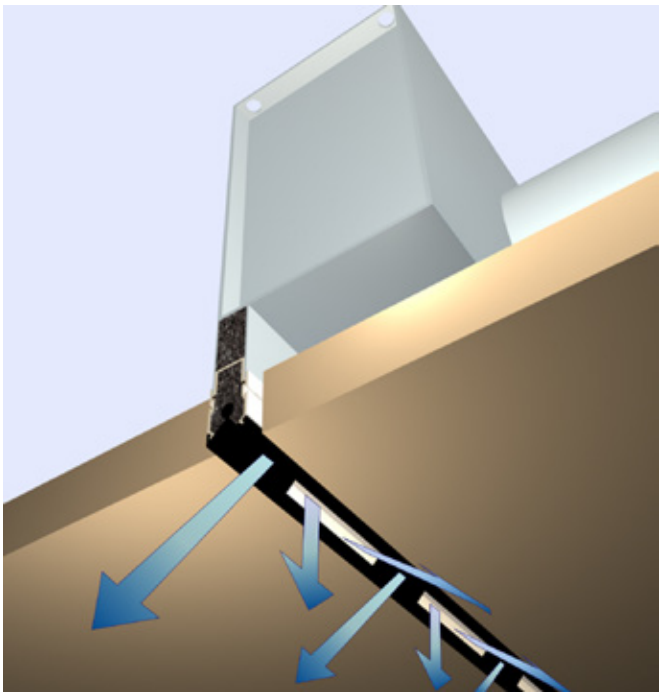
Kiefer Klimatechnik

Technical Information

Linear Diffuser
INDUL® Type P…N
INDUL® Type V…N



- Draught-free air distribution
- Highest comfort
- Temperature difference of up to –14 K
- Air flow rate 20 to 250 m³/hm
- Installation widths of 15, 18, 24 and 45 mm
- Completely asymmetrical even with insulation
- Throat height of 37 – 130 mm possible
- Simple quick installation

Content

Features

Installation width:
INDUL P: 15, 18 and 24 mm
INDUL V: 24 and 45 mm
Slender Linear diffuser for the inconspicuous installation in joints of
• Metal-coffered ceilings
• Wood- and metal-panel ceilings
• Plasterboard and mineral fibre ceilings
as well as simplified design integration into all types of special ceilings.

Completely draught-free air distribution
Air is outlet vertically and finely spread, which enables a diffuse, non-centrifugal ambient air flow. Thanks to special perforations (INDUL P) and adjustable air guide vanes (INDUL V), it is possible to achieve tangential and asymmetrical air distribution.

High temperature differences possible
INDUL P: up to –14 K
INDUL V: up to –10 K
This is thanks to an extremely high induction ratio and the rapid temperature reduction associated with it.

INDUL keeps ceilings dust-free longer
The stable, 90° free-jet characteristics distribute the supply air directly into the occupied zone without dampening the ceiling. Precisely formed break-away edges prevent the Coanda effect.

Load variation from 100% to 20% possible
For this reason, it is especially suited for variable flow rate systems.

Jet direction adjustment
- INDUL P provides stable, 90° flow characteristics in all operating states. This means there is no need to adjust the jet direction.
- INDUL V features air guide vanes that can be adjusted from within the room, by clicking them into place in 15° increments.
- With both types, the jet pulse is reduced after approx. 1 m.

Extensive range of application
Homogeneous ambient air flow with an air exchange rate (per hour) of 1.5 to 12 h^{-1} thanks to optimised free-jet characteristics.

Insulated version
The entire INDUL P and V series is available with highly efficient air-gap insulation and is thus fully recyclable. The lack of mineral fibre and foam insulation also makes recycling an easy and inexpensive process.

Energy saving
As the system offers the highest possible temperature difference, it opens up excellent potential for making energy savings through the use of free cooling.

Easy to install
- Clean installation in plasterboard ceilings thanks to unique plaster bracket.
- Overlay brackets are available for all types.
- Very light weight as components are made from aluminium as far as possible.
- Mounting sections allow for slight adjustment on all three levels, even after installation and connection.

In the case of INDUL type P, the discharge profile has perforations that enable the supply air to be fed into the room as a large number of fine individual jets measuring around 3 mm in thickness. Most of the individual jets can be directed into the room in two ways, at 45° in each case. A small vertical proportion of the air supports and stabilises the jet geometry.

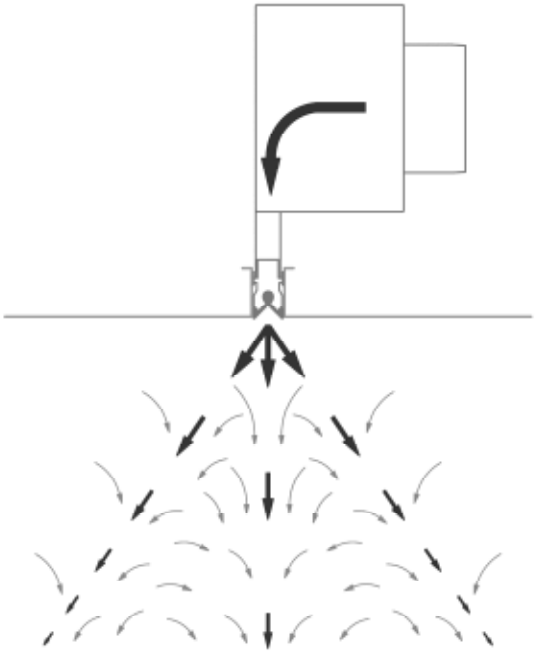
Maximum induction and the rapid jet temperature reduction associated with this are yet more benefits offered by these discharge characteristics. They dramatically reduce the ambient flow's reliance on the supply air temperature and room height.

In the case of INDUL type V, the discharge profile is equipped with adjustable air guide vanes. This model range has been designed for applications requiring volumetric flows that range from relatively high to high. Assuming the correct design and dimensioning are used, adherence to EN 13779 limit values is assured in all cases.

INDUL type V consistently offers a high level of induction coupled with rapid jet temperature reduction.

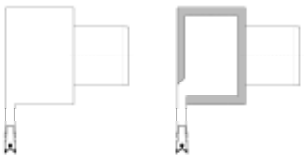
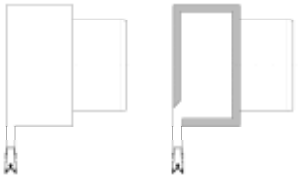
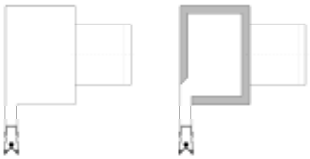
With the Kiefer linear diffuser INDUL, it is possible to achieve a draught-free supply air feed with up to 12 times the air exchange rate (per hour), as well as a supply air temperature difference of –14 K (supply air temperature – average ambient temperature) in the case of INDUL type P and –10 K in the case of INDUL type V.

The classic INDUL supply air distribution



The specially developed discharge geometry produces fine individual jets. Ambient air can be induced effectively on the surfaces of the individual jets.

Product Overview

Model Range **INDUL N**			
	AP 15 - 80 N API 15 - 80 N	**AP 15 - 125 N API 15 - 125 N**	**AP 18 - 80 N API 18 - 80 N**

Quick Design and Dimensioning Information

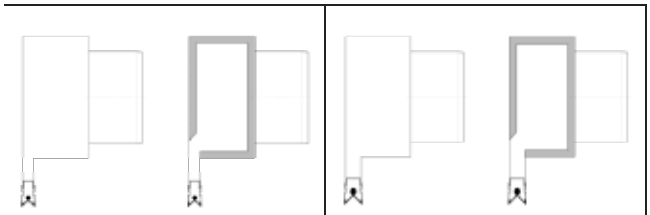
Maximum supply air flow rate* and resulting pressure losses and average ambient air velocities with specified sound pressure level in the room and

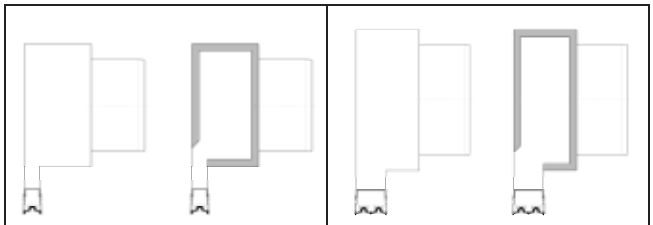
Air exchange rate (per hour)		2	6	2	6	2	6
L_p = 30 dB(A)	$\dot{V}_{max}$ [m³/hm]	56	45	61	49	73	59
	Δp [Pa]	18	12	20	13	29	18
	$\bar{v}_y$ (m/s)	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12
L_p = 35 dB(A)	$\dot{V}_{max}$ [m³/hm]	70	56	77	62	93	74
	Δp [Pa]	29	18	31	20	46	29
	$\bar{v}_y$ (m/s)	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12
L_p = 40 dB(A)	$\dot{V}_{max}$ [m³/hm]	88	71	97	78	116	93
	Δp [Pa]	46	30	50	32	71	46
	$\bar{v}_y$ (m/s)	0.13	<0.12	0.14	<0.12	<0.12	<0.12

* The specified values are valid for supply air in combination with our arrangement information on page 7 and with the dimensions on page 18
The air room velocities are valid for a seat level of 1.1 m and temperature difference of – 6 K.

Sound power level with supply air (exctract air) $L_W = 60 \cdot \log(\dot{V}_{spez}) - X$ [dB(A)/m]	X = 72 (79) dB(A)/m	X = 74 (81) dB(A)/m	X = 78 (85) dB(A)/m
Minimum supply air flow rate when operating with Δt = – 6 K	20 m³/hm	20 m³/hm	30 m³/hm
Pressure losses with supply air (extract air) $\Delta p = (\dot{V}_{spez.})^2/K$ [Pa]	K = 170 (120)	K = 190 (170)	K = 190 (170)
Max. temperature difference	–14 K	–14 K	–14 K
Ranges of application	Designed for rooms with the highest comfort demands. This is achieved thanks to		
Design and dimensioning diagrams on page 10 and 13		10 and 13	10 and 14
Dimensions:			
Socket-Ø [mm]	78	123	78
Box height [mm]	126	166	126
Throat heigth [mm]	65	65	65
Overall height [mm]	191	231	191
Box width [mm]	90	90	90
Discharge profile width [mm]	15	15	18
Socket length [mm]	75	75	75

The box lengths are for all series 480/730/980/1230/1480/1730/1980/2230/2480 mm. Special lengths and widths are on request possible.

	
AP 18-125 N API 18-125 N	**AP 24-125 N API 24-125 N**

	
AV 24-125 N AVI 24-125 N	**AV 45-160 N AVI 45-160 N**

air exchange rate (per hour)

2	6	6	12
88	71	85	74
19	12	12	9
<0.12	<0.12	<0.15	<0.15
111	89	107	93
30	19	20	15
<0.12	<0.12	<0.15	<0.15
140	112	135	118
48	31	31	23
<0.12	<0.12	<0.15	<0.15

6	12	6	12
93	81	214	186
14	11	9	7
<0.17	<0.17	0.17	<0.17
118	102	270	235
23	17	15	11
<0.17	<0.17	0.22	0.19
148	129	339	296
36	27	23	18
<0.17	<0.17	0.27	0.24

with a reverberation time of 0.6 s and a standard room height of 2.8 m with completely open damper.

