

Technical Brochure

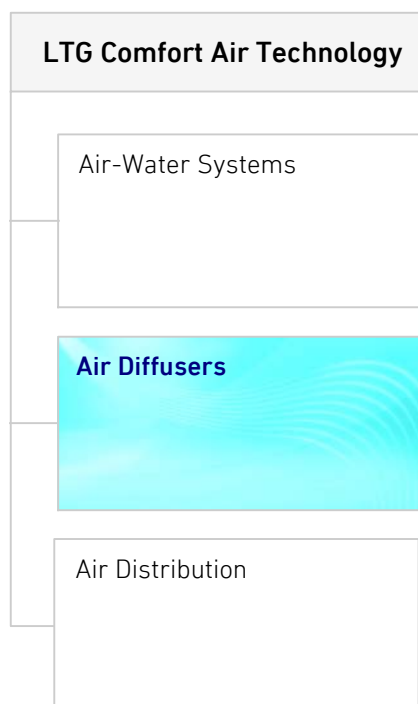
LTG Air Diffusers

Linear air diffusers LDB



Installation in ceilings, walls and sills

Technical brochure • Linear air diffusers LDB



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Notes

Dimensions stated in this brochure are in mm.

Dimensions stated in this brochure are subject to General Tolerances according to DIN ISO 2768-vL.

Length tolerance: $\leq 1.5 \text{ m} \pm 1.5 \text{ mm}$
 $\geq 1.5 \text{ m} \pm 2.0 \text{ mm}$

For the outlet grille see the special tolerances specified in the drawing.

Straightness and twist tolerances for extruded aluminium profiles according to DIN EN 12020-2.

For punched profiles - LDB 12 - twice the straightness and torsion tolerances acc. to DIN EN 12020-2.

The surface finishes meet standard indoor use requirements, i.e. room climate requirements according to DIN EN ISO 7730. Other finishes meeting special use requirements are available on request.

The actual tender documentations are available in word format at your local dealership or at www.LTG-AG.com.

Please note!

The profiles for our linear diffusers are exclusively designed for use as decoration elements to cover the gap between the ceiling and the diffuser. They are not suitable for use as supporting profiles or fasteners!

LTG planning tools – we support you!

Visit the **download area on our website** with helpful tools, such as dimensioning programs, streaming videos and product information!

Also available: Our product overviews about air diffusers, air-water systems and air distribution products.

DOWNLOADS

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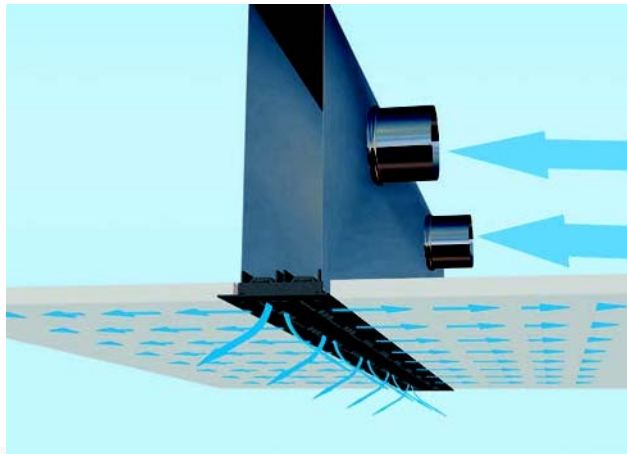


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Air Diffusers for Ceiling Installation

LDB



LDB linear air diffusers with variable settings ensure effective ventilation and optimized air conditions.

Advantages

Comfortable:

- High induction air diffusers ensure rapid mixing of supply and room air to create comfortable thermal environments
- Uniform, optimal purging of the room with fresh air
- A pleasant indoor climate thanks to uniform temperature distribution

Quiet: Low-noise air distribution, aerodynamically optimized inner cylinder contours

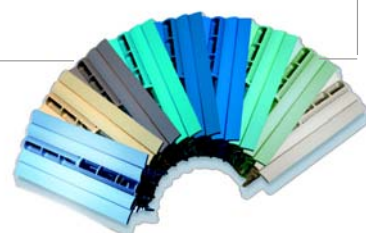
Variable: Limitless options for design, colour and surface appearance, can be perfectly integrated in all ceilings

Flexible: Can be adjusted to individual spatial conditions without impeding operation

LTG System clean® - unique and ingenious!

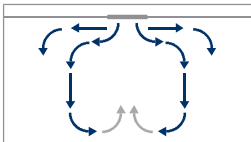
Contaminants within the room air like dust, tobacco smoke, carpet abrasions, dust or oil vapour deposit around the ceiling and diffuser as a result of entrainment. The LTG System clean® prevents surface staining almost completely by providing a screen of clean supply air across the ceiling. **Benefits:** The costs of renovation and maintenance are considerably reduced.

Profiles are available in all colour systems (e.g. RAL, Pantone, ...) and can be combined individually



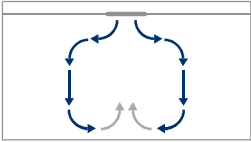
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Product overview

Type		LDB 12 ^{clean} LTG System clean®	LDB 12 ^{style} LTG System clean®
Features / Application		For high comfort, additional slot in the diffuser border profile to reduce contamination around the diffuser	Completely made from metal, non-flammable. Inconspicuous installation in suspended ceilings. Meets highest architectural demands with its narrow and unobtrusive build. With LTG System clean®.
Slot rows		1...4	1...3
Recommended max. air flow rate at L _{WA}		1 slot: 70 m³/h at 27 dB(A) 2 slots: 130 m³/h at 27 dB(A) 3 slots: 190 m³/h at 31 dB(A) 4 slots: 250 m³/h at 30 dB(A)	1 slot: 70 m³/h at 27 dB(A) 2 slots: 130 m³/h at 27 dB(A) 3 slots: 190 m³/h at 31 dB(A)
Integrated sound absorber		Optional, on request	
Profile width	[mm]	31...160	41...129
Length	[mm]	up to 2000	up to 2500
Cylinder Ø	[mm]	12	--
Recommended installation height	[m]	from 2.4	from 2.4
Diffuser elements adjustable		Standard Individually adjustable air flow, even after installation	Standard Individually adjustable air flow
Connection box with integrated air regulator		Standard	Standard
Air diffusion			
Version		Profile surface: untreated aluminium, anodized, painted similar to RAL. The diffusers can alternatively be ordered without air distribution box.	
		Diffuser elements: black, white or aluminium grey, on request in other colours similar to RAL	Diffuser elements: natural anodized, painted similar to RAL
Accessories		For integration in the ceiling, a variety of border and additional profiles is available. See page 10	See page 11

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Product overview

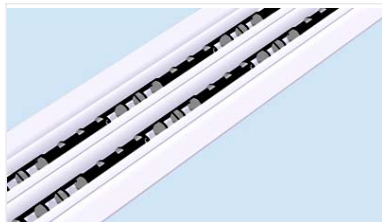
Type		LDB 12 small	LDB 20 classic	LDB 50 maxx
Features / Application		Inconspicuous installation in shaded joints and suspended ceilings	For high comfort	For high ceilings and large air flow rates
Slot rows		1	1...4	1...3
Recommended max. air flow rate at L _{WA}		65 m ³ /h at 36 dB(A)	1 slot: 110 m ³ /h at 36 dB(A) 2 slots: 190 m ³ /h at 38 dB(A) 3 slots: 250 m ³ /h at 31 dB(A) 4 slots: 300 m ³ /h at 36 dB(A)	1 slot: 310 m ³ /h at 40 dB(A) 2 slots: 430 m ³ /h at 38 dB(A) 3 slots: 510 m ³ /h at 39 dB(A)
Integrated sound absorber		Optional on request		
Profile width	[mm]	15 resp. 28	31...160	100, 200, 300
Length	[mm]	up to 1500	up to 2000	up to 2100
Cylinder Ø	[mm]	12	20	50
Recommended installation height	[m]	from 2.4	from 2.6	from 3.5
Diffuser elements adjustable		Individually adjustable, even after installation		
Connection box with integrated air regulator		Optional on request	Standard	Optional on request
Air diffusion				
Version		Profile surface: untreated aluminium, anodized, painted similar to RAL. The diffusers can alternatively be ordered without air distribution box. Diffuser elements: black, white or aluminium grey, on request in other colours similar to RAL.		
Accessories		For integration in the ceiling, a variety of border and additional profiles is available. See page 14 See page 16 See page 18		

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General Description

Product views

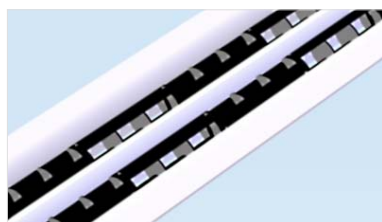
Type LDB 12 *clean* LTG System *clean*®



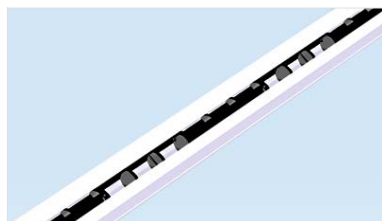
Type LDB 12 *style* LTG System *clean*®



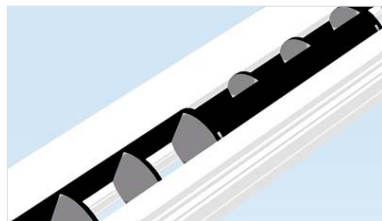
Type LDB 20 *classic*



Type LDB 12 *small*



Type LDB 50 *maxx*



Application

LTG diffusers type LDB are suitable for all kinds of applications, e.g. rooms with:

- high comfort requirements such as offices
- increased heat loads and fresh air requirements such as labs or conference rooms
- special requirements regarding acoustics such as broadcasting studios
- constant temperature requirements such as production halls.

LTG diffusers type LDB are perfect for both supply air with a constant or varying volume flow rate and return air with the same diffuser element adjustment.

Installation, positioning

LTG diffusers type LDB may be installed in ceilings, walls or sills depending on the looks desired, the existing air conditioning system and the intended use. Also available are diffusers for special requests.

Flexibility regarding the interior design, by ensuring both the use for an inconspicuous installation and as an eye-catching decoration element.

Function

The LTG diffuser type LDB is an adjustable linear diffuser allowing treated air to be distributed precisely within the room, thus ensuring both highest thermal and acoustic comfort.

The diffuser consists of diffuser elements with an optimized interior and profile contour, mounted in aerodynamically harmonized aluminium frames. Each of the diffuser elements can be adjusted individually, thus permitting a large number of different flow patterns, varying from a flat ceiling flow to a broad fan jet with a maximum of 36 micro-jets per meter diffuser length.

