vertical	connection box	piping	spiro piping
160	2,5	2,7	1,2	1,2	1,3
200	3,5	3,5	1,2	1,6	1,7
250	5,8	4,9	2,1	2,0	2,3
315	7,2	7,7	3,0	2,9	3,1

4. Installation

- 4.1. Whirlwind anemosats of all dimensions are suitable for installation into the ceiling or outside enclosed ceilings. Front plate or front plate with diffuser VAPM are attached to the connection box using a central bolt and a bracket. Front plate VAPM-V are attached on the connection box using the screws, which are placed in the holes consol front plate. Connection boxes are fitted with suspension brackets.

4.2. Examples of the hinge

Fig. 31 Placement

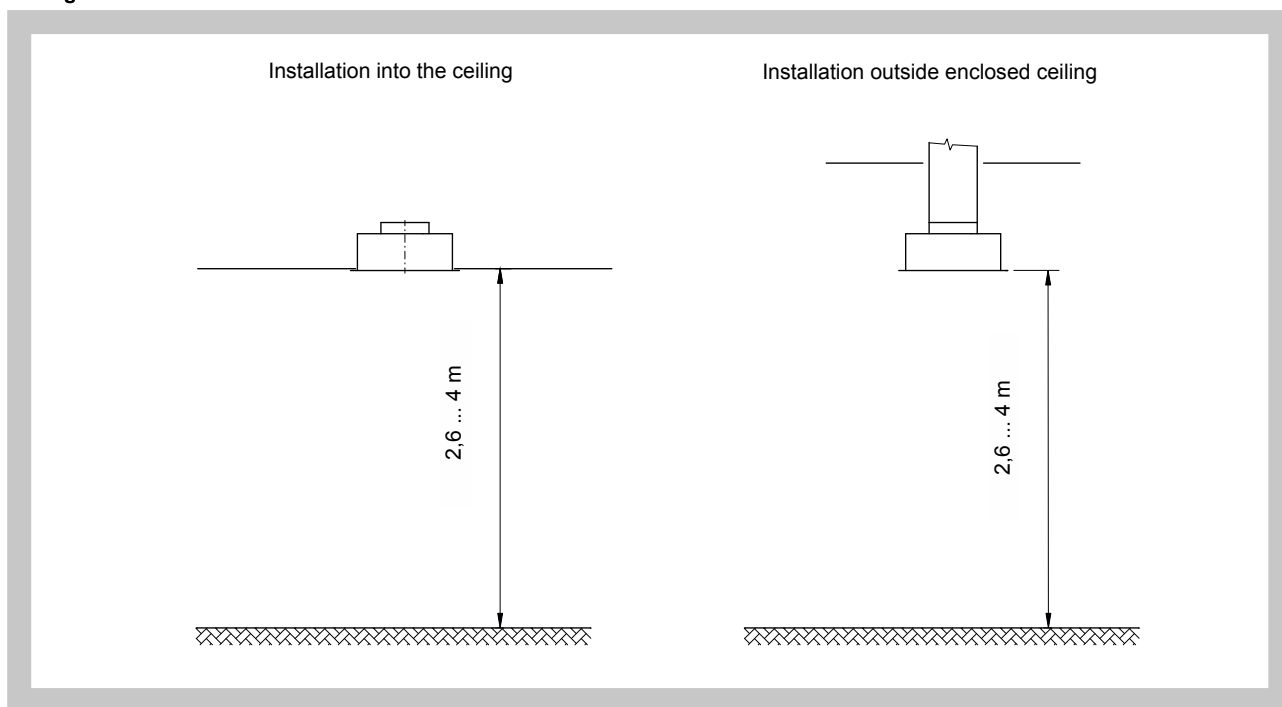
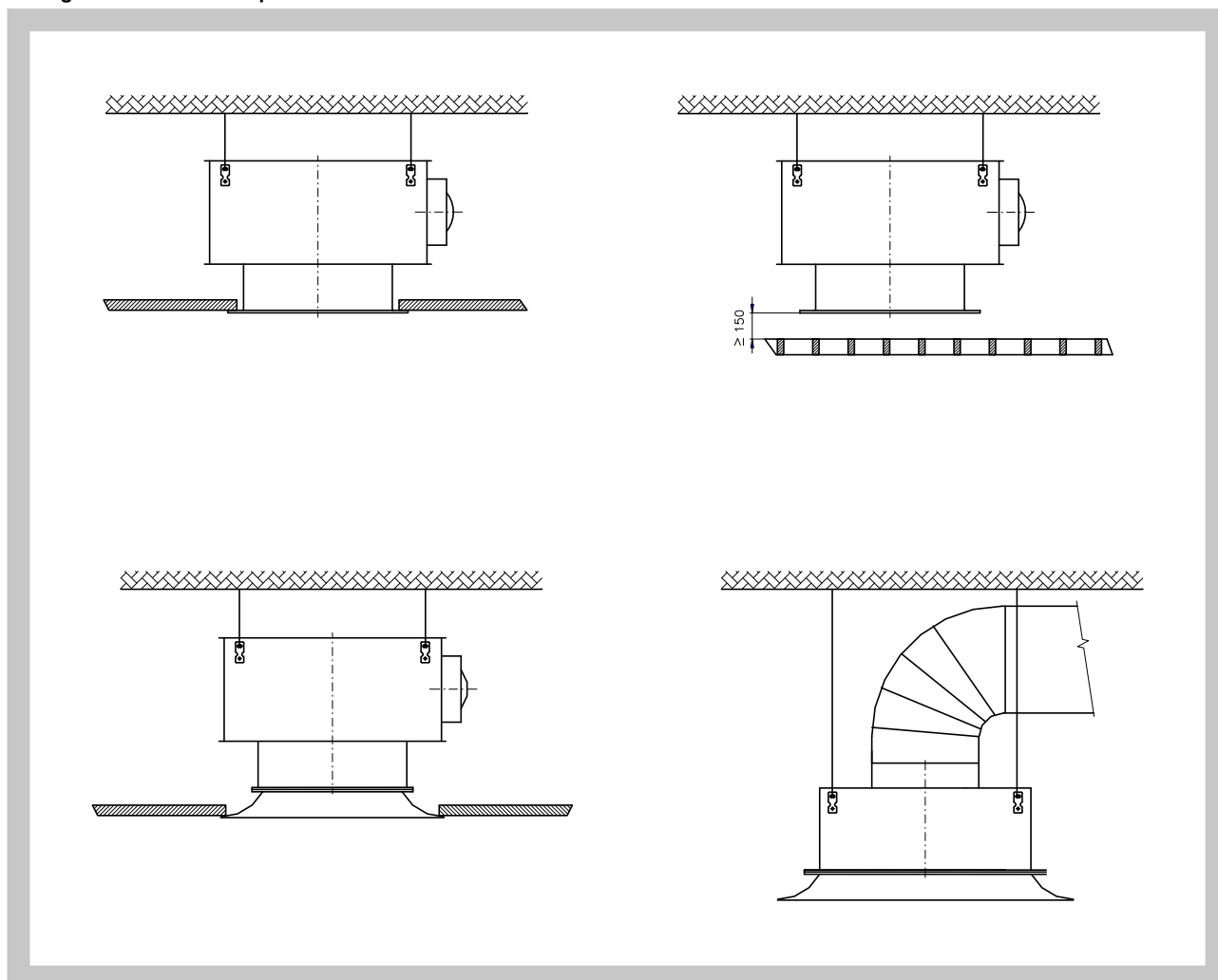


