# 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.

## I. CONTENT                                                2

## 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.**     Anemosats 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)

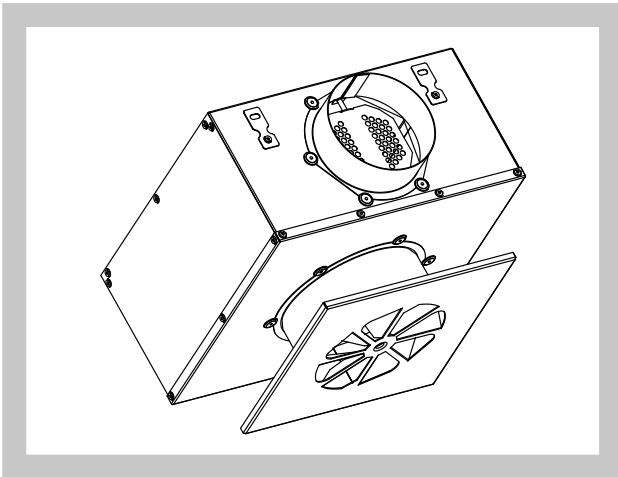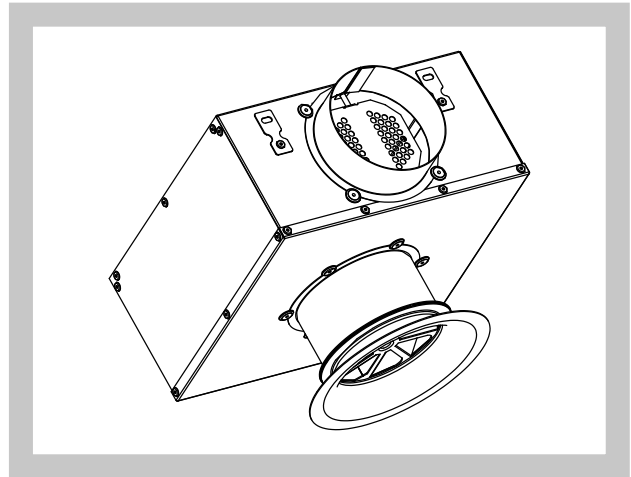**Fig. 1    Horizontal connections  VAPM xxx C/-/V/P/R**

**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**

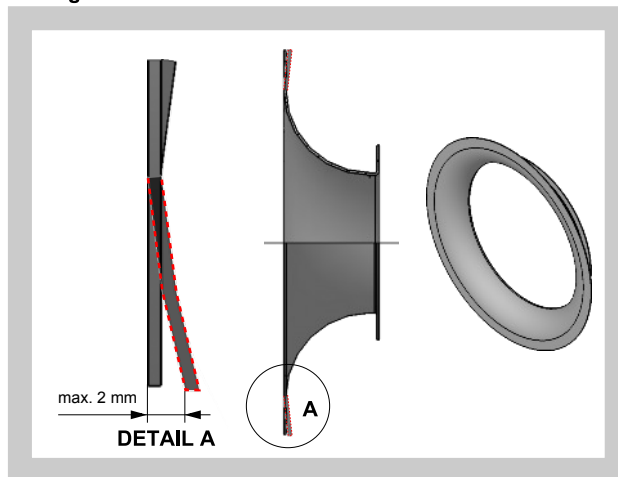**Fig. 5    Design VAPM xxx K without diffuser, circular front panel**

**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**



max. 2 mm

**DETAIL A**

A

## 3. Dimensions and weights

### 3.1.    Horizontal connection VAPM

**Tab. 3.1.1. Dimensions**

| Size | □C | □C$_D$ | Ø K | Ø K$_D$ | Ø D | Ø B | □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 |

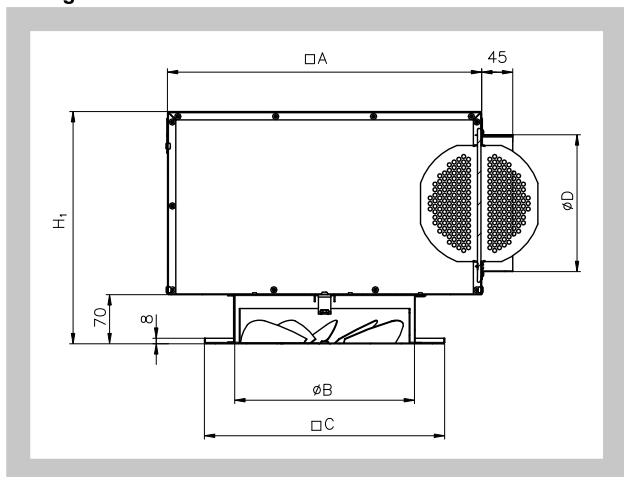**Fig. 9    VAPM xxx C/-/V/x/R**



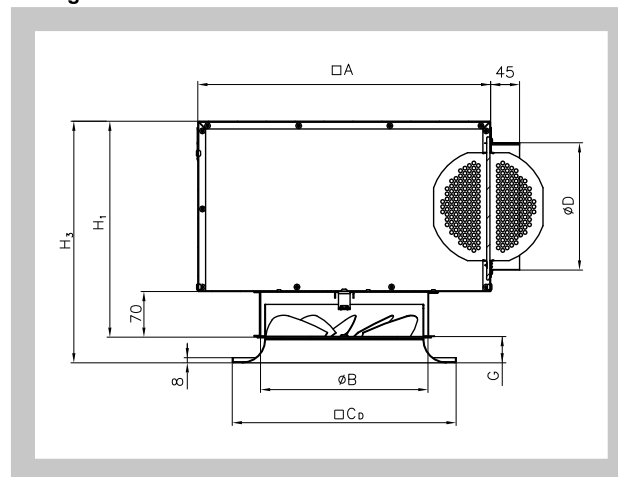**Fig. 10   VAPM xxx C/D/V/x/R**



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



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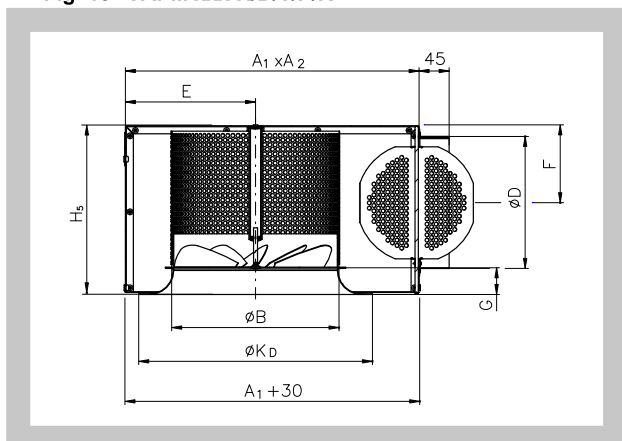


**Fig. 13   VAPM xxx K/D/T/P/R**



## 3.2.   Vertical connection VAPM

**Tab. 3.2.1. Dimensions**

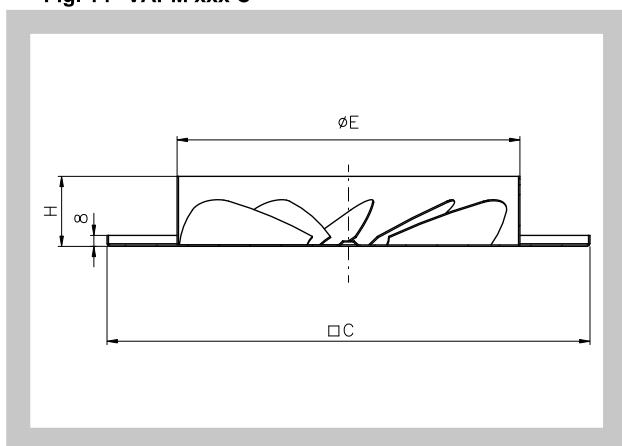| Size | $\varnothing E$ | $\square C$ | $\square C_D$ | $\varnothing K$ | $\varnothing K_D$ | $\varnothing D$ | $\varnothing B$ | H | $H_D$ | $H_2$ | $H_4$ | $H_6$ | $H_7$ | G |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| **125** | 123 | 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**
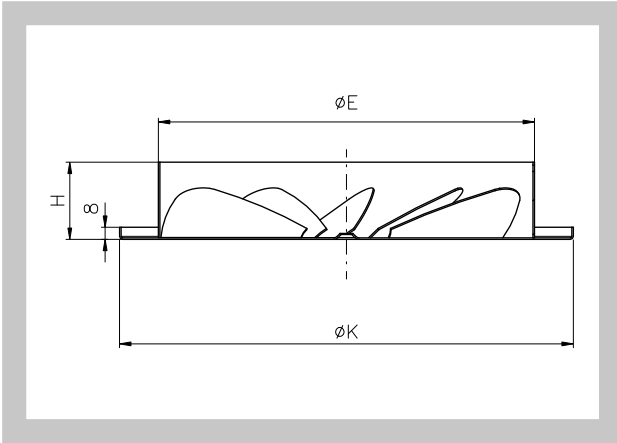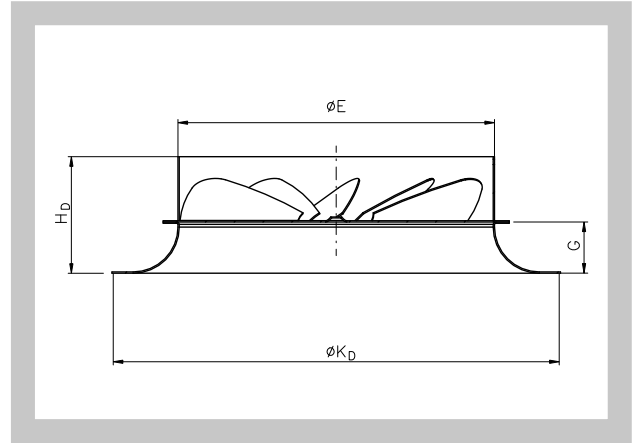
**Fig. 16  VAPM xxx K**

