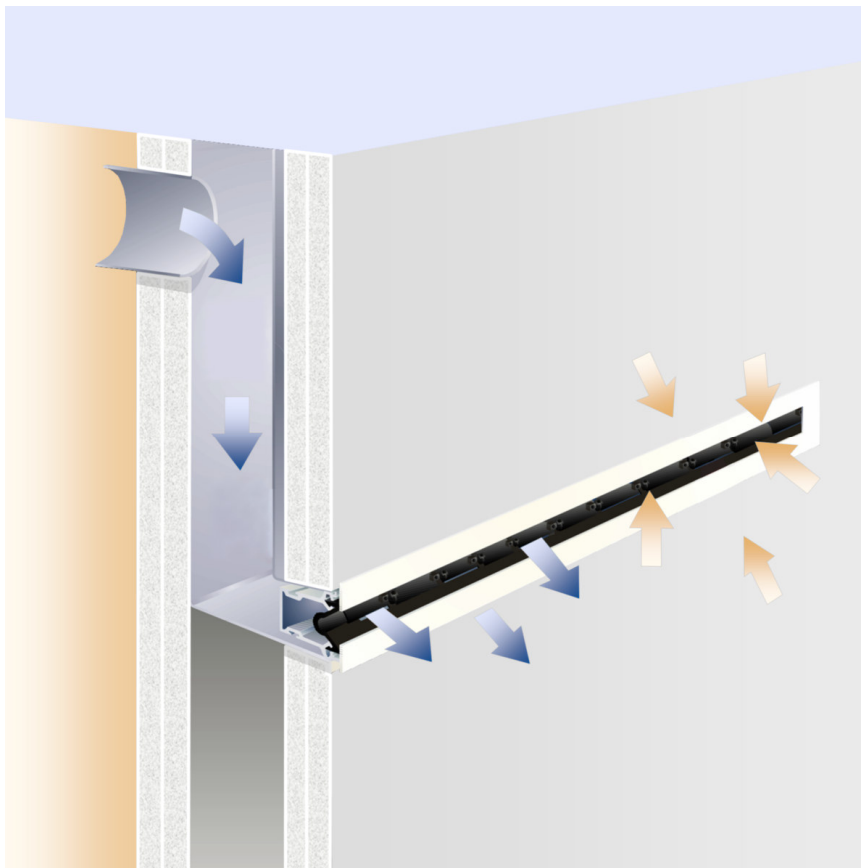


## Technical Information

# Wall Air Passage INDULSNAP



- Absorption box can be installed in dividing wall
- Integral cross-talk silencer
- For use as supply air and extract air
- Air flow rate up to 250 m<sup>3</sup>/hm

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## Architecture

- Absorption box can be completely installed in a dry wall
- Highly effective acoustic absorption box is designed as a cross-talk silencer
- The air guide profiles are installed using the newly developed snap fittings only after the wall is completed
- Available as a single diffuser or as a supply air and extract air combination
- Requires no space in corridor areas
- Provides for flexible axes (a dividing wall on each axis is possible)

## Technical Features

- High thermal comfort
- Tangential flow with optimum flow-flushing up to a room depth of 7 meters
- Distribution of the hygienically necessary supply air with draught-free ambient air flow
- Adjustable discharge direction
- Air flow rate 70...150 m<sup>3</sup>/hm with V24 air guide profiles
- Air flow rate 100...250 m<sup>3</sup>/hm with V45 air guide profiles
- Number of air exchange rate 1...6 h<sup>-1</sup> (depending on room depth and wall grid)
- Supply air temperature difference up to – 8 K
- The installation of INDULSNAP does not cause any acoustic weakening of the wall
- High input attenuation value
- Air flow rate can be adjusted from the room using slide dampers without removing the air guide profiles
- Ceiling flow improves the heat transfer performance of radiant chilled ceilings and construction part activation.
- Fast installation
- Air guide profiles correspond to VDI 6022 requirements
- Dust protection prevents soiling of the absorption box during fitting out

## Conditioning of Offices

Many of the office buildings being planned today will be designed without suspended ceilings. This architectural trend results in a reduction in the floor height and so permits a larger number of floors for a given building height.

On the one hand there is a need to build office space as economically as possible, and, on the other, a requirement to ensure comfortable conditions in the rooms. To reduce ambient temperatures, construction component cooling is sometimes used for basic load cooling. The thermal insulation code requires air-tight facades which, in conjunction with the need to control humidity, make it essential to install a ventilation system. Only in this way can damage to the building by mould be prevented.

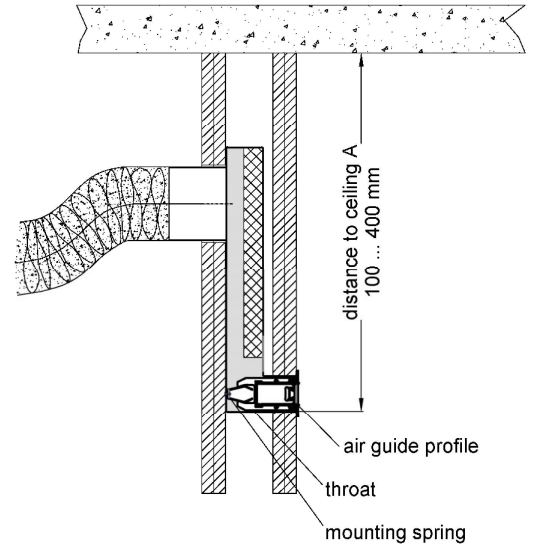
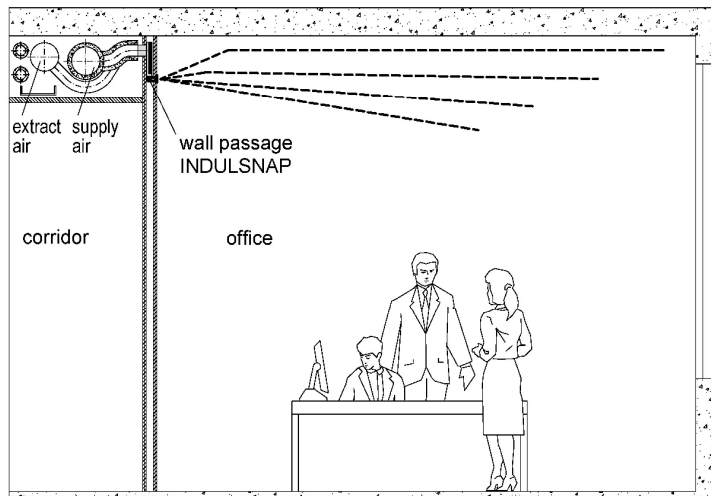
The ducts for supplying and extracting air are best installed in the ceiling hollow space of the corridor. Here, the main distribution lines with crossing connection lines to the individual rooms can be installed in the smallest possible space. There is generally very little space for the cross-talk silencers required to prevent noise interference from room to room. One potential solution for this type of concept is INDULSNAP, a high-comfort linear diffuser with an integral cross-talk silencer for installation in dividing walls.

The absorption box is installed directly between the panels when the dry-construction walls are built. An opening is formed in the office-side panel through which the outlet neck and the connection socket pass (see pages 5 and 6).

On completion of the dry construction and paintwork, the dust protection is removed and the air guide profiles clipped into place. The hygiene requirements for easy cleaning specified in VDI 6022 are fulfilled by the clip fitting.

## Ventilation Functions

The aluminium outlet profile has aerodynamically-formed fins, which splits up the supply air into a multitude of fine individual jets. The fins can be adjusted from within the room to adapt the supply air to the room geometry. Kiefer linear wall air passage INDULSNAP can achieve draught-free air distribution up to a room depth of 7 meters and an air exchange rate of six times per hour. The maximum supply air temperature difference is – 8 K (supply air temperature – average ambient temperature).



## Sizing Ventilation Systems

The "mean local air velocity" to EN ISO 7730:2007 is the air velocity measured at an arbitrary point in the occupied zone and averaged over 3 minutes.

Thermal comfort: EN ISO 7730:2007

Occupied zone: EN 13779:2007

The proprietor and engineer or installer should define and agree the boundaries of the "occupied zone" and the maximum permissible "local air velocity".

Our selection diagrams indicate the "mean local air velocity"  $\bar{v}_y$  in cooling mode  $\Delta t_{SUP} - 6$  K. It was determined from numerous measuring points distributed evenly throughout the room at the reference height considered relevant for the design. 50 % of the velocity values are above the diagram value and 50 % are below it.

The "local air velocities" that actually occur can be affected by the level of turbulence from mixed air flow as well as by ambient air motions that are not caused by the air flow system, such as cold façades, heaters and similar.