Fig. 32 Method of suspension

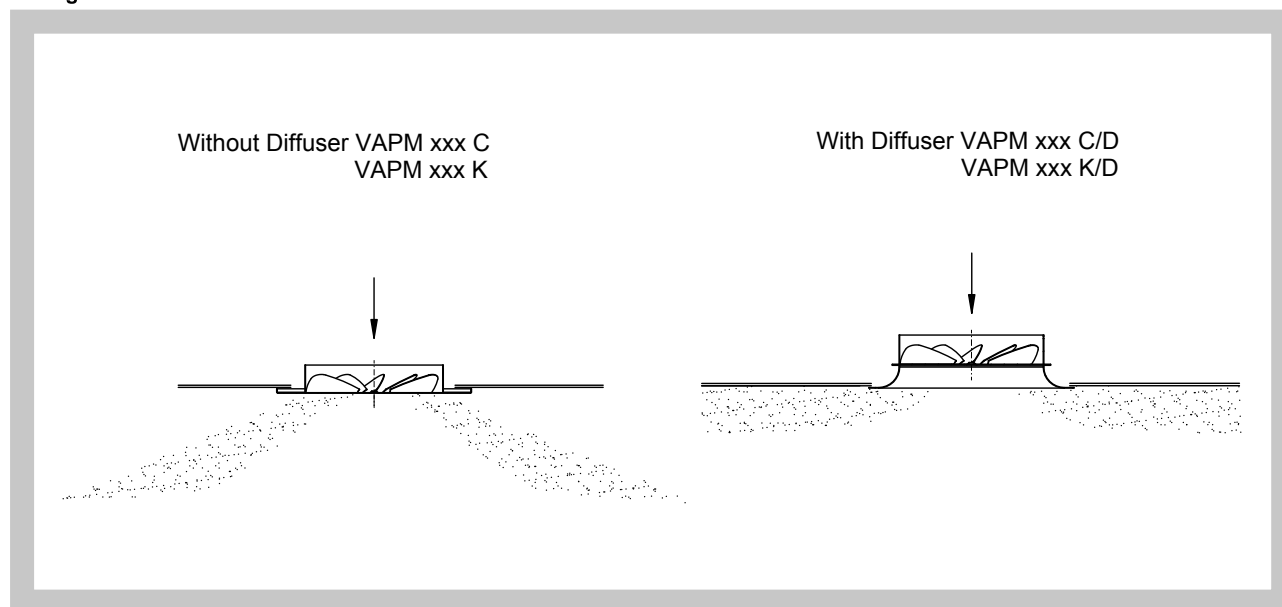


III. TECHNICAL DATA

5. Basic parameters

5.1. Air flow depending on the version:

Fig. 33 Air flow



5.2. Basic parameters

Tab. 5.2.1. VAPM

Size	125		160		200		250		315		400	
Diffuser	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
$\dot{V}_{\max}$ [m³.h⁻¹]	80	100	120	150	210	240	280	300	600	640	800	900
$\dot{V}_{\min}$ [m³.h⁻¹]	30	35	45	55	70	90	100	105	180	230	265	280
*LWA max [dB(A)]	30	31	37	38	41	38	36	31	42	43	38	42
**LWA max [dB(A)]	42	36	39	36	38	38	31	30	41	39	42	40
LWA min [dB(A)]	< 20		< 20		< 20		< 20		< 20		< 20	
S _{ef} [m²]	0,0049		0,0089		0,0141		0,0167		0,0365		0,0440	

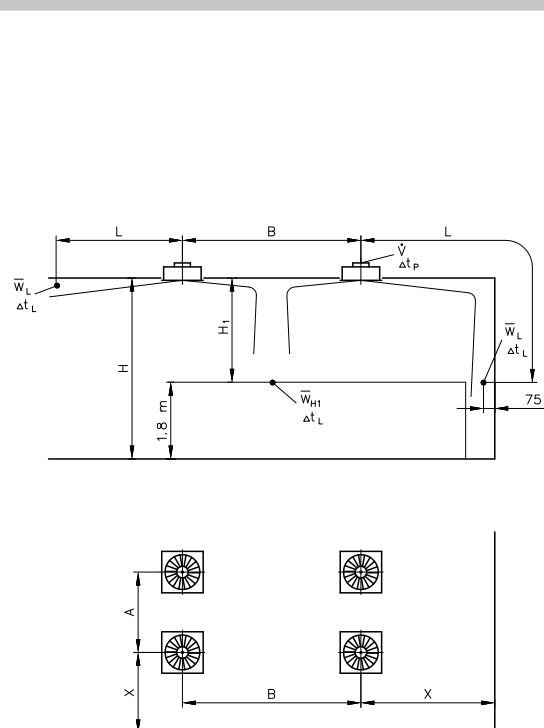
* vertical connections

** horizontal connections

6. Calculation and determining quantities

6.1. Quantities and units

Fig. 34



$\dot{V}$	[m ³ .h ⁻¹]	volumetric air flow per one anemostat
A, B	[m]	distance between two anemostats
L	[m]	horizontal + vertical distance (X + H1)
X	[m]	distance of the anemostat center from the wall
H	[m]	height from ceiling – from 2,6 to 4,0 m
H ₁	[m]	distance between the ceiling and the occupied zone
$\bar{W}_L$	[m.s ⁻¹]	medium speed of airflow at the wall surface
$\bar{W}_{H1}$	[m.s ⁻¹]	medium velocity of airflow between two anemostats at the distance H ₁
$\bar{W}_{ef}$	[m.s ⁻¹]	effective output velocity of air
Δt_p	[K]	difference between the temperature of air led into the room and room temperature
Δt_L	[K]	difference between the temperature of air in the center of the airflow at distance L and room temperature: $L = A/2 + H_1$ or $L = B/2 + H_1$ or $L = X + H_1$
Δp_c	[Pa]	total pressure loss at $\rho = 1,2 \text{ kg.m}^{-3}$
L_{WA}	[dB(A)]	acoustic power level
S_{ef}	[m ²]	effective area of the anemostat

