

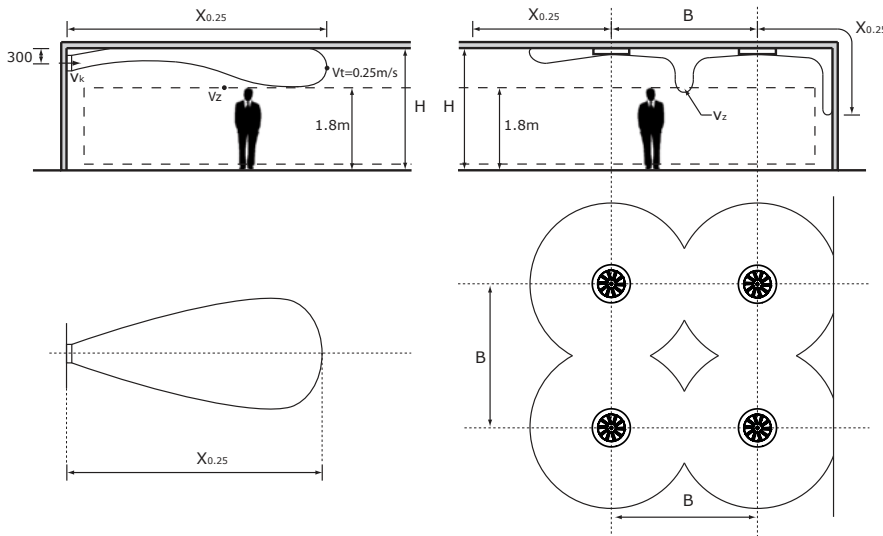

## Basic principles for air diffusion type Intro

### Selection criteria

The important selection criteria for a grille are:

- Throw
- Air speed
- Sound
- Pressure loss
- Temperature difference

These criteria will be treated in the areas listed below.



## Throw

An important selection criteria for choosing the right grille, is the throw (penetration depth of the air supply). The mentioned throw distances  $X_{0.25}$  are equal to the distance of the grille up to the distances where the outgoing air stream only has an end speed  $V_t$  of 0.25 m/s.

A grille must be selected with a throw smaller than or equal to the distance to an opposite wall or obstacle or half of the mutual grille distance. These distances can simply be measured on a floor plan. A throw that is too large will result in high air speeds in the living area. A throw that is too small can lead to insufficient rinsing of the area. Other air flows of for example radiators or possible disturbing elements in the area have to be taken into account. An air flow that follows the convection power is being preferred.

The grille must be selected based on the specified quick selection tables. An important element here is the air pattern. According to the structure of the wall grilles, this pattern can be adjusted. Grilles with solid air pattern with fixed blades are available, up to grilles with fully adjustable air pattern in 1, 2, 3, 4 or every direction. The table values do not take possible spread into account and mention the throw with fully forward pointed blades. Obviously, the air pattern determines the mounting position of the grille.

Wall and duct grilles that are mounted next to each other have to have a mutual distance that is at least equal to 1/3 of the throw with a straight forward air pattern. In case of spread air patterns, the mutual distance, in this situation, has to be equal to at least the throw. When selecting the adjustable swirl diffusers or circular blade grilles, a vertical component will also be added. These grilles are continuously adjustable between horizontal and vertical outlet. Assuming an occupation zone of 1,8 m, the vertical throw will be recommended to be selected to this zone. When selecting grilles, following criteria are also important:

### Air volume constant or variable

It is recommended to select the grille based on the largest air volume. Then check the selection with minimum air volume, cold air downdraughts may occur, by a low temperature air emissions. Probably another grille has to be selected. Alternatively, the minimum air volume can be increased.

### Kind of ceiling

To prevent complaints about comfort, it is essential that the ceiling is flat. The throw of many grilles is based on the occurring of the coanda-effect (adhesive effect). A flat ceiling guarantees the occurrence of this effect. The selection tables of the wall grilles take the coanda effect into account with mounting 300 mm below the ceiling.

When placing at a distance between 400 and 600 mm below the ceiling, setting up a deflection of 15° is recommended towards the ceiling. When mounting at a distance larger than 600 mm of the ceiling, the throw will be  $X_{0.25}$  smaller because of the lack of the coanda effect.

With ceiling grilles, the coanda effect was always included unless otherwise stated.