## Arrangement Information

The distance "A" to the ceiling or other suspended cooling surface must be at least 100mm. We recommend 150 to 400 mm as a favourable distance. The gap between the panel and the neck of the absorption box that passes through the panel (see Detail X) must be closed. If the neck becomes de-formed, it may no longer be possible to clip the air guide profiles into place. After installation, the neck must not stand proud of the panel.

## Acoustic Design

The relevant guidelines, e.g. EN 13779:2007, provide bandwidths of possible sound pressure levels. These tolerance ranges should be utilised, particularly with an eye on cost-effectiveness. If different connector diameters are being used, pay attention to the air velocity in the connector, as this can result in increased noise levels.

We supply products complying with the standards of machine and equipment manufacturing with dimensional tolerances in accordance with DIN ISO 2768 Part 1 and 2. In contrast, the extruded aluminium profiles often used in many other products have tolerances according to DIN EN 755-9:2008-06. Depending on the combination and surface treatment of the components and extruded profiles, additional dimensional deviations of 2 mm can occur. Due to manufacturing tolerances, the caloric performance is subject to a tolerance range of  $\pm 10\%$ , and the acoustic values to  $\pm 2$  dB.

Usual reverberation times								Sound pressure level acc. to EN 13779 [dB(A)]
$T_N$ (s)	0,4	0,5	0,6	0,7	0,8	0,9	1,0	
Counter halls, Open-plan offices								40 ... 50
Offices in general								35 ... 40
Conference-, Meeting rooms								35 ... 40
Canteens, Restaurants								40 ... 55

## INDULSNAP V24E and V45E

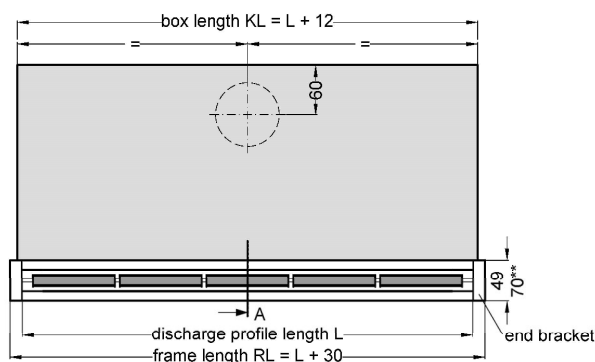
As single wall air passage for supply air or extract air

Discharge profile length L [mm]	Number of sockets
550	1
860	2
1.000	2
1.200	2

Nominal size socket	Socket length
DN 80	60
DN 100	60

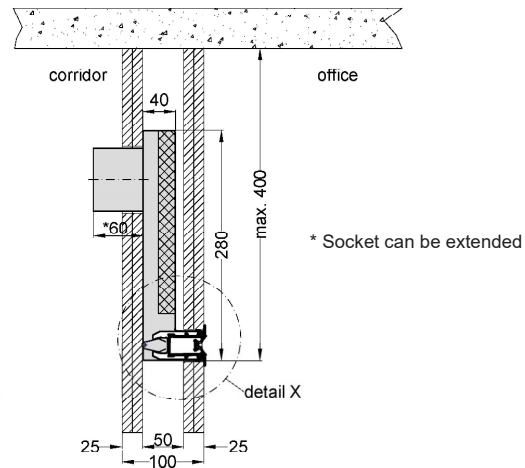
1 adaptor for extending the socket  
(total length = 105 mm)  
or with two adaptors  
(total length = 155 mm)

front view

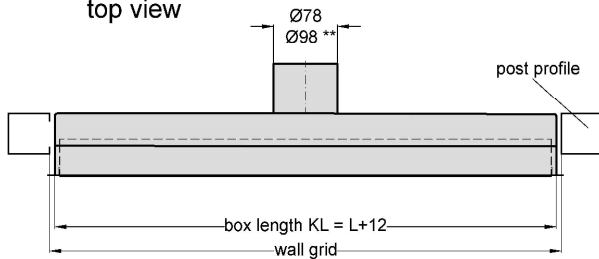


section A

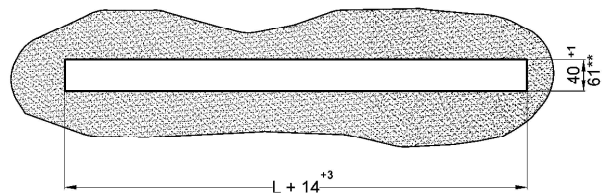
installation in room partition wall



top view

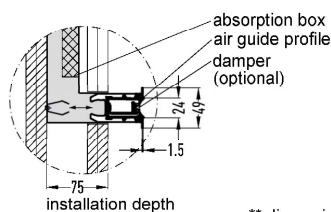


wall opening



## INDULSNAP V24E

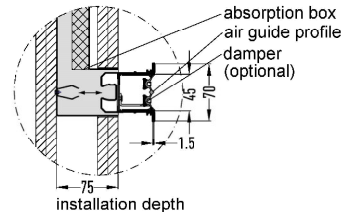
detail X



\*\* dimensions type INDULSNAP V45E

## INDULSNAP V45E

detail X



### Please note:

- To prevent noise bypass, the gap between the wall opening and the neck of the absorption box must be closed. Remove the dust protection shortly before installing the air guide profiles, with the room dust-free.
- Other dimensions on request (max. box length 1500 mm). Absorption boxes are available for all conventional dry walls.

## INDULSNAP V24K and V45K

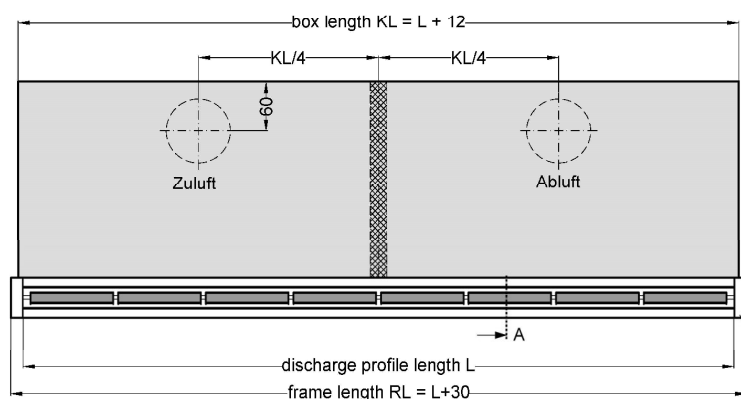
As combination wall-air diffusers for supply air and extract air

Discharge profile length L [mm]	Number of nozzles
860	One each for supply + extract air
1.000	One each for supply + extract air
1.200	One each for supply + extract air

Nominal size socket	Socket length
DN 80	60
DN 100	60

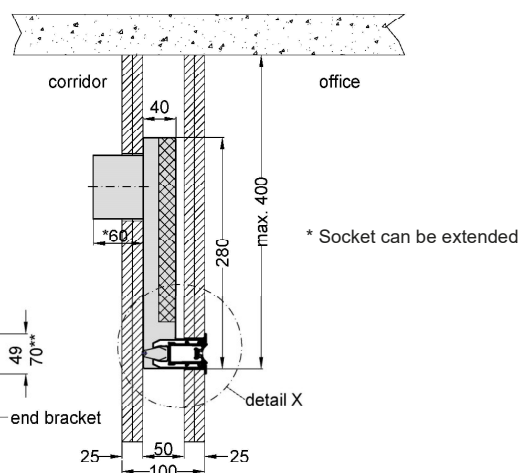
1 adaptor for extending the socket (total length = 105 mm)  
or with two adaptors (total length = 155 mm)