7. Aerodynamic data

7.1. VAPM acoustic power levels and pressure losses

Chart 7.1.1. VAPM horizontal connection – without diffuser

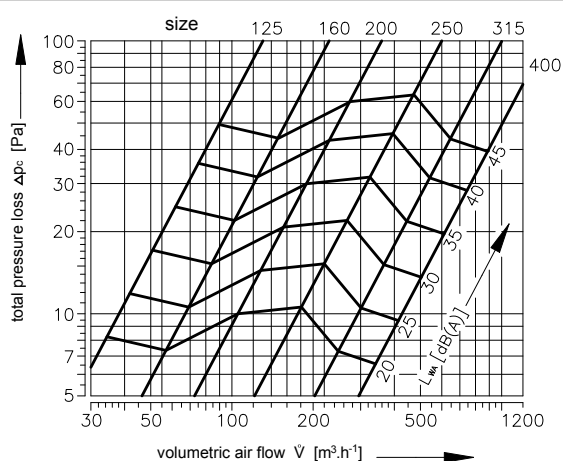
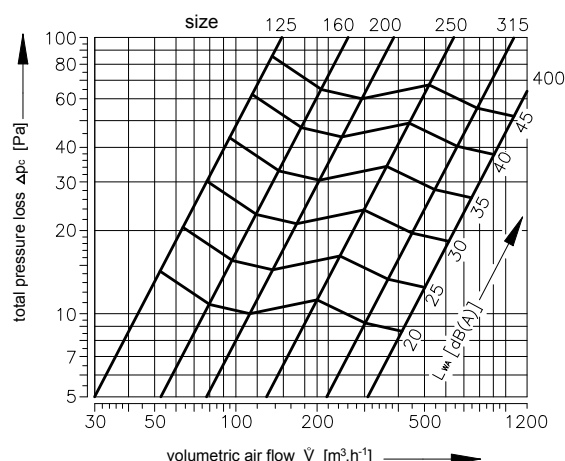
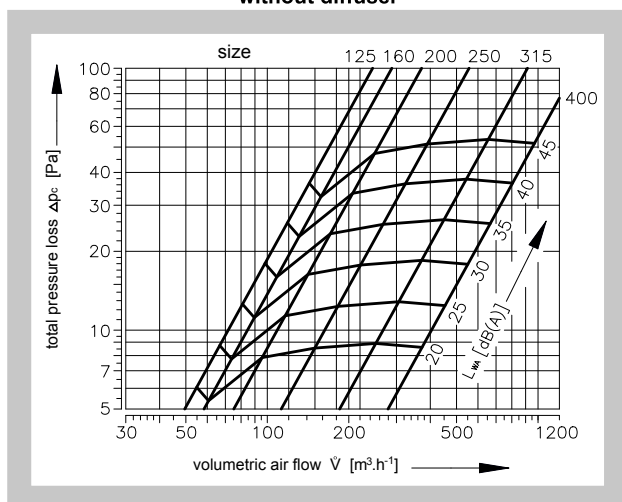


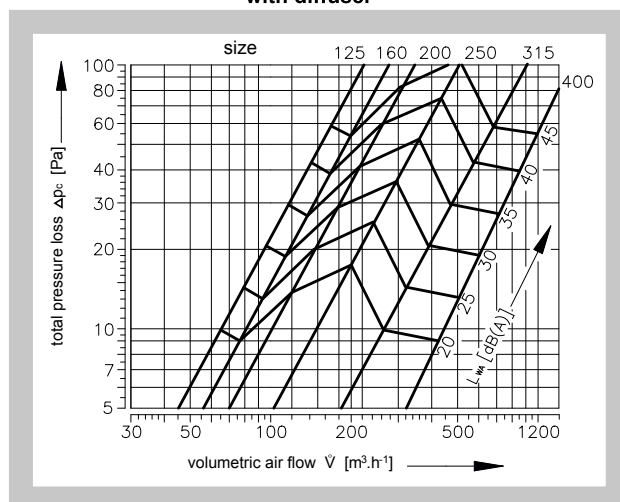
Chart 7.1.2. VAPM horizontal connection – with diffuser



**Chart 7.1.3. VAPM vertical connection
– without diffuser**



**Chart 7.1.4. VAPM vertical connection
– with diffuser**



Tab. 7.1.1. Correction coefficients to compensate for the angle of the regulation flap - correction Chart 7.1.1.

Size		Angle of regulation flap		
		0°	45°	90°
125	Δp_c	-	-	-
	L_{WA}	x1,0	x1,4	x2,5
160	Δp_c	3	-	-
	L_{WA}	x1,0	x1,3	x1,9
200	Δp_c	3	4	5
	L_{WA}	x1,0	x1,4	x2,1
250	Δp_c	-	-	1
	L_{WA}	x1,0	x1,4	x2,1
315	Δp_c	-	-	1
	L_{WA}	x1,0	x1,4	x2,1
400	Δp_c	-	-	2
	L_{WA}	-	-	-

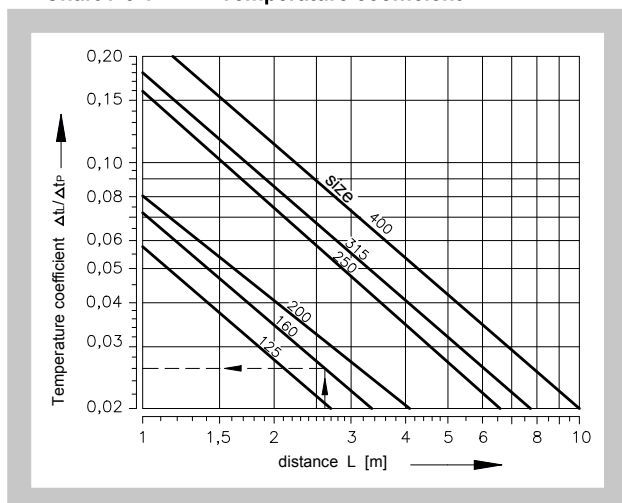
Tab. 7.1.2. Correction coefficients to compensate for the angle of the regulation flap - correction Chart 7.1.2.