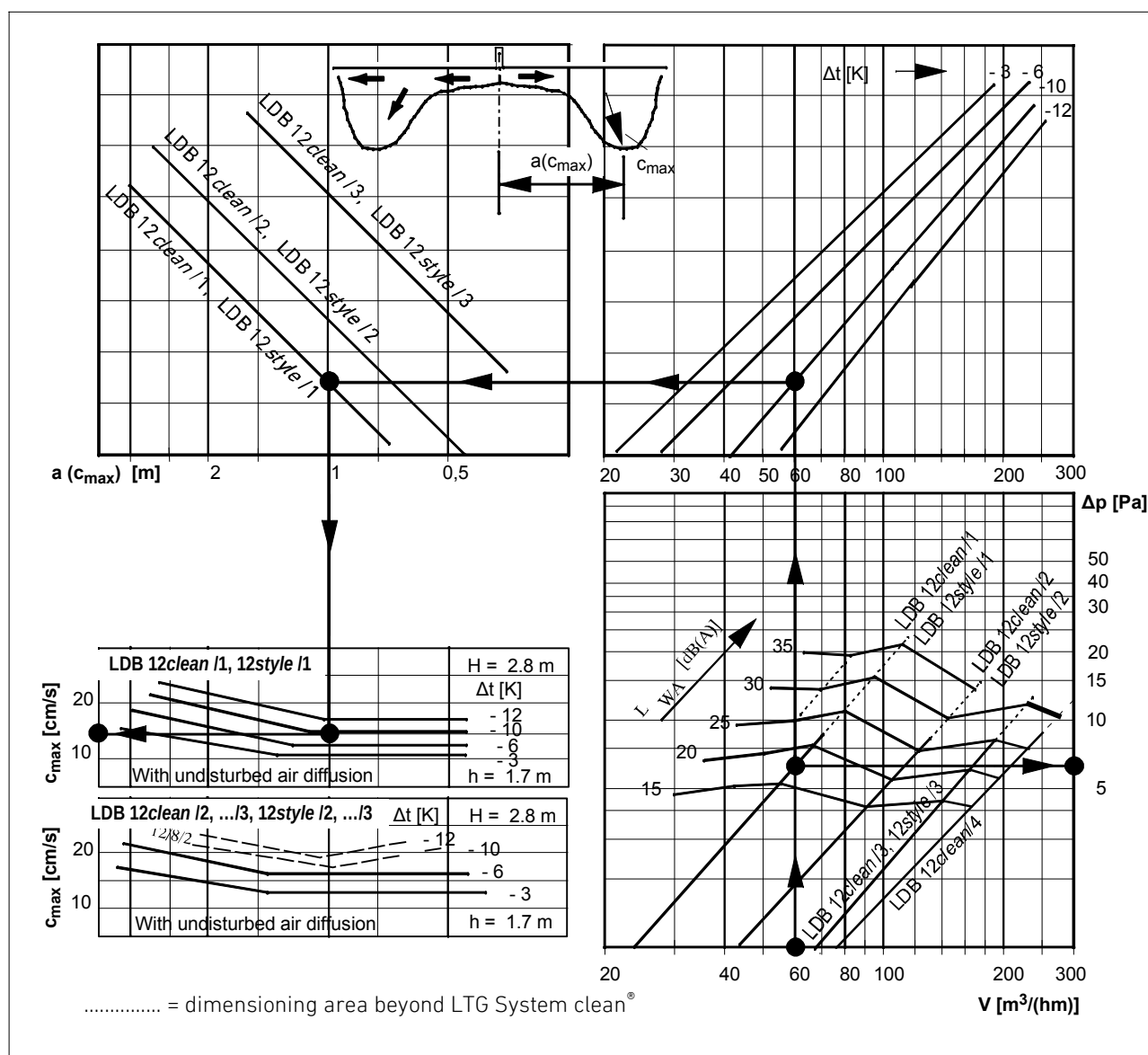
These features ensure low air speeds and a rapid reduction of temperature differences within the room, some of the basic requirements for agreeable conditions in the occupied space.

The highly inductive effect produces a stable flow pattern and permits supply air temperatures up to 12 K lower than the ambient temperature.

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Type LDB 12*clean* and LDB 12*style*, LTG System *clean*® - selection

Selection diagram



V	= volume flow rate	$[m^3/(hm)]$
t_{zu}	= supply air temperature	$[^{\circ}C]$
t_{RA}	= room air temperature	$[^{\circ}C]$
Δt	= temperature difference between t_{zu} and t_{RA}	$[K]$
Δp	= pressure drop	$[Pa]$
L_{WA}	= sound power level	$[dB(A)]$
$a(c_{max})$	= extension of jet at which the maximum speed of the ambient air was measured	$[m]$
c_{max}	= maximum speed of ambient air with uniformly distributed thermal loads	$[cm/s]$
H	= room height	$[m]$
h	= height of measuring point	$[m]$

Note: The recommended min. distance between two parallel diffusers should, in case of high temperature differences Δt , not be less than the value of $a(c_{max})$. The diagrams are based on measuring results with the standard diffuser element adjustment and a room height of 2.8 m.

Example for diagram above

Volume flow rate per meter of diffuser:
 $V = 60 \text{ m}^3/(hm)$

Resulting data for type LDB 12*clean*/1:

$\Delta p = 7 \text{ Pa}$
 $L_{WA} = 17 \text{ dB(A)}$
 $\Delta t = -10 \text{ K}$
 $a(c_{max}) \approx 1 \text{ m}$
 $c_{max} \leq 5 \text{ cm/s}$

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Type LDB 12*clean* and LDB 12*style*, LTG System *clean*® - dimensions

Spigot dimensions

Box length [mm]				494	594	694	794	894	994	1094	1194	1294	1394	1494	1594	1694	1794	1894	1994
Number diff. rows	V [m³/h]	Ød [mm]	Number of spigots	L _{WA} [dB(A)] from diagram * / correction [dB] of diagram *															
1	70	80		19	20	20	21	22	22	22	23	23	23	24	24	24	25	25	25
			1	-3	-1	+2	+4	+6	+8	+11	+12	+12							
			2			-4	-4	-4	-2	-1	-1	+1	+2	+3	+4	+6	+6	+7	+9
		100	3				-5	-5	-5	-4	-4	-3	-3	-3	-2	-1	-1	0	+1
			1		-3	0	+1	+3	+5	+7	+8	+10	+12	+12					
		125	2			-4	-5	-5	-4	-3	-3	-2	0	0	+1	+2	+3	+4	+5
			1		-4	-3	-2	-1	+1	+3	+3	+5	+7	+7	+8	+10	+10		
			2				-5	-5	-5	-4	-4	-3	-3	-3	-2	-1	-1	0	+1
	130	80		24	25	25	26	27	27	27	28	28	28	29	29	29	30	30	30
			1	0	+3	+7	+9												
			2				-2	-2	-1	+1	+1	+3	+4	+5	+6				
		100	3					-3	-3	-2	-3	-2	-1	-2	-1	0	0	+1	+2
			1		-1	+2	+3	+5	+7										
			2					-3	-2	-1	-2	-1	0	0	+1	+2	+2	+4	+5
		125	3					-3	-3	-2	-3	-2	-2	-3	-2	-2	-2	-2	-1
			1				-2	-1	0	+2	+3	+5	+7						
			2					-3	-3	-2	-3	-3	-2	-3	-2	-2	-2	-2	-1
		140	1				-2	-2	-1	+1	+1	+3	+5	+6					
			2					-3	-3	-2	-3	-3	-2	-3	-2	-2	-3	-2	-2
3	190	100		22	23	23	24	25	25	25	26	26	26	27	27	27	28	28	28
			1	+4	+7	+11	+11												
			2				+1	+2	+4	+6	+7	+9							
			3					0	+1	+1	+1	+2	+4	+4	+5	+7	+7		
		125	4					0	-1	0	+1	0	+1	0	+1	+2	+2	+3	+4
			1			+4	+6	+8	+10										
			2					0	+1	+1	+3	+4	+5	+6	+7				
		140	3					0	-1	0	0	0	0	+1	+1	+1	+2	+3	
			1			+2	+3	+4	+6	+8	+9								
			2					0	0	0	+1	+2	+2	+3	+4	+4	+5	+6	
		160	3						-1	-1	0	0	-1	0	0	0	0	+1	+1
			1				0	+1	+3	+3	+4	+5	+5	+7	+8				
4 **	250	125	2				0	-1	0	0	0	0	0	0	0	0	0	0	0
			3					0	-1	0	0	0	0	0	0	0	0	0	0
			4					0	-1	0	0	0	0	0	0	0	0	0	0
			1	+1	+3	+5	+7	+8											
		140	2		0	+1	+1	+1	+2	+3	+3	+4	+5	+5					
			3		0	+1	0	0	+1	+1	+1	+1	+2	+1	+2	+3	+2	+3	+4
			4		0	+1	0	0	0	+1	0	+1	+1	0	+1	+1	+1	+1	+2
		160	1	+1	+1	+2	+2	+3	+4	+5	+6	+7							
			2		0	+1	+1	0	+1	+1	+1	+1	+2	+2	+3	+3	+3	+4	
			3		0	+1	0	0	0	+1	0	+1	+1	0	+1	+1	+1	+1	+1

V - flow rate Ød - diameter spigot * see page 9 ** for LDB 12*clean* only

L_{WA} = L_{WA} from diagram page 9 + correction value

Selection example: LDB 12*clean*/3, length 1494 mm, 2 x Ø140, flow rate 190 m³/h, L_{WA} = 27 dB(A) + 2 dB = 29 dB(A)

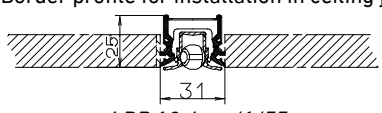
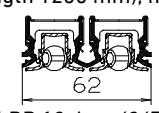
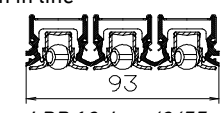
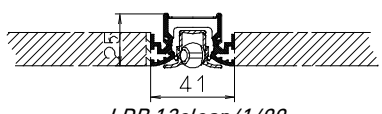
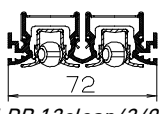
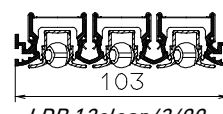
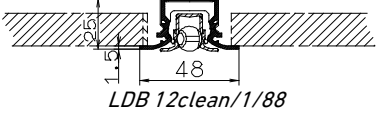
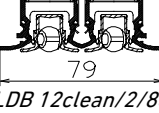
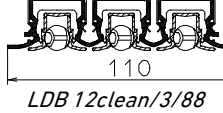
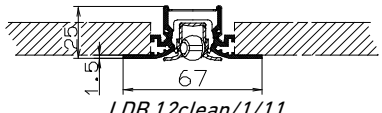
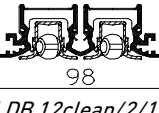
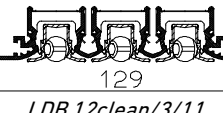
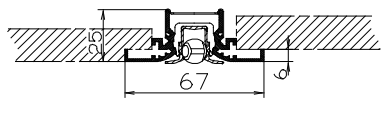
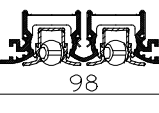
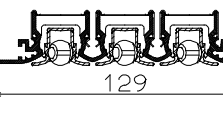
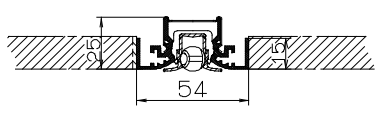
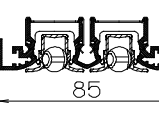
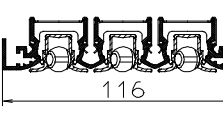
Technical brochure • Linear air diffusers LDB

Type LDB 12*clean* and LDB 12*style*, LTG System *clean*[®] - accessories

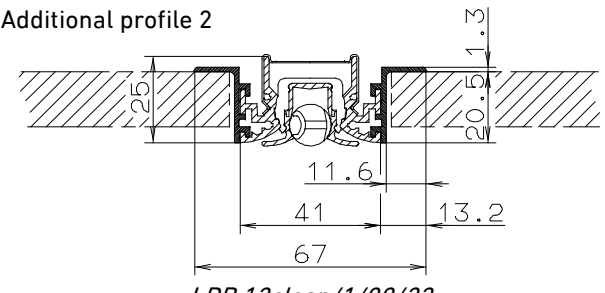
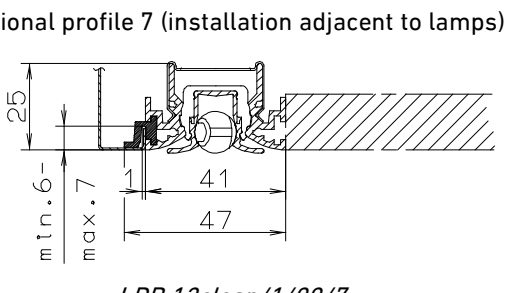
Various border and additional profiles are available for LTG linear diffusers LDB ensuring a perfect integration in and adaptation to all kinds of ceiling systems.