front view

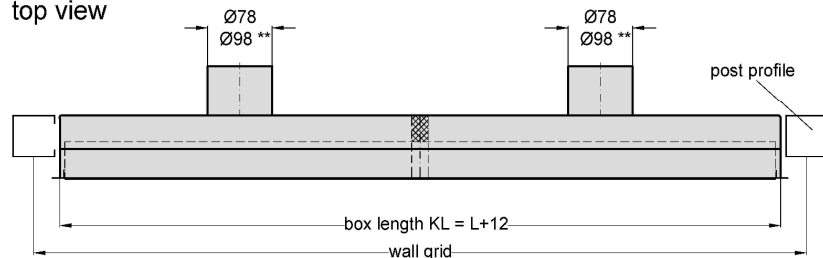


section A

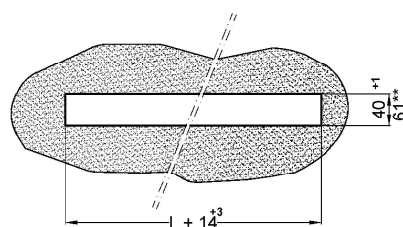
installation in room partition wall



top view

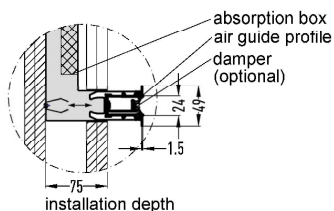


wall opening



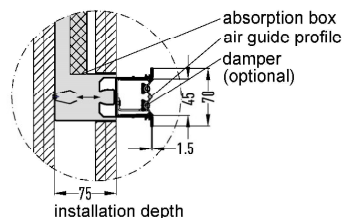
## INDULSNAP V24K

detail X



## INDULSNAP V45K

detail X



\*\* dimensions type INDULSNAP V45K

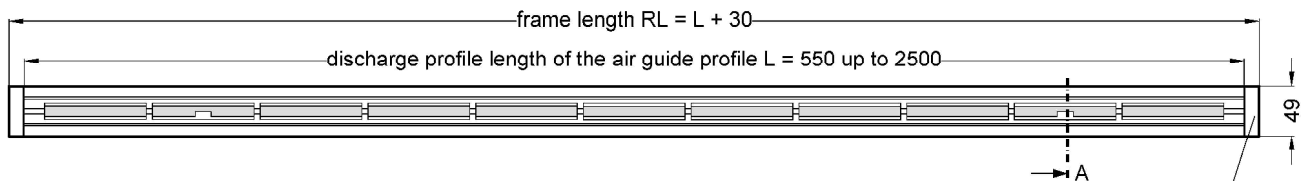
### Please note:

- To prevent noise bypass, the gap between the wall opening and the neck of the absorption box must be closed. Remove the dust protection shortly before installing the air guide profiles, with the room dust-free.
- Other dimensions on request (max. box length 1500 mm). Absorption boxes are available for all conventional dry walls.

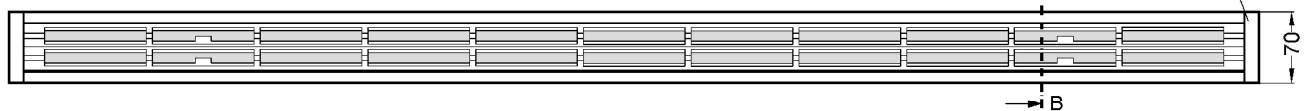
## INDULSNAP V24 W/D and V45 W/D

As air guide profile for installation in pressure ceilings  
or behind wall claddings (no absorption box)

### INDULSNAP V24 W/D

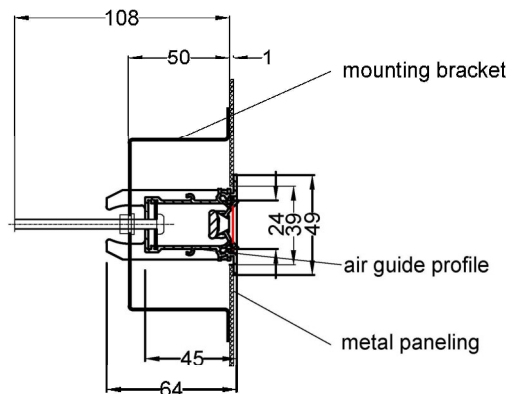


### INDULSNAP V45 W/D



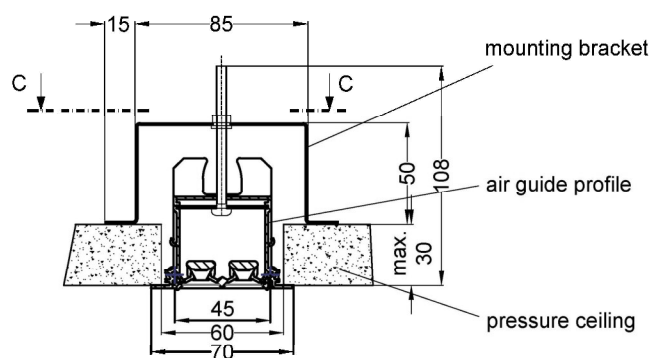
#### section A

installation in metal paneling  
with type V 24 W/D



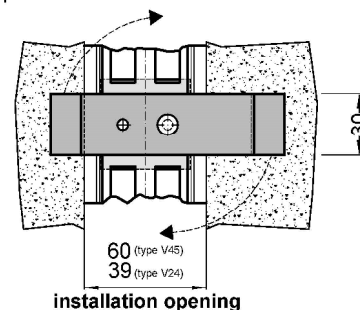
#### section B

installation in pressure ceiling  
with type V 45 W/D



#### view C-C

top view



**When installed in pressure ceiling:**  
Please accomplish ventilation and  
acoustic design according to  
Technical Information INDULSNAP  
V24 or V45.

#### Installation note:

- 1) install air guide profile in  
installation opening with  
mounting bracket
- 2) turn bracket 90°
- 3) screw on

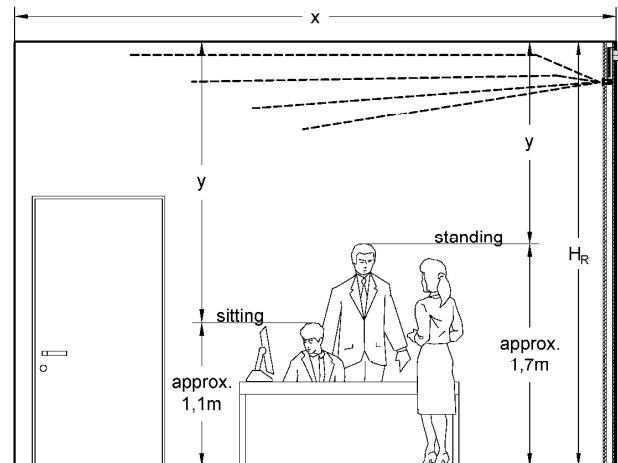


## Ventilation System Design

### INDULSNAP V24 as wall air passage

The design method considers the horizontal jet path  $x$  and the vertical jet path  $y$ . In the installation illustrated,  $x$  is the room depth. If diffusers are also installed in the opposite wall, then  $x$  will be half the room depth.

The "average local air velocity" given in the graph is for  $\Delta t_{\text{SUP}} = -6\text{K}$ . Correction factors for other supply air temperature differences are given in the table below. All data are valid for 1...6 air changes per hour.



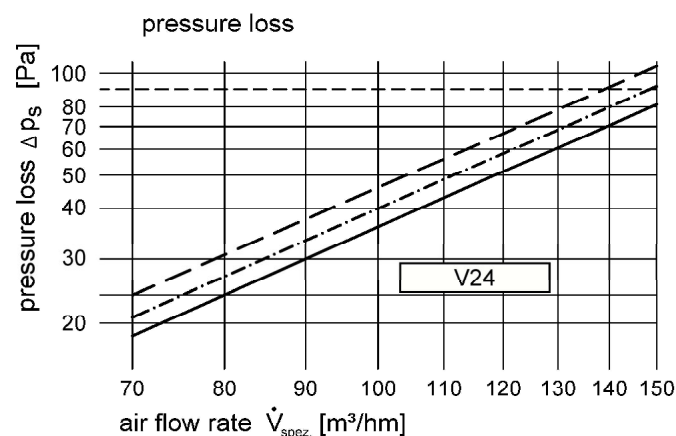
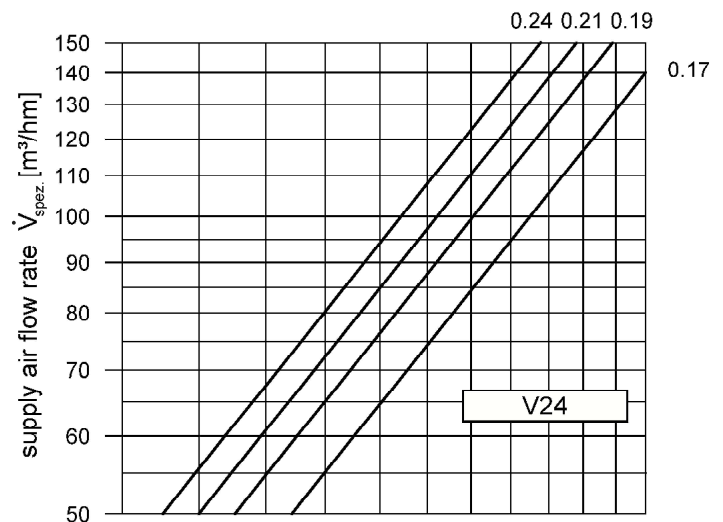
### Corrections for local air velocities at $\Delta t_{\text{SUP}} \neq -6\text{K}$