Size		Angle of regulation flap		
		0°	45°	90°
125	Δp_c	-	-	-
	L_{WA}	x1,0	x1,4	x2,6
160	Δp_c	-	1	3
	L_{WA}	x1,0	x1,4	x2,1
200	Δp_c	-	1	4
	L_{WA}	x1,0	x1,4	x2,4
250	Δp_c	-	-	1
	L_{WA}	x1,0	x1,4	x2,5
315	Δp_c	-	-	1
	L_{WA}	x1,0	x1,4	x2,4
400	Δp_c	-	-	2
	L_{WA}	-	-	-

7.2. For VAPM-V should be corrected values read from the previous charts and tables appears factors listed in the table Tab. 7.2.1.

7.3. Temperature coefficient and Effective velocity of airflow

Chart 7.3.1. Temperature coefficient



Tab. 7.2.1. corrective coefficient VAPM-V contra VAPM

Size	Δp_c	L_{WA}
160	x 1,13	2
200	x 1,11	2
250	x 1,09	1
315	x 1,06	1

Fig. 35

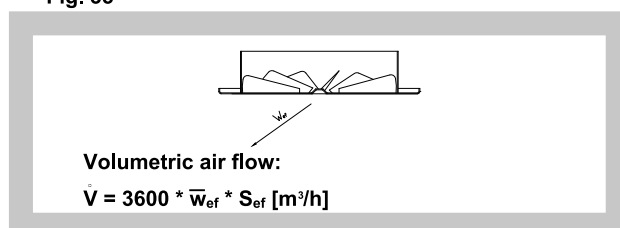


Chart 7.3.2. VAPM effective velocity of air flow

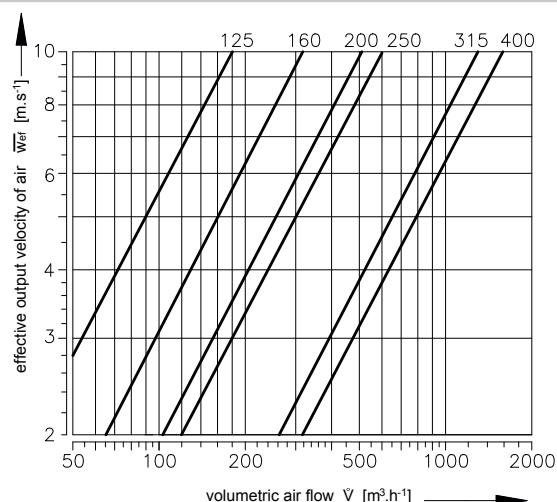
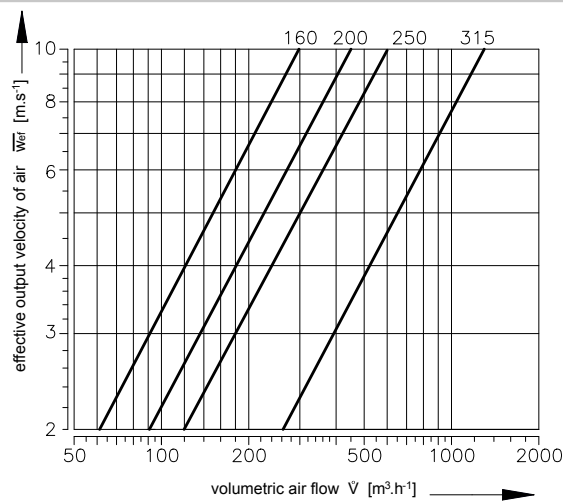