Thus, both an inconspicuous installation of the diffuser and its use as an interior design element are possible. Profiles may also be used in combination with each other.

Border profiles for type LDB 12*clean* LTG System *clean*[®]

Border profile for installation in ceiling joints (max. length 1250 mm), not suitable for installation in line		
 LDB 12clean/1/55	 LDB 12clean/2/55	 LDB 12clean/3/55
Border profile for combination with additional profiles		
 LDB 12clean/1/00	 LDB 12clean/2/00	 LDB 12clean/3/00
Border profile for covering ceiling joints		
 LDB 12clean/1/88	 LDB 12clean/2/88	 LDB 12clean/3/88
Border profile for covering ceiling joints		
 LDB 12clean/1/11	 LDB 12clean/2/11	 LDB 12clean/3/11
Border profile for ceiling panels and adjacent to lamps		
 LDB 12clean/1/44	 LDB 12clean/2/44	 LDB 12clean/3/44
Border profile for ceiling panels		
 LDB 12clean/1/22	 LDB 12clean/2/22	 LDB 12clean/3/22

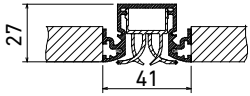
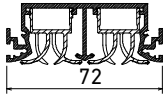
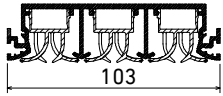
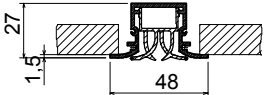
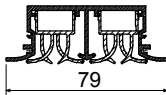
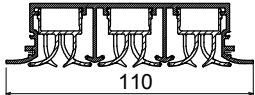
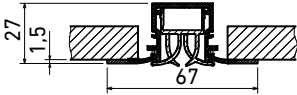
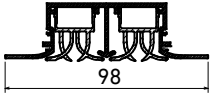
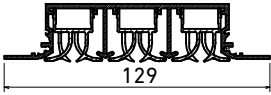
Additional profiles for type LDB 12*clean* and 12*style*, LTG System *clean*[®]

Additional profile 2  LDB 12clean/1/00/22	Additional profile 7 (installation adjacent to lamps)  LDB 12clean/1/00/7
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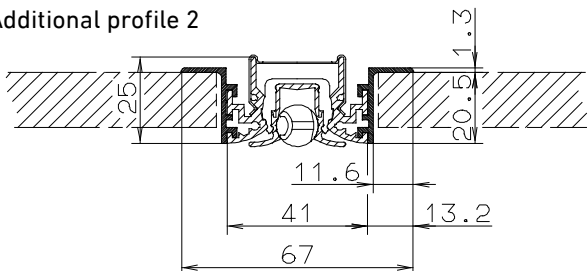
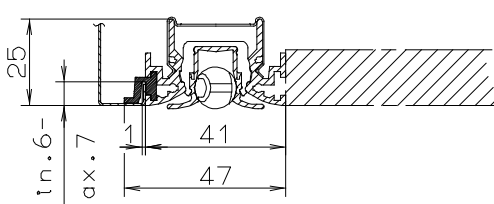
Technical brochure • Linear air diffusers LDB

Type LDB 12*clean* and LDB 12*style*, LTG System *clean*[®] - accessories

Border profiles for type LDB 12*style* LTG System *clean*[®]

Border profile for combination with additional profiles		
		
LDB 12style/1/00	LDB 12style/2/00	LDB 12style/3/00
Border profile for covering ceiling joints		
		
LDB 12style/1/88	LDB 12style/2/88	LDB 12style/3/88
Border profile for covering ceiling joints		
		
LDB 12style/1/11	LDB 12style/2/11	LDB 12style/3/11

Additional profiles for type LDB 12*clean* and 12*style*, LTG System *clean*[®]

Additional profile 2  LDB 12clean/1/00/22	Additional profile 7 (installation adjacent to lamps)  LDB 12clean/1/00/7
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Technical brochure • Linear air diffusers LDB

Type LDB 12^{clean} and 12^{style}, LTG System clean® - with sound absorber

Insertion loss / end reflection factor

The cross-talk sound transmission via air ducts between adjacent rooms is a sound flanking path which might reduce the sound insulation of partition walls or suspended ceilings.

DIN 4109 or customer agreements set minimum sound insulation requirements for partition walls in terms of a weighted sound reduction index R'_w .

Sound insulation indices may be calculated in terms of a sound pressure level difference with known ceiling surface S and the equivalent absorption surface A of the receiving room:

$$\Delta L = R_L - 10 \lg (S/A)$$

When assessing the sound pressure level difference in the air duct between the source and receiving room, calculation must be in the frequency bands (compare VDI 2081, Pages 1 and 2, and LTG selection program). Therefore, for cross-talk sound absorbers manufacturers' frequency-dependent insertion loss indices will have to be used. For air diffusers, the insertion loss/end reflection of the air diffusers according to DIN EN ISO 7235 is decisive.

The following decision must be made:

1. no cross-talk sound absorber required
2. sound absorber integrated in the air diffuser required
3. additional packaged attenuator of length x required

Through loss data of the air diffusers are determined as follows:

$$D_t = D_i + D_{td}$$

D_i Air diffuser insertion loss index

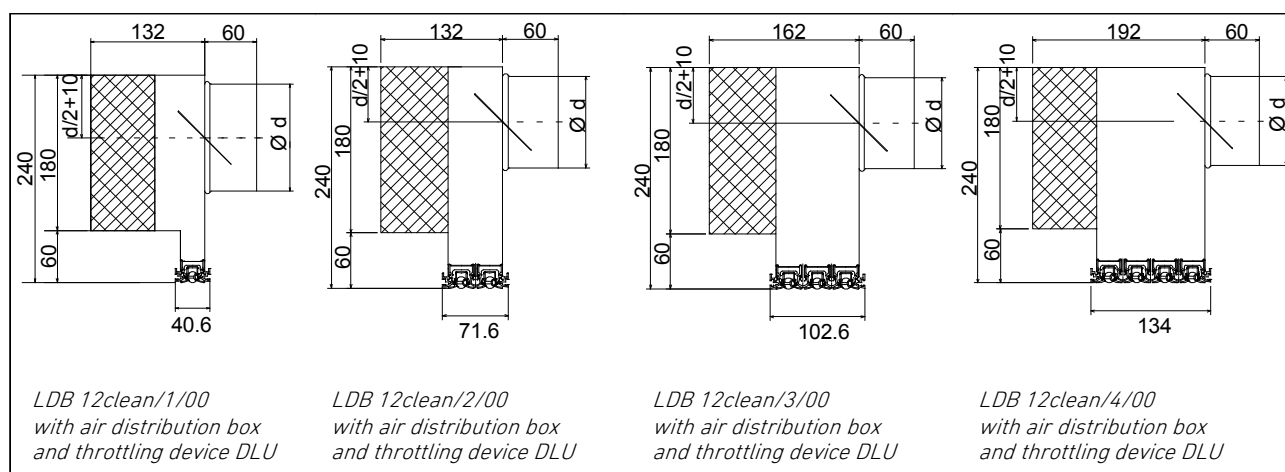
D_{td} theoretical end reflection at the open end of a straight, solid duct (duct end reflection) from equation B3 in DIN EN ISO 7235

Insertion loss /end reflection factor D_t

Octave [Hz]	D_t <u>without</u> sound trap [dB]			
	LDB 12 ^{clean} /...			
	.../1	.../2	.../3	.../4
63	25	22	19	21
125	16	17	14	15
250	8	6	7	5
500	12	8	8	8
1000	12	7	9	7
2000	9	5	5	4
4000	6	5	6	5
8000	6	5	4	4

Octave [Hz]	D_t <u>with</u> sound trap [dB]			
	LDB 12 ^{clean} /...			
	.../1	.../2	.../3	.../4
125	16	17	14	15
250	18	12	11	9
500	22	18	16	15
1000	24	19	15	13
2000	19	15	12	10
4000	20	13	13	11
8000	18	11	11	9

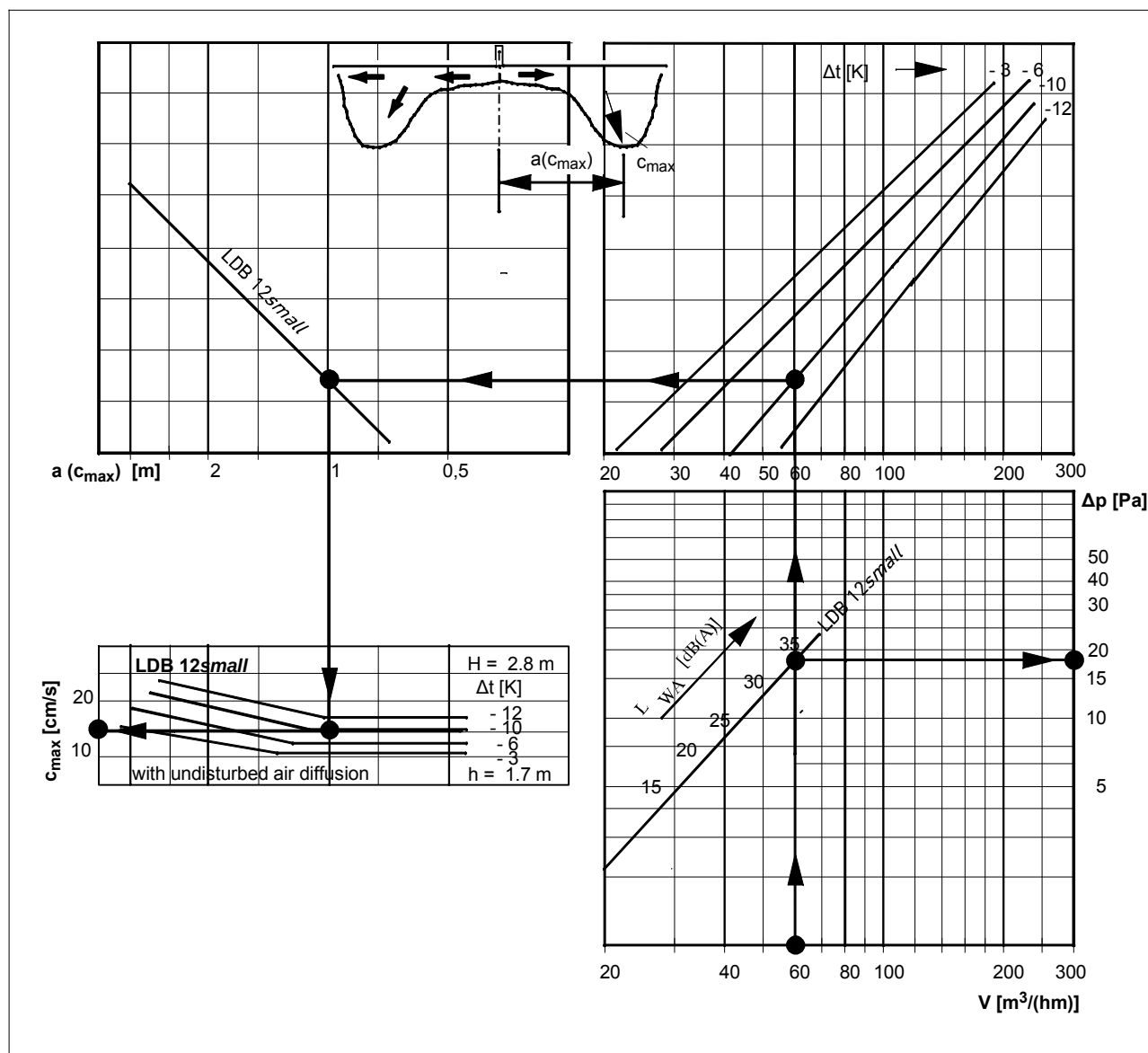
Dimensions air distribution box with sound absorber (melamine resin foam)



Technical brochure • Linear air diffusers LDB

Type LDB 12small – selection

Selection diagram



V	=	flow rate	$[\text{m}^3/(\text{hm})]$
t_{zu}	=	supply air temperature	$[\text{°C}]$
t_{RA}	=	room air temperature	$[\text{°C}]$
Δt	=	temperature difference between t_{zu} and t_{RA}	$[\text{K}]$
Δp	=	pressure drop	$[\text{Pa}]$
L_{WA}	=	sound power level	$[\text{dB(A)}]$
$a(c_{\max})$	=	extension of jet at which the maximum speed of the ambient air was measured	$[\text{m}]$
$c_{\max}$	=	maximum speed of ambient air with uniformly distributed thermal loads	$[\text{cm/s}]$
H	=	room height	$[\text{m}]$
h	=	height of measuring point	$[\text{m}]$

Note: The recommended min. distance between two parallel diffusers should, in case of high temperature differences Δt , not be less than the value of $a(c_{\max})$. The diagrams are based on measuring results with the standard diffuser element adjustment and a room height of 2.8 m.