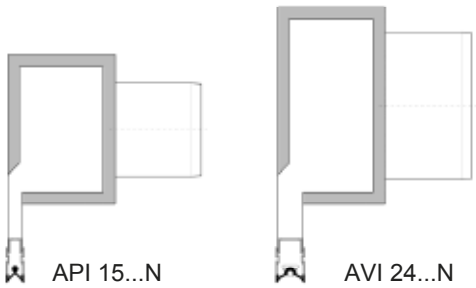
X = 82 (86) dB(A)/m	X = 86 (87) dB(A)/m
30 m^3/hm	50 m^3/hm
K = 410 (330)	K = 590 (470)
–14 K	–14 K
the diffuse, entirely non-centrifugal ambient air flow.	
10 and 14	11 and 14
123	123
166	166
65	65
231	231
90	90
18	24
75	75

X = 88 (93) dB(A)/m	X = 106 (106) dB(A)/m
50 m^3/hm	70 m^3/hm
K = 610 (540)	K = 4900 (1430)
–10K	–10 K
Designed for rooms with high comfort demands and large supply air flow rates.	
12 and 15	12 and 15
123	158
166	201
65	65
231	266
90	90
24	45
75	75

The discharge profiles have an overhang of min. 20 mm and max. 269 mm compared to the box length. (See dimensions on page 18).

Thermal Insulation

Significant energy losses are characteristic of uninsulated plenum boxes. For this reason, the Linear diffuser system INDUL is available with factory-finished insulation, which drastically reduces energy losses.

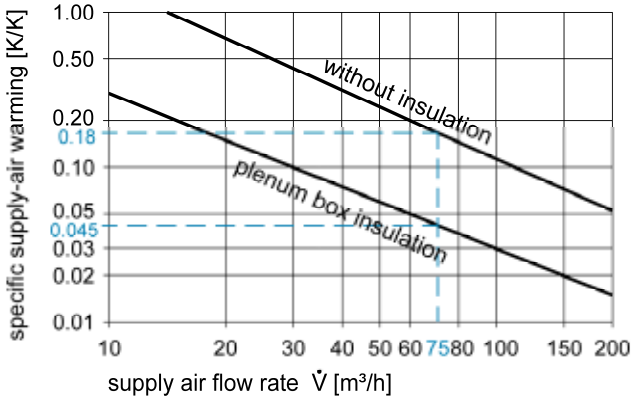


API 15...N AVI 24...N

Highly efficient air-gap insulation without mineral fibre insulating material

Diagram

Specific supply air heating in the case of non-insulated and insulated supply air diffusers (1500 mm long, 1 connection socket).



Example

Supply air flow rate of 75 m³/h.

	Without insulation	With air-gap insulation	
Specific supply air heating	0.175	0.04	K/K
Heating at Δt –10 K	1.75	0.4	K
Energy losses at Δt –10 K	17.5	4.0	%

PRESSURE LOSS $\Delta p_s = \dot{V}^2/K$ [Pa] $\dot{V}$ = m³/hm		
Model series	**Supply air**	**Extract air**
AP 15 – 80 N	K = 170	K = 120
AP 15 – 125 N	K = 190	K = 170
AP 18 – 80 N	K = 190	K = 170
AP 18 – 125 N	K = 410	K = 330
AP 24 – 125 N	K = 590	K = 470
AV 24 – 125 N	K = 610	K = 540
AV 45 – 160 N	K = 4900	K = 1430

Acoustics

SOUND PRESSURE $L_W(A) = 60 \cdot \log(\dot{V}) - X$ [dB(A)/m] $\dot{V}$ = m³/hm		
Model series	**Supply air**	**Extract air**
AP 15 – 80 N / API 15 – 80 N	X = 72	X = 79
AP 15 – 125 N / API 15 – 125 N	X = 74	X = 81
AP 18 – 80 N / API 18 – 80 N	X = 78	X = 85
AP 18 – 125 N / API 18 – 125 N	X = 82	X = 86
AP 24 – 125 N / API 24 – 125 N	X = 86	X = 87
AV 24 – 125 N / AVI 24 – 125 N	X = 88	X = 93
AV 45 – 160 N / AVI 45 – 160 N	X = 106	X = 106

RELATIVE SOUND PRESSURE LEVEL ΔL_W [dB]							
	Oktave band, average frequency (Hz)						
Model series	125	250	500	1000	2000	4000	8000
AP 15 –125 N	-11	-2	-9	-11	-10	-21	-30
AP 18 –125 N	-10	-2	-8	-12	-12	-18	-26
AP 24 –125 N	-9	-1	-9	-13	-16	-20	-24
AV 24 –125 N	-5	0	-8	-13	-16	-26	-28
AV 45 –160 N	-3	0	-8	-10	-22	-30	-27

L_W (frequency) [dB] = $L_W(A) + \Delta L_W$
The A-weighting is already included in the ΔL_W value.
The values apply to an installation length of 1000 mm.

Note:
While observing the dimensions given on **page 18,** the specific supply air flow rate $\dot{V}_{sup}$ (m³/hm) can be determined using the actual installed length of discharge profile.

Recommendation:

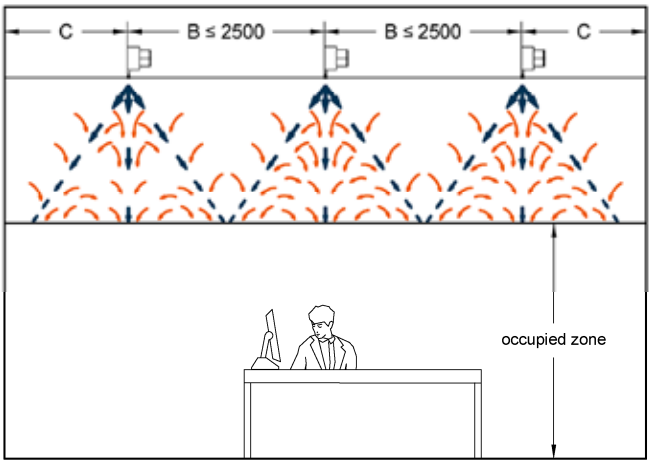
- The applicable guidelines, such as DIN EN 13779, provide bandwidths for the possible sound pressure levels.
  Especially from the perspective of economics, these tolerance ranges should be used.
- If a fitting dimension deviates from our standard fitting dimension, the fitting speed may not exceed a speed of 6 m/s.
- In case of doubt, please ask our technical consultant.

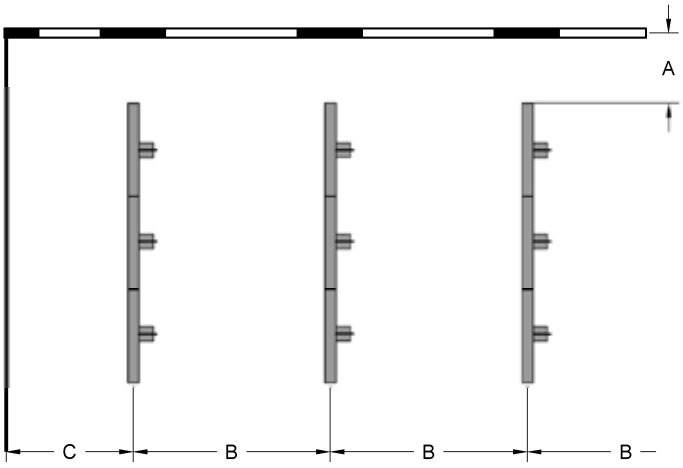
Usual reverberation times									sound pressure level acc.to EN 13779
T_N (s)	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.2	[dB(A)]
counter halls, open-plan offices									40 ... 50
offices in general									35 ... 40
conference-, meeting rooms									35 ... 40
canteens, restaurants									40 ... 55

Arrangement Information

Recommendation:

- Parallel distances B ≤ 2.5 m with a room height of approx. 3 m.
- Uniform diffuser arrangement within the room.
- Air diffusers must be arranged so that they are vertical in relation to the facade.
- Aim for symmetrical jet geometry and uniform arrangement of air diffusers in the room.
- The best way to achieve a diffuse, entirely draught-free ambient air flow is to use the fixed, non-adjustable linear diffusers INDUL P15, P18 and P24.





Dimension A: Vertical facade distance non-critical, up to 0 m possible
Dimension B: Parallel distance from between the diffusers ≥ 1.2 m
Dimension C: Parallel distance to walls ≥ 1.0 m
With lower values, the specific supply air flow rate must be reduced. Take advantage of our technical consultation service.

Measurement Methods and Standards

According to DIN EN ISO 7730:2007, the "average local air velocity“ is the air velocity measured at an arbitrary point in the com-mon area and averaged over 3 minutes.

Perm. velocity: DIN EN ISO 7730:2007
Measurement method: DIN EN 13182:2002
Occupied zone: DIN EN 13779:2007

The limits of the "occupied zones" and the maximum permissible "local air velocity" must be coordinated between the building owner and planners or installers.

Our selection diagrams indicate the "average local air velocity $\bar{v}_y$" in cooling mode. It was determined from numerous measurement points distributed evenly in the room, of the reference level relevant to the design and dimensioning. 50 % of the velocity values are above the diagram value and 50 % are below it.

The actual "local air velocities" that occur can be influenced by the level of turbulence from mixed-air streams on the one hand and by ambient air motions not caused by the air flow system on the other (cold facades, heaters and similar).

The discharge characteristics of INDUL P...N correspond to a symmetrical, vertical, 90° full jet. They assuring a stable, draught-free ambient air flow over a wide range of temperature differences and supply air flow rates.

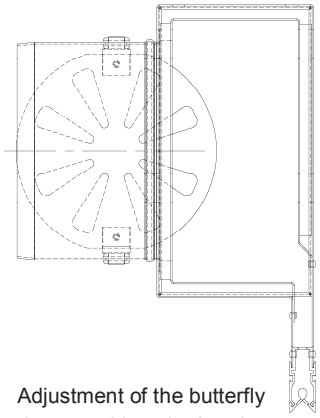
Asymmetric discharge characteristics are possible too, but should be agreed upon with the manufacturer.

The diagrams become invalid if combined with other air diffuser types.

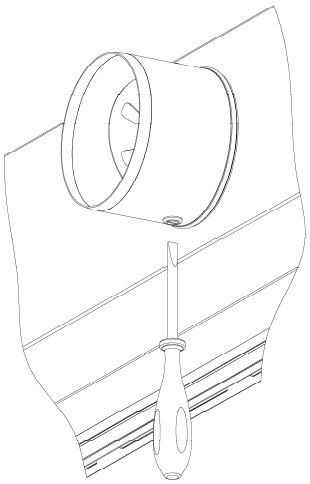
We supply products that comply with machine and equipment manufacturing standards where dimensional tolerances are in accordance with DIN ISO 2768 Part 1 and 2. By contrast, the extruded aluminium profiles used in many other products have tolerances in accordance with DIN EN 755-9:2008-06. Depending 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 ± 10 %, and the acoustic values to a tolerance range of ± 2 dB.