Chart 7.3.3. VAPM-V effective velocity of air flow



7.4. Velocity of air flow

Chart 7.4.1. Velocity of air flow - size 125, design without diffuser

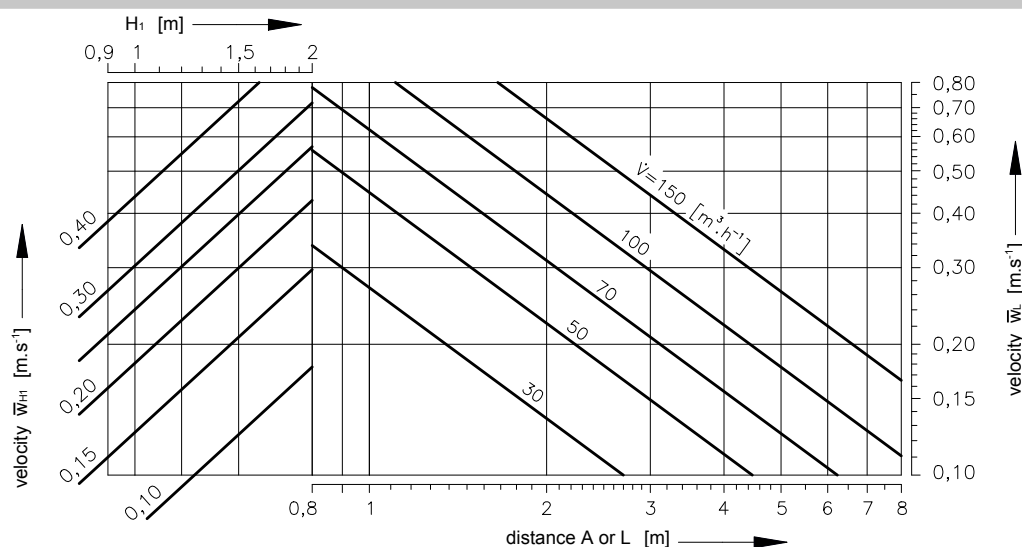


Chart 7.4.2. Velocity of air flow - size 125, design with diffuser

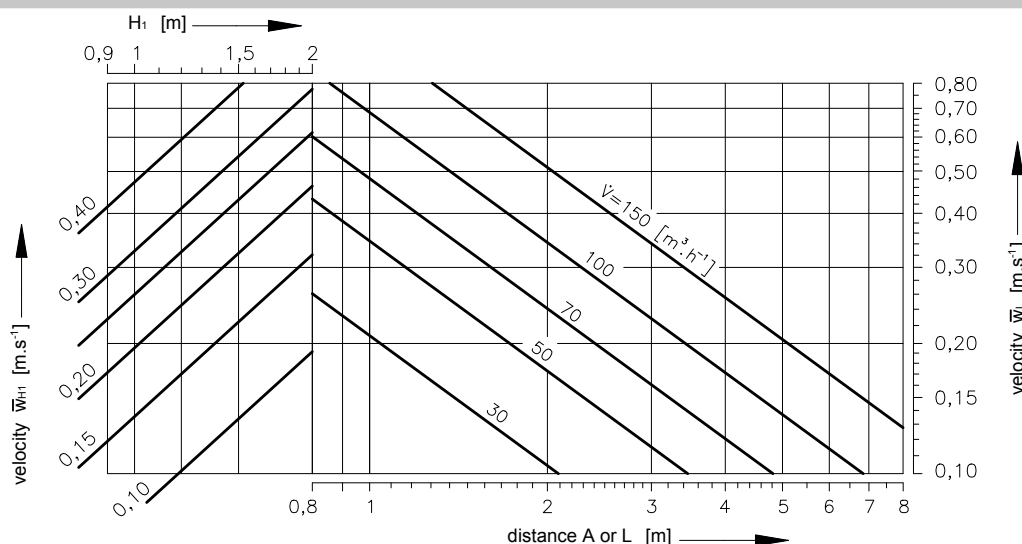


Chart 7.4.3. Velocity of air flow - size 160, design without diffuser

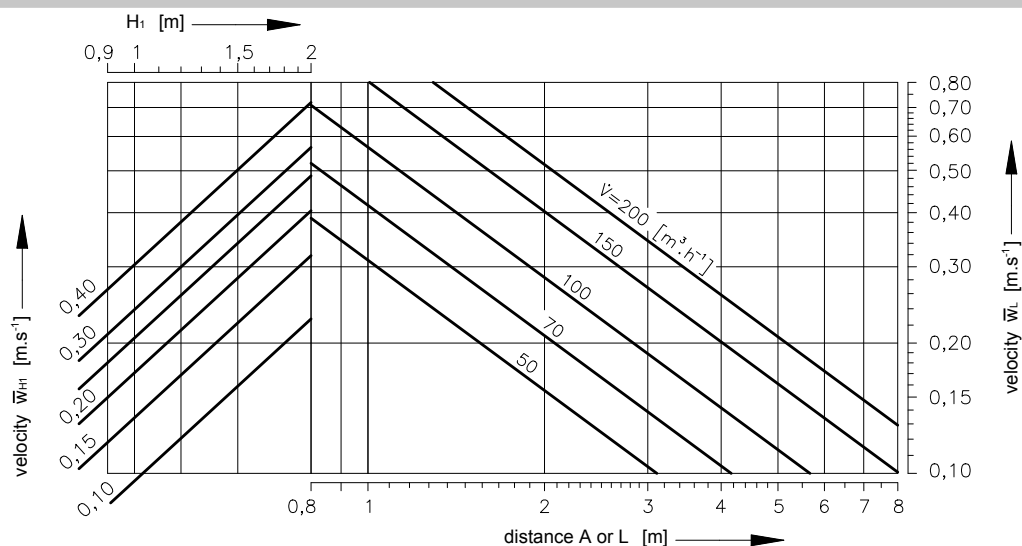


Chart 7.4.4. Velocity of air flow - size 160, design with diffuser

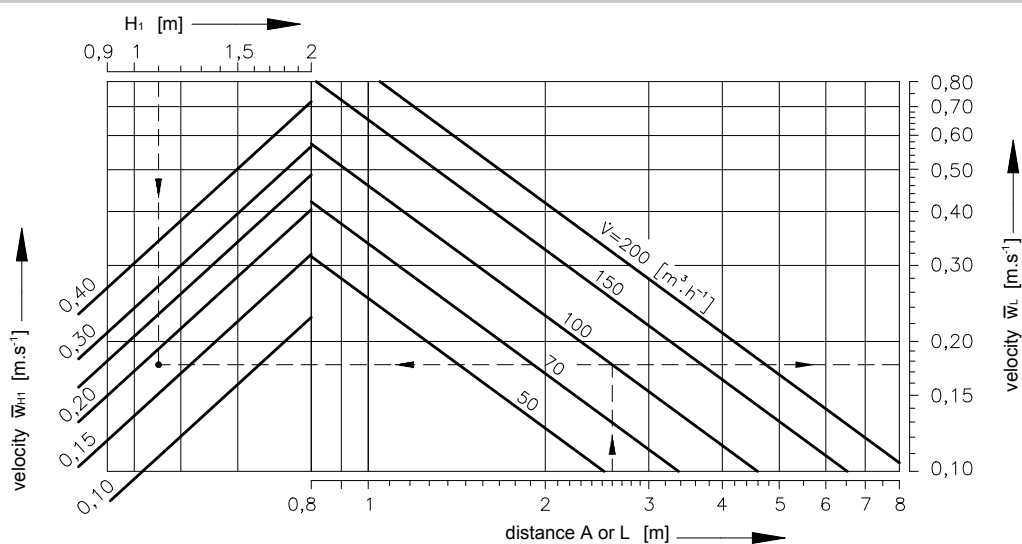


Chart 7.4.5. Velocity of air flow - size 200, design without diffuser

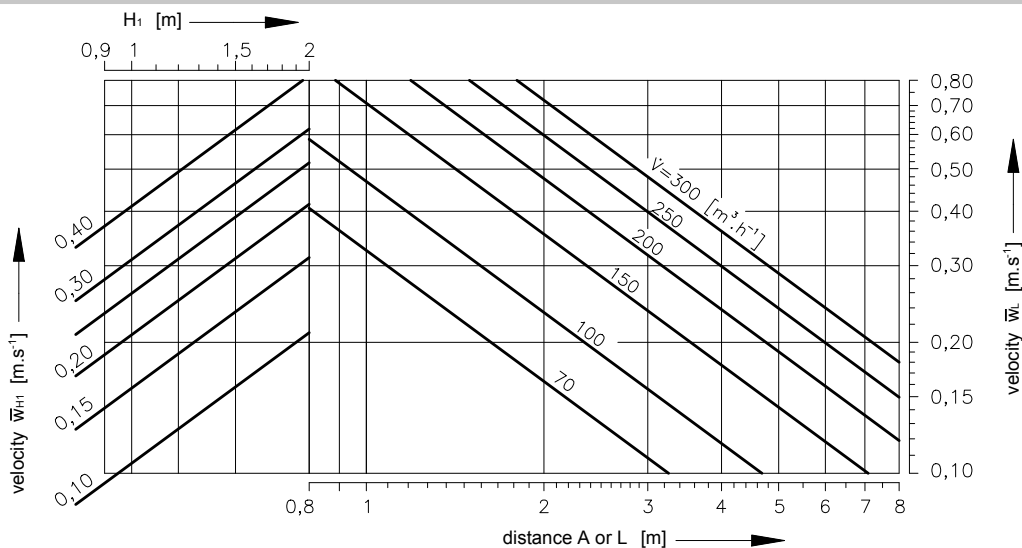


Chart 7.4.6. Velocity of air flow - size 200, design with diffuser