Supply air temp. difference $\Delta t_{\text{SUP}} [\text{K}]$	-2	-6	-8
Approx. change of velocity $\Delta v_{xy} [\text{m/s}]$	-0,02	0	+0,02

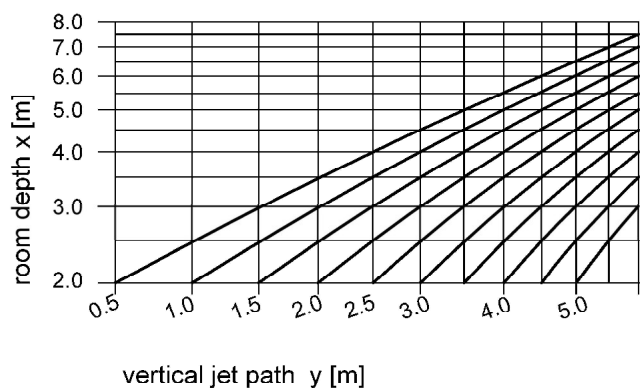
#### Please note:

Be sure to follow the instructions on page 4! The design information lays down definitions and terminology.

average "local air velocity"  $\bar{v}_y [\text{m/s}]$   
for exchange rate 1,5 ... 12  $\text{h}^{-1}$



- unthrottled
- - - slide damper 50% closed  
(increase of the sound power level  
of approx. 1,5 dB)
- . - slide damper 100% closed  
(increase of the sound power level  
of approx. 3 dB)



The graphs become invalid if combined with other diffuser types. In case of doubt, please ask our technical consultants.

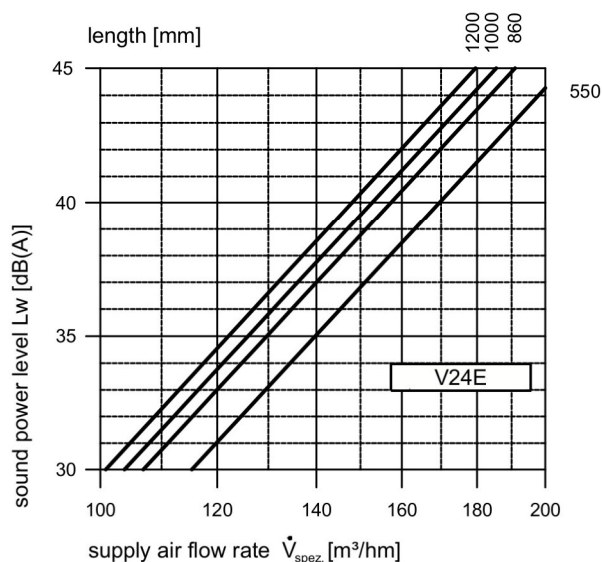


## Acoustic Design

### INDULSNAP V24 as wall air passage

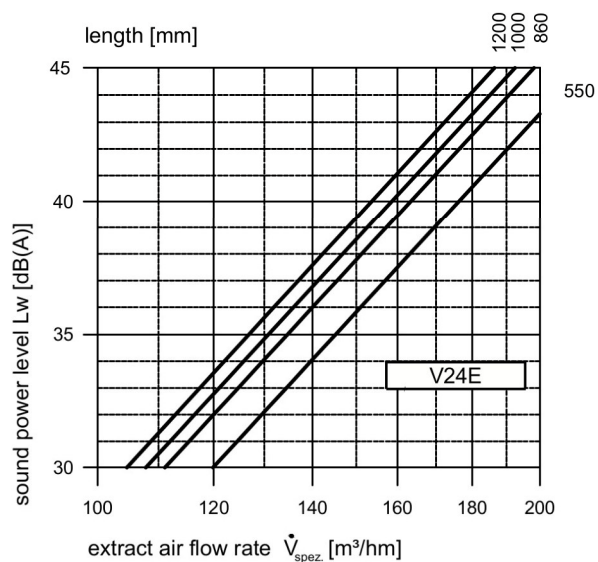
#### for single wall air passage - supply air

valid for standard length L=550 mm,  
L=860 mm, L=1000 mm and L=1200 mm



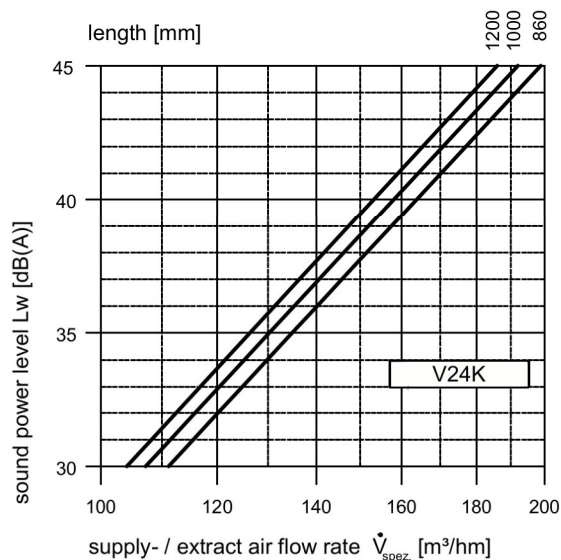
#### for single wall air passage - extract air

valid for standard length L=550 mm,  
L=860 mm, L=1000 mm and L=1200 mm



#### for combination wall air passage

valid for standard length L=860 mm,  
L=1000 mm and L=1200 mm  
(for the same supply- and extract air flow rate)



#### Sound power level $L_w$ for INDULSNAP V24

Supply air only	$L_w = 60 \cdot \log(\dot{V}_{\text{spez}}) + 10 \cdot \log(L) - 91$	[dB(A)]
Extract air only	$L_w = 60 \cdot \log(\dot{V}_{\text{spez}}) + 10 \cdot \log(L) - 92$	[dB(A)]
Combination	$L_w = 60 \cdot \log(\dot{V}_{\text{spez}}) + 10 \cdot \log(L) - 92$	[dB(A)]

Air flow rate  $\dot{V}_{\text{spez.}}$  [m³/hm]

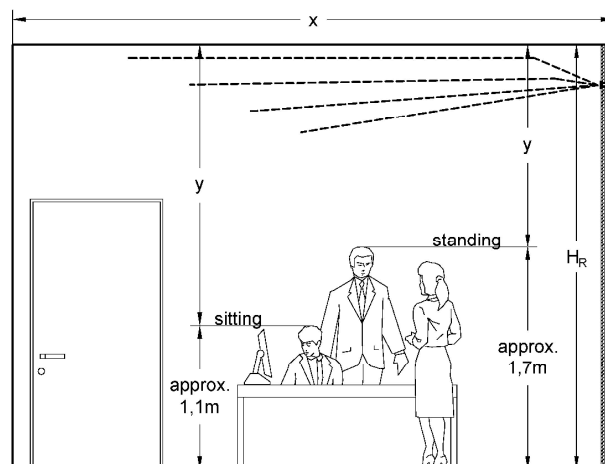
Diffuser profile length L [m] (only active length for supply air or extract air)

## Ventilation System Design

### INDULSNAP V45 as wall air passage

The design method considers the horizontal jet path  $x$  and the vertical jet path  $y$ . In the installation illustrated,  $x$  is the room depth. If diffusers are also installed in the opposite wall, then  $x$  will be half the room depth.

The "average local air velocity" given in the graph is for  $\Delta t_{\text{SUP}} = -6\text{K}$ . Correction factors for other supply air temperature differences are given in the table below. All data are valid for 1...6 air changes per hour.