Example for diagram above

Flow rate per meter of diffuser:
 $V = 60 \text{ m}^3/(\text{hm})$

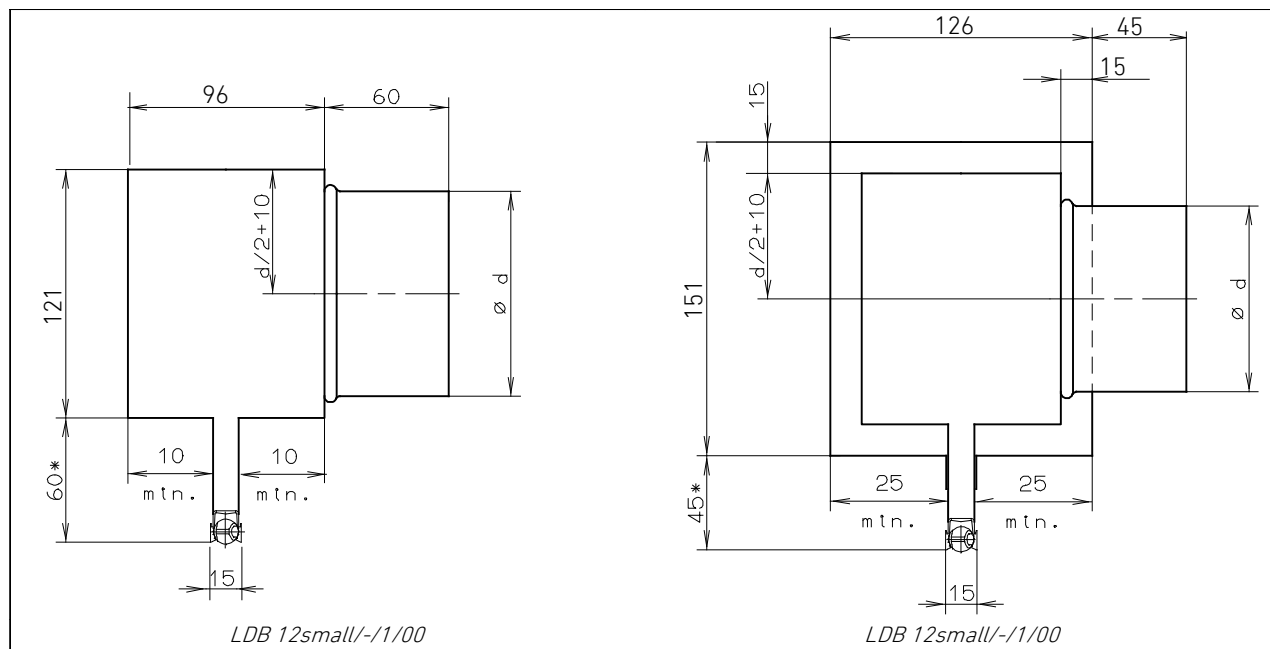
Resulting data for type LDB 12small:

$\Delta p = 19 \text{ Pa}$
 $L_{WA} = 33 \text{ dB(A)}$
 $\Delta t = -10 \text{ K}$
 $a(c_{\max}) \approx 1 \text{ m}$
 $c_{\max} \leq 15 \text{ cm/s}$

Technical brochure • Linear air diffusers LDB Type LDB 12small - dimensions, border profiles

Air distribution box without insulation

Air distribution box with insulation (longitudinal double skin box)



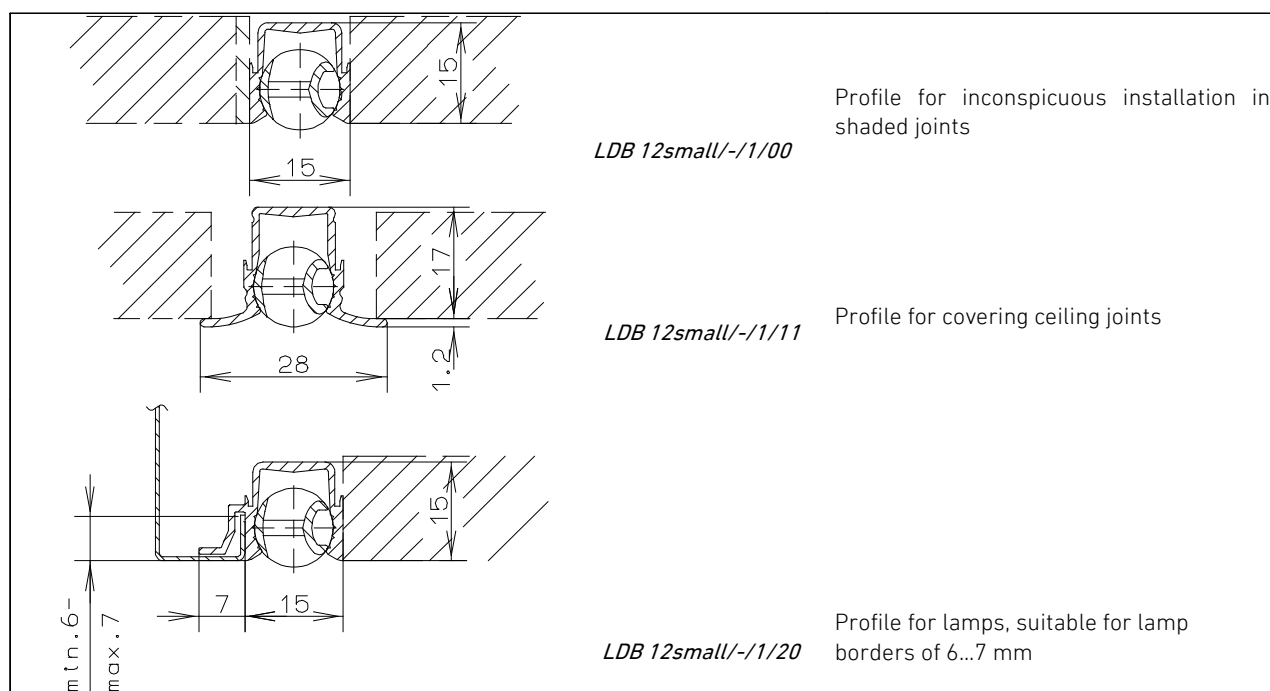
The values given refer to standard versions. Reduced box sizes and spigot diameters are available on request, depending on flow rate and acoustic requirements.

*) Neck lengths 45 to 80 mm
Special dimensions on request.

Spigot dimensions

Diffuser length	L_{nom} [mm]*	500	750	1000	1250
LDB 12 small	$\varnothing d$ [mm]	1 x 99	1 x 99	1 x 99	2 x 99

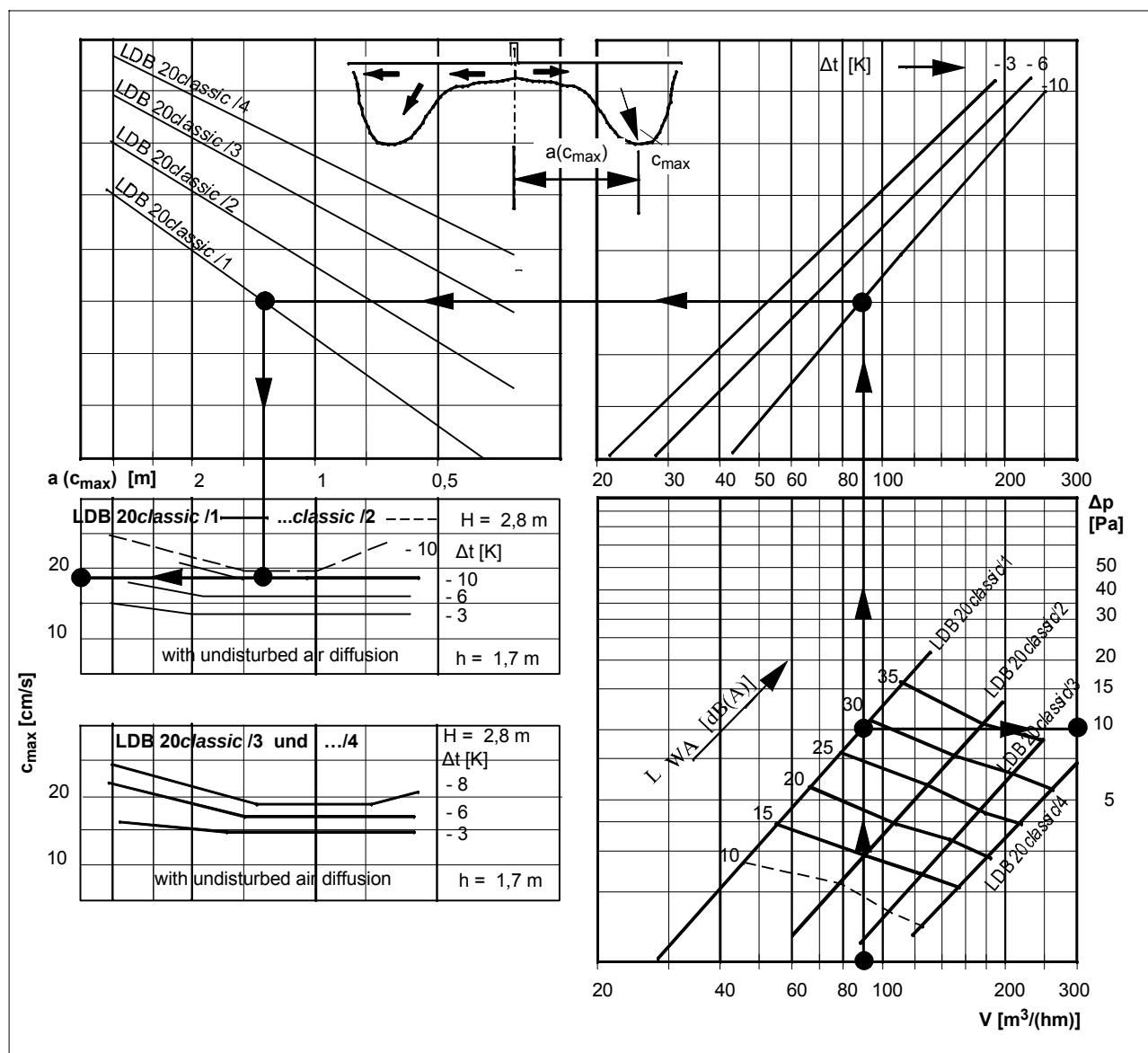
Border profiles (length 1250 mm max.)



Technical brochure • Linear air diffusers LDB

Type LDB 20*classic* - Selection

Selection diagram



The recommended min. distance between two parallel diffusers should, in case of high temperature differences Δt , not be less than the value of $a(c_{max})$.

The diagrams are based on measuring results with the standard diffuser element adjustment and a room height of 2.8 m.