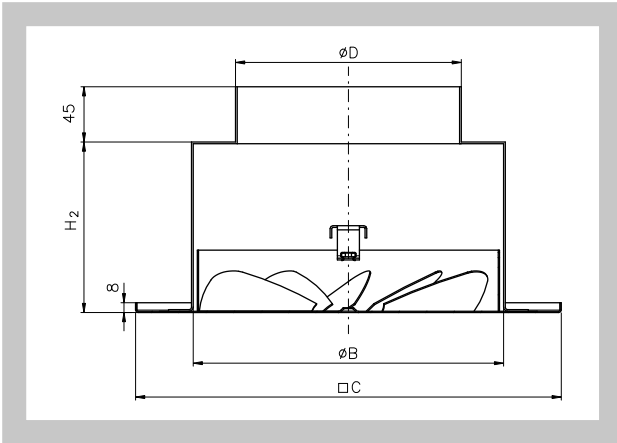**Fig. 17  VAPM xxx K/D**

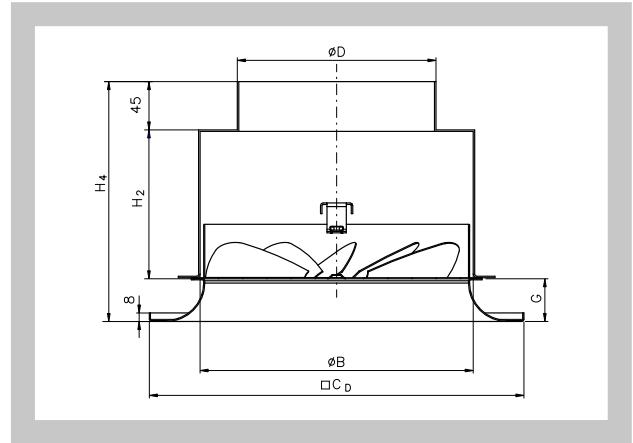**Fig. 18  VAPM xxx C/-/S/x**

**Fig. 19  VAPM xxx C/D/S/x**
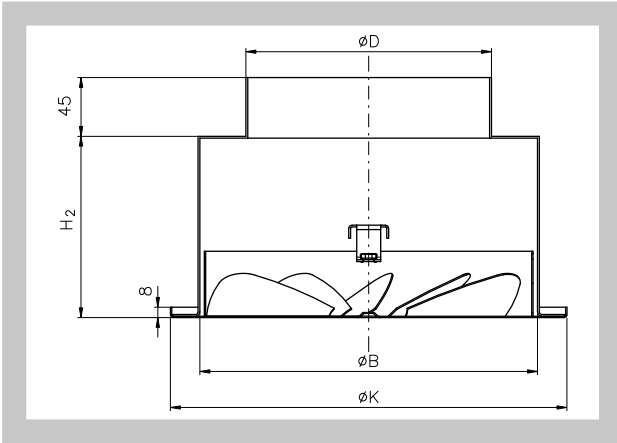
**Fig. 20  VAPM xxx K/-/S/x**
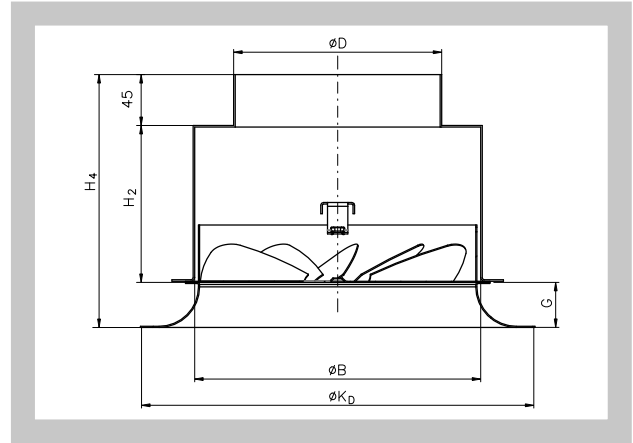
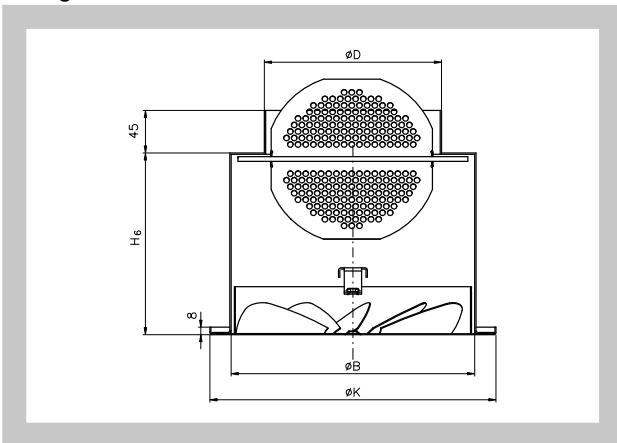**Fig. 21  VAPM xxx K/D/S/x**

**Fig. 22  VAPM xxx C/-/S/x/R**
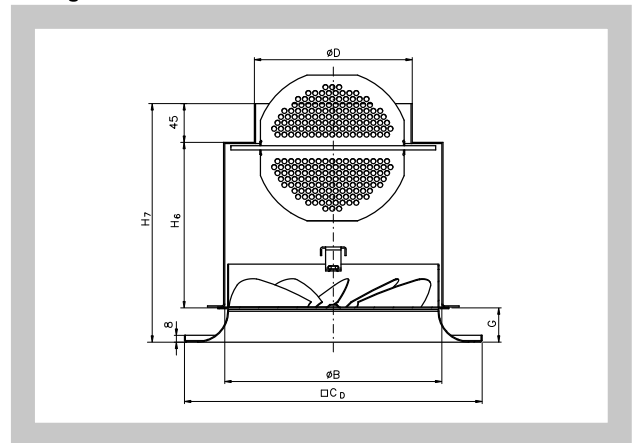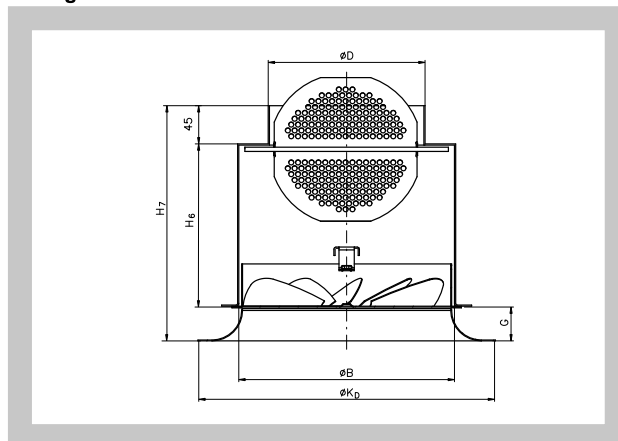
**Fig. 23  VAPM xxx C/D/S/x/R**

**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 | Ø D | Ø E | 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 |

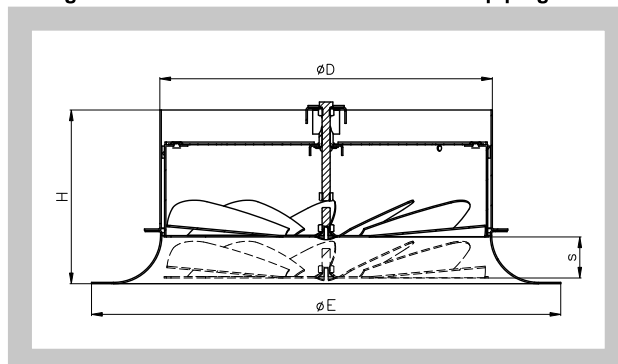**Fig. 28 VAPM-V xxx K/D connection to the piping**

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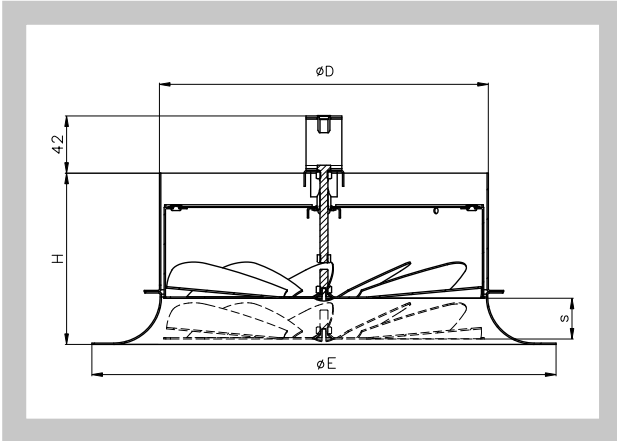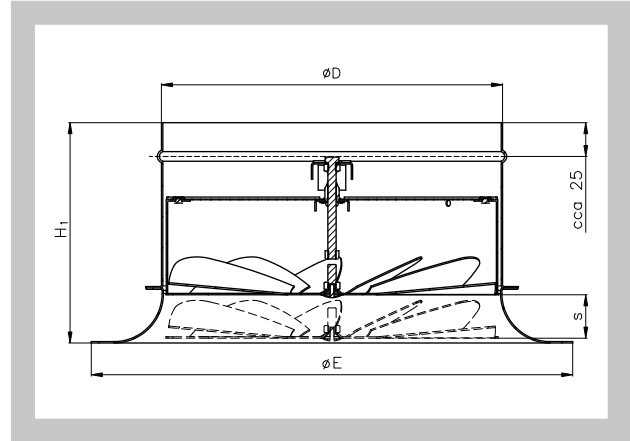