Butterfly Damper

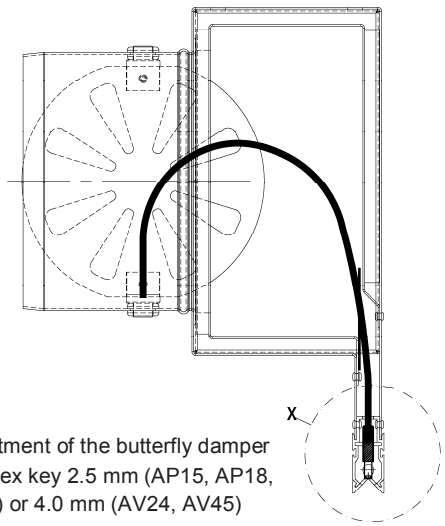
adjustable at socket



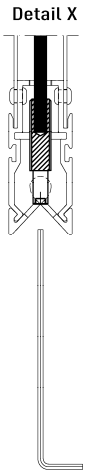
Adjustment of the butterfly damper with a slot-head screwdriver



adjustable from room



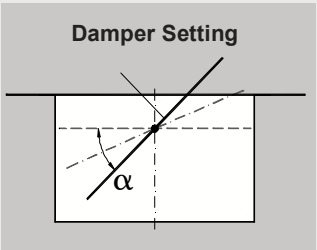
Adjustment of the butterfly damper with hex key 2.5 mm (AP15, AP18, AP24) or 4.0 mm (AV24, AV45)



Note:
INDUL Diffusers are supplied with the butterfly damper closed. Once installation has been completed all butterfly dampers must first be opened before carrying out system regulation.

Additional Pressure Loss and Sound Power Increase with different Damper Settings

	Factor K_d			Sound Power Increase ΔL_W		
Factor	**Damper Setting α**			**Damper Setting α**		
Nominal Size, Socket	**0°**	**22.5°**	**45°**	**0°**	**22.5°**	**45°**
80	290	480	1520	+ 8 dB(A)	+ 7 dB(A)	+2 dB(A)
125	1810	2700	14700	+12 dB(A)	+ 6 dB(A)	+1 dB(A)
160	3080	5100	22300	+20 dB(A)	+12 dB(A)	+2 dB(A)



0° = butterfly damper closed

Pressure Loss Increase

Formula: Δp = (volumetric^2 / factor K_d)

Example:

Socket: 125 mm
Volumetric: 150 m^3/h
Damper setting: 22.5°
Faktor K_d: 2700

$$\Delta p = \frac{(150\ m^3/h)^2}{2700}$$

Pressure loss increase: + 8 Pa

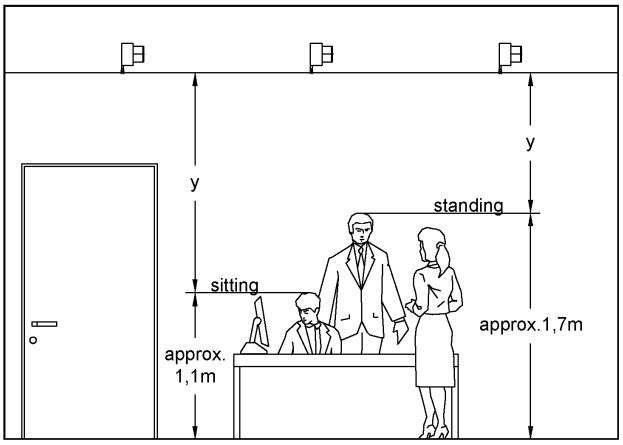
Level Increase

Example:

Socket: 125 mm
Damper setting: 22.5°
ΔL_W = + 6 dB(A)

Given:

Area:	A	= 7.5 m x 11 m = 82.5 m^2
Room height:	H	= 2.75 m
Supply air flow rate:	$\dot{V}_{sup}$	= 2250 m^3/h
Reverbaration time:	T_N	= 0.7 s
Max. permissible sound pressure level in the room:	L_p	= 35 dB(A)
Max. permissible ambient air velocity at seated level (1,1 m):	$\bar{v}_y$	< 0.12 m/s



Definition: vertical jet path y

Selected:

3 bands, each with 8 x INDUL API 18 – 125 N of 1250 mm each, and each with 1 socket of Ø 125 => active length: 30 rm.

Calculated:

Spec. supply air flow rate: $\dot{V}_{sup} = \frac{2250\ m^3/h}{30\ m} = 75\ m^3/hm$

Spec. air exchange rate: (per hour) $L_{W\ spez.} = \frac{2250\ m^3/h}{82.5\ m^2} = 27.3\ m^3/hm^2$

Sound pressure level from diagram: L_p = 33.0 dB(A)

Correction for other room heights: ΔL_1 = +0.4 dB(A)

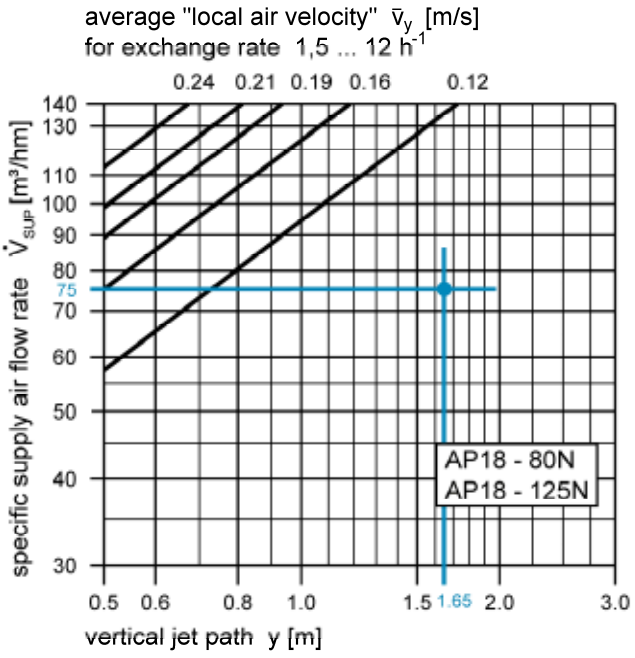
Correction for other reverberation times: ΔL_2 = +0.7 dB(A)

Actual sound pressure level in the room: $L_p \approx$ 34 dB(A)

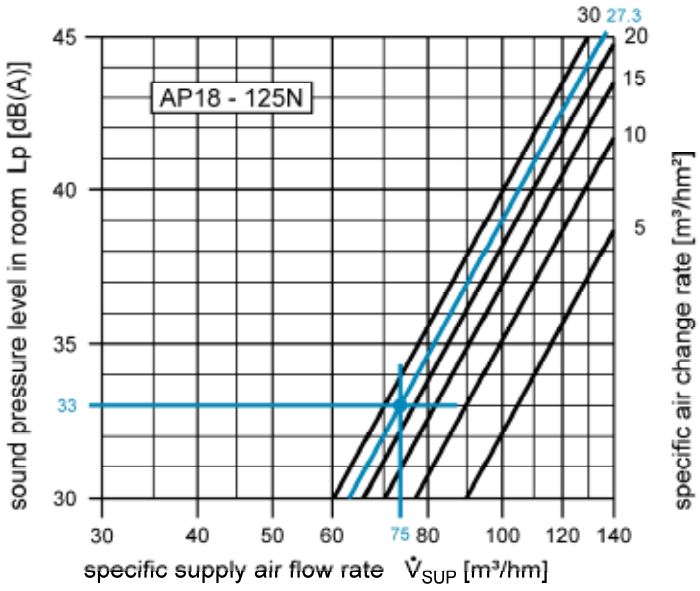
Vertical jet path = room height – measurement level: y = 2.75 m – 1.1 m = 1.65 m

Average ambient air velocity from diagram: $\bar{v}_y$ < 0.12 m/s

Ambient Air Velocity

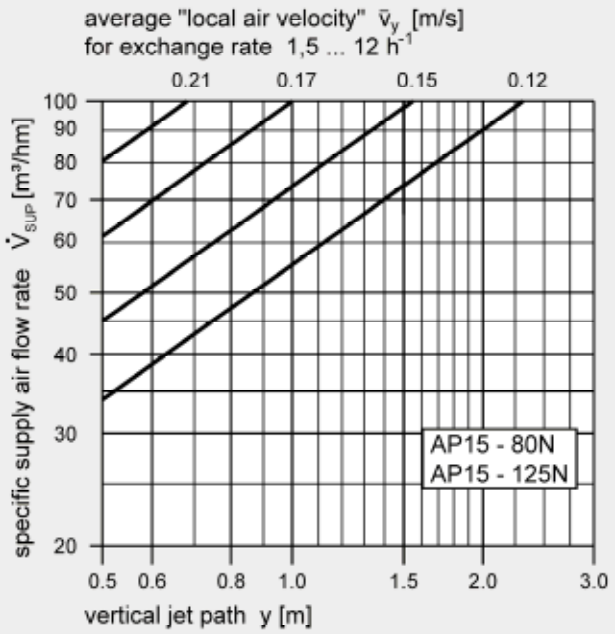


Sound Pressure Level

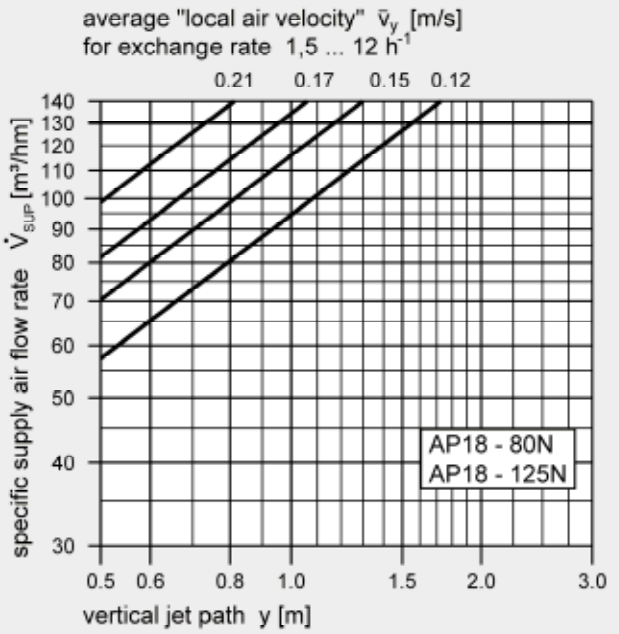


Ventilation System Design

INDUL AP15

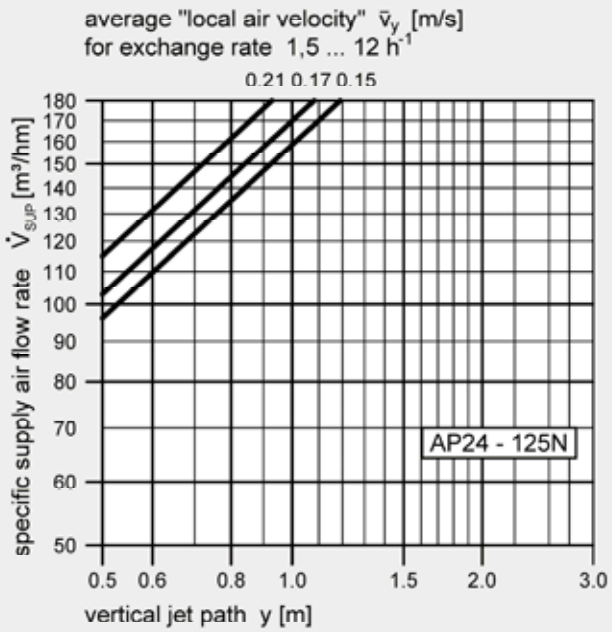


INDUL AP18



Ventilation System Design

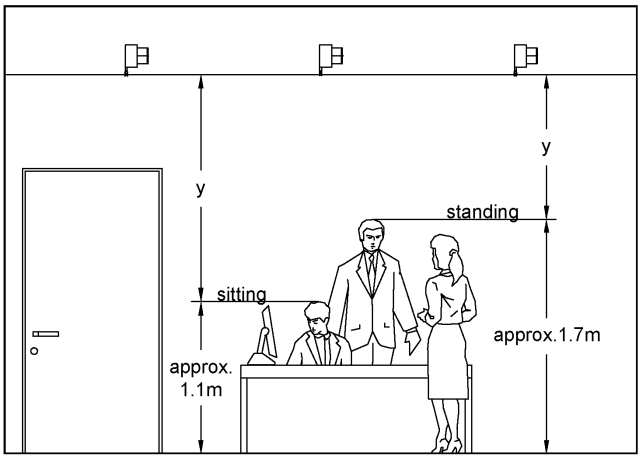
INDUL AP24



Important:
Please observe the information on pages 6 –7! The design information outlines definitions and terms.