Situations where obstacles are situated in the ceiling can also occur.

Possible obstacles can be:

- Beams or coves on the ceiling
- Substructure lightning
- Angled descending ceilings
- High or large obstacles on the floor

In case of placing on distances larger than 600 mm of the ceiling and all other special set-ups, please contact our engineering department.

### Room height

The maximum throw like presented in the tables, are sufficient for a maximum ceiling height (usual approximately 3,5

meter). Some cases refer specifically to lower or higher rooms and to correction tables or end speeds  $V_z$  to the occupation zone are specified. Seeking extra advise is recommended with areas lower than 2,6 meter.

Chilled or heated air

The throw data of grilles, as mentioned in tables are based on the air supply at isotherm condition, where the temperature of primary and secondary air are equal. With critical selection of grilles, it is recommended to take shortened and extended throw into account due to deviant  $\Delta T$  (see table below). The data above do not count for Down-Flow over displacement flow diffusers where a maximum  $\Delta T$  of 3 to 4 K has to be applied.

## Air velocity

A lot of grilles are selected based on the throw. There are types of grilles, however, that influence each other making the throw not constant, but dependent on the number of grilles and its placement. The selection tables of ceiling grilles reflect the end speed with different ceiling grilles and grille distances. In the selection tables of these grilles, the air space is always the effective open area speed  $V_k$  through the grille with open area surface  $A_k$  specified in  $m^2$ . The throw X0.25 will always be specified on end speed of 0.25 m/s (unless otherwise stated). In order to guarantee the comfort in the living zone, do not exceed the maximum air velocity  $V_z$  of 0.25 m/s in the occupation zone.

Factors that influence the air velocity are:

- Air flow
- The model grille and quantity
- The mutual grille distance
- Placement in the room
- The height of the room

## Pressure loss

The selection tables always reflect the static pressure loss  $P_s$  of the grille with a specific air flow. In order to select a grille, knowing the maximum allowed head of the connected duct net is required. Usually grilles are selected with a maximum pressure loss of approx. 20 Pa. With fan coil units above the ceiling, usually a maximum pressure loss of approx. 15 Pa is taken.

## Sound

In order to select a grille, it is recommended to know the destination of the space, which helps to determine the permitted sound level. In the quick selection tables, sound powers  $L_w(A)$  will always be mentioned without room damping, which decreases the specified values usually to 10dB(A).

## Selection table

The selection tables per grille type can be provided with following data:

- The grille type with measurements in length L and height H or diameter  $\varnothing$  specified in mm
- Q = Air flow in  $m^3/h$
- $A_k$  = Effective open area per grille type specified in  $m^2$
- $V_k$  = Effective average air speed through the grille in m/s
- B = Distance between grilles specified in m
- H = Installation height of the grille in m
- $V_z$  = Air speed on the occupation zone in m/s
- X0.25 = Horizontal throw with end speed  $V_t$  of 0.25 m/s
- Y0.25 = Vertical throw or penetration depth in the room (for floor grilles)
- $\Delta t$  = Temperature difference in K when different of isotherm conditions
- $P_s$  = Static pressure loss over the grille without or with fully opened air flow regulator in Pa
- $L_w(A)$  = Sound power of the grille without or with fully opened air flow regulator specified in dB(A). In case of values lower than 20 dB(A), "<20" will be mentioned.

Air flow [m³/h]		Size			
Type of grille	VWR-FSA	300			
Q	Ak	0.01			
	B	1.2	2.4	3	
Distance between grilles [m]	H= 2.7	0.12	0.15	0.18	0.22
	H= 3.2	0.15	0.12	0.15	0.18
	H= 3.8	0.12	0.1	0.12	0.15
Maximal air speed in occupation zone [m/s]	Vk	2.8			
	X0,25	1.2			
	Ps	3			
Installation height [m]	Lw(A)	<20			
	H= 2.7	0.13	0.22	0.18	0.22
	H= 3.2	0.23	0.18	0.15	0.18
Effective air speed through the grille [m/s]	H= 3.8	0.18	0.15	0.12	0.15
	Vk	4.2			
	X0,25	1.8			
Throw distance [m]	Ps	8			
	Lw(A)	30			
Static pressure loss [Pa]					
Sound power [dB(A)]					