**Fig. 30   VAPM-V xxx K/D connection to the spiro piping**



**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.

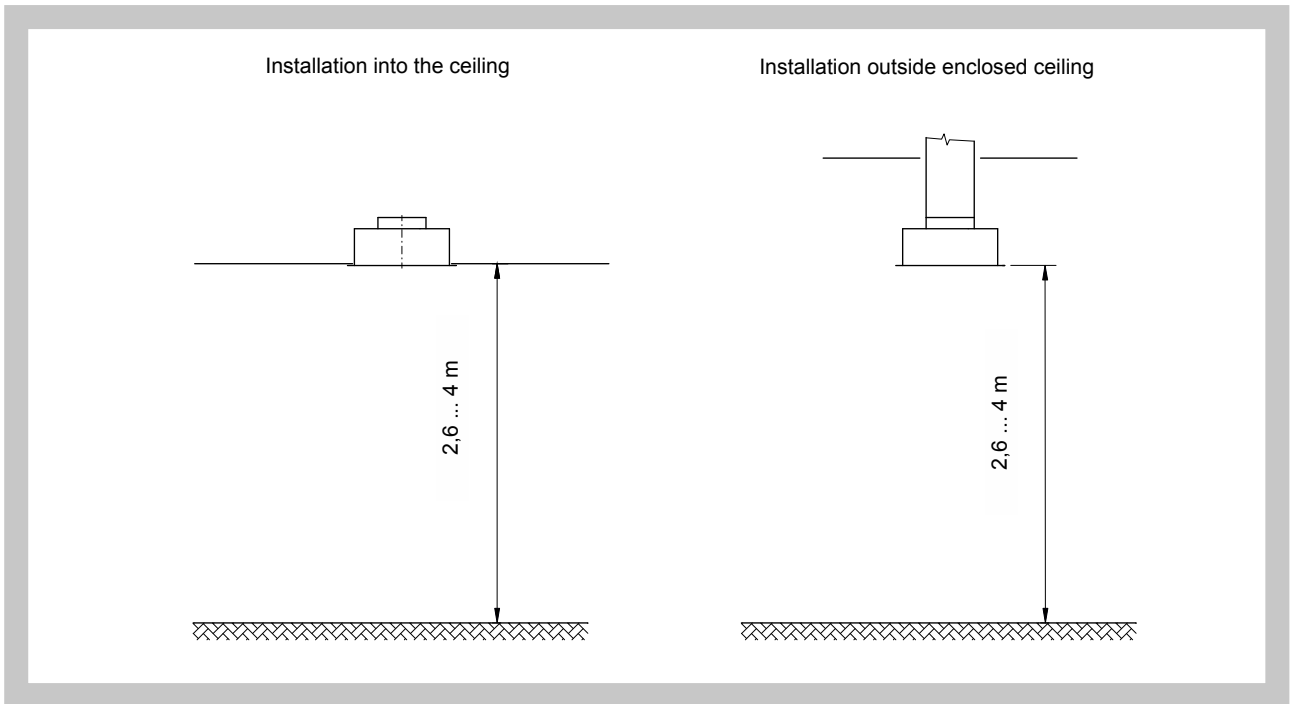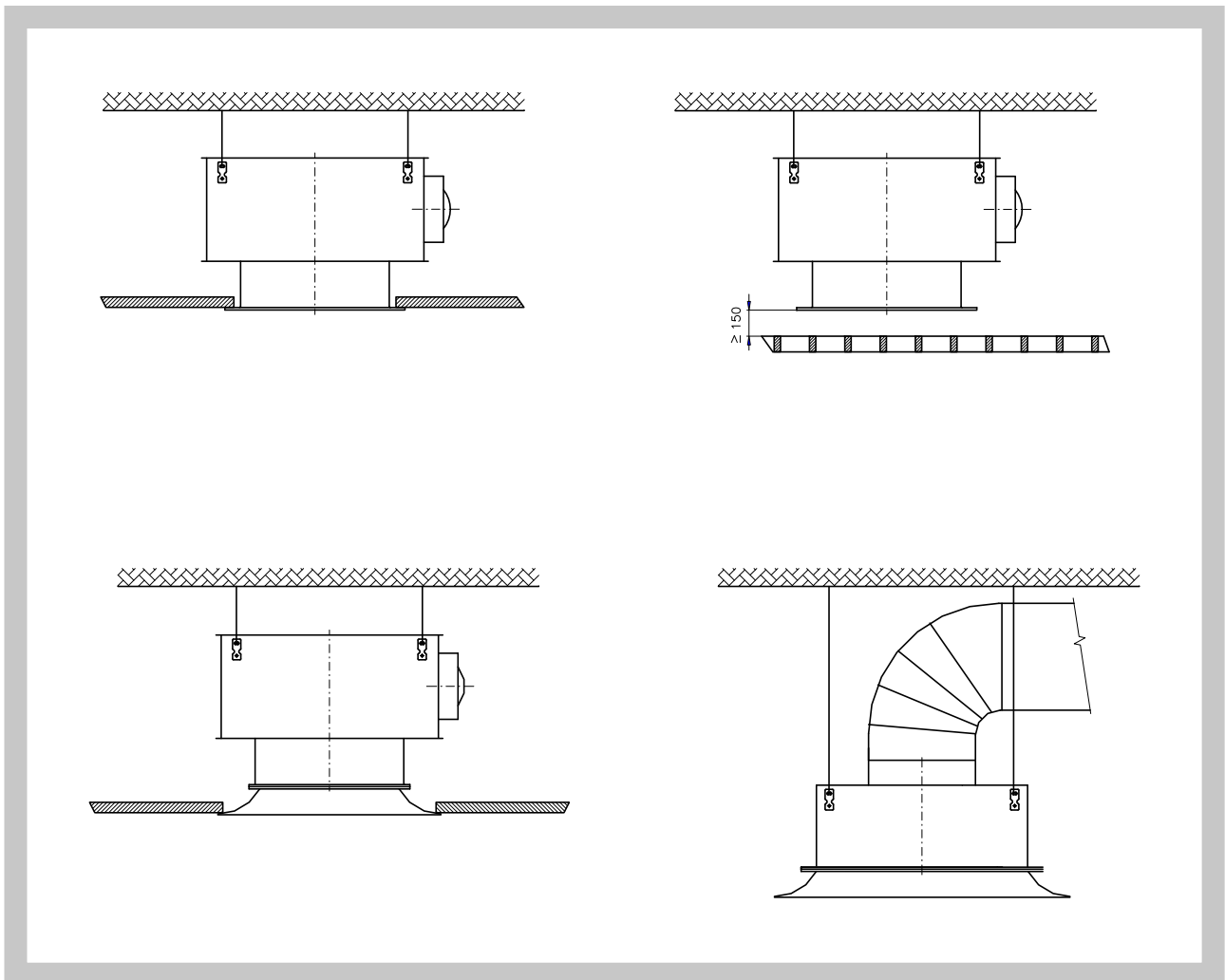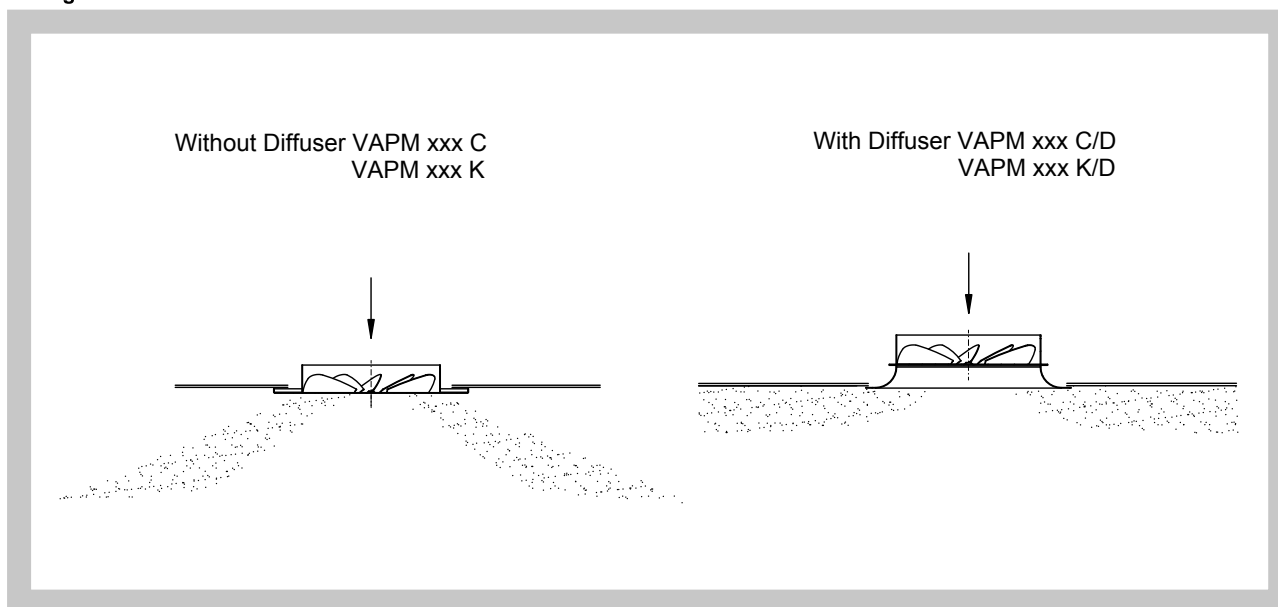## 4.2. Examples of the hinge