Recommendation:
Ambient air velocity from: $\bar{v}_y$ = 0.12…0.15 m/s at seated level for the highest demands.

Ambient air velocity from: $\bar{v}_y$ = 0.15…0.17 m/s at seated level for elevated demands.



Definition: vertical jet path y

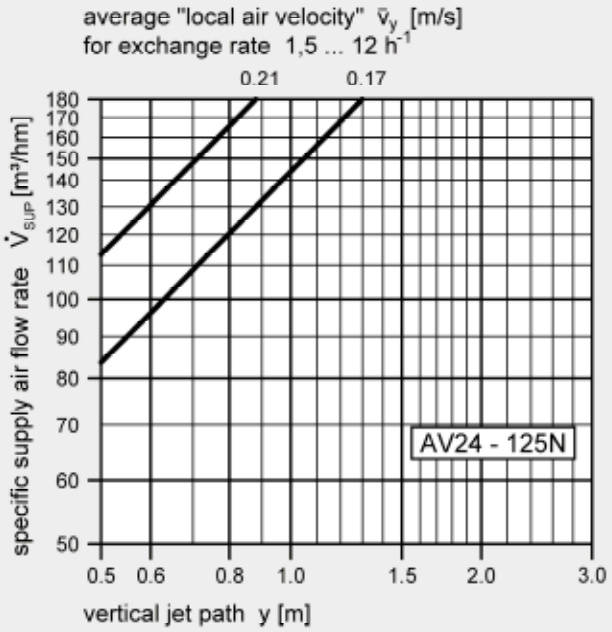
The "average local air velocity" specified in the diagram refers to Δt_{SUP} = – 6K. The table below shows correction values for other supply air temperature differences. All data applies to a diffuse ambient air flow with an air exchange rate (per hour) of 1.5 to 12 h^{-1}. A diffuse ambient air flow is achieved by evenly distributing the linear diffusers throughout the room as well as ensuring an even distribution of supply air.

Correction of local air velocity at $\Delta t_{SUP} \neq$ – 6K

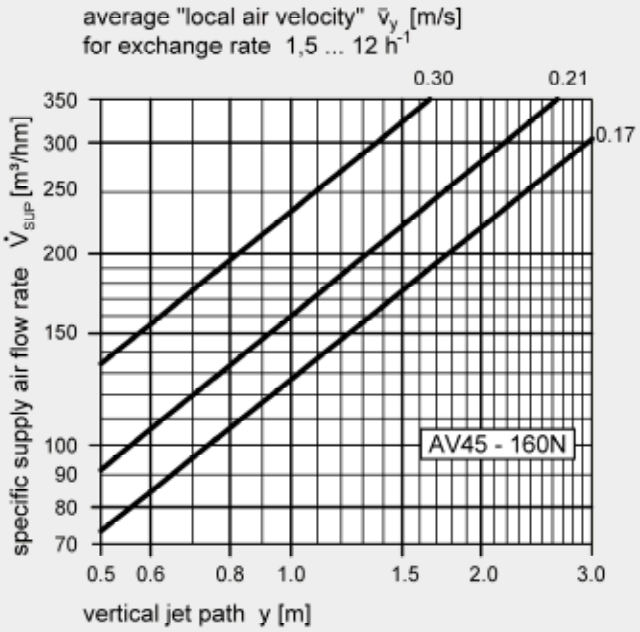
Supply air temperature difference Δt_{SUP} [K]	-2K	-6K	-8K	-10K
Approx. velocity change Δv_y [m/s]	-0.02	0	+0.01	+0.02

Ventilation System Design

INDUL AV24



INDUL AV45



The "average local air velocity" specified in the diagram refers to Δt_{SUP} = – 6K. The table below shows correction values for other supply air temperature differences. All data applies to a diffuse ambient air flow with an air exchange rate (per hour) of 1.5 to 12 h^{-1}. A diffuse ambient air flow is achieved by evenly distributing the linear diffusers throughout the room as well as ensuring an even distribution of supply air.

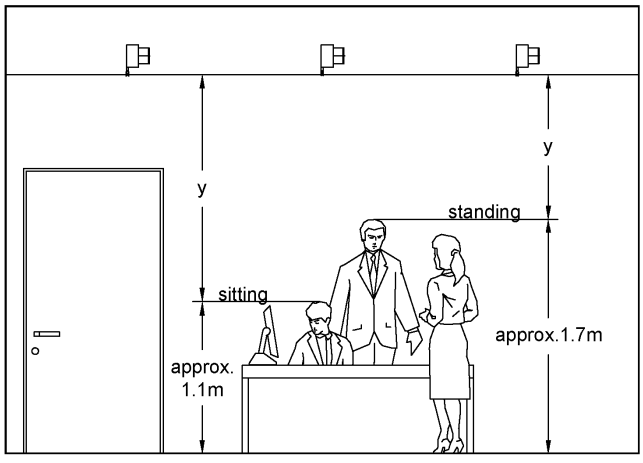
Correction of local air velocity at $\Delta t_{SUP} \neq$ – 6K

Supply air temperature difference Δt_{SUP} [K]	-2K	-6K	-8K	-10K
Approx. velocity change Δv_y [m/s]	-0.02	0	+0.01	+0.02

Important:
Please observe the information on pages 6–7! The design information outlines definitions and terms.

Recommendation:
Ambient air velocity from: $\bar{v}_y$ = 0.12…0.15 m/s at seated level for the highest demands.

Ambient air velocity from: $\bar{v}_y$ = 0.15…0.17 m/s at seated level for elevated demands.

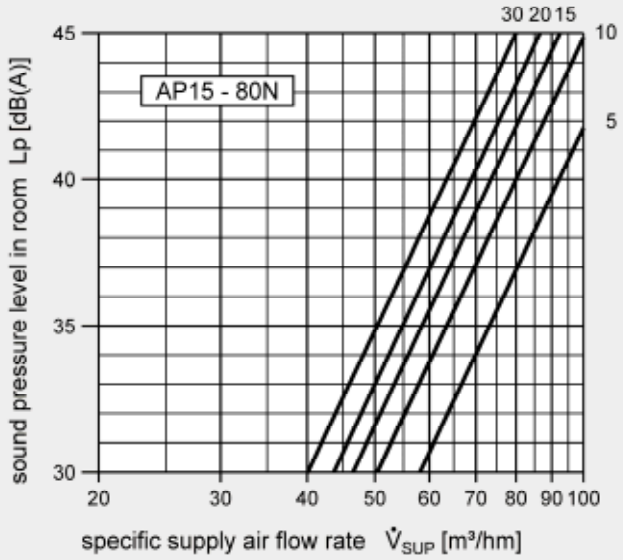


Definition: vertical jet path y

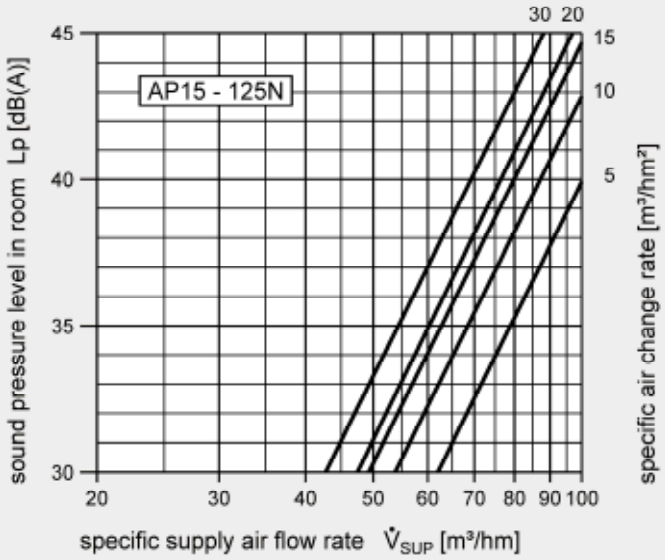
Acoustic Design

INDUL AP15

Socket Ø 78 mm
H_R = 3.0 m
T_N = 0.6 s



Socket Ø 123 mm
H_R = 3.0 m
T_N = 0.6 s



Correction ΔL_1 for other Room Heights

H_R [m]	2.5	2.75	3.0	3.5	4.0	4.5	5.0	6.0
ΔL_1 [dB(A)]	+0.8	+0.4	0	-0.7	-1.2	-1.8	-2.2	-3.0

Correction ΔL_2 for other Reverberation Times T_N

T_N [s]	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.2
ΔL_2 [dB(A)]	-1.8	-0.8	0	+0.7	+1.2	+1.8	+2.2	+3.0

Note:

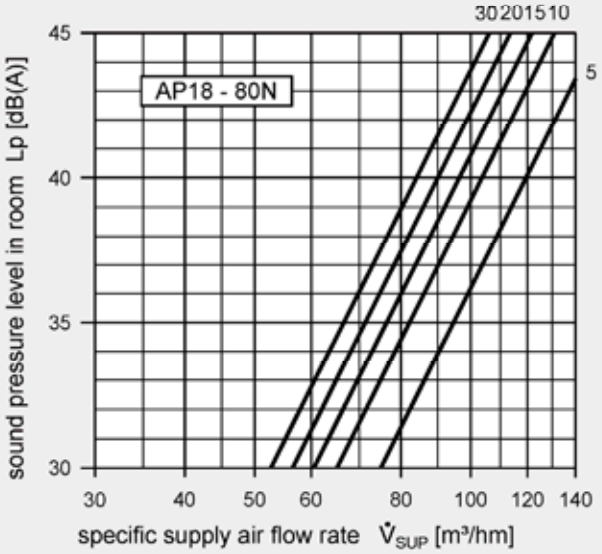
While observing the dimensions given on **page 18**, the specific supply air flow rate $\dot{V}_{sup}$ (m^3/hm) can be determined using the actual installed length of discharge profile.

The sound pressure level data cover only noise emitted by the INDUL outlets. Other sources of noise can result in an increase in the sound pressure level in a room. These graphs are not valid for combinations with other types of air diffuser. In case of doubt, please ask our technical consultant.