Example for diagram above

Flow rate per meter of diffuser:
 $V = 90 \text{ m}^3/(\text{hm})$

Resulting data for type LDB 20*classic*/1:

- $\Delta p = 10 \text{ Pa}$
- $L_{WA} = 28 \text{ dB(A)}$
- $\Delta t = -10 \text{ K}$
- $a(c_{max}) \approx 1.4 \text{ m}$
- $c_{max} \leq 18 \text{ cm/s}$

The recommended min. distance between two parallel diffusers should, in case of high temperature differences Δt , not be less than the value of $a(c_{max})$.

The diagrams are based on measuring results with the standard diffuser element adjustment and a room height of 2.8 m.

Example for diagram above

Flow rate per meter of diffuser:

$$V = 90 \text{ m}^3/(\text{hm})$$

Resulting data for type LDB 20*classic*/1:

$$\Delta p = 10 \text{ Pa}$$

$$L_{WA} = 28 \text{ dB(A)}$$

$$\Delta t = -10 \text{ K}$$

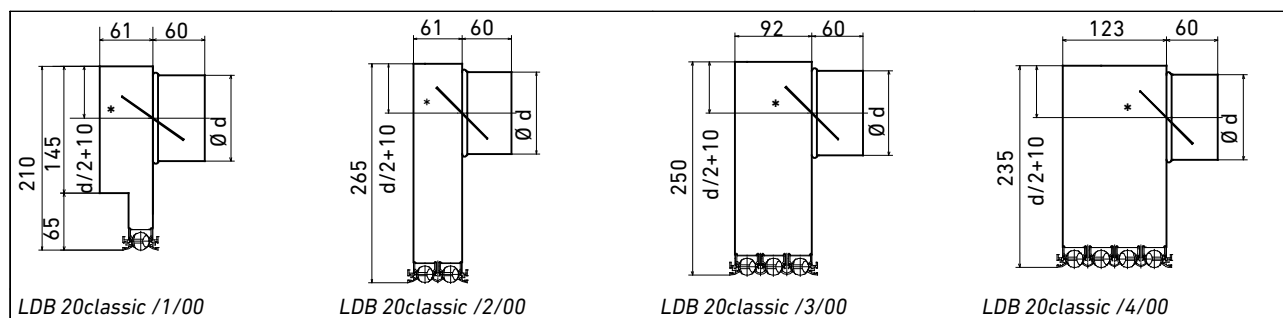
$$a(c_{max}) \approx 1.4 \text{ m}$$

$$c_{max} \leq 18 \text{ cm/s}$$

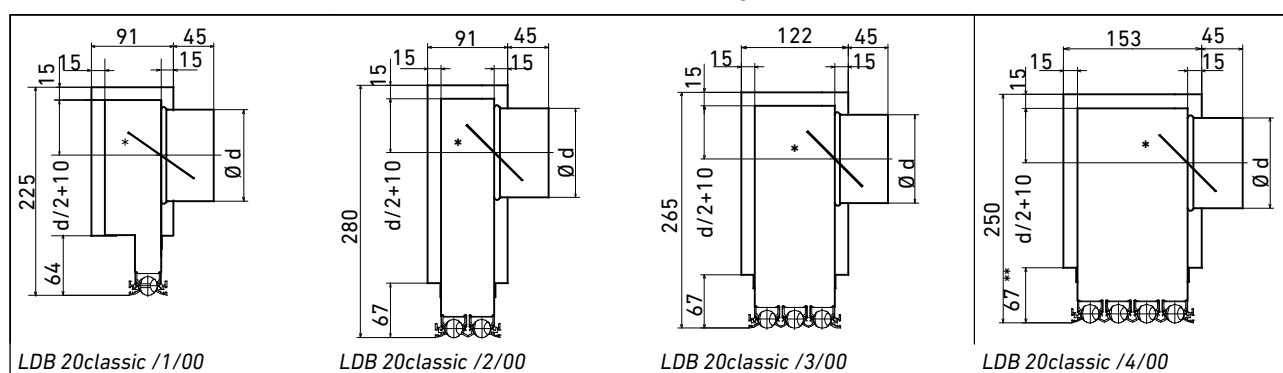
Technical brochure • Linear air diffusers LDB

Type LDB 20classic - dimensions

Dimensions of air distribution boxes without insulation



Dimensions of air distribution boxes with insulation (longitudinal double skin box)



Diffuser length [mm]	from	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
	up to	599	699	799	899	999	1099	1199	1299	1399	1499	1599	1699	1799	1899	1999	2100
Box length [mm]		494	594	694	794	894	994	1094	1194	1294	1394	1494	1594	1694	1794	1894	1994

* With integrated throttle damper DLU.

The values given refer to standard versions. Reduced box sizes and spigot diameters are available on request, depending on flow rate and acoustic requirements.

** For the longitudinal double skin box LDB 20classic/4 and a spigot diameter of 160, it is 52 mm instead of 67 mm

Technical brochure • Linear air diffusers LDB

Type LDB 20classic - dimensions

Spigot dimensions

Box length [mm]				494	594	694	794	894	994	1094	1194	1294	1394	1494	1594	1694	1794	1894	1994		
Number of diffuser rows	V [m³/h]	Ød [mm]	Number of spigots	L _{WA} [dB(A)] from diagram * / correction [dB] of diagram *																	
1	90			26	27	27	28	29	29	29	30	30	30	31	31	31	32	32	32		
		80	1	+1	+1	+3	+5	+6													
			2	0	0	0	0	0	+1	+1	+1	+2	+3	+4							
			3	0	0	0	0	-1	0	0	0	0	+1	0	+1	+2	+1	+2	+3		
			4	0	0	0	0	-1	0	0	0	0	0	0	0	+1	0	0	+1		
		100	1	0	0	+2	+3	+3	+5												
			2	0	0	0	0	0	0	+1	0	+1	+2	+2	+3	+3	+3				
		3	0	0	0	0	-1	0	0	0	0	+1	0	0	+1	0	+1	0	+1		
		125	1	0	0	+1	+1	+1	+2	+3	+4	+5									
2	0		0	0	0	-1	0	0	0	0	+1	0	+1	+1	+1	+1	+1	+2			
2	150			27	28	28	29	30	30	30	31	31	31	32	32	32	33	33	33		
		80	1	+1	+4	+7															
			2	-2	-3	-2	-2	-2	0	+1	+2	+3									
			3		-3	-2	-2	-3	-2	-2	-2	-2	-1	-1	0	+1	0	+1	+2		
			4		-3	-2	-2	-3	-2	-2	-3	-2	-2	-2	-2	-2	-2	-2	-1		
		100	1	-1	0	+2	+4	+5													
			2		-3	-2	-2	-3	-2	-1	-1	0	+1	+1	+2	+3					
			3		-3	-2	-2	-3	-2	-2	-3	-2	-2	-2	-2	-1	-2	-1	-1		
		125	1	-2	-2	-1	-1	-1	+1	+3	+4										
			2		-3	-2	-2	-3	-2	-2	-3	-2	-2	-2	-2	-1	-2	-1	0		
		140	1		-3	-2	-2	-2	0	+1	+2	+4									
			2		-3	-2	-2	-3	-2	-2	-3	-2	-2	-2	-2	-2	-1	-2	-1		
		3	210			27	28	28	29	30	30	30	31	31	31	32	32	32	33	33	33
				100	1	+1	+4														
					2			-4	-3	-2	+1	+3									
3									-5	-4	-3	-2	0	+1	+2						
4											-6	-5	-4	-4	-3	-2	-1	0	+1		
125	1			-5	-3	+1	+3	+5													
	2								-5	-3	-3	-1	+1	+2	+3						
	3											-6	-5	-5	-4	-3	-3	-2	0		
140	1					-3	-1	+1	+3	+5											
	2									-5	-5	-4	-3	-2	-1	0	+1	+2			
3												-6	-7	-6	-5	-5	-5	-5	-4		
160	1							-5	-3	-2	-1	0	+2	+2	+3						
	2											-6	-6	-6	-5	-4	-5	-4	-3		
4	260					27	28	28	29	30	30	30	31	31	31	32	32	32	33	33	33
				125	1	+1	+3														
		2	-2		-2	-1	-1	0	+1	+3	+3										
		3	-2		-2	-1	-2	-2	-1	-1	-1	0	+1	+1	+2	+3					
		4	-2		-2	-1	-2	-2	-2	-1	-2	-1	-1	-1	-1	0	0	0	+1		
		140	1	-1	+1	+3	+5														
			2	-2	-2	-1	-1	-1	-1	0	+1	+2	+3	+3							
			3	-2	-2	-1	-2	-2	-2	-1	-2	-1	0	-1	0	+1	0	+1	+2		
			4	-2	-2	-1	-2	-2	-2	-1	-2	-1	-1	-2	-1	-1	-1	-1	0		
		160	1	-1	-1	0	0	0	+2	+3	+4										
			2	-2	-2	-1	-2	-2	-1	-1	-1	-1	0	0	0	+1	+1	+1	+2		
			3	-2	-2	-1	-2	-2	-2	-1	-2	-1	-1	-2	-1	-1	-1	-1	-1		

V - flow rate Ød - spigot diameter * see page 12

L_{WA} = L_{WA} from diagram in page 9 + correction value,

Example: LDB 20classic/2, length = 994 mm, 2 x Ø100, flow rate 150 m³/h L_{WA} = 30 dB(A) - 2 dB = 28 dB(A)

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Type LDB 20*classic* - with sound absorber

Insertion loss / end reflection factor

The cross-talk sound transmission via air ducts between adjacent rooms is a sound flanking path which might reduce the sound insulation of partition walls or suspended ceilings.

DIN 4109 or customer agreements set minimum sound insulation requirements for partition walls in terms of a weighted sound reduction index R'_w .

Sound insulation indices may be calculated in terms of a sound pressure level difference with known ceiling surface S and the equivalent absorption surface A of the receiving room:

$$\Delta L = R_L - 10 \lg (S/A)$$

When assessing the sound pressure level difference in the air duct between the source and receiving room, calculation must be in the frequency bands (compare VDI 2081, pages 1, 2, and LTG selection program). Therefore, for cross-talk sound absorbers manufacturers' frequency-dependent insertion loss indices will have to be used. For air diffusers, the insertion loss/end reflection of the air diffusers according to DIN EN ISO 7235 is decisive.

The following decision must be made:

1. no cross-talk sound absorber required
2. sound absorber integrated in the air diffuser required
3. additional packaged attenuator of length x required

Through loss data of the air diffusers are determined as follows:

$$D_t = D_i + D_{td}$$

D_i air diffuser insertion loss index

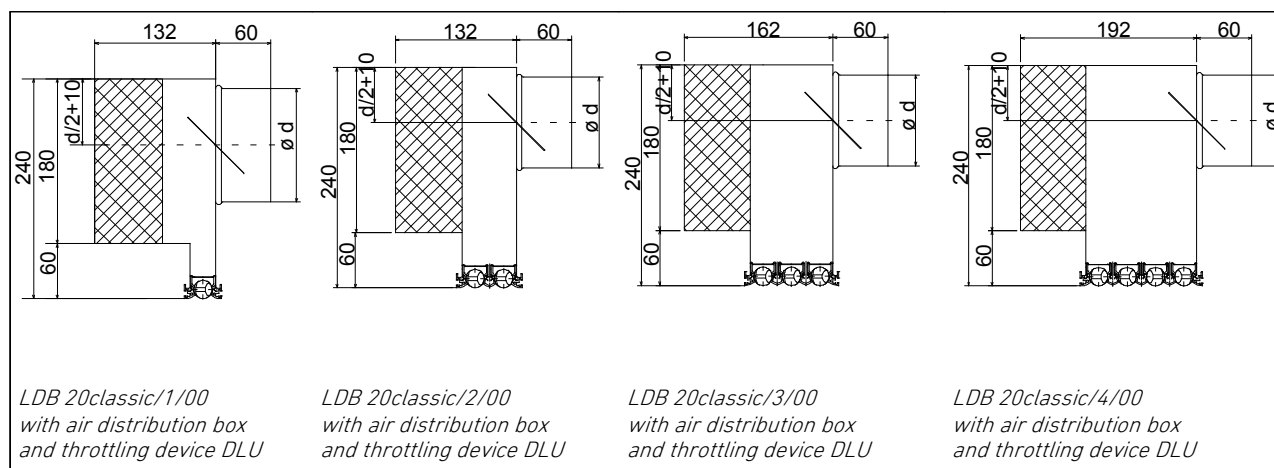
D_{td} theoretical end reflection at the open end of a straight, solid duct (duct end reflection) from equation B3 in DIN EN ISO 7235