**Fig. 31  Placement**

Installation into the ceiling

Installation outside enclosed ceiling

2,6 ... 4 m

2,6 ... 4 m

**Fig. 32  Method of suspension**

≥ 150

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III. TECHNICAL DATA

5. Basic parameters

**5.1.** Air flow depending on the version:

**Fig. 33  Air flow**



Without Diffuser VAPM xxx C
VAPM xxx K

With Diffuser VAPM xxx C/D
VAPM xxx K/D

**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 |
| $\mathring{V}_{max}$ [m³.h⁻¹] | 80 | 100 | 120 | 150 | 210 | 240 | 280 | 300 | 600 | 640 | 800 | 900 |
| $\mathring{V}_{min}$ [m³.h⁻¹] | 30 | 35 | 45 | 55 | 70 | 90 | 100 | 105 | 180 | 230 | 265 | 280 |
| *$L_{WA\,max}$ [dB(A)] | 30 | 31 | 37 | 38 | 41 | 38 | 36 | 31 | 42 | 43 | 38 | 42 |
| **$L_{WA\,max}$ [dB(A)] | 42 | 36 | 39 | 36 | 38 | 38 | 31 | 30 | 41 | 39 | 42 | 40 |
| $L_{WA\,min}$ [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

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## 6. Calculation and determining quantities

### 6.1.      Quantities and units

**Fig. 34**



| | | |
|---|---|---|
| $\mathring{V}$ | [m³.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 |
| $\overline{w}_L$ | [m.s⁻¹] | medium speed of airflow at the wall surface |
| $\overline{w}_{H1}$ | [m.s⁻¹] | medium velocity of airflow between two anemostats at the distance $H_1$ |
| $\overline{w}_{ef}$ | [m.s⁻¹] | effective output velocity of air |
| $\Delta t_p$ | [K] | difference between the temperature of air led into the room and room temperature |
| $\Delta t_L$ | [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 $L = X + H_1$ |
| $\Delta p_c$ | [Pa] | total pressure loss at $\rho = 1,2$ kg.m⁻³ |
| $L_{WA}$ | [dB(A)] | acoustic power level |
| $S_{ef}$ | [m²] | effective area of the anemostat |

## 7. Aerodynamic data

### 7.1.      VAPM acoustic power levels and pressure losses
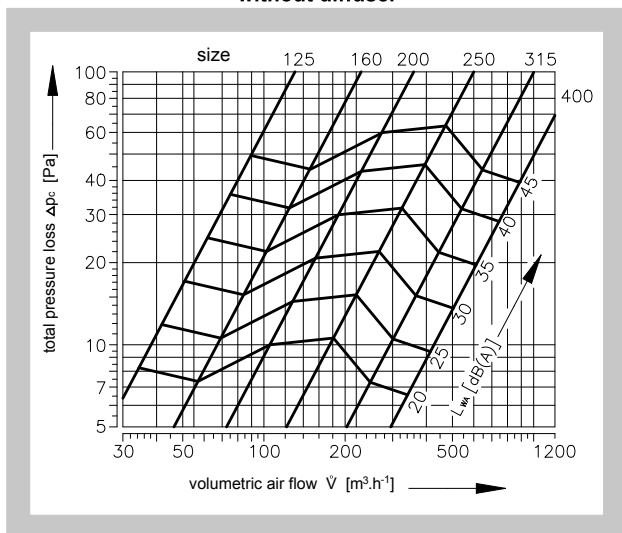
**Chart 7.1.1.      VAPM  horizontal connection**
**− without diffuser**
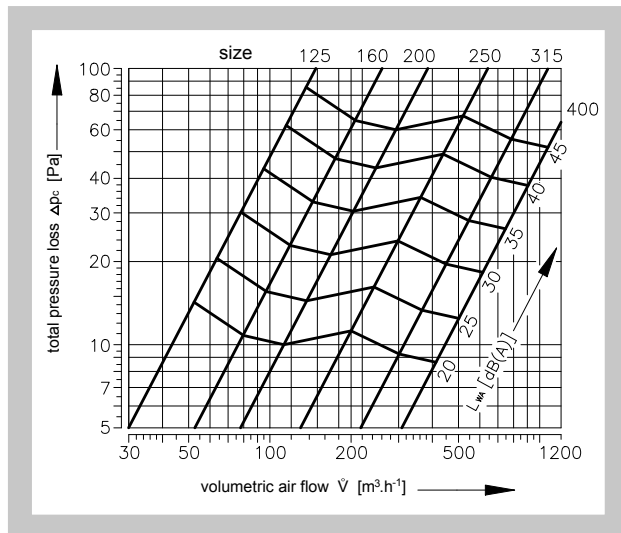


**Chart 7.1.2.      VAPM horizontal connection**
**− with diffuser**

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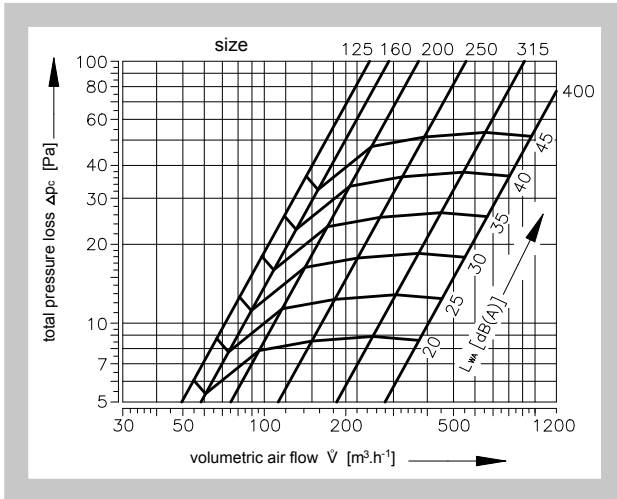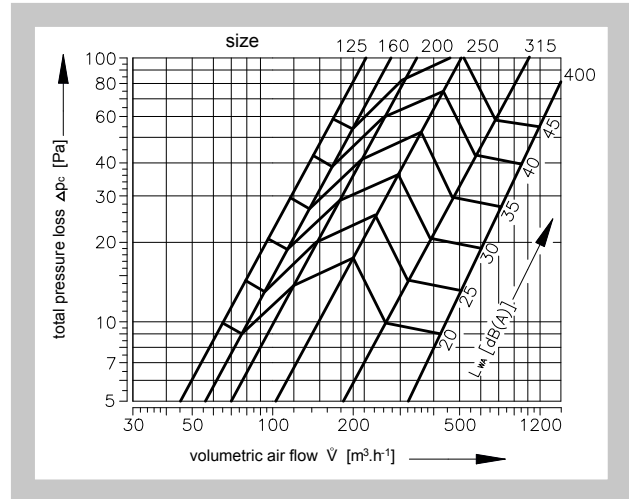


**Chart 7.1.4.**     **VAPM vertical connection – with diffuser**



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

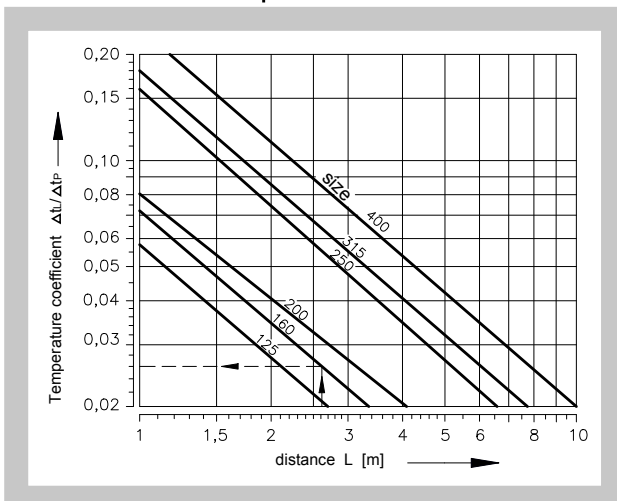| Size | | Angle of regulation flap | | |
|------|------|------|------|------|
| | | 0° | 45° | 90° |
| 125 | $\Delta p_c$ | - | - | - |
| | $L_{WA}$ | x1,0 | x1,4 | x2,5 |
| 160 | $\Delta p_c$ | 3 | - | - |
| | $L_{WA}$ | x1,0 | x1,3 | x1,9 |
| 200 | $\Delta p_c$ | 3 | 4 | 5 |
| | $L_{WA}$ | x1,0 | x1,4 | x2,1 |
| 250 | $\Delta p_c$ | - | - | 1 |
| | $L_{WA}$ | x1,0 | x1,4 | x2,1 |
| 315 | $\Delta p_c$ | - | - | 1 |
| | $L_{WA}$ | x1,0 | x1,4 | x2,1 |
| 400 | $\Delta p_c$ | - | - | 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 | $\Delta p_c$ | - | - | - |
| | $L_{WA}$ | x1,0 | x1,4 | x2,6 |
| 160 | $\Delta p_c$ | - | 1 | 3 |
| | $L_{WA}$ | x1,0 | x1,4 | x2,1 |
| 200 | $\Delta p_c$ | - | 1 | 4 |
| | $L_{WA}$ | x1,0 | x1,4 | x2,4 |
| 250 | $\Delta p_c$ | - | - | 1 |
| | $L_{WA}$ | x1,0 | x1,4 | x2,5 |
| 315 | $\Delta p_c$ | - | - | 1 |
| | $L_{WA}$ | x1,0 | x1,4 | x2,4 |
| 400 | $\Delta p_c$ | - | - | 2 |
| | $L_{WA}$ | - | - | - |