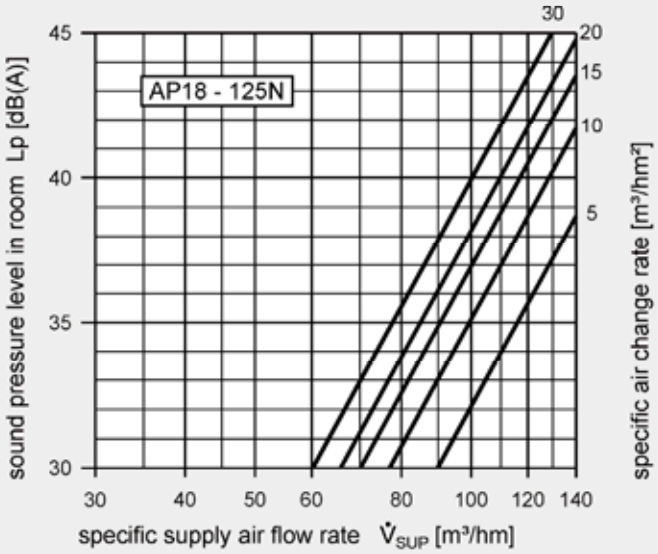
Acoustic Design

INDUL AP18

Socket Ø 78 mm
H_R = 3.0 m
T_N = 0.6 s

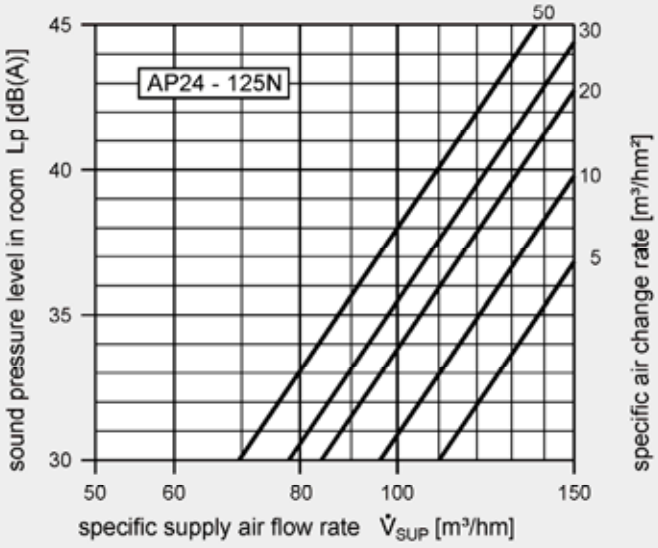


Socket Ø 123 mm
H_R = 3.0 m
T_N = 0.6 s



INDUL AP24

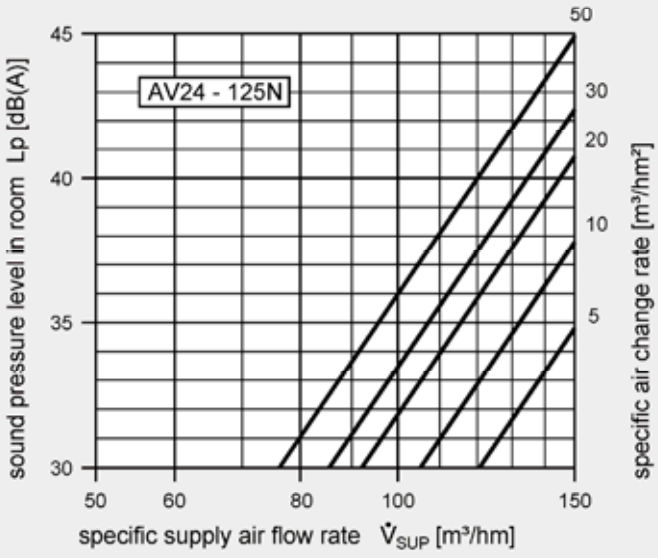
Socket Ø 123 mm
H_R = 3.0 m
T_N = 0.6 s



Acoustic Design

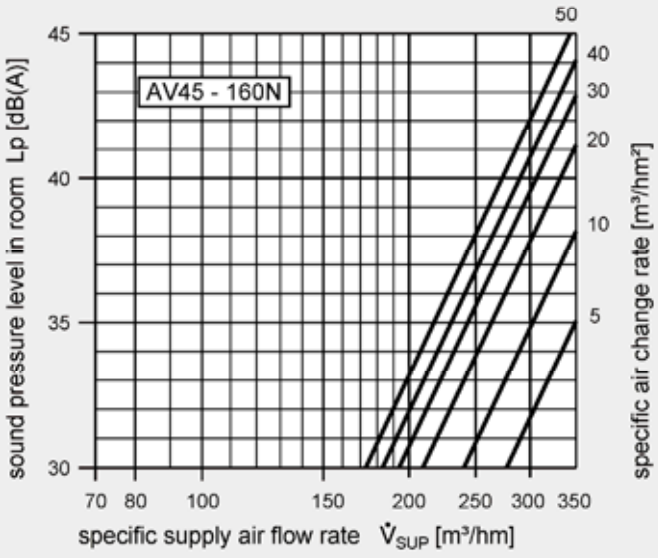
INDUL AV24

Socket Ø 123 mm
H_R = 3.0 m
T_N = 0.6 s



INDUL AV45

Socket Ø 158 mm
H_R = 3.0 m
T_N = 0.6 s



Correction ΔL_1 for other Room Heights

H_R [m]	2.5	2.75	3.0	3.5	4.0	4.5	5.0	6.0
ΔL_1 [dB(A)]	+0.8	+0.4	0	-0.7	-1.2	-1.8	-2.2	-3.0

Correction ΔL_2 for other Reverberation Times T_N

T_N [s]	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.2
ΔL_2 [dB(A)]	-1.8	-0.8	0	+0.7	+1.2	+1.8	+2.2	+3.0

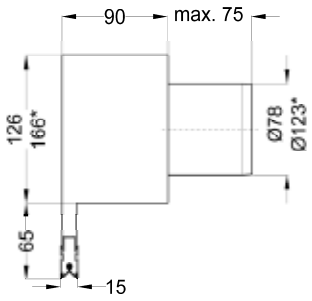
Note:

While observing the dimensions given on **page 18**, the specific supply air flow rate $\dot{V}_{sup}$ (m^3/hm) can be determined using the actual installed length of discharge profile.

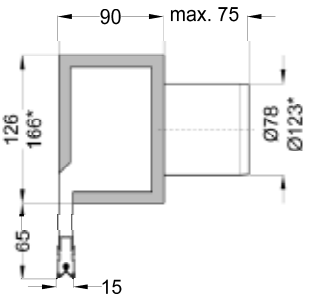
The sound pressure level data cover only noise emitted by the INDUL outlets. Other sources of noise can result in an increase in the sound pressure level in a room. These graphs are not valid for combinations with other types of air diffuser. In case of doubt, please ask our technical consultant.

Dimensions for Type AP

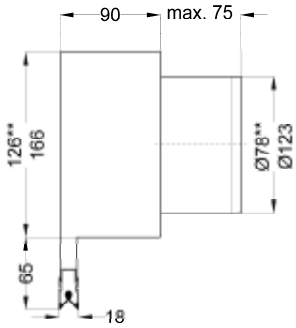
AP 15 - 80 N
AP 15 - 125 N*



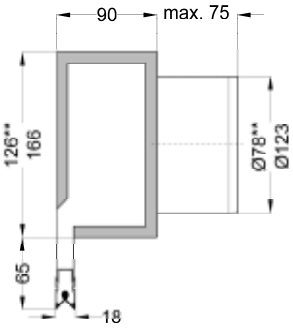
API 15 - 80 N
API 15 - 125 N*



AP 18 - 80 N**
AP 18 - 125 N



API 18 - 80 N**
API 18 - 125 N

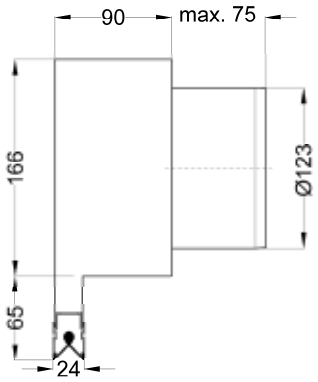


* Dimensions for type INDUL AP15 - 125 N

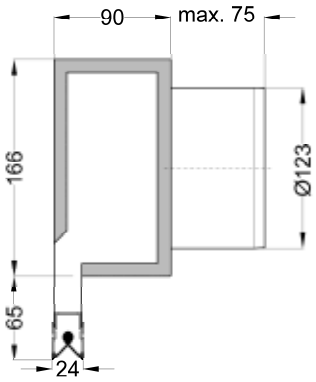
** Dimensions for type INDUL AP18 - 80 N

Special throat height of 37 mm (uninsulated) or 45 mm (insulated) to 130 mm possible option.

AP 24 - 125 N



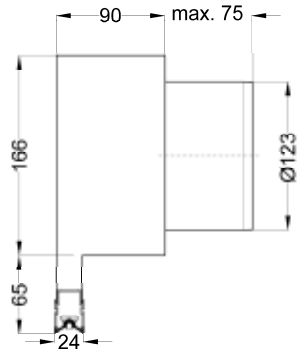
API 24 - 125 N



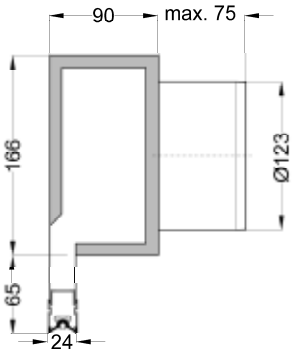
Special throat height of 37 mm (uninsulated) or 45 mm (insulated) to 130 mm possible option.

Dimensions for Type AV

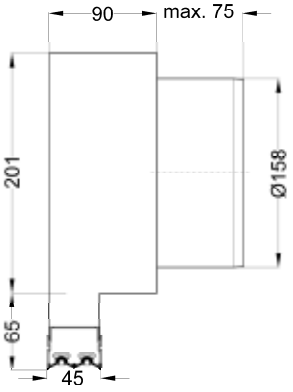
AV 24 - 125 N



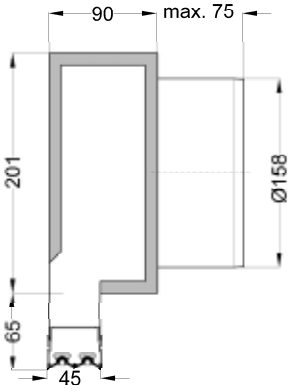
AVI 24 - 125 N



AV 45 - 160 N



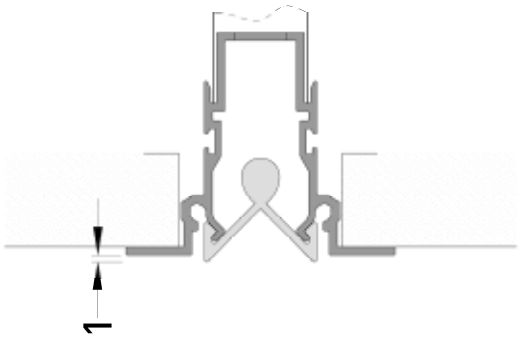
AVI 45 - 160 N



Special throat height of 37 mm (uninsulated) or 45 mm (insulated) to 130 mm possible option.