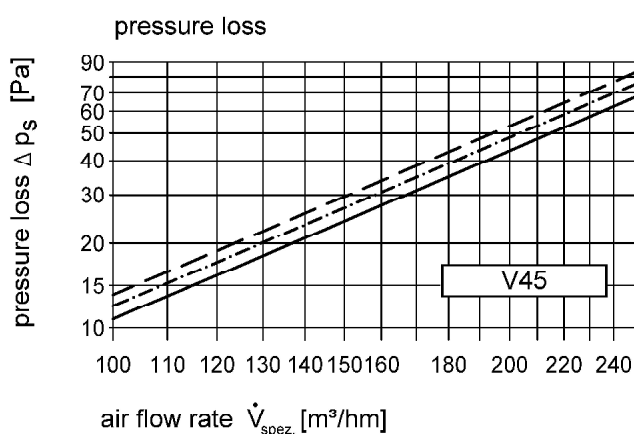
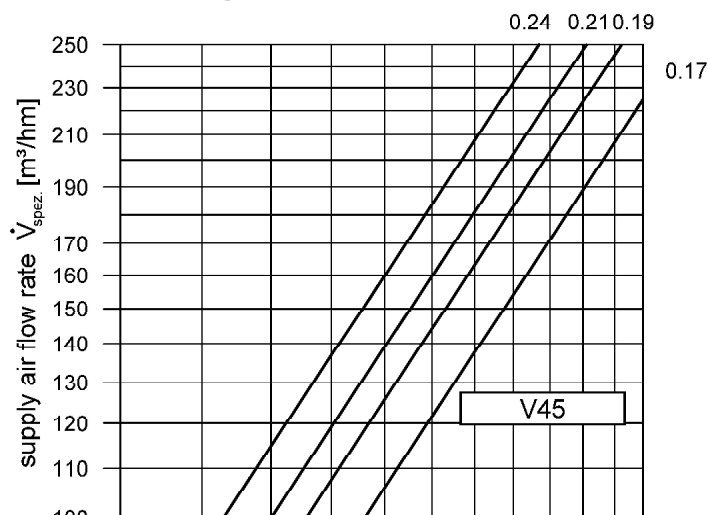
### Corrections for local air velocities at $\Delta t_{\text{SUP}} \neq -6\text{K}$

Supply air temp. difference $\Delta t_{\text{SUP}} [\text{K}]$	-2	-6	-8
Approx. change of velocity $\Delta v_{xy} [\text{m/s}]$	-0,02	0	+0,02

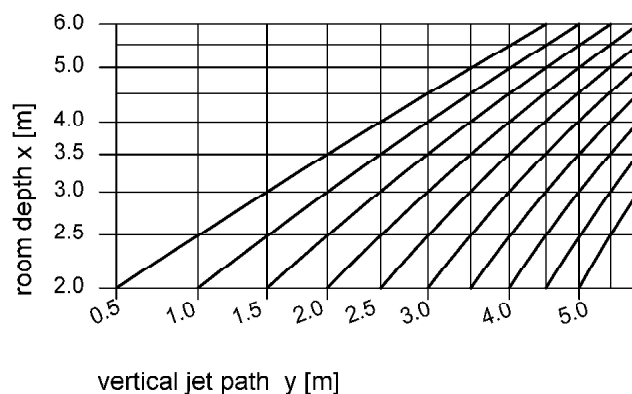
#### Please note:

Be sure to follow the instructions on page 4! The design information lays down definitions and terminology.

average "local air velocity"  $\bar{v}_y [\text{m/s}]$   
for exchange rate 1,5 ... 12  $\text{h}^{-1}$



- unthrottled
- - - slide damper 50% closed  
(increase of the sound power level of approx. 1,5 dB)
- ... slide damper 100% closed  
(increase of the sound power level of approx. 1,5 dB)



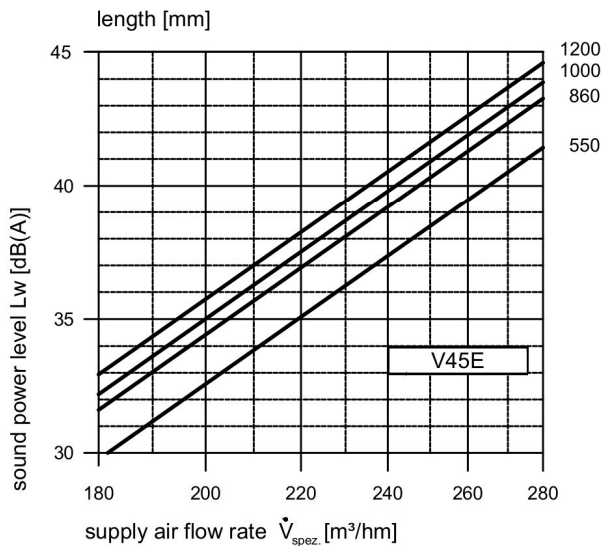
The graphs become invalid if combined with other diffuser types. In case of doubt, please ask our technical consultants.

## Acoustic design

### INDULSNAP V45 as wall air passage

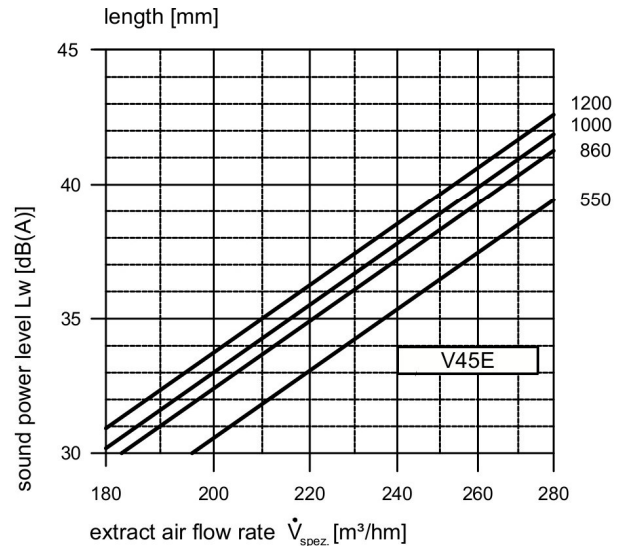
#### for single wall air passage - supply air

valid for standard length  $L=550$  mm,  
 $L=860$  mm,  $L=1000$  mm and  $L=1200$  mm



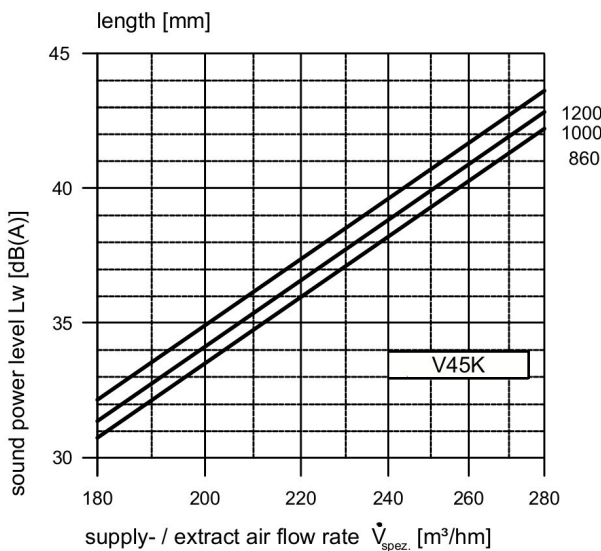
#### for single wall air passage - extract air

valid for standard length  $L=550$  mm,  
 $L=860$  mm,  $L=1000$  mm and  $L=1200$  mm



#### for combination wall air passage

valid for standard length  $L=860$  mm,  
 $L=1000$  mm and  $L=1200$  mm  
(for the same supply- and extract air flow rate)



#### Sound power level $L_w$ for INDULSNAP V45

Supply air only	$L_w = 60 \cdot \log(\dot{V}_{\text{spec}}) + 10 \cdot \log(L) - 103$	[dB(A)]
Extract air only	$L_w = 60 \cdot \log(\dot{V}_{\text{spec}}) + 10 \cdot \log(L) - 105$	[dB(A)]
Combination	$L_w = 60 \cdot \log(\dot{V}_{\text{spec}}) + 10 \cdot \log(L) - 104$	[dB(A)]

Air flow rate  $\dot{V}_{\text{spec}}$  [m³/hm]

Diffuser profile length  $L$  [m] (only active length for supply air or extract air)

## Case 1: Standard Sound Level Differential

### Installation of INDULSNAP V24 / V45 in a double-skinned plasterboard drywall.

#### Air side supply and extract air connection to the ventilation duct network.

Question: Does the installation of our wall air diffuser weaken the acoustic properties of the wall structure when the air diffuser is installed?