**7.2.**     For VAPM-V should be corrected values read from the previous charts and tables appeals 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 | $\Delta p_c$ | $L_{WA}$ |
|------|------|------|
| 160 | x 1,13 | 2 |
| 200 | x 1,11 | 2 |
| 250 | x 1,09 | 1 |
| 315 | x 1,06 | 1 |

**Fig. 35**



**Volumetric air flow:**

$$\mathring{V} = 3600 * \overline{w}_{ef} * S_{ef} \ [m^3/h]$$
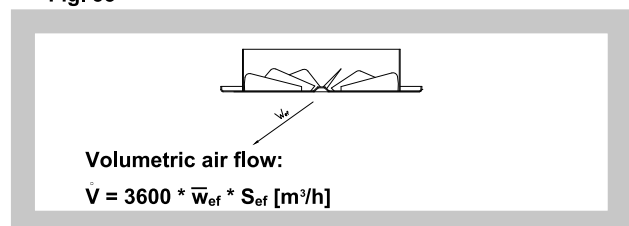
**Chart 7.3.2.**      **VAPM effective velocity of air flow**
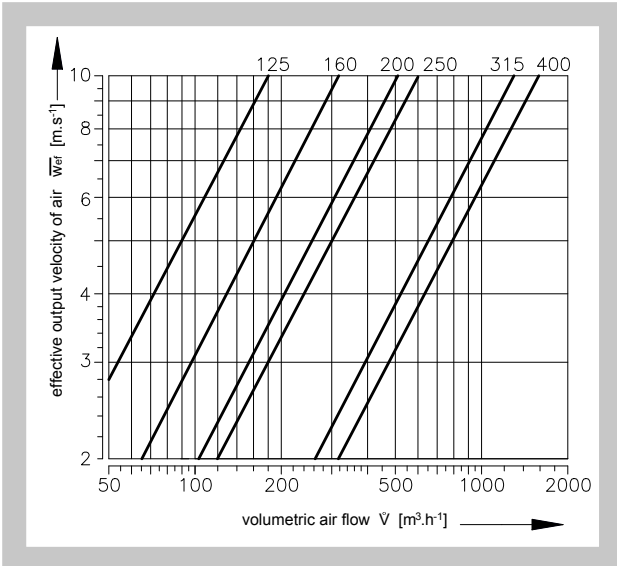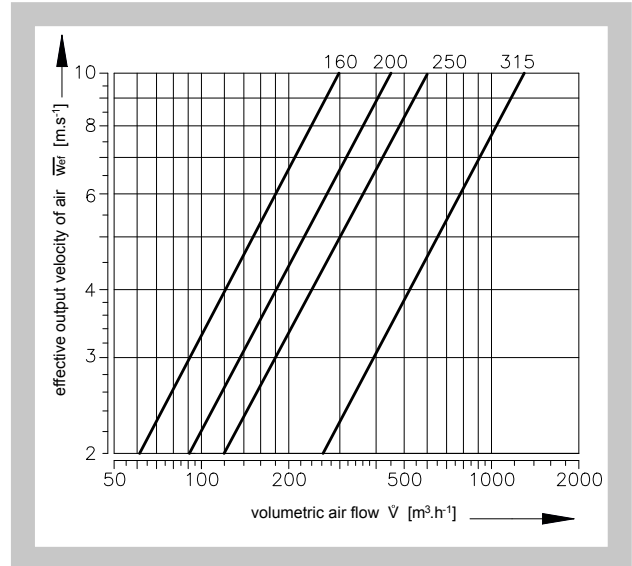
**Chart 7.3.3.**      **VAPM-V effective velocity of air flow**

## 7.4.    Velocity of air flow

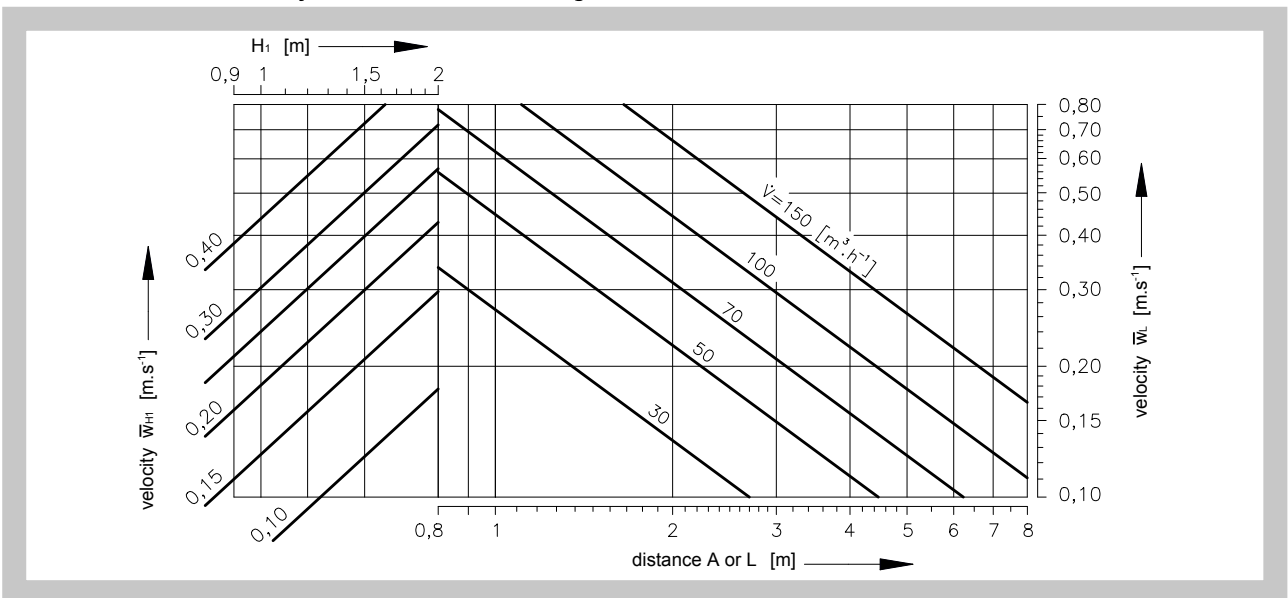**Chart 7.4.1.**      **Velocity of air flow - size 125, design without diffuser**

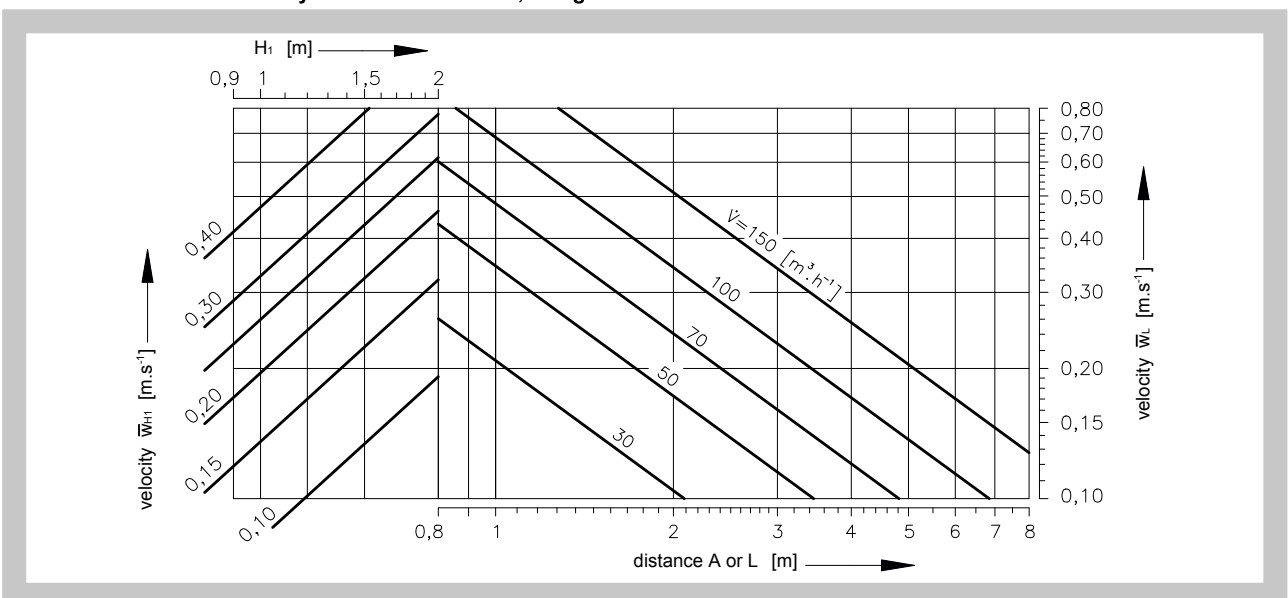**Chart 7.4.2.**      **Velocity of air flow - size 125, design with diffuser**