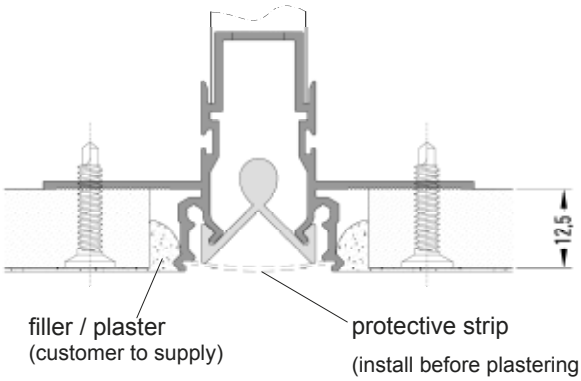
INDUL Type AP and AV with integrated Overlay Bracket

Integrated overlay bracket type INDUL ...NA
available for all types



INDUL Type AP and AV with integrated Plaster Bracket

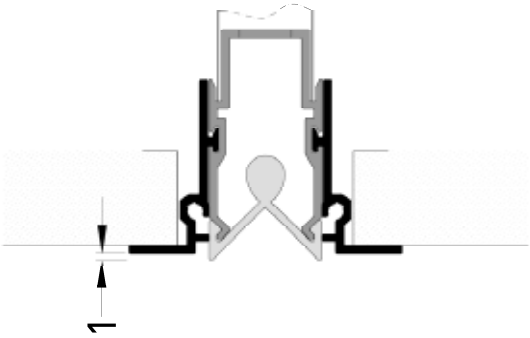
Integrated plaster bracket type INDUL ...NG
available for all types



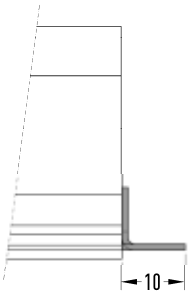
For other dimensions, see the support profile information on page 19.

INDUL Type AP and AV with loose Overlay Bracket

Loose overlay bracket type W-NA for insertion,
available for all types



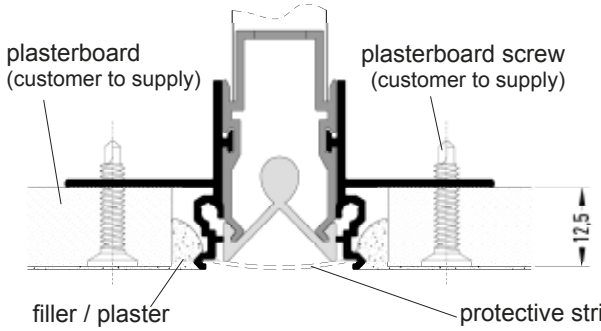
End-overlay bracket for integrated and loose overlay brackets (optional).



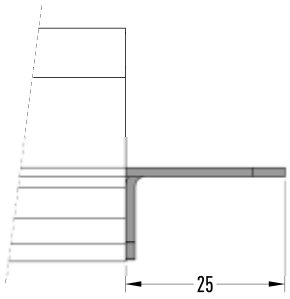
Type E15-NA, E18-NA
E24-NA, E45-NA

INDUL Type AP and AV with loose Plaster Bracket

Loose plaster bracket type W-NG for insertion,
available for all types



End-overlay bracket for integrated and loose plaster brackets (optional).

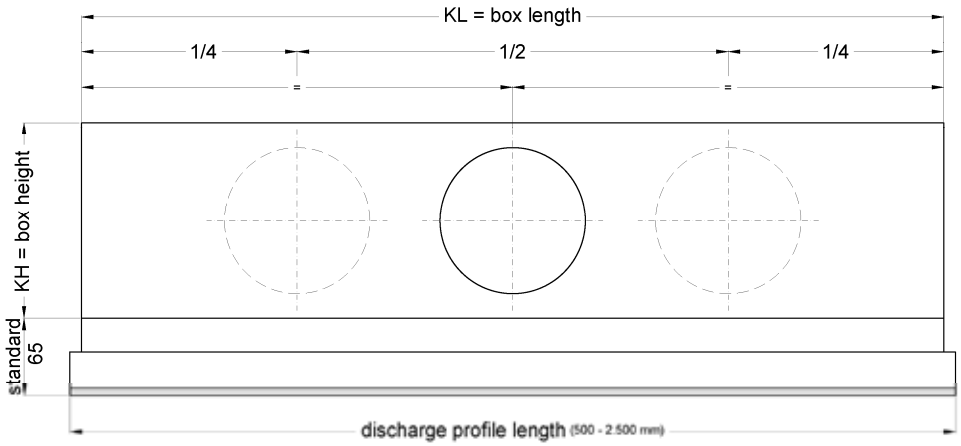


Type E15-NG, E18-NG
E24-NG, E45-NG

For other dimensions, see the support profile information on page 19.

Dimensions

1 socket of up to 1499 mm – 2 sockets from 1500 - 2500 mm diffuser length available.



Length	Box length [mm]	Discharge profile length [mm]	Discharge profile length with overhang [mm]	Socket quantity
500	480	500	501 - 749	1
750 ❑	730 ❑	750 ❑	751 - 999	1
1000 ❑	980 ❑	1000 ❑	1001 - 1249	1
1250 ❑	1230 ❑	1250 ❑	1251 - 1499	1
1500 ❑	1480 ❑	1500 ❑	1501 - 1749	2
1750	1730	1750	1751 - 1999	2
2000	1980	2000	2001 - 2249	2
2250	2230	2250	2251 - 2499	2
2500	2480	2500	-	2

All technical data (ambient air velocities, sound level data, pressure losses etc.) apply for the above dimensions*.
Calculation must be carried out using the actual installed length of discharge profile (including overhang).

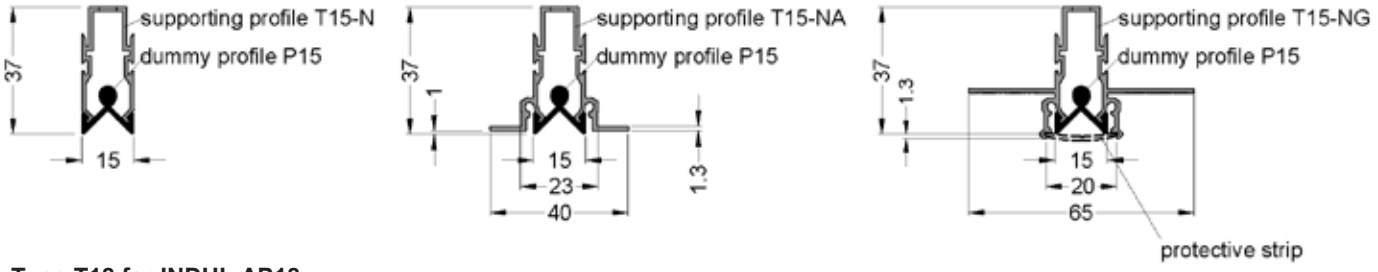
Greater overhang lengths, up to a maximum diffuser profile length of 2500 mm, can be supplied on request.
In such a case, however, the layout must be calculated with the maximum overhang according to the above table.

* When there is overhang, the plenum is centred with respect to the discharge profile.