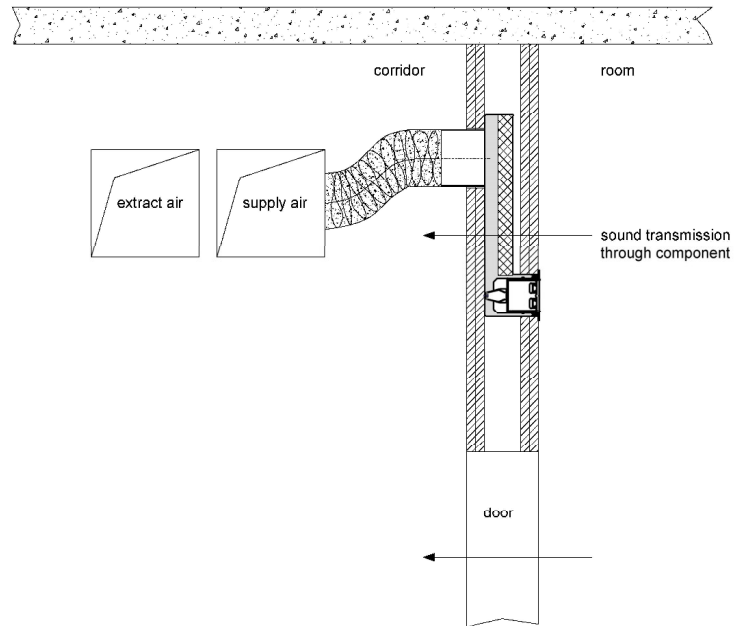
The measure used in building acoustics to indicate the attenuation properties of a component is the weighted sound attenuation value  $R_w$ . This is always expressed as a function of the area. Another variable is the assessed standard sound level differential  $D_{n,e,w}$ . For this variable, the weighted sound attenuation value  $R_w$  is extrapolated out to a reference plane of  $10 \text{ m}^2$ .

The test procedure used as a basis for determining the  $R_w$  values is specified in EN ISO 10140 and EN ISO 717. Such components are measured on a window test rig comprising two reverberation chambers located opposite each other. The  $R_w$  value, or the standard sound level differential  $D_{n,e,w}$  for a  $10 \text{ m}^2$  area, is calculated from the difference in sound pressure level in the transmitting and receiving chambers. The value measured here can then be used to calculate structural sound attenuation value  $R_{w,res}$  of the combined components. Our air diffusers are normally installed in double-skinned plasterboard walls. For an installed depth of 100 mm, these wall structures typically have a weighted standard sound level differential  $D_{n,e,w}$  of 54 – 56 dB.

To investigate whether the wall structure is weakened by our air diffuser, the vent was installed in a plasterboard wall panel and the air connection sockets on the back were sealed with end caps. In actual wall systems, the connected duct network would assume this function.

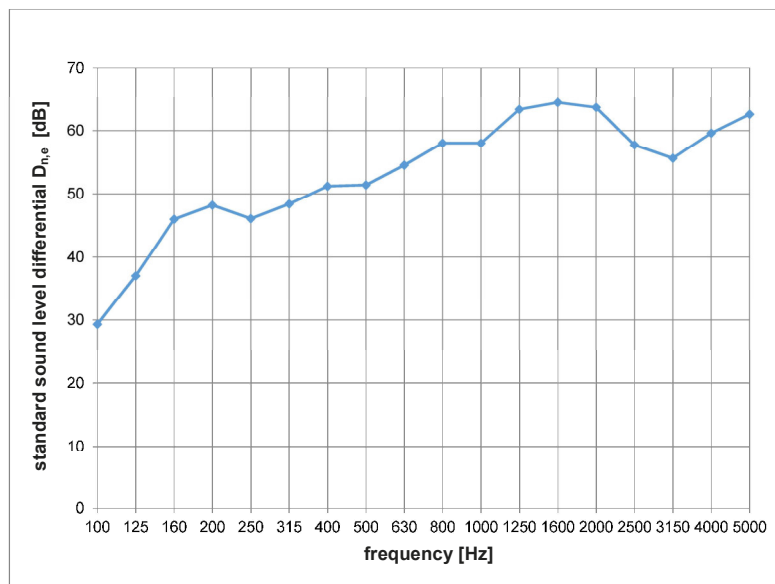
The measured values prove that there is no measurable weakening of the component. The weighted standard sound level differentials  $D_{n,e,w}$  are 53,6–55,6 dB.

Conclusion: When correctly installed, INDULSNAP does not weaken the acoustic properties of the wall component.



## Case 1 - V24 K

Diagram of the standard sound level differential V24 K / L = 1000 mm

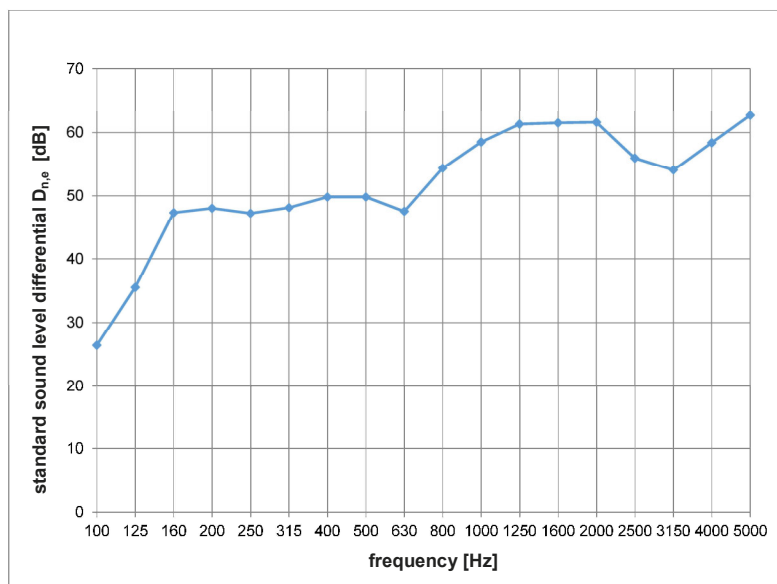


$D_{n,e,w} = 55,6 (\pm 1,2) \text{ dB}$

f [Hz]	Dn,e [dB]
100	29,3
125	37,0
160	46,0
200	48,2
250	46,1
315	48,4
400	51,2
500	51,4
630	54,5
800	58,0
1000	58,0
1250	63,4
1600	64,5
2000	63,7
2500	57,7
3150	55,6
4000	59,6
5000	62,6

## Case 1 - V45 K

Diagram of the standard sound level differential V45 K / L = 1000 mm



$D_{n,e,w} = 53,6 (\pm 1,2) \text{ dB}$

f [Hz]	Dn,e [dB]
100	26,4
125	35,5
160	47,3
200	48,0
250	47,2
315	48,1
400	49,8
500	49,8
630	47,5
800	54,4
1000	58,5
1250	61,3
1600	61,5
2000	61,6
2500	56,0
3150	54,1
4000	58,4
5000	62,7

## Case 2: Standard Sound Level Differential

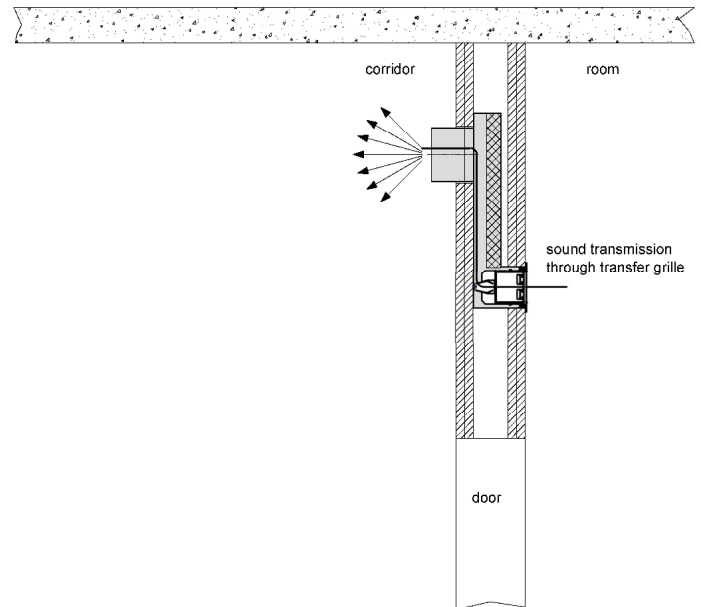
**Installation of INDULSNAP V24/V45 in a double-skinned plasterboard drywall.**

**Supply air side connection to the duct network only, no extract air connection.**

Free transfer of air from room to room. This is often implemented if, for cost and space reasons, most of the extract air duct network has to be dispensed with and only central extraction is used.