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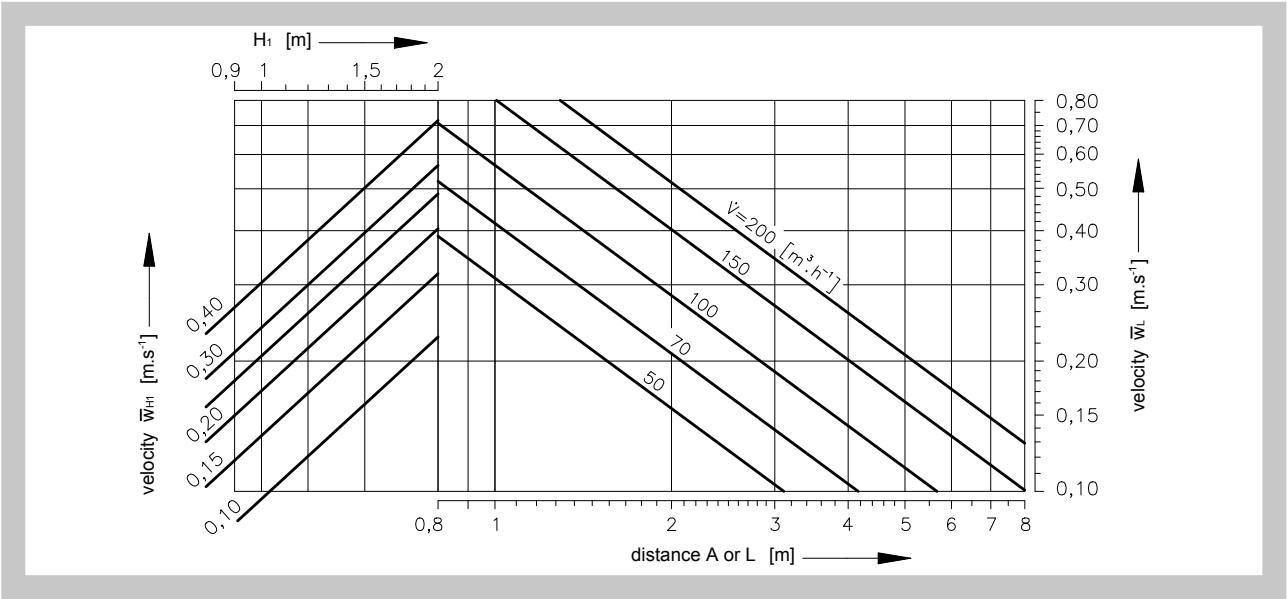**Chart 7.4.3.** **Velocity of air flow - size 160, design without diffuser**



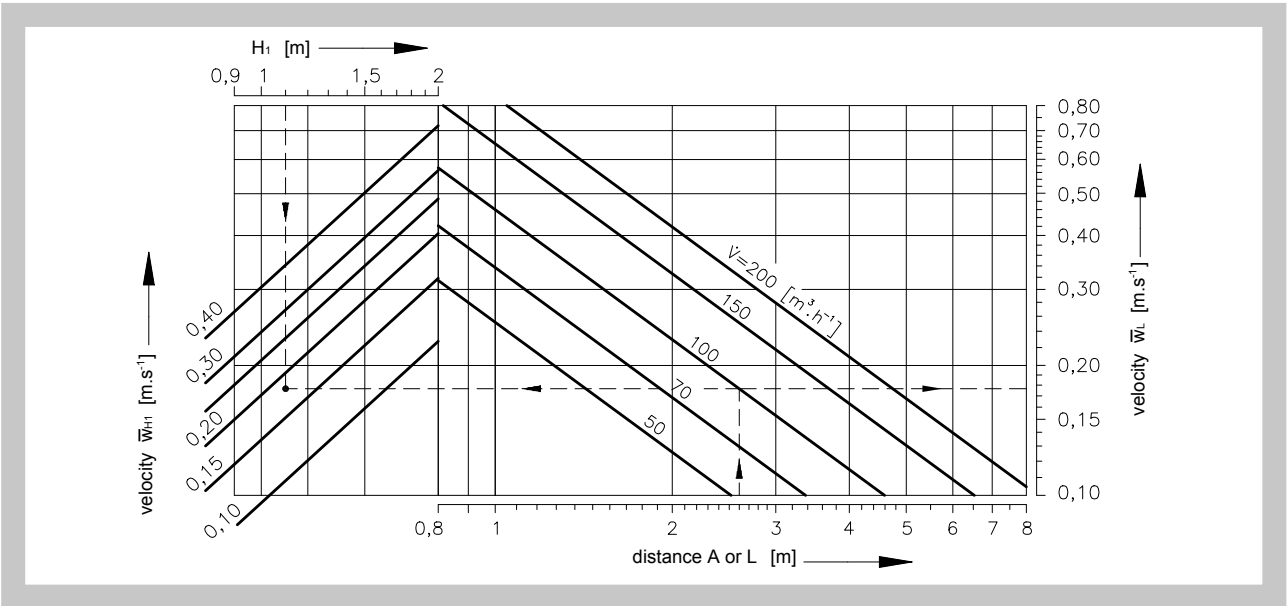**Chart 7.4.4.** **Velocity of air flow - size 160, design with diffuser**



**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**



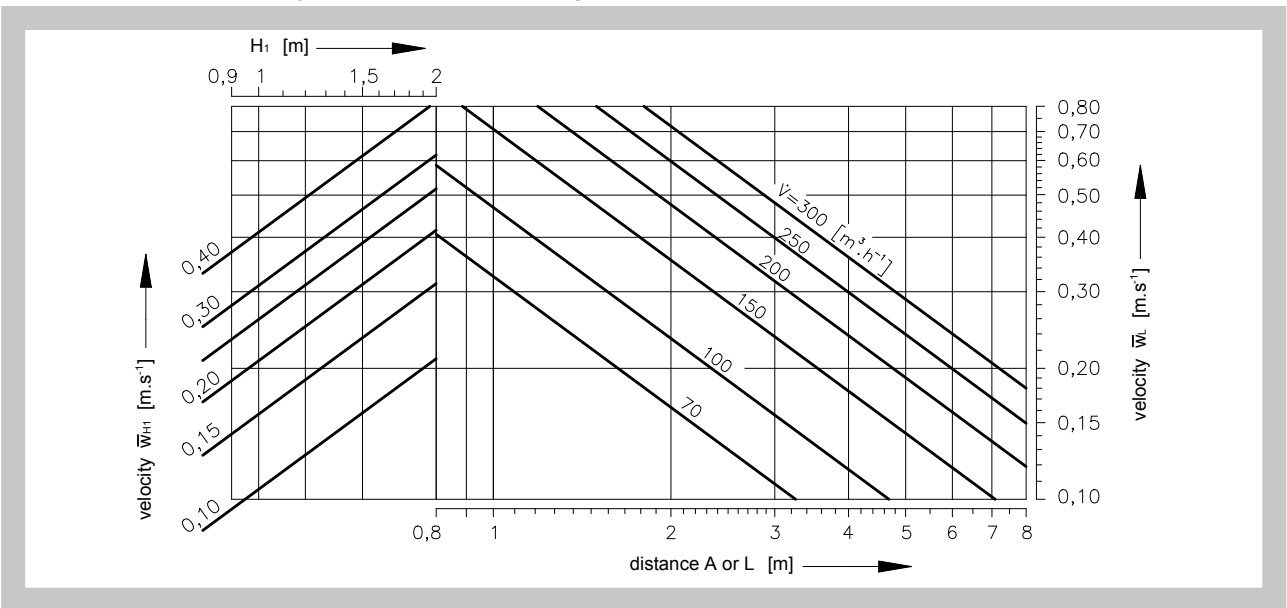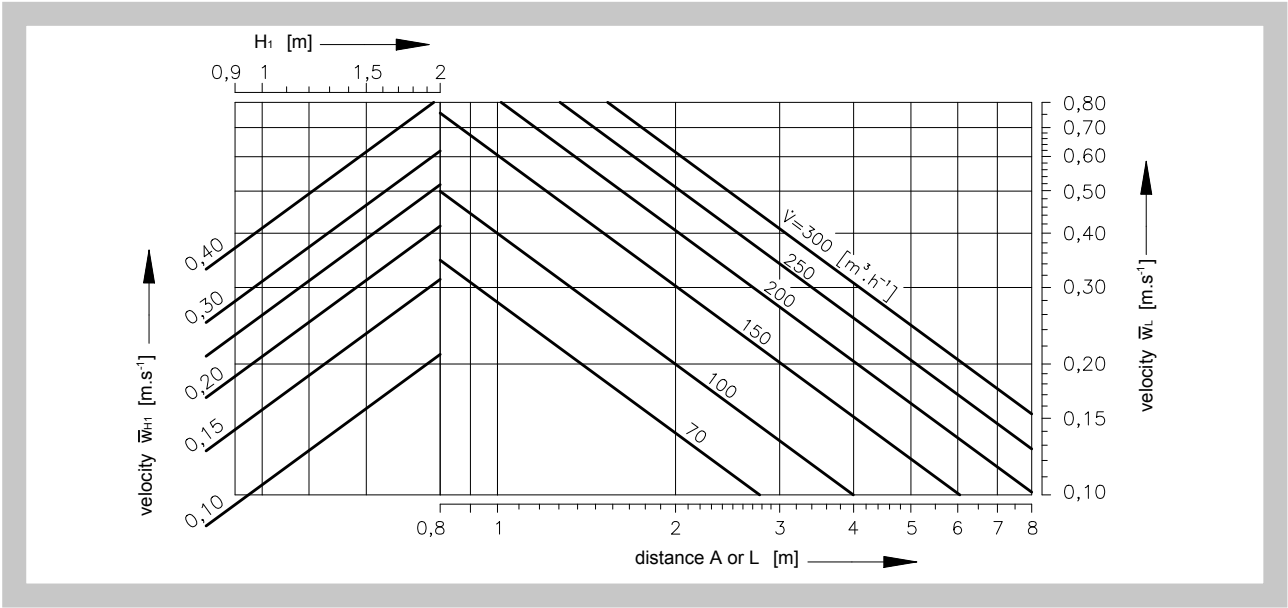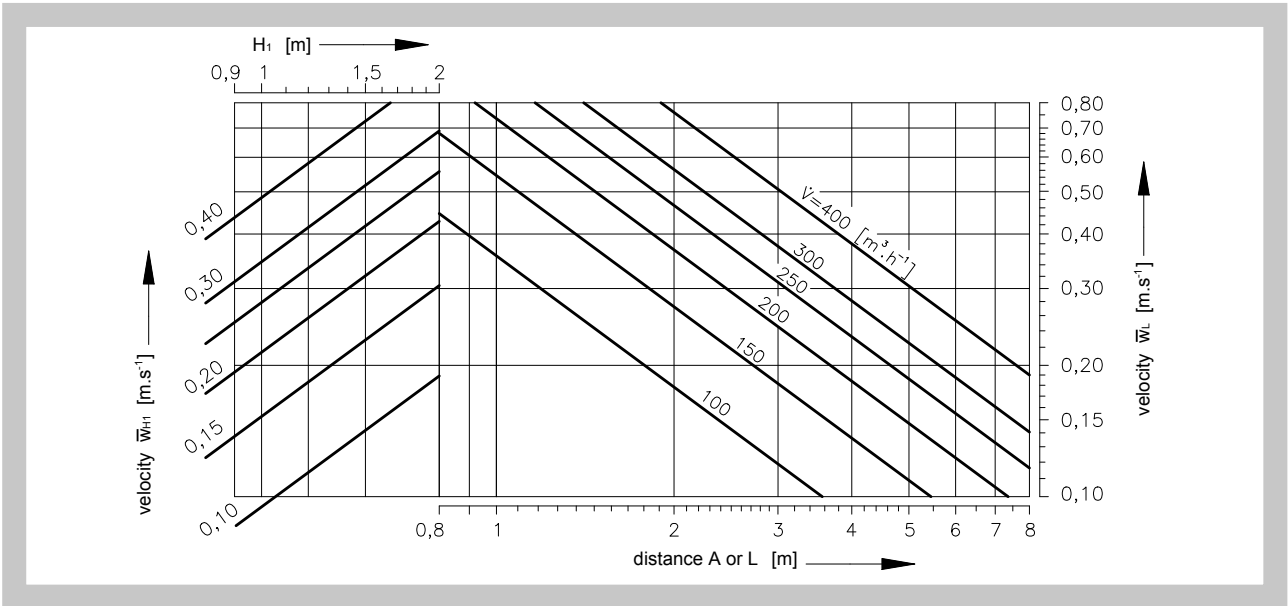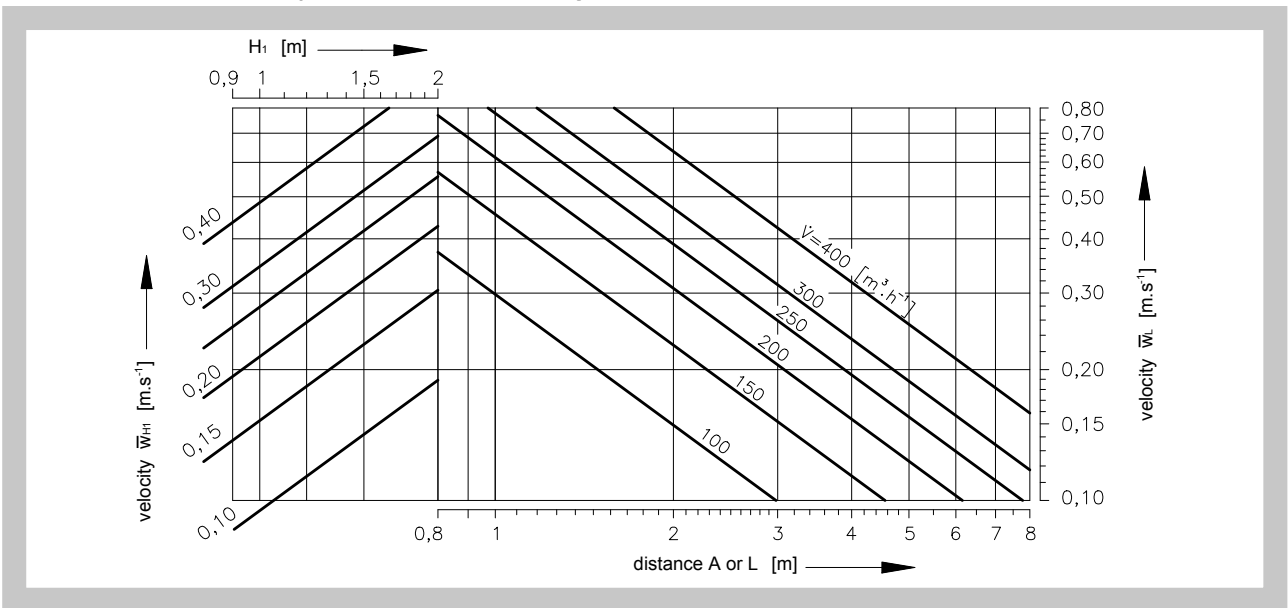**Chart 7.4.8.**      **Velocity of air flow - size 250, design with diffuser**