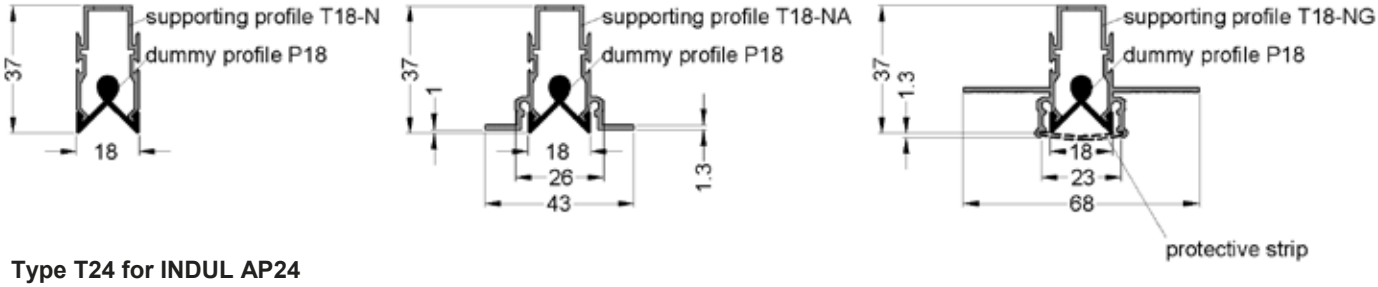
❑ Profile length

Supporting Profiles

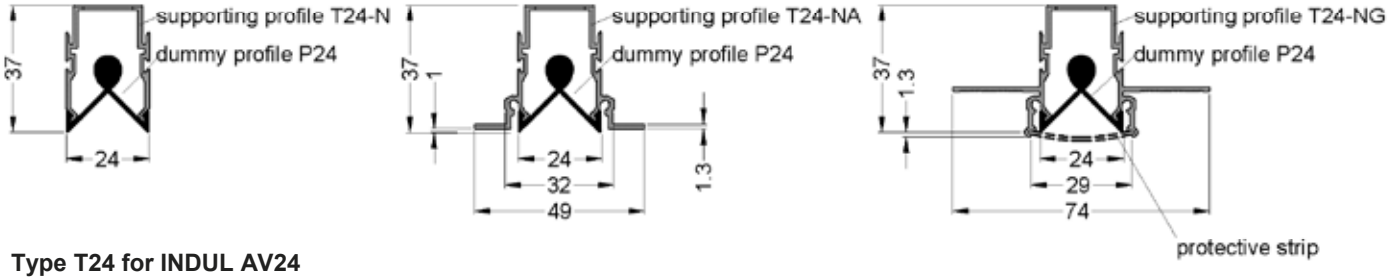
Type T15 for INDUL AP15



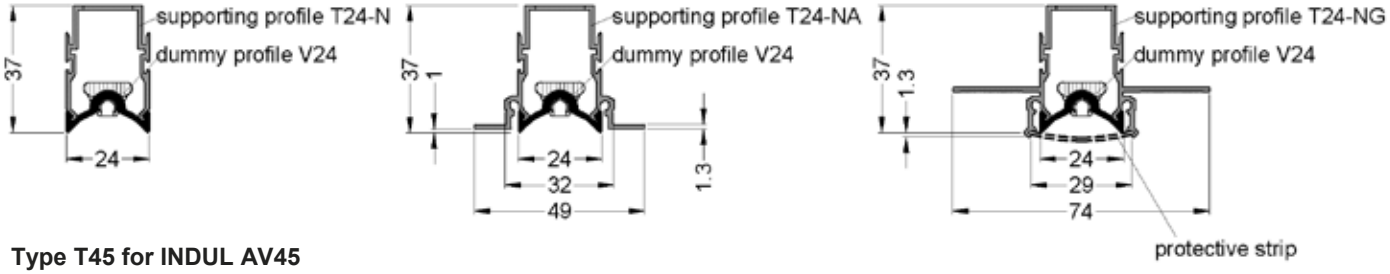
Type T18 for INDUL AP18



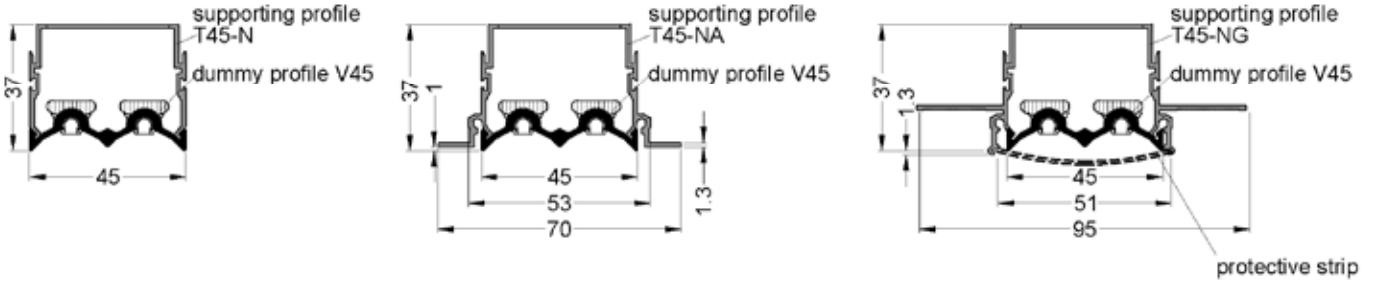
Type T24 for INDUL AP24



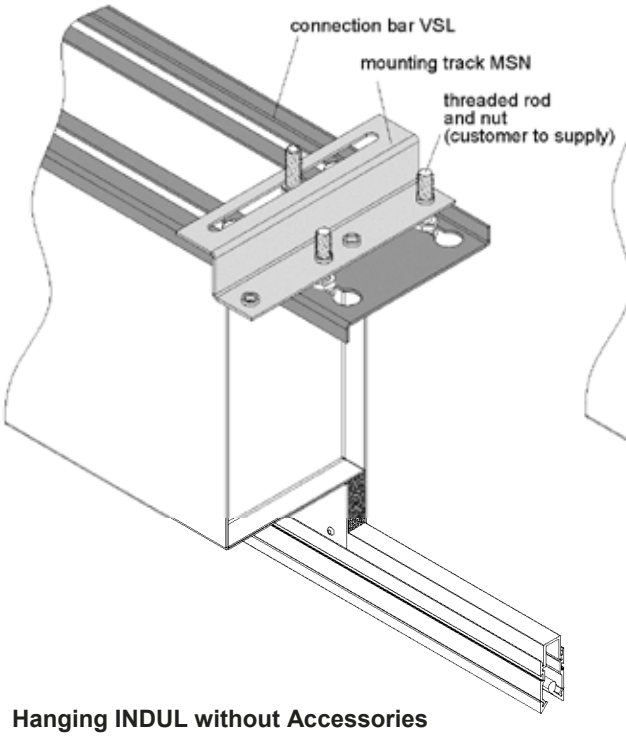
Type T24 for INDUL AV24



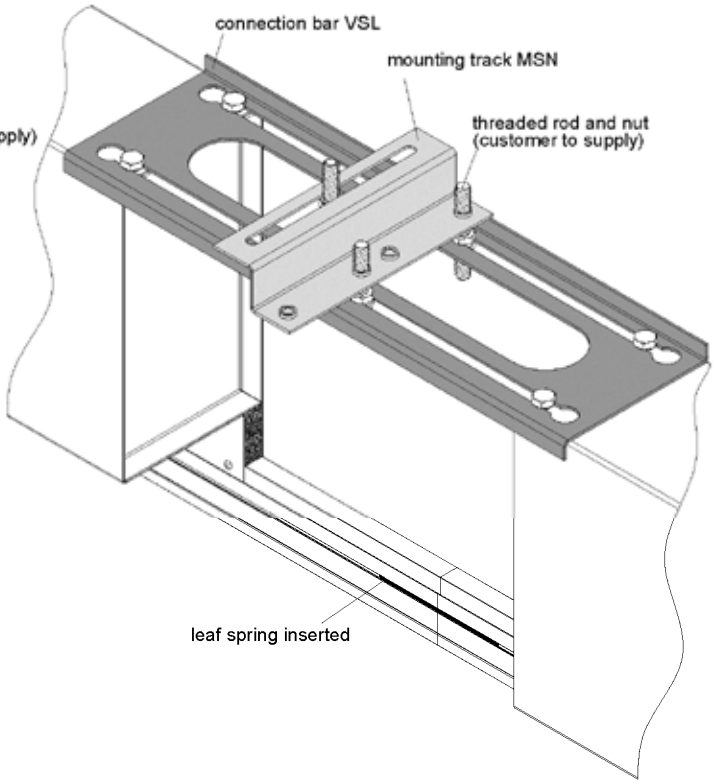
Type T45 for INDUL AV45



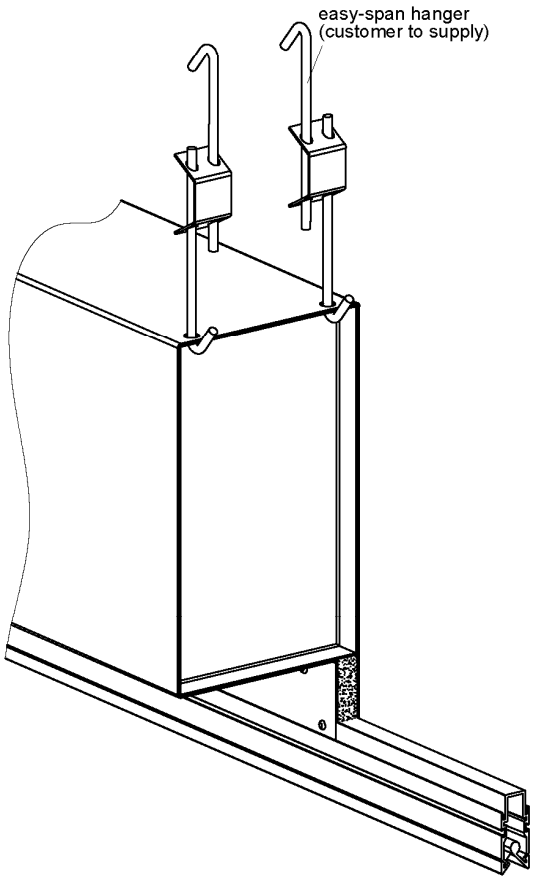
Single Arrangement
with Connection Bar VSL



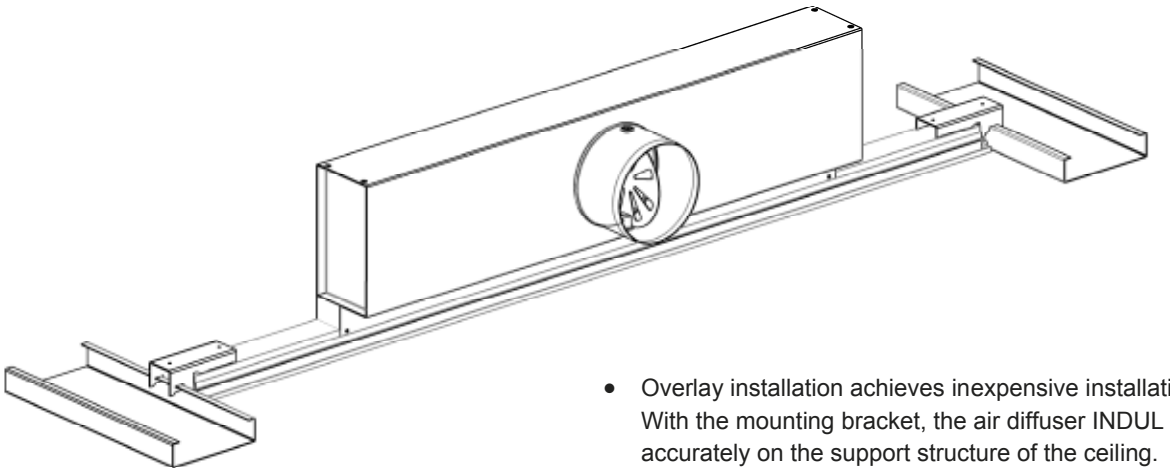
Band Arrangement
with Connection Bar VSL



Hanging INDUL without Accessories



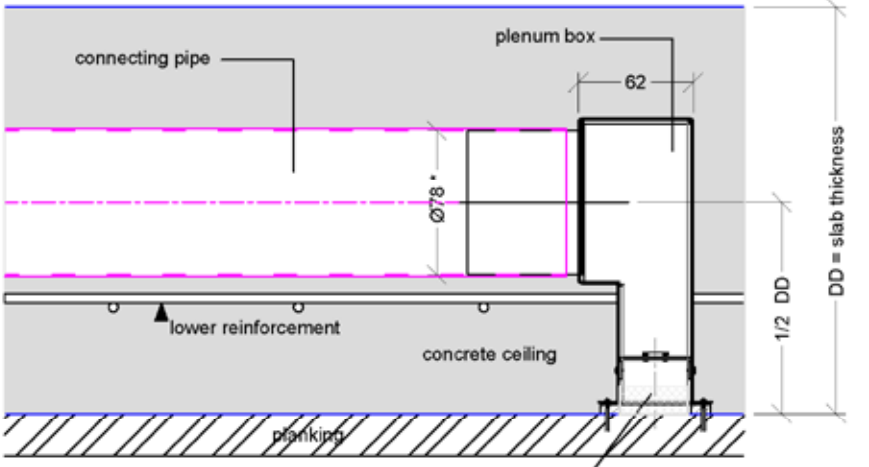
Example of Overlay Installation



- Overlay installation achieves inexpensive installation results. With the mounting bracket, the air diffuser INDUL also fits accurately on the support structure of the ceiling.
- We would be happy to develop project-specific installation solutions for you free of charge.

INDUL AV24-80 NB in Concrete Ceiling

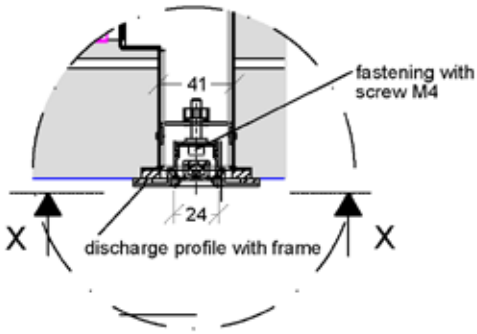
detail - plenum box embedded in concrete



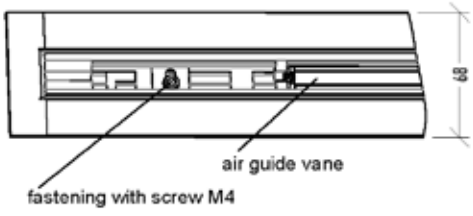
* can be adapted for the project

remove dust protection of styrofoam before mounting the discharge profile!