Insertion loss / end reflection factor D_t

Octave [Hz]	d_t <u>without</u> sound trap [dB]			
	LDB 20 <i>classic</i> / ...			
	.../1	.../2	.../3	.../4
63	25	22	19	21
125	16	17	14	15
250	8	6	7	5
500	12	8	8	8
1000	12	7	9	7
2000	9	5	5	4
4000	6	5	6	5
8000	6	5	4	4

Octave [Hz]	D_t <u>with</u> sound trap [dB]			
	LDB 20 <i>classic</i> / ...			
	.../1	.../2	.../3	.../4
63	25	22	19	21
125	16	17	14	15
250	18	12	11	9
500	22	18	16	15
1000	24	19	15	13
2000	19	15	12	10
4000	20	13	13	11
8000	18	11	11	9

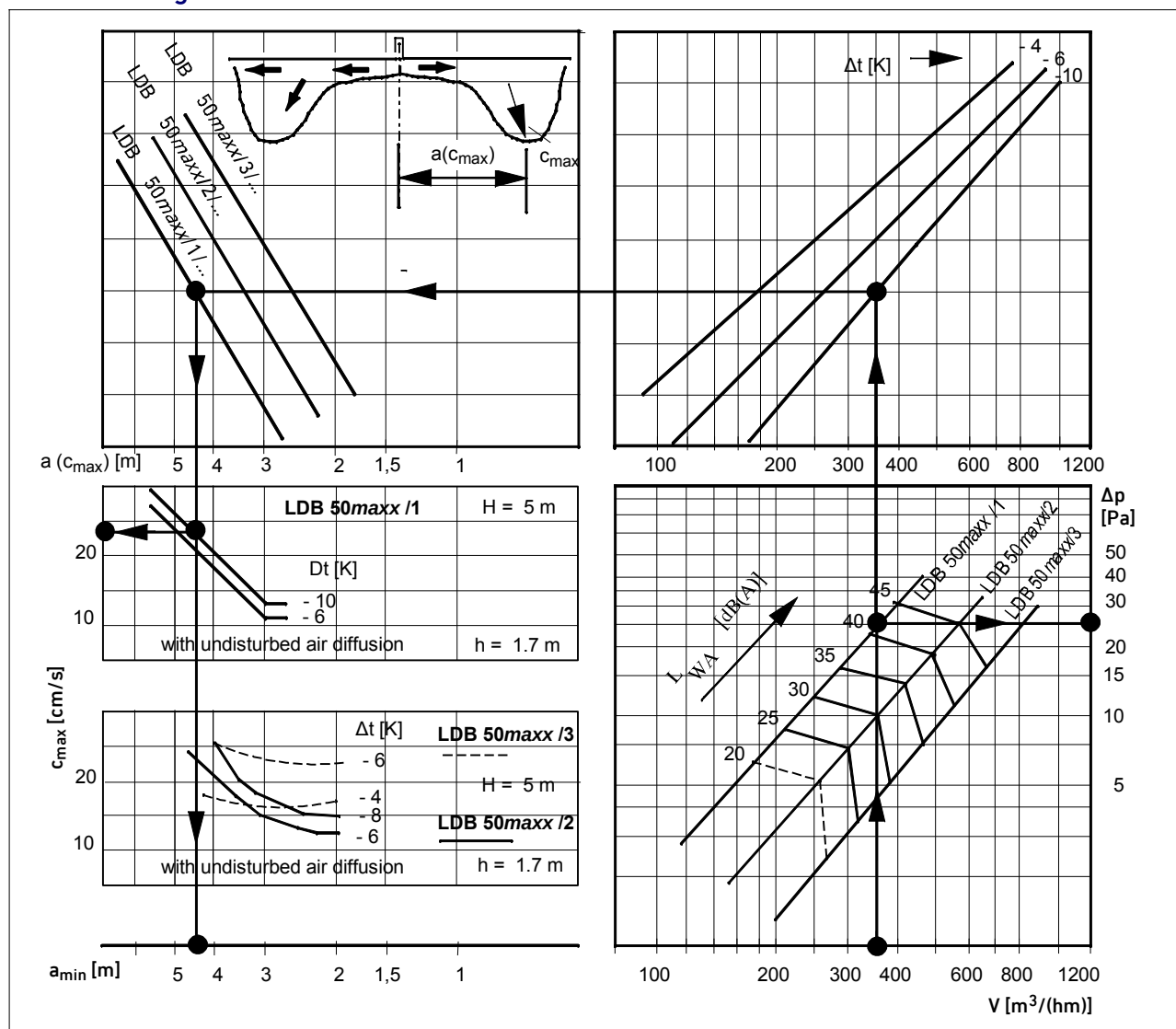
Dimensions air distribution box with sound absorber (melamine resin foam)



Technical brochure • Linear air diffusers LDB

Type LDB 50maxx - selection

Selection diagram



V	=	volume flow rate	[m³/(hm)]
t _{zu}	=	supply air temperature	[°C]
t _{RA}	=	room air temperature	[°C]
Δt	=	temperature difference between t _{zu} and t _{RA}	[K]
Δp	=	pressure drop	[Pa]
L _{WA}	=	sound power level	[dB(A)]
a(c _{max})	=	extension of jet at which the maximum speed of the ambient air was measured	[m]
c _{max}	=	maximum speed of ambient air with uniformly distributed thermal loads	[cm/s]
H	=	room height	[m]
h	=	height of measuring point	[m]

Note: The recommended min. distance between two parallel diffusers should, in case of high temperature differences Δt, not be less than the value of a (c_{max}).

The diagrams are based on measuring results with the standard diffuser element adjustment, a room height of 5 m and a uniform load distribution. For an optimized air flow, an adaptation may be required according to project.

Example for diagram above

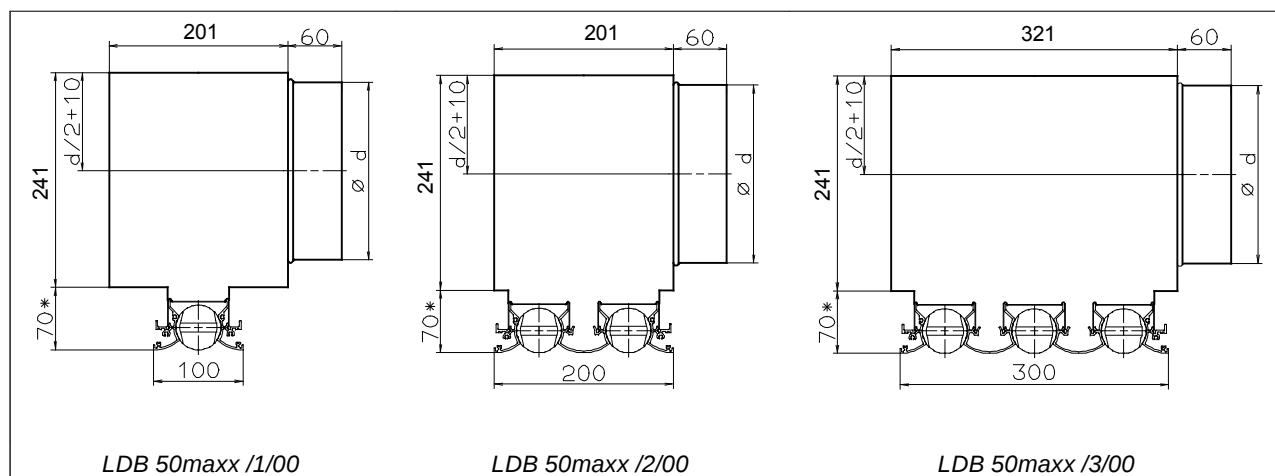
Flow rate per meter of diffuser:
V = 360 m³/(hm)

Resulting data for type LDB 50maxx/1:

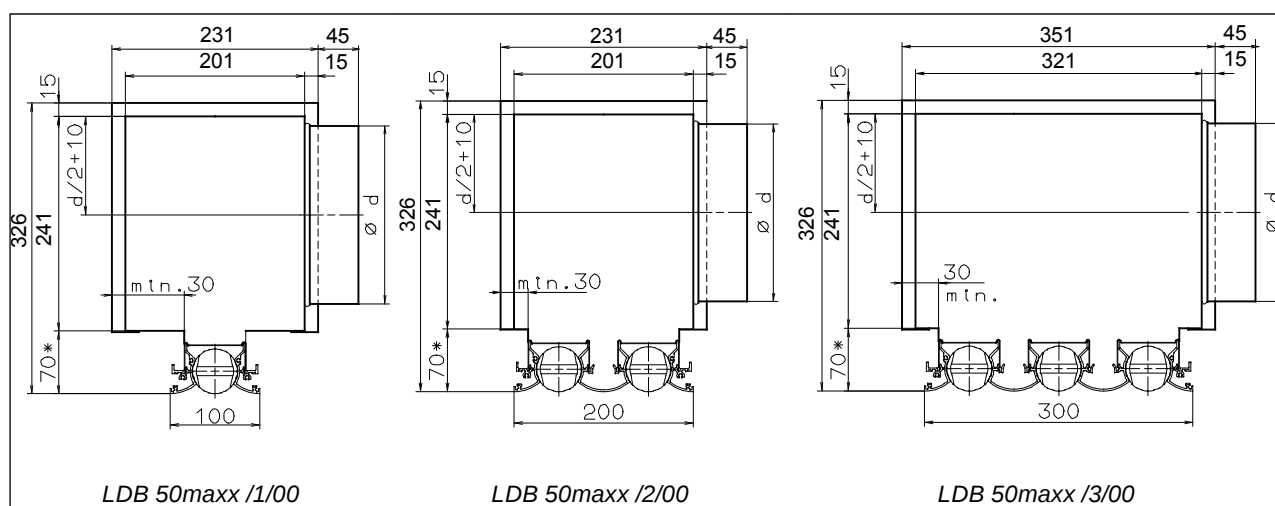
Δp = 26 Pa
L_{WA} = 41 dB(A)
Δt = -10 K
a(c_{max}) ≈ 4.4 m
c_{max} ≤ 24 cm/s

Technical brochure • Linear air diffusers LDB Type LDB 50maxx - dimensions, additional profile

Dimensions of air distribution boxes



Dimensions of air distribution boxes with insulation (longitudinal double skin box)



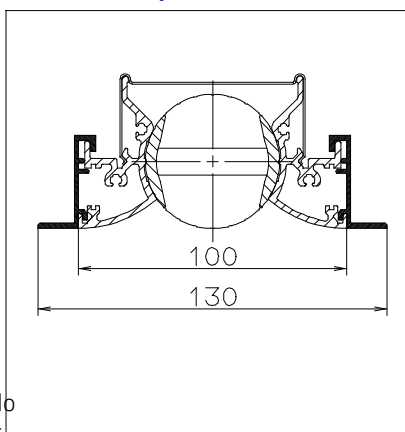
The values given refer to standard versions. Reduced box sizes and spigot diameters are available on request, depending on volume flow rate and acoustic requirements. *) Neck length 70...170 mm

Spigot dimensions

Diffuser length	L _{nom} [mm]*	300	600	900	1200	1500	1800	2100
LDB 50maxx /1 (1 slot row)	Ø d	1x 199	1x 199	2x 199	2x 199	3x 199	3x 199	3x 199
LDB 50maxx /2 (2 slot rows)	Ø d	1x 199	1x 199	2x 199	2x 199	3x 199	3x 199	4x 199
LDB 50maxx /3 (3 slot rows)	Ø d	1x 199	1x 199	2x 199	2x 199	3x 199	3x 199	4x 199

*) We recommend to choose large spigot and duct diameters to obtain the lowest possible duct speed as this will result in lower pressure losses and less noise caused by the flow. Due to an improved air distribution, the system can do without some of the additional units usually required such as throttling devices.