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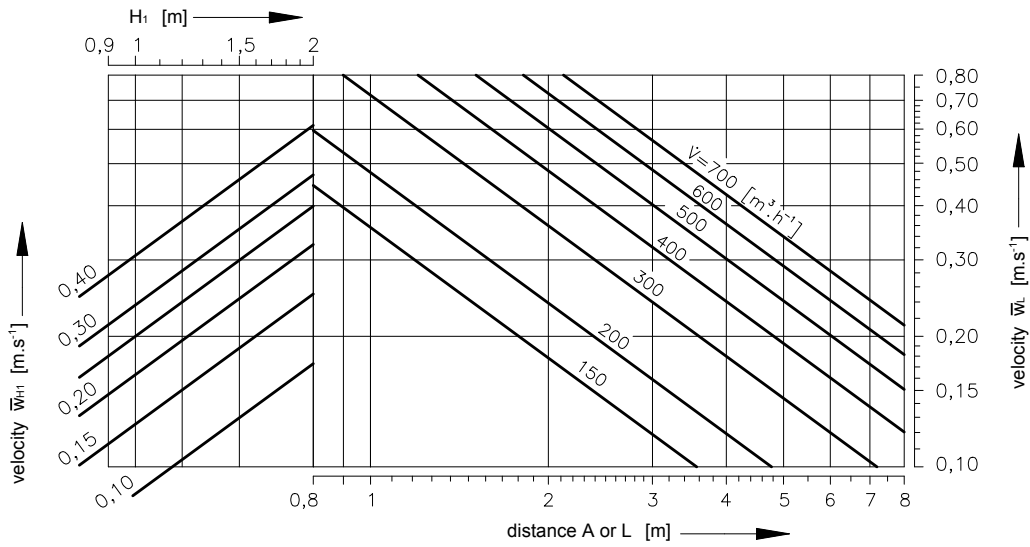


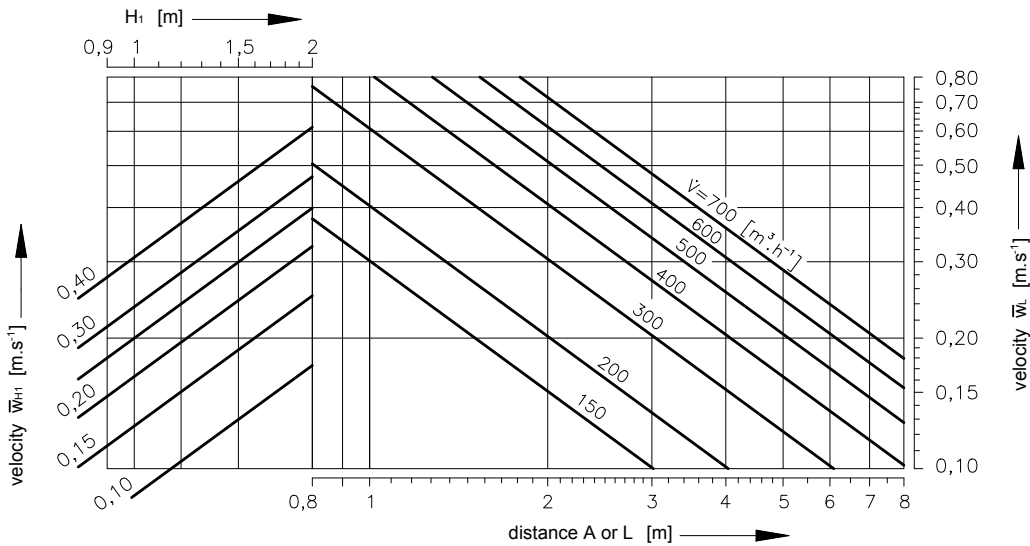**Chart 7.4.10.** **Velocity of air flow - size 315, design with diffuser**