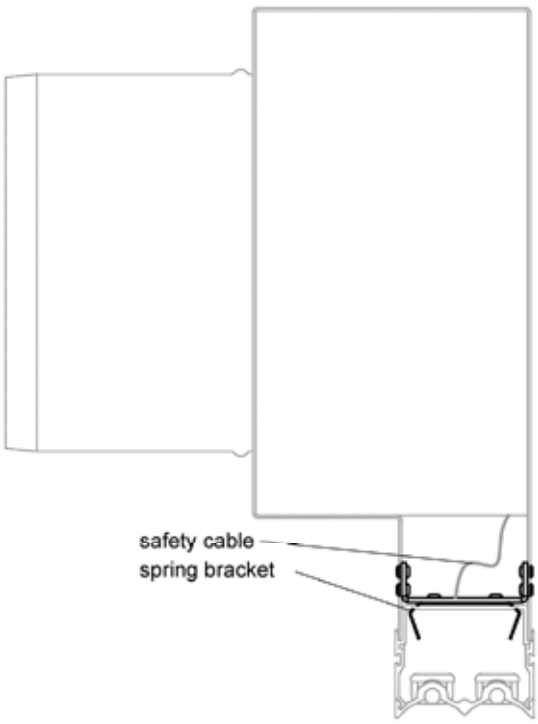
detail with mounted discharge profile



view "X" discharge profile



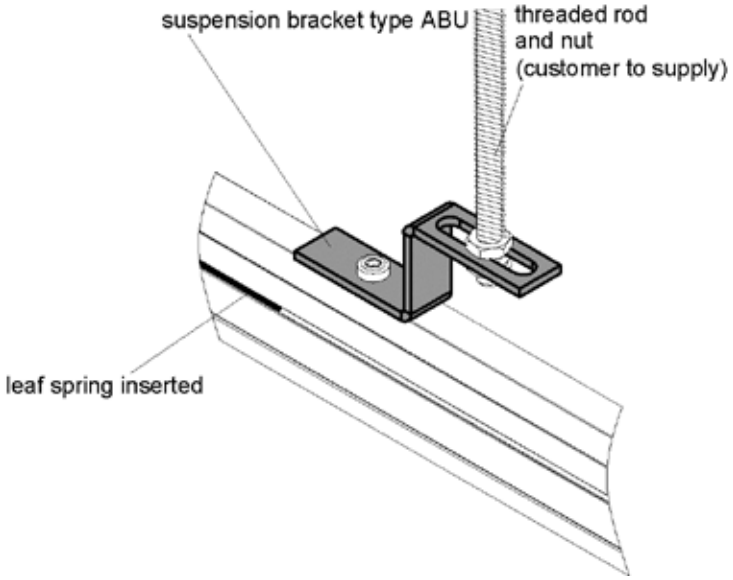
INDUL with Releaseable Connection between Supporting Profile and Plenum Box.



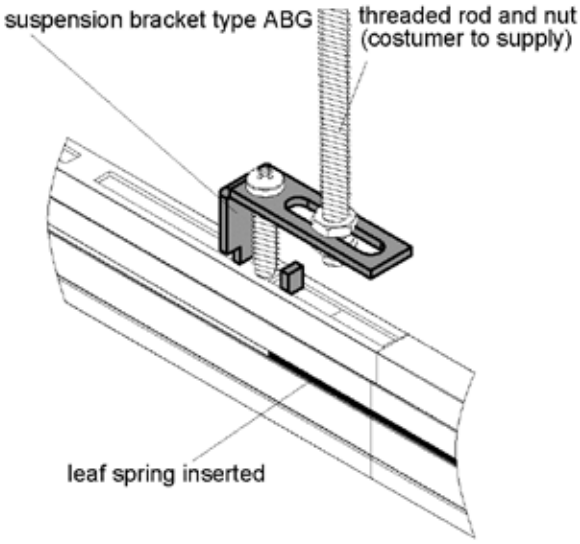
exemplary description
INDUL AV45.

The connection between the supporting profile and the plenum box can be optionally executed realized with a releasable connection so that the box can be cleaned according to VDI 6022. The releasable connection is not possible in combination with an overlay or loose plaster bracket...NG.

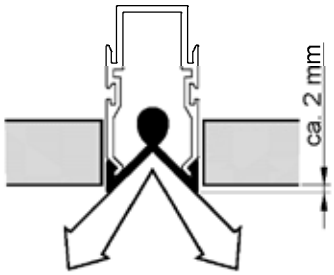
mounting bracket ABU
for the mounting of dummy sections, non-stamped



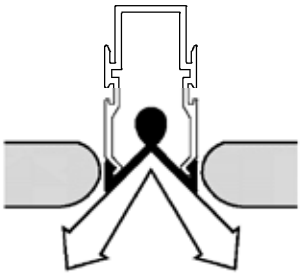
mounting bracket ABG
for the mounting of dummy sections, rear stamped



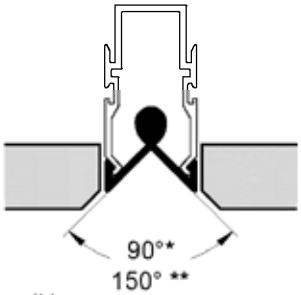
correct
ceiling panels with sharp edges



possible
ceiling panels with rounded edges

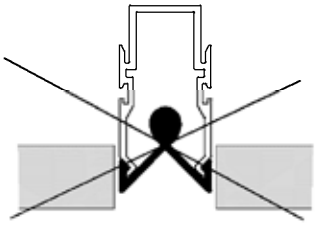


ceiling panels
with bevelled edges



flow deflection possible

wrong
recessed installation



higher room air velocities
and soiling

Installation information

- It is essential to ensure an uninterrupted 90° discharge.
- Optimum installation dimension: approx. 2 mm projection (see details above).
- For safety reasons, no pressure should be applied to the diffuser throat (for example, as a result of thermal-related changes to the length of the ceiling elements).
- INDUL air diffusers are built-in ceiling components. They are not a replacement for necessary static ceiling support structures. This applies regardless of whether you are using integrated or loose brackets.

Linear Diffuser INDUL AP15 / AP18 / AP24

Highly inductive air diffuser for variable volume flow rates. Optimised discharge direction for rapid reduction in outlet velocities and temperature differences. Developed for air temperature differences of up to –14 K.

Air diffuser comprising:

- Discharge profile and supporting profile made from aluminium extrusion profile
- Plenum box with completely asymmetrical design, made from aluminium sheet metal, with four mounting holes for suspension at customer's site
- Air connection socket (with option of butterfly damper)

Design:

Slot width (installation width)

☐ 15 mm ☐ 18 mm ☐ 24 mm

Installation length ……..mm (500 to 2500 mm)
Box length ...……...mm (480 to 2480 mm in 250 mm steps)
Discharge profile length…….mm (box length + 20 to + 269 mm)

Plenum box:

☐ Insulated version

☐ Non-insulated version

Air connection socket:

☐ Ø 80 mm (installation height 126 mm)

☐ Ø 125 mm (installation height 166 mm)

☐ with butterfly damper, adjustable at socket

☐ with butterfly damper adjustable from the room

☐ without damper

Colour:

- Discharge profile powder-coated in RAL 9005 or RAL 9010

No. _____ Qty. _____ Unit price _____

Manufacturer: Maschinenfabrik Gg. Kiefer GmbH
Series: Linear Diffuser
Type: INDUL AP15 / AP18 / AP24

Accessories/Special designs:

Dummy section:

☐ Linear diffuser in dummy section form (non-stamped)

Ceiling connection:

☐ Overlay bracket on both sides (NA) in colour _____
☐ Plaster bracket on both sides (NG) in colour _____
☐ Overlay bracket on one side W-NA in colour _____
☐ Plaster bracket on one side W-NG in colour _____
☐ Overlay bracket for overlay bracket in colour _____
☐ Overlay bracket for plaster bracket in colour _____

Installation:

☐ Leaf spring for band installation
☐ Connection bar VSL
☐ Mounting track MSN

☐ Installation kit for single installation and mounting band consisting of:
- Mounting track MSN
- Connection bar VSL

☐ Suspension bracket ABG
☐ Suspension bracket ABU

Plenum box:

☐ Special box with different dimensions
☐ Connection socket at top (max. Ø 80 mm)

Special colours:

☐ Discharge profile in special colour in line with RAL
☐ Discharge profile with natural anodised finish EV1

No. _____ Qty. _____ Unit price _____

➡ **Tender text can be downloaded from www.kieferklima.de**

Linear diffuser INDUL AV24 / AV45

Highly inductive air diffuser for variable volume flow rates. Optimised discharge direction for rapid reduction in outlet velocities and temperature differences. Developed for air temperature differences of up to –10 K.

Air diffuser comprising:

- Discharge profile and supporting profile made from aluminium extrusion profile
- Air guide vanes individually adjustable in 15 ° increments
- Plenum box with completely asymmetrical design, made from aluminium sheet metal, with four mounting holes for suspension at customer's site
- Air connection socket (with option of butterfly damper)

Design:

Slot width (installation width)

☐ 24 mm

☐ 45 mm

Installation length.....mm (500 to 2500 mm)
Box length .....mm (480 to 2480 mm in 250 mm steps)
Discharge profile length.....mm (box length + 20 to + 269 mm)

Plenum box:

☐ Insulated version

☐ Non-insulated version

Air connection socket:

☐ Ø 125 mm (installation height 166 mm)

☐ Ø 160 mm (installation height 201 mm)

☐ with butterfly damper, adjustable at socket

☐ with butterfly damper adjustable from the room

☐ without damper

Colour:

- Discharge profile powder-coated in RAL 9005 or RAL 9010

No. _____ Qty. _____ Unit price _____

Manufacturer: Maschinenfabrik Gg. Kiefer GmbH
Series: Linear Diffuser
Type: INDUL AV24 / AV45

Accessories/Special designs:

Dummy section:

☐ Linear diffuser in dummy section form (non-stamped)

Ceiling connection:

☐ Overlay bracket on both sides (NA) in colour _____

☐ Plaster bracket on both sides (NG) in colour _____

☐ Overlay bracket on one side W-NA in colour _____

☐ Plaster bracket on one side W-NG in colour _____

☐ Overlay bracket for overlay bracket in colour _____

☐ Overlay bracket for plaster bracket in colour _____

Installation:

☐ Leaf spring for band installation
☐ Connection bar VSL
☐ Mounting track MSN

☐ Installation kit for single installation and mounting band
consisting of:
- Mounting track MSN
- Connection bar VSL

☐ Suspension bracket ABG
☐ Suspension bracket ABU

Plenum box:

☐ Special box with different dimensions
☐ Connection socket at top (max. Ø 80 mm)

Special colours:

☐ Discharge profile in special colour in line with RAL
☐ Discharge profile with natural anodised finish EV1
☐ Air guide vanes in white

No. _____ Qty. _____ Unit price _____

➡ **Tender text can be downloaded from www.kieferklima.de**

Data for Inquiries

Data required for the technical Design and Offer Preparation:

Recipient:

Fax-Nr.: 0711/8109-205

Maschinenfabrik Gg. Kiefer GmbH

Heilbronner Straße 380-396

70469 Stuttgart

Sender:

_____

_____

_____

_____

Linear Diffuser: ☐ INDUL Type AP...N

Project:

_____

_____

Project No. Customer: _____ Date/Associate: _____ Project No. Kiefer: _____

Room or module name					
Number of these rooms/modules					
Spec. supply air volumetric flow	[m^3/h]				
Room width	[m]				
Room length	[m]				
Area	[m^2]				
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]				

Data required for the technical Design and Offer Preparation:

Recipient:

Fax-Nr.: 0711/8109-205

Maschinenfabrik Gg. Kiefer GmbH

Heilbronner Straße 380-396

70469 Stuttgart

Sender:

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Linear Diffuser: ☐ INDUL Type AV...N

Project:

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Project No. Customer: _____ Date/Associate: _____ Project No. Kiefer: _____

Room or module name					
Number of these rooms/modules					
Spec. supply air volumetric flow	[m^3/h]				
Room width	[m]				
Room length	[m]				
Area	[m^2]				
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.

Services

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.

E3006_02/19

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70469 Stuttgart, Germany

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Internet: www.kieferklima.de