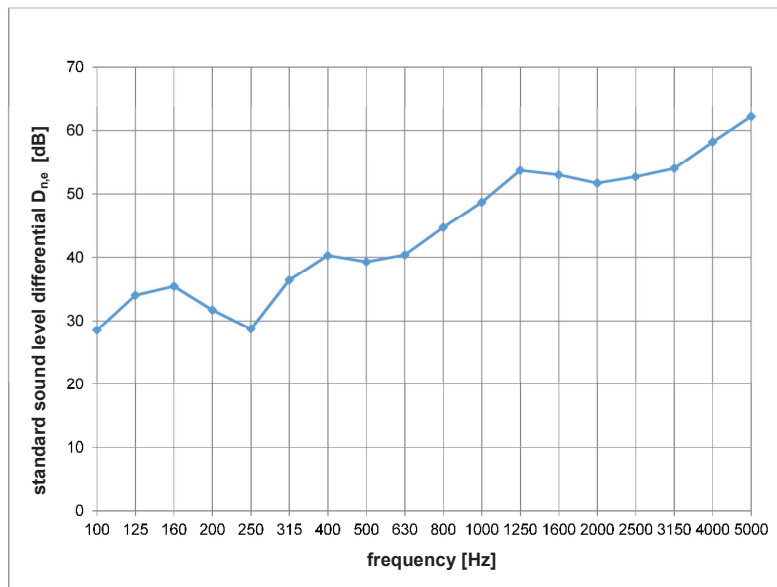
Question: Does this result in a weakening of the wall? If yes, by how much?

Here, the approach in terms of measurement and calculation is similar to that in Case 1. The weighted sound attenuation value  $R_w$  or the weighted standard sound level differential  $D_{n,e,w}$  must be determined. As expected, this configuration results in a weakening of the wall. The  $R_w$  value can now be used to calculate the  $R_{w,res}$  of the combined component (wall, door...).



## Case 2 - V24 K

Diagram of the standard sound level differential V24 K / L = 1000 mm

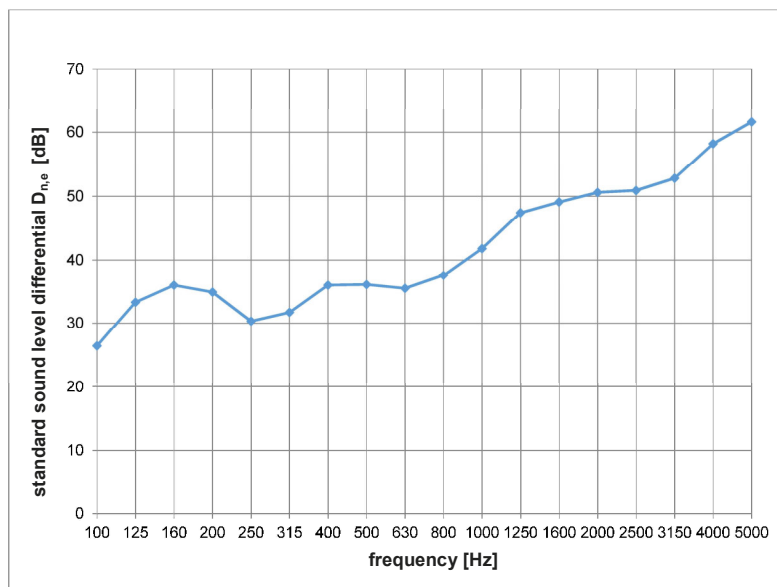


$D_{n,e,w} = 44,6 (\pm 1,2) \text{ dB}$

f [Hz]	Dn,e [dB]
100	28,5
125	34,0
160	35,4
200	31,7
250	28,7
315	36,4
400	40,3
500	39,3
630	40,4
800	44,7
1000	48,7
1250	53,7
1600	53,0
2000	51,7
2500	52,7
3150	54,0
4000	58,2
5000	62,2

## Case 2 - V45 K

Diagram of the standard sound level differential V45 K / L = 1000 mm



$D_{n,e,w} = 41,0 (\pm 1,2) \text{ dB}$

f [Hz]	Dn,e [dB]
100	26,4
125	33,3
160	36,0
200	34,9
250	30,3
315	31,7
400	36,0
500	36,1
630	35,5
800	37,6
1000	41,8
1250	47,4
1600	49,1
2000	50,6
2500	50,9
3150	52,8
4000	58,2
5000	61,6



## Case 3: Input attenuation

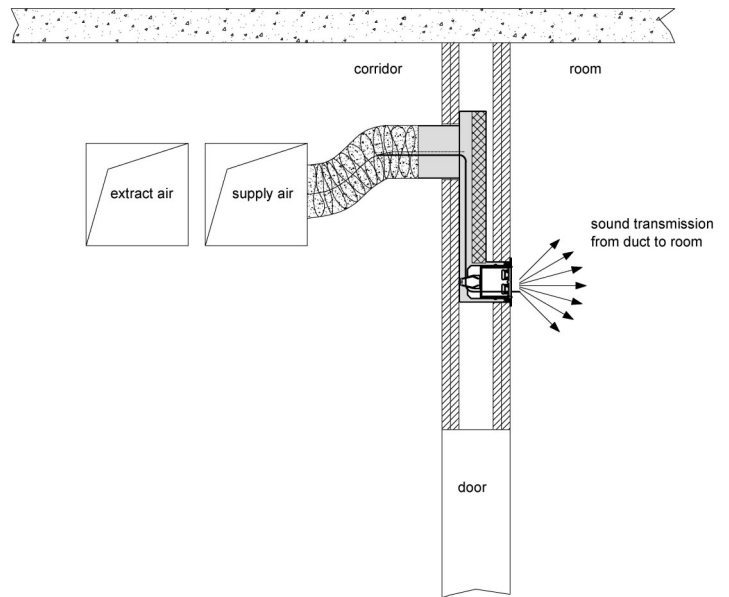
### Installation of INDULSNAP V24 / V45 in a double-skinned plasterboard drywall.

#### Air side supply and extract air connection to the ventilation duct network.

Question: To what extent does the inline silencer reduce the system noise (from the fan, air flow rate controller...) remaining in the duct network?

Our air diffuser is equipped with an inline silencer which, as the name suggests, is designed to reduce cross-talk sound transmission. At the same time, it also reduces the system noise in the duct network.

The reduction in sound level is indicated, amongst other things, by the input attenuation value  $D_i$ . This is obtained from the differential between the average sound pressure level in front of and behind the air diffuser. The input attenuation value  $D_i$  also includes the theoretical vent point reflection as per VDI 2081.



## Case 4: Sound power

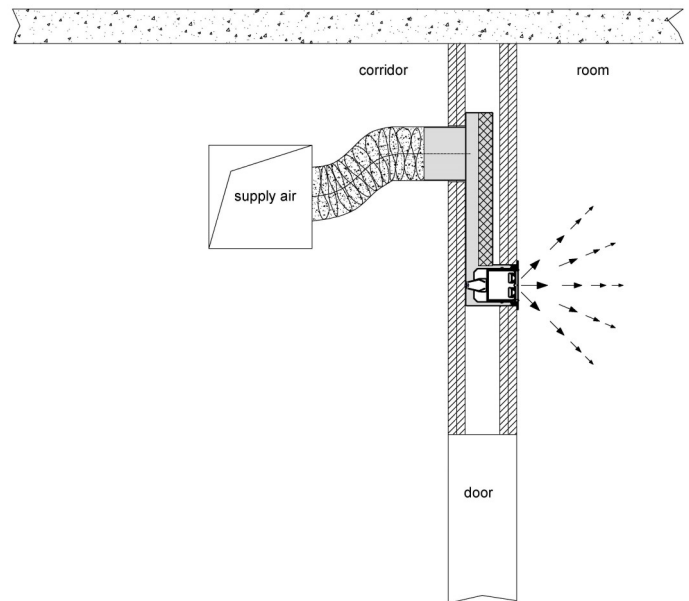
This refers to the sound power that is generated by the air diffuser as a result of the flow pattern of supply and extract air. Duct and system noise upstream of the air diffuser is not taken into consideration.

If a diffuse reverberant field is assumed, the sound pressure level, virtually through the entire room (reverberation field), is dependent on the sound power level of the air diffuser, its directional factor and the absorption capability of the room.

Generally, a room attenuation of 5 – 6 dB can be expected on average. An exact calculation of the expected sound pressure level in a room requires a knowledge of the room geometry and the reverberation time. Typical reverberation times and sound pressure levels can be found in EN 13779 (as can be seen from the accompanying table).

The sound power level can be obtained from the diagrams on pages 9 and 11.