**Chart 7.4.11.** **Velocity of air flow - size 400, design without diffuser**
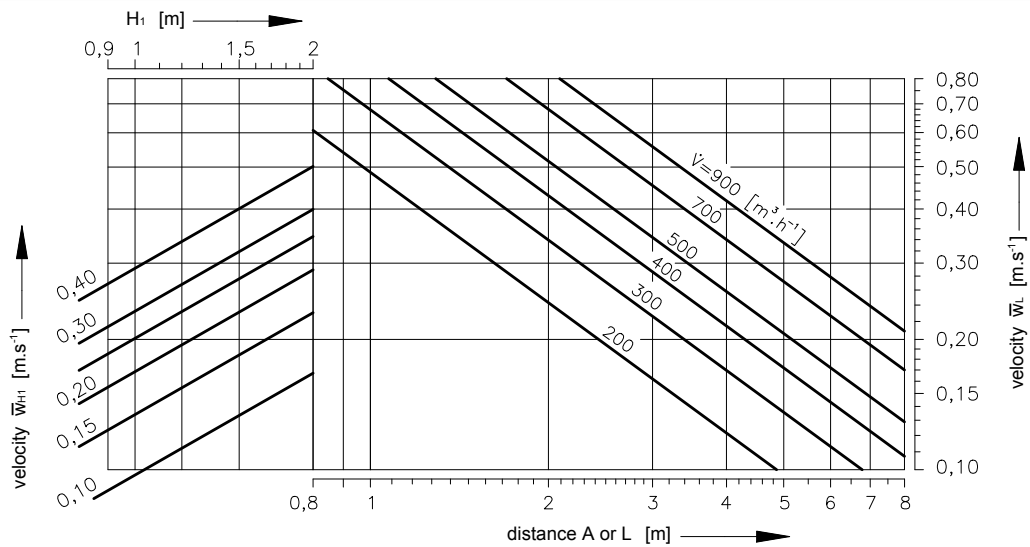
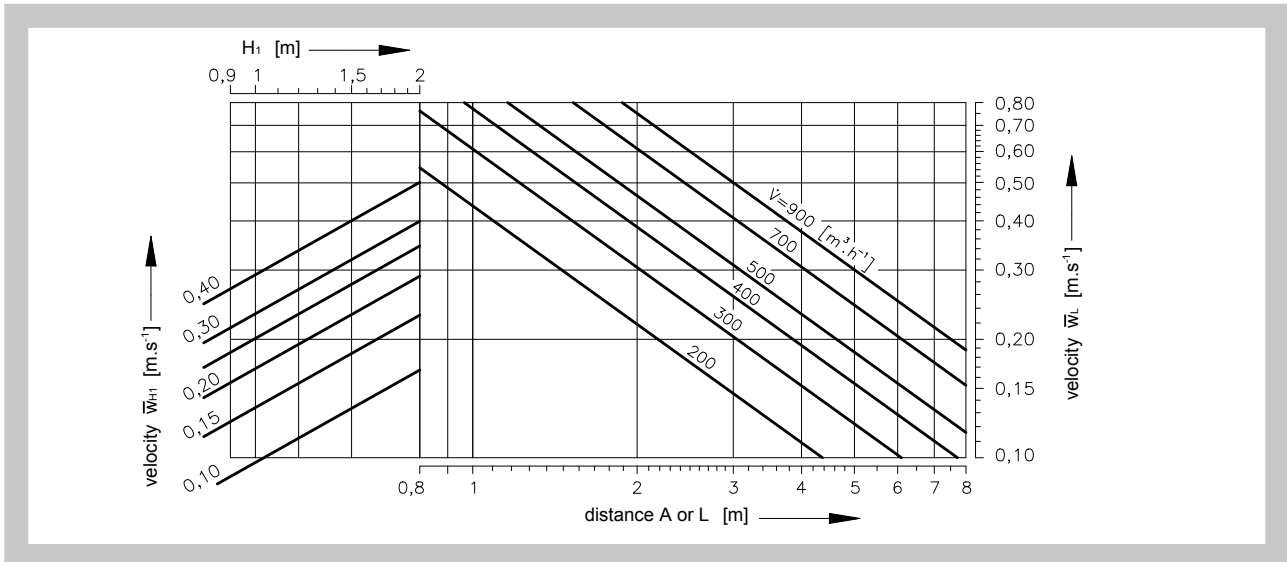**Chart 7.4.12.**      **Velocity of air flow - size 400, design with diffuser**



**Fig. 36**    **VAPM example**

| | |
|---|---|
| Given data: | Anemostat VAPM 160 K/D/V/P |
| | $\dot{V}$ = 100 m³.h$^{-1}$ |
| | $\triangle t_p$ = - 8 K |
| | $H_1$ = 1,1 m |
| | A = 3 m |
| | X = 1,5 m |

| | | |
|---|---|---|
| Chart 7.1.1. : | $L_{WA}$ = 27 dB(A) | |
| | $\triangle p_c$ = 17 Pa | |
| Chart 7.3.1. : | L = A/2 + $H_1$ = 2,6 m | between anemostats |
| | $\triangle t_L$ / $\triangle t_p$ = 0,026 | |
| | $\triangle t_L$ = - 8 * 0,026 = - 0,208 K | |
| | L = X + $H_1$ = 2,6 m | at the wall |
| | $\triangle t_L$ / $\triangle t_p$ = 0,026 | |
| | $\triangle t_L$ = - 8 * 0,026 = - 0,208 K | |
| Chart 7.4.4. : | $\overline{w}_{H1}$ = 0,18 m/s | between anemostats |
| | $\overline{w}_L$ = 0,18 m/s | at the wall |

**Fig. 37**    **VAPM-V example**

| | |
|---|---|
| Given data: | Anemostat VAPM 160 K/D/V/P |
| | $\dot{V}$ = 100 m³.h$^{-1}$ |
| | $\triangle t_p$ = - 8 K |
| | $H_1$ = 1,1 m |
| | A = 2,6 m |
| | X = 1,3 m |

| | | |
|---|---|---|
| Chart 7.1.2. : | $L_{WA}$ = 28 dB(A) | correction according to Tab. 7.2.1. |
| | $\triangle p_c$ = 19 Pa | |
| Chart 7.3.1. : | L = A/2 + $H_1$ = 2,4 m | between anemostats |
| | $\triangle t_L$ / $\triangle t_p$ = 0,028 | |
| | $\triangle t_L$ = - 8 * 0,028 = - 0,224 K | |
| | L = X + $H_1$ = 2,6 m | at the wall |
| | $\triangle t_L$ / $\triangle t_p$ = 0,028 | |
| | $\triangle t_L$ = - 8 * 0,028 = - 0,224 K | |
| Chart 7.4.4. : | $\overline{w}_{H1}$ = 0,2 m/s | between anemostats |
| | $\overline{w}_L$ = 0,19 m/s | 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.
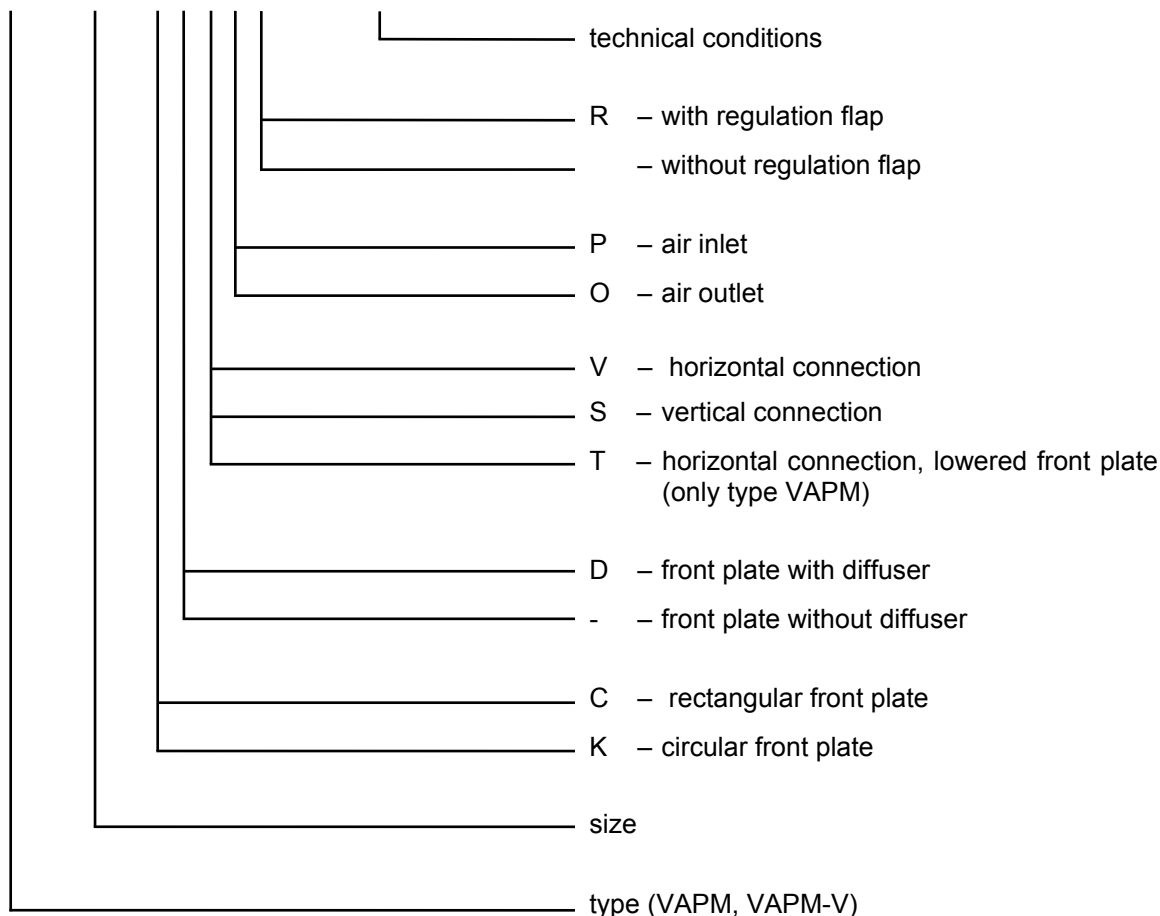
## V. TRANSPORTATION AND STORAGE

### 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 |

technical conditions

R – with regulation flap

– without regulation flap

P – air inlet
O – air outlet

V – horizontal connection
S – vertical connection
T – horizontal connection, lowered front plate (only type VAPM)

D – front plate with diffuser
- – front plate without diffuser

C – rectangular front plate
K – circular front plate

size

type (VAPM, VAPM-V)

**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.**

The producer reserves the right for innovations of the product. For actual product information see
www.mandik.com