Additional profile



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Minimum cut-out dimensions

Type	Border profile	Profile width					
		1 row	2 rows	3 rows	4 rows		
LDB 12 _{clean}	00	41	72	103	134	Length = diffuser length + 10 mm	Width = profile width + 2 mm
LDB 12 _{style}	00/22	44	75	106	137		
LDB 20 _{classic}	11	41	72	103	134		
	22	54	85	116	147		
	44	41	72	103	134		
	55	31	62	93	124		
LDB 12 _{small}	00	15	--	--	--	Length = diffuser length + 20 mm	
	11	25	--	--	--		
LDB 50 _{maxx}	00	100	200	300	--		
	11	103	203	303	--		

Distance between parallel linear diffusers and to walls

An unfavourable arrangement of linear diffusers in parallel lines or close to walls may result in air flow speeds higher than those given in the technical specifications.

In order to avoid this problem:

- ensure that the distance between parallel linear diffusers is sufficiently large to exclude any interaction,
- ensure that air jets are mixed above the occupied zone (e.g. at a height of 1.8 m).

Based on these requirements, the two areas marked in Figure 1 are obtained indicating the recommended distance b between parallel linear diffusers.

For an installation parallel to walls, at least half the distance ($b/2$) is required.

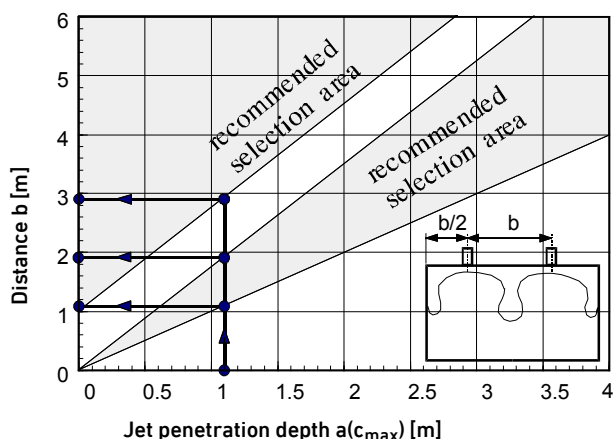


Figure 1: Distance between parallel diffusers with a symmetric air flow pattern

Example

From the selection diagram: $a(c_{\max}) = 1.1 \text{ m}$

Recommended distance betw. parallel diffusers: $1.1 \text{ m} < b < 1.9 \text{ m}$ or $b > 2.9 \text{ m}$

recommended distance to the wall: $b/2 > 0.55 \text{ m}$

All linear diffusers also allow an asymmetric splitting of the air volume in a 1/3 to 2/3 ratio.

The recommended distances $b_{1/3}$ and $b_{2/3}$ between parallel diffusers are illustrated in Figure 2. For the jet penetration depth $a(c_{\max})$ refer to the selection diagrams for a *symmetric distribution*.

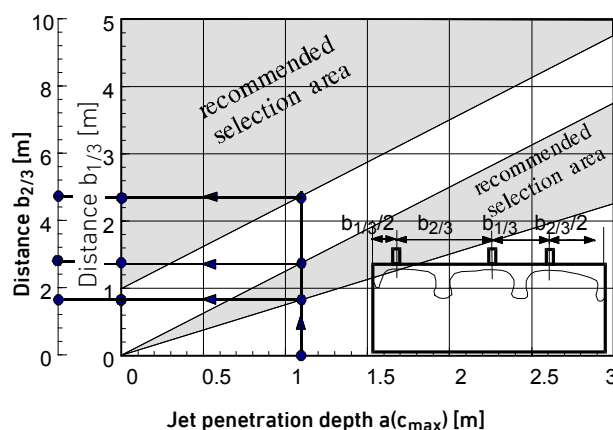


Figure 2: Distance between parallel diffusers with an asymmetric air flow pattern (1/3 to 2/3).

Example

From the selection diagram: $a(c_{\max}) = 1.1 \text{ m}$

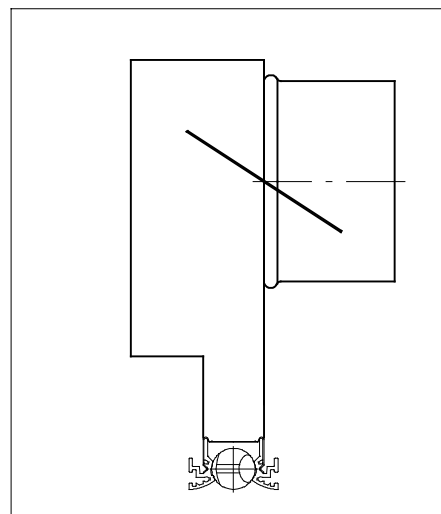
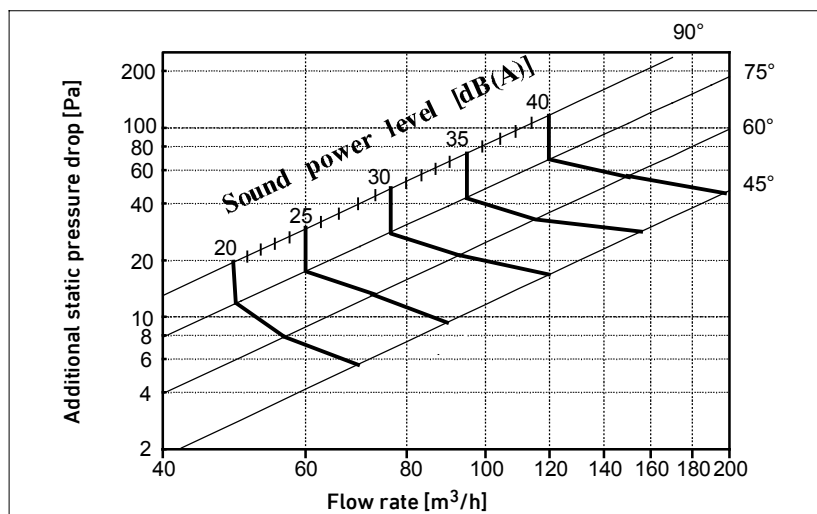
Recommended distance between parallel diffusers:
1/3-share: $0.8 \text{ m} < b_{1/3} < 1.4 \text{ m}$ or $b_{1/3} > 2.4 \text{ m}$
2/3-share: $1.6 \text{ m} < b_{2/3} < 2.8 \text{ m}$ or $b_{2/3} > 4.8 \text{ m}$

Recommended distance to the wall:

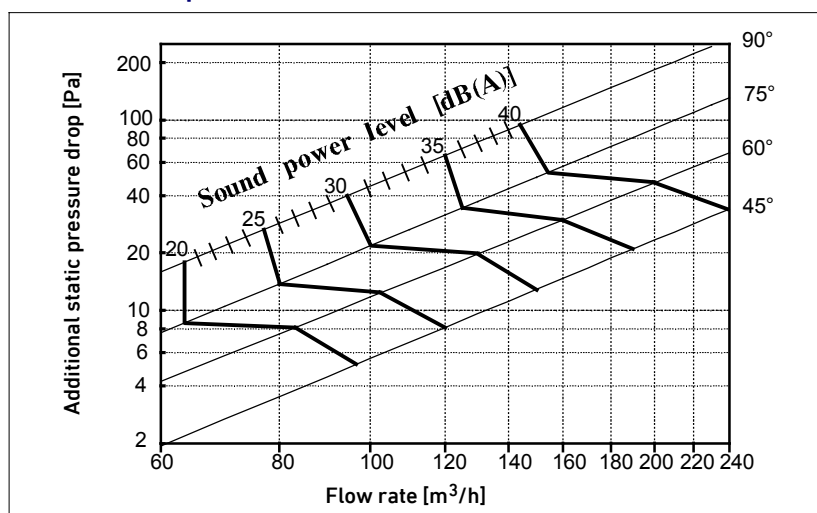
1/3-share: $b_{1/3}/2 > 0.4 \text{ m}$
2/3-share: $b_{2/3}/2 > 0.8 \text{ m}$

Technical brochure • Linear air diffusers LDB Accessories - throttling device type DLU

Pressure drop and acoustic level DLU Ø 99



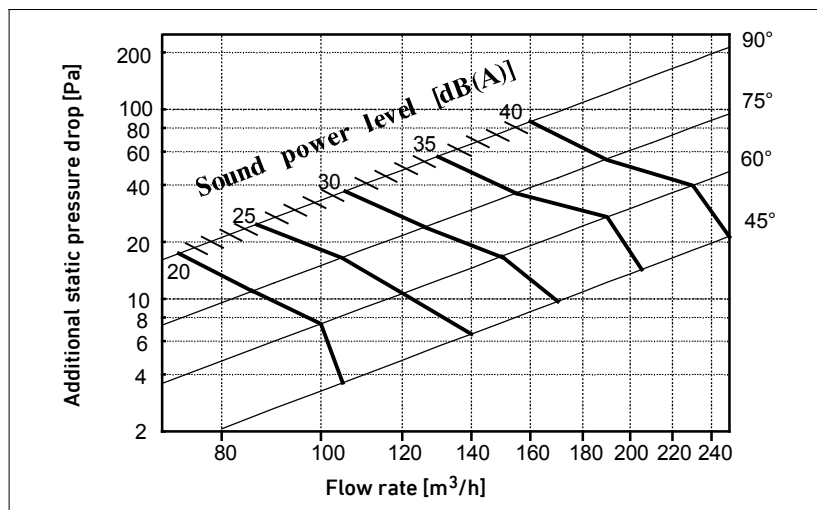
Pressure drop and acoustic level DLU Ø 124



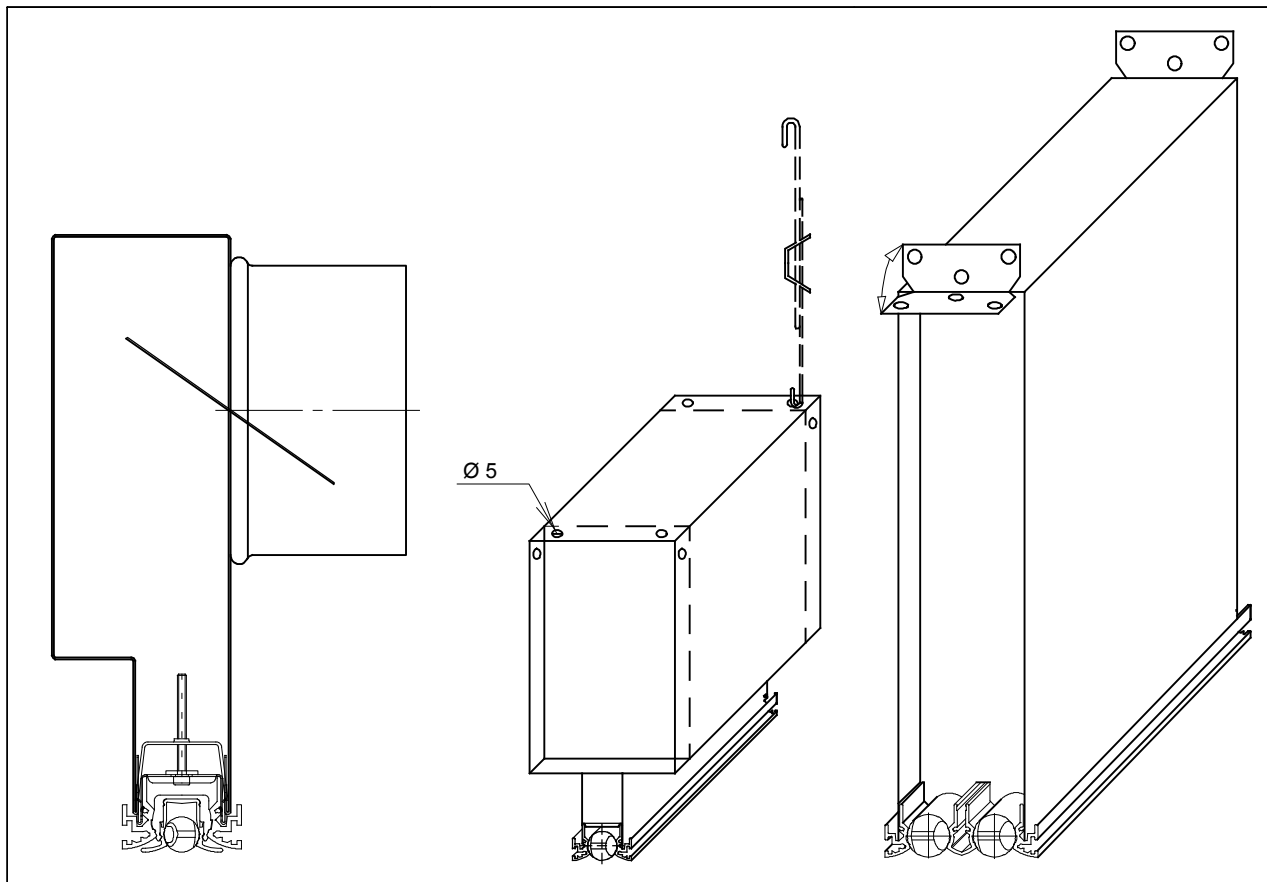
The throttling device DLU consists of a damper blade out of galvanizes steel sheet, integrated in the air distribution box. It is adjustable through the diffuser.