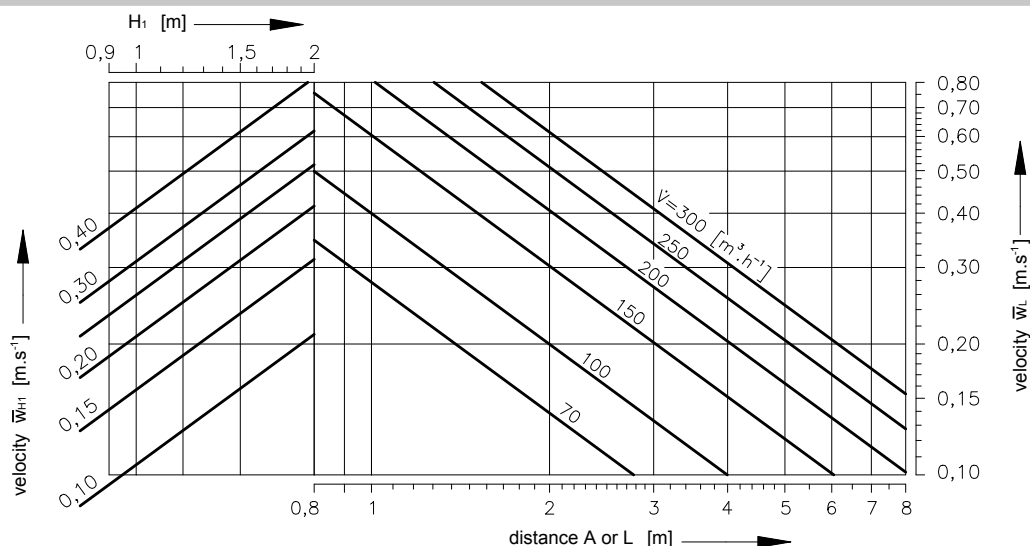


Chart 7.4.7. Velocity of air flow - size 250, design without diffuser

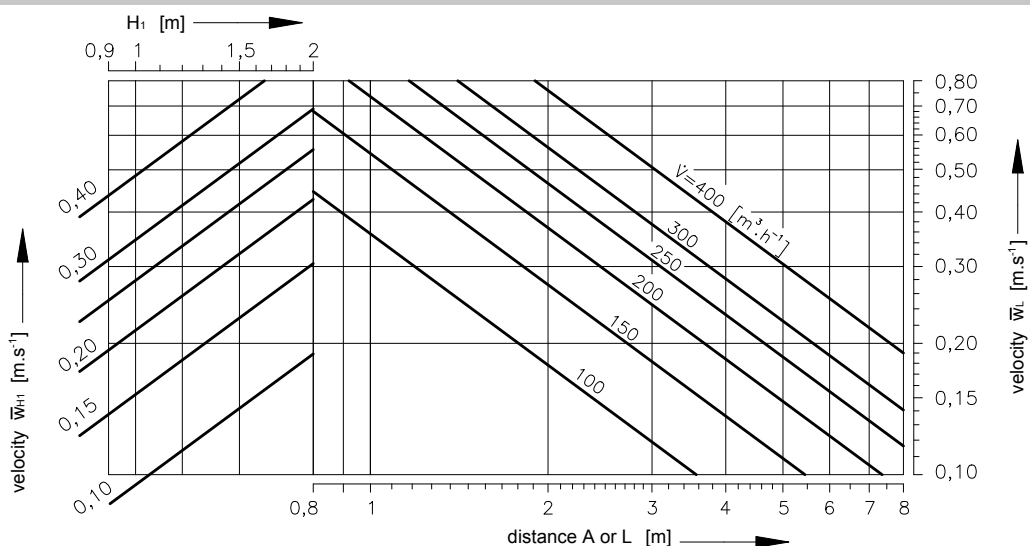


Chart 7.4.8. Velocity of air flow - size 250, design with diffuser

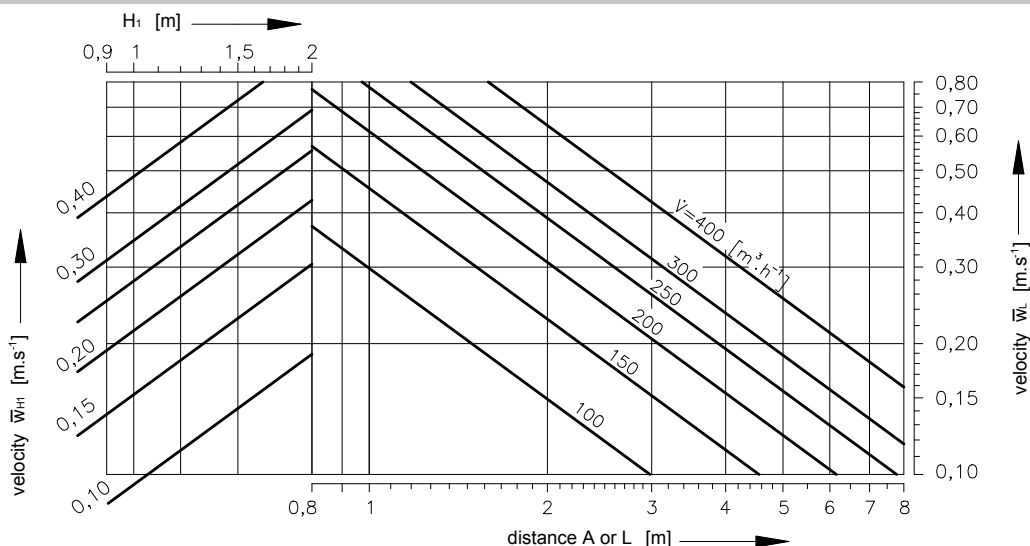


Chart 7.4.9. Velocity of air flow - size 315, design without diffuser

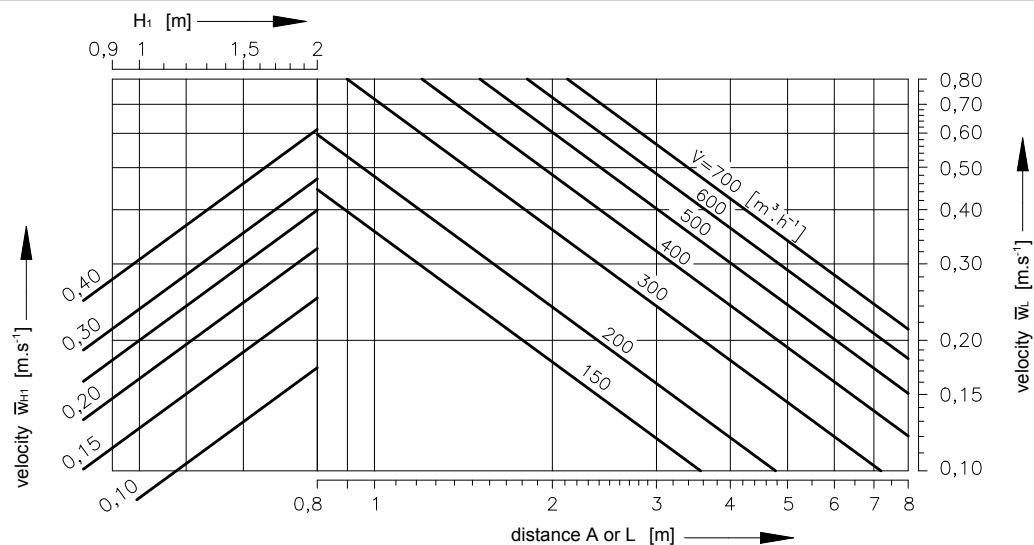


Chart 7.4.10. Velocity of air flow - size 315, design with diffuser

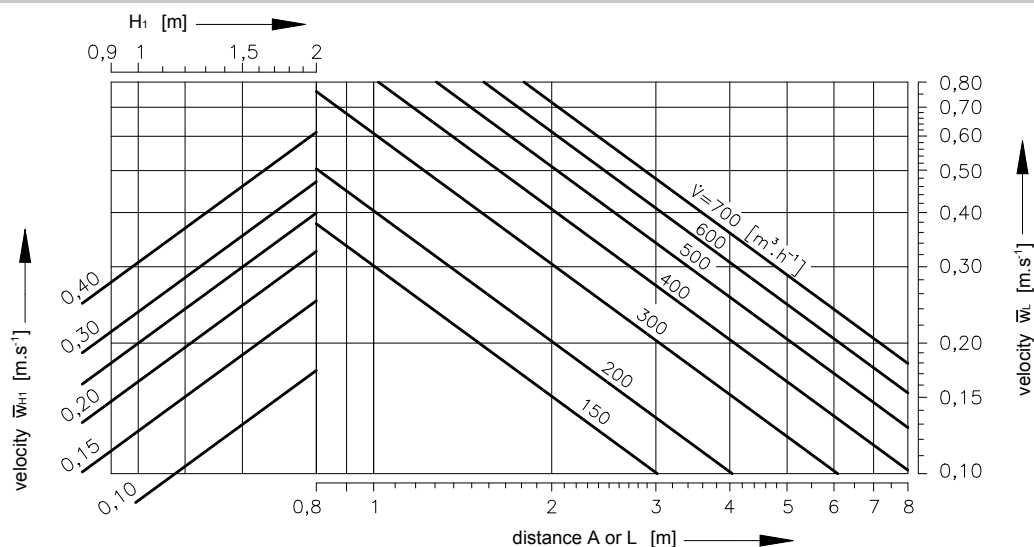


Chart 7.4.11. Velocity of air flow - size 400, design without diffuser

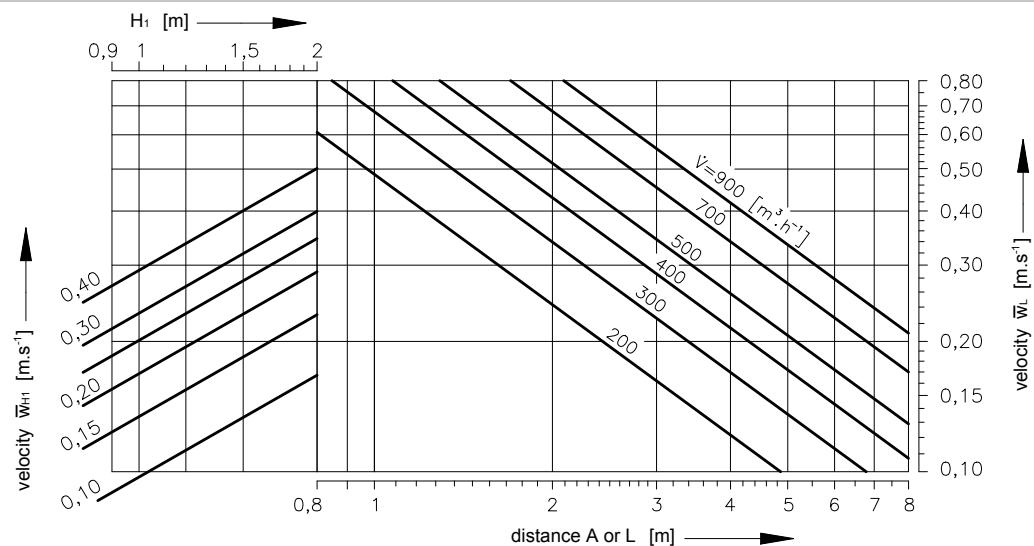


Chart 7.4.12. Velocity of air flow - size 400, design with diffuser