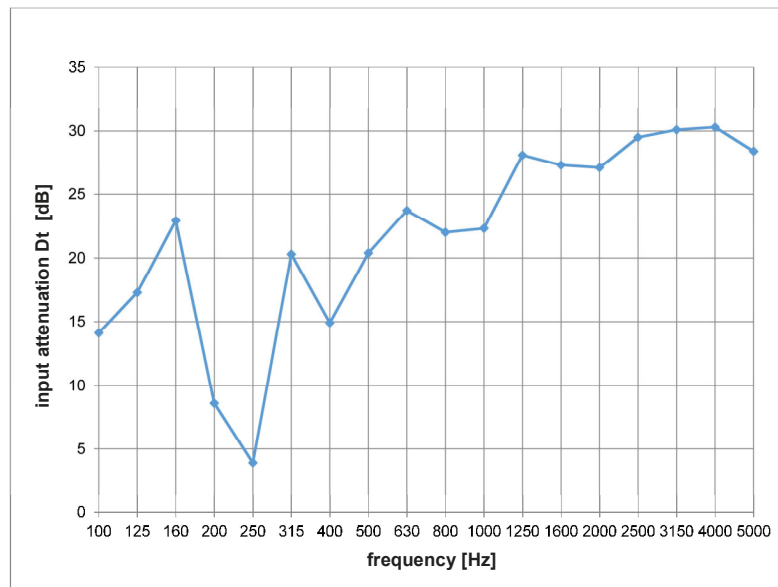
The sound pressure level in the centre of the room can be calculated according to Sabine, assuming a diffuse reverberant field. Here, all sound powers are added together logarithmically and the room attenuation subtracted. Taking into account the direct field, however, higher sound pressure levels are observed in the areas close to the vents.



Usual reverberation times									Sound pressure level acc.to EN 13779 [dB(A)]
$T_N$ (s)	0,4	0,5	0,6	0,7	0,8	0,9	1,0	1,2	
Counter halls, Open-plan offices		←→							40 ... 50
Offices in general			←→						35 ... 40
Conference-, Meeting rooms				←→					35 ... 40
Canteens, Restaurants					←→				40 ... 55

## Case 3 - V24 K

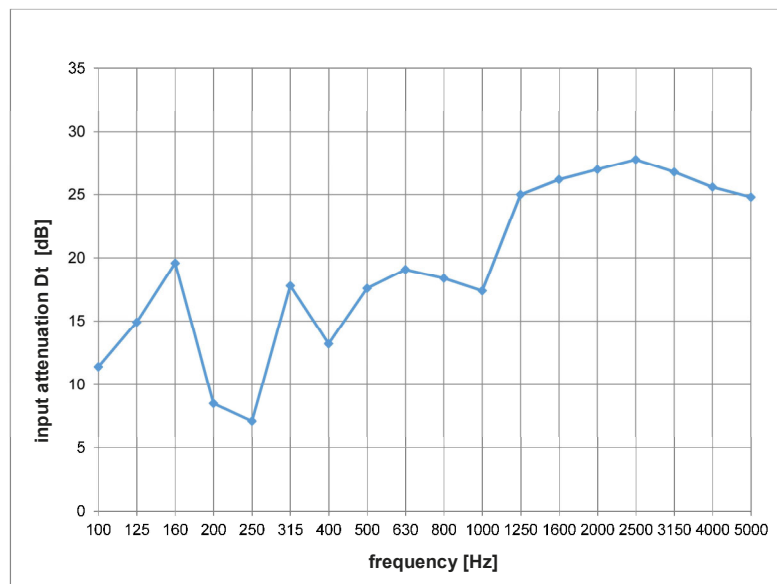
Diagram of input attenuation V24K / L = 1000 mm



f [Hz]	Dt [dB]
100	14,1
125	17,3
160	22,9
200	8,6
250	3,9
315	20,3
400	14,9
500	20,4
630	23,7
800	22,0
1000	22,3
1250	28,1
1600	27,3
2000	27,1
2500	29,5
3150	30,1
4000	30,3
5000	28,4

## Case 3 - V45 K

Diagram of input attenuation V45K / L = 1000 mm



f [Hz]	Dt [dB]
100	11,4
125	14,9
160	19,6
200	8,5
250	7,1
315	17,8
400	13,2
500	17,6
630	19,1
800	18,4
1000	17,4
1250	25,0
1600	26,2
2000	27,0
2500	27,8
3150	26,8
4000	25,6
5000	24,8

**Wall Air Diffuser INDULSNAP**

Highly inductive air diffuser for variable volumetric flows. Thanks to its highly compact design, it is ideally suited for installation in dividing walls and where space is restricted. The supply air is fed in via a tangential ceiling jet using the Coanda effect. This enables excellent penetration depth. Also available as combination diffuser (K version) for supply air and extract air. The absorption box features an integrated sound insulation lining for reducing cross-talk sound transmission, which means there is usually no need for additional cross-talk sound insulation. The air diffuser is easy to clean (VDI 6022) as the air guide profiles can be removed easily without tools. Supply air temperature differences of up to – 8K are possible.

**Air diffuser comprising:**

- Discharge profile and support profile made from aluminium extrusion profile
- Air guide vanes can be adjusted in 15° increments
- Absorption box made from galvanized sheet steel with inner lining made from high-absorption sound insulating material (incombustible, building material class A2 to DIN 4102) including dust protection for preventing soiling during construction.
- Air guide profiles suitable for installation after dry construction work is complete
- Air connection socket
- Slide damper can be operated from within the room (optional)

**Design:**

Slot width (discharge profile)

- ☐ 24 mm  
☐ 45 mm

**Type:**

- ☐ Single diffuser for supply air or extract air (type E)  
☐ Combination diffuser for supply air and extract air (type K)  
☐ Air guide profiles, as described above, for installation in pressure ceilings or behind wall claddings, with mounting brackets for simple, invisible mounting in wall or ceiling slots, without acoustically effective absorption boxes. (Type WD).

**Installation length (mm):**

- ☐ 550   ☐ 860   ☐ 1000   ☐ 1200   ☐ \_\_\_\_\_ (Type WD, possible lengths 550-2500 mm)

**Damper:**

- ☐ Slide damper can be operated from within the room

**Colour:**

Discharge profile:

- ☐ white, powder-coated in RAL 9010

Air guide profile including frame:

- ☐ white, powder-coated in RAL 9010

Air guide vanes:

- ☐ black

No. \_\_\_\_\_ Qty. \_\_\_\_\_ Unit price \_\_\_\_\_

**Special colours:**

- ☐ Discharge profile and air guide profiles in special colours similar to RAL  
☐ Air guide vanes white

**Manufacturer: Kiefer Klimatechnik GmbH**

**Series: Wall Air Diffuser**

**Type: INDULSNAP V24/V45**

➡ Tender text can be downloaded from [www.kieferklima.de](http://www.kieferklima.de)

## Data required for the Technical Design and Offer Preparation:

Recipient:

Sender:

Fax-No.: 0711/8109-205

Maschinenfabrik Gg. Kiefer GmbH

Heilbronner Straße 380-396

70469 Stuttgart

Wall Air Passage: ☐ INDULSNAP V24

☐ INDULSNAP V45

Project:

Project No. Customer: \_\_\_\_\_ Date/Associate: \_\_\_\_\_ Project No. Kiefer: \_\_\_\_\_

Room or module name					
Number of these rooms/modules					
Spec. supply air volumetric flow	[m <sup>3</sup> /h]				
Room width	[m]				
Room length	[m]				
Area	[m <sup>2</sup> ]				
Room height	[m]				
Cooling capacity	[W]				
Room air temperature	[°C]				
Supply air temperature	[°C]				
Average room air velocity	[m/s]				
at room height	[m]				
Sound pressure level in the room	[dB(A)]				
at reverberation time	[s]				

## Product Range

### Components:

Linear, wall, ceiling and air outlet diffusers, chilled ceiling panels, recirculation coolers, cross-flow units, concrete core cooling with air. Axial and radial ventilators, hot-gas ventilators, plastic ventilators.

### Systems:

Air conditioning plants of all kinds for comfort (office, administration, shopping centres, hospitals, libraries, museums, etc.) and industrial applications (machine construction, high-tech, textile, plastics, chemicals, automotive, soft drinks, food industry, etc.).

## Services

### Consulting and planning:

We provide advice concerning all aspects of our systems and create system analyses and cost estimates based on cooling load / pipe network / energy cost / efficiency calculations. We also develop proposals concerning suggested layouts for air distribution, lighting and ceiling systems; and compile lighting-related data using the latest software tools, as well as developing and implementing control-technology related concepts in our own MSR division.

We are furthermore able to draw on a wealth of experience from previous projects when it comes to designing innovative products and new projects.

### Laboratory:

Certificates, 1:1 room airflow laboratory analyses; acoustic and aerodynamic analyses of air-conditioning modules. Development of innovative air conditioning components. Caloric performance measurements of air and water-related components on test stands. On-site comfort measurements to assess thermal comfort and indoor air quality.

### Maintenance and servicing

All kinds of air-conditioning and climate control systems as part of maintenance and service contracts.