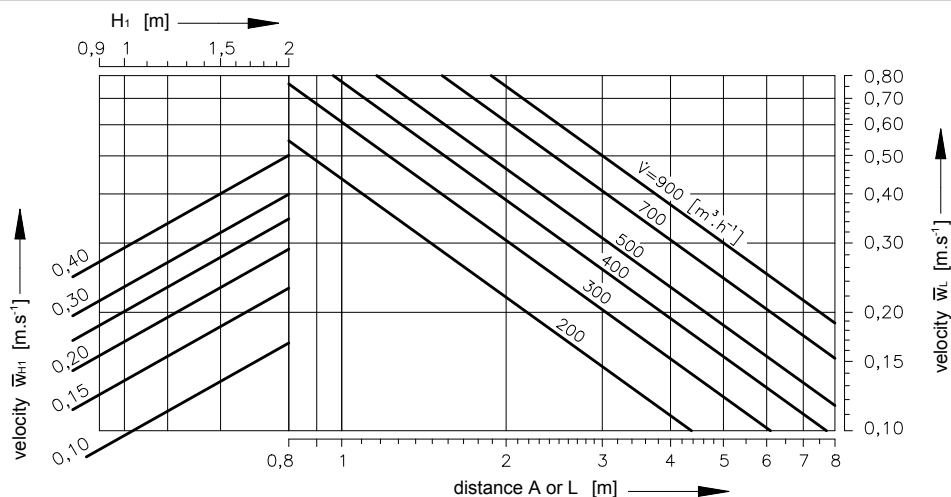


Fig. 36 VAPM example

Given data:	Anemostat VAPM 160 K/D/V/P $\dot{V} = 100 \text{ m}^3 \cdot \text{h}^{-1}$ $\Delta t_p = -8 \text{ K}$ $H_1 = 1,1 \text{ m}$ $A = 3 \text{ m}$ $X = 1,5 \text{ m}$	
Chart 7.1.1. :	$L_{WA} = 27 \text{ dB(A)}$ $\Delta p_c = 17 \text{ Pa}$	
Chart 7.3.1. :	$L = A/2 + H_1 = 2,6 \text{ m}$ $\Delta t_L / \Delta t_p = 0,026$ $\Delta t_L = -8 * 0,026 = -0,208 \text{ K}$ $L = X + H_1 = 2,6 \text{ m}$ $\Delta t_L / \Delta t_p = 0,026$ $\Delta t_L = -8 * 0,026 = -0,208 \text{ K}$	between anemostats at the wall
Chart 7.4.4. :	$\bar{w}_{H1} = 0,18 \text{ m/s}$ $\bar{w}_L = 0,18 \text{ m/s}$	between anemostats at the wall

Fig. 37 VAPM-V example

Given data:	Anemostat VAPM 160 K/D/V/P $\dot{V} = 100 \text{ m}^3 \cdot \text{h}^{-1}$ $\Delta t_p = -8 \text{ K}$ $H_1 = 1,1 \text{ m}$ $A = 2,6 \text{ m}$ $X = 1,3 \text{ m}$	
Chart 7.1.2. :	$L_{WA} = 28 \text{ dB(A)}$ $\Delta p_c = 19 \text{ Pa}$	correction according to Tab. 7.2.1.
Chart 7.3.1. :	$L = A/2 + H_1 = 2,4 \text{ m}$ $\Delta t_L / \Delta t_p = 0,028$ $\Delta t_L = -8 * 0,028 = -0,224 \text{ K}$ $L = X + H_1 = 2,6 \text{ m}$ $\Delta t_L / \Delta t_p = 0,028$ $\Delta t_L = -8 * 0,028 = -0,224 \text{ K}$	between anemostats at the wall
Chart 7.4.4. :	$\bar{w}_{H1} = 0,2 \text{ m/s}$ $\bar{w}_L = 0,19 \text{ m/s}$	between anemostats at the wall

IV. MATERIAL, FINISHING

8. Material

- 8.1. All parts are made of galvanized plate. The surface of the front plate and diffuser is coated with white baked varnish, RAL 9010 shade. Other RAL shades must be negotiated with the manufacturer in advance.
- 8.2. Connection boxes are made of z galvanized plate.

V. TRANSPORTATION AND STORAGE

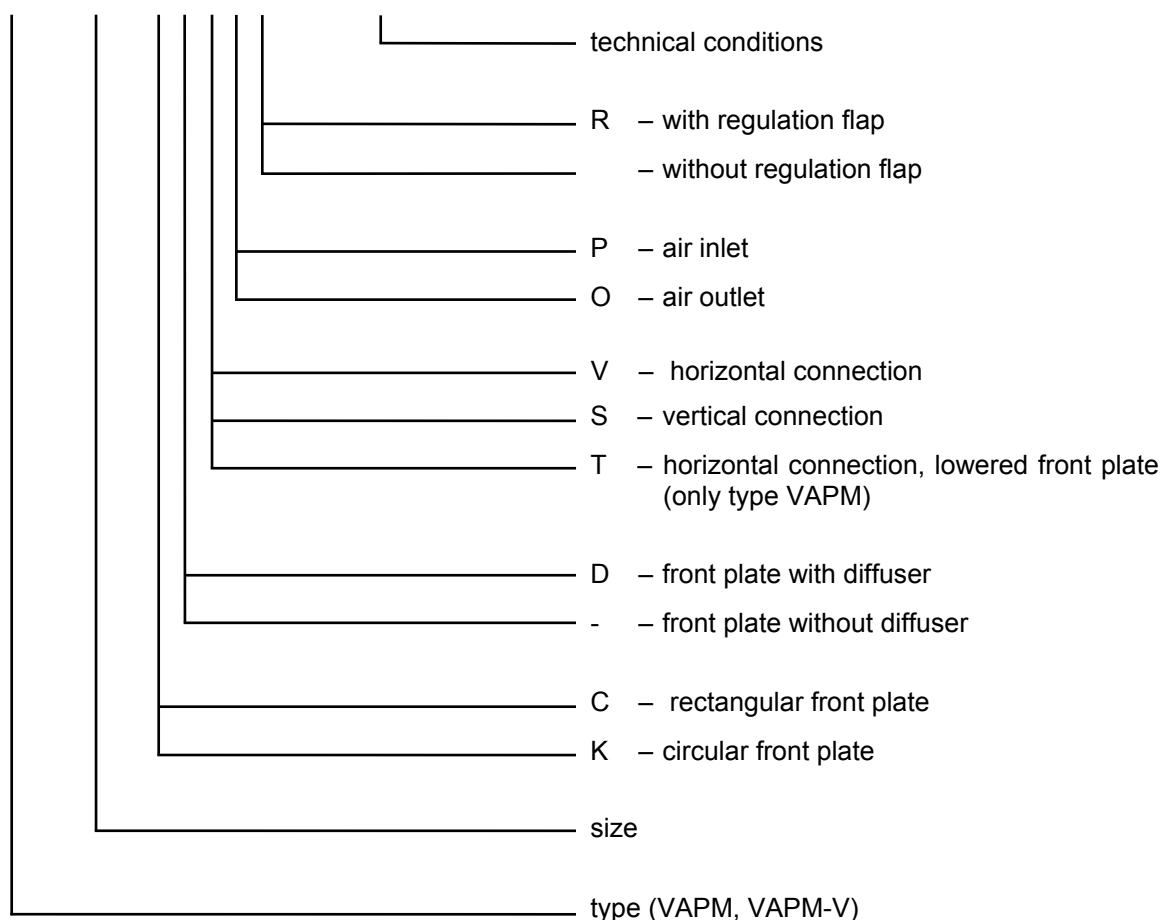
9. Logistics terms

- 9.1. Whirling anemostats are delivered in cardboard packages in bulk. As agreed with customers, anemostats may be transported on pallets or in crates. While transported and stored they must be protected against mechanical damage and weather conditions.
- 9.2. Whirling anemostats have to be stored in closed premises, in the environment without aggressive steams, gases and dusts. Temperature range have to be from -5 to +40°C and relative humidity max. 80%.

IV. ORDERING INFORMATION

10. Ordering key

VAPM 160 C/D/V/P/R TPM 010/00



When ordering separate front plate in design VAPM-V must be specified in the order (in writing), whether it is a front plate intended to be connected to the connection boxes, connecting directly to the piping or connecting directly to the spiro piping.

Separate front plate can be ordered with the dispersal sheet, which must be specified in words.

Example: VAPM-V 160 K / D on spiro piping without dispersal sheet.

Other requirements for non standard design (eg. A horizontal circular connection via terminal box) is must be specified in the order verbally too.

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www.mandik.com