For an acoustic dimensioning, the sound sources must be summed logarithmically when using throttling devices in combination with linear diffusers.

Pressure drop and acoustic level DLU Ø 139



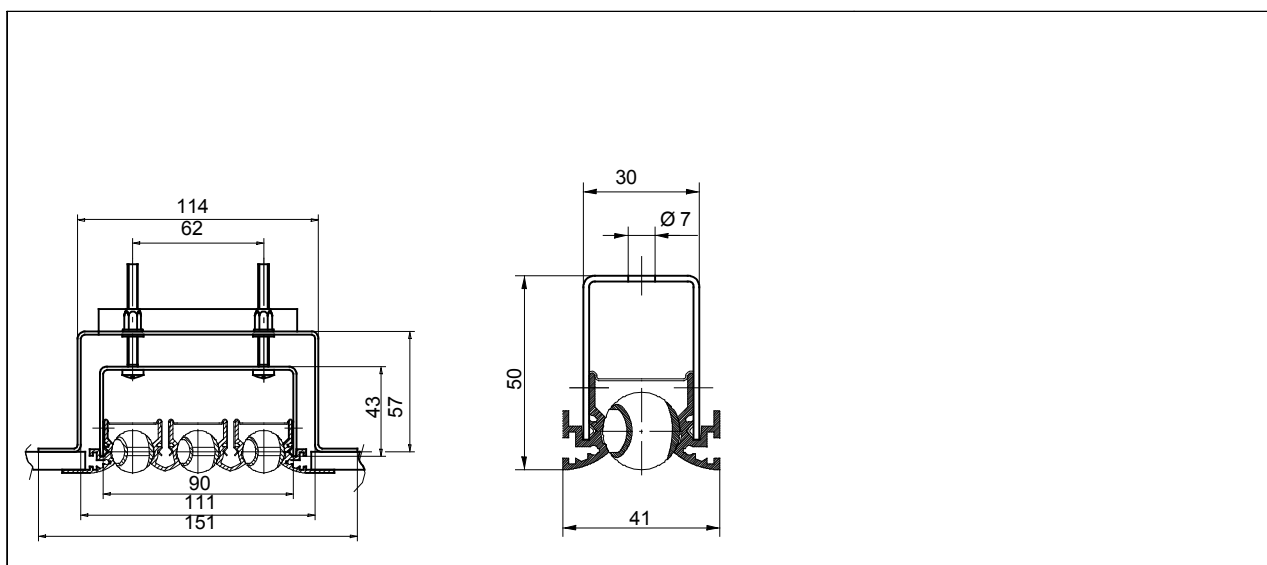
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Example for installation of type LDB 20classic/1/00 with air distribution box and **subsequently "second fix" installed** slotted rail

Example for installation of type LDB 20classic/1/00 with air distribution box and **continuously adjustable spring hanger** (adjusting range about 3/4 of the length of the hooked wire)

Example for installation of type LDB 20classic/2/00 with air distribution box without insulation. The **4 suspension eyes** are included in the delivery of the narrow box.



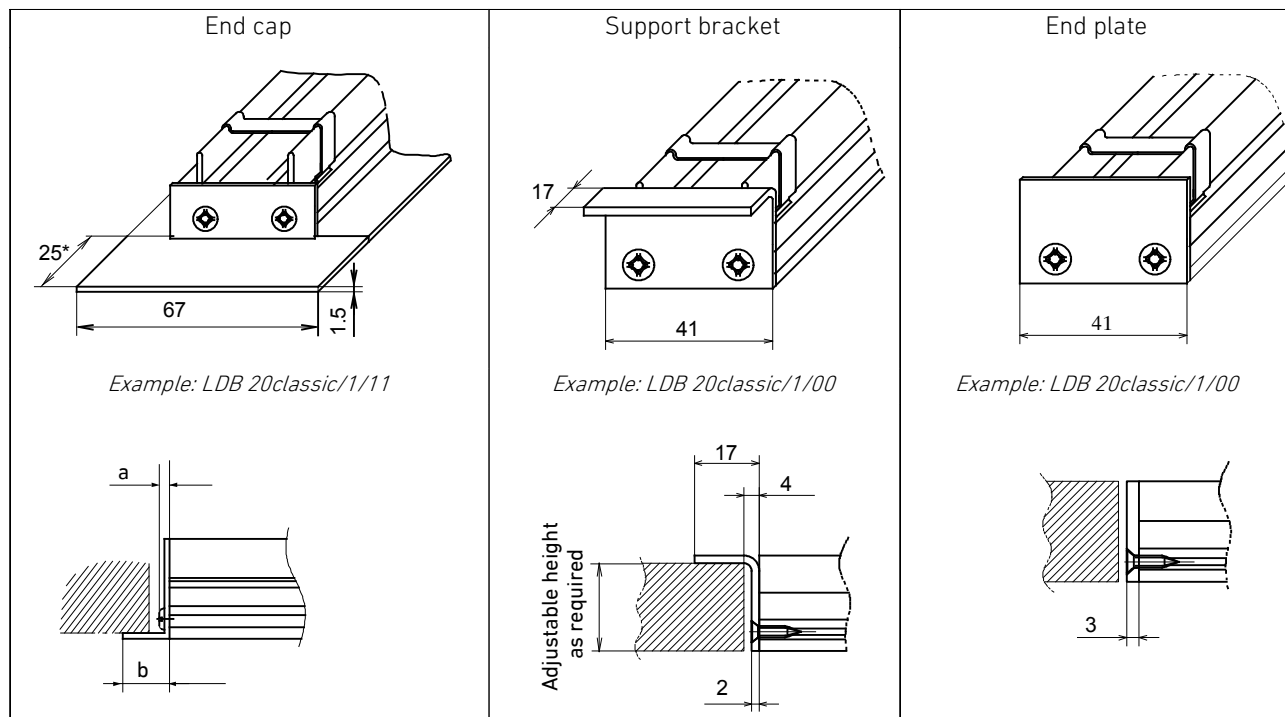
Example for installation of type LDB 20classic/3/11 with **double brackets** for blind attachment

Example for installation of type LDB 20classic/1/00 with **suspension bracket** for blind attachment

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End caps

By using end caps, a closed frame of linear diffusers is obtained.

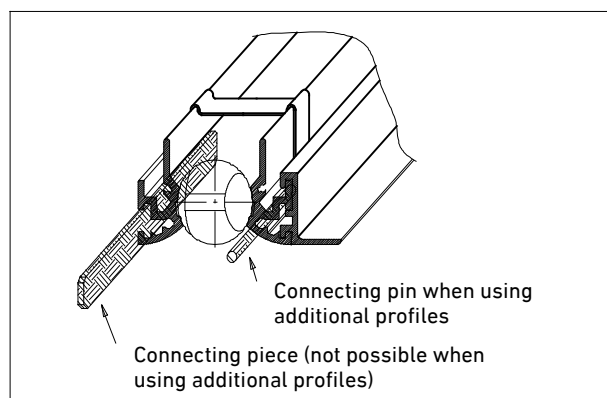


Type	a [mm]	b [mm]
LDB 12 <i>clean</i> , 12 <i>style</i> , 20 <i>classic</i>	4.5	15 with border profile 7, 25 with border profile 1
LDB 50 <i>maxx</i>	6	

Connecting piece

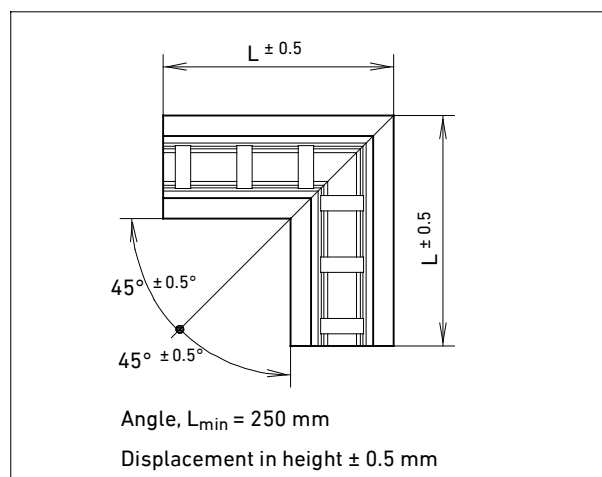
A flush mounting of the diffusers is achieved by using connecting pieces inserted in the guiding grooves of the profiles. Several linear diffusers may thus be connected to form a continuous line. For linear diffusers with additional profiles, a flush mounting is achieved by using additional overlap profiles or connecting pins.

To make the installation in line easier the connecting piece must be bended slightly before the 2nd diffuser is pushed in.



Angle

Angles offer a perfect solution for the continuous installation of linear diffusers.



Technical brochure • Linear air diffusers LDB

Nomenclature, ordering code

LDB 20classic / 2 / 88 / - / E6 - EV1 / 1000 / S3 / S / A / - / ME // S / SF / DK / - / 2 x DLU 100

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19)

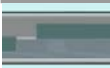
(1)	Diffuser type	LDB 12 <i>small</i> LDB 12 <i>clean</i> LDB 12 <i>style</i> LDB 20 <i>classic</i> LDB 50 <i>maxx</i>	= Formerly known as LDB 12/- = Formerly known as LDB 12/8 = Formerly known as LDB 12/M = Formerly known as LDB 20/8 = Formerly known as LDB 50/-
(2)	Number of slot rows	1...4	= 1...4 slots LDB 12 <i>small</i> : 1 slot only, LDB 12 <i>style</i> + 50 <i>maxx</i> : 1...3 slots only
(3)	Design of border profile	0...8	= First number left - 2nd number right
(4)	Design of additional profile	- 1 or 7	= Without = Left - right ... (LDB 50 <i>maxx</i> only with additional profile 1, LDB 12 <i>small</i> without additional profile)
(5)	Surface of border profile	LM LG E6 R SX	= Painted, mat = Painted, glossy = Anodized, unbrushed (standard) = Unfinished = Special finish
(6)	Colour of border profile	 SX	= RAL-colour = painted / EV1 = naturally anodized = Special RAL-colour / special anodizing shade
(7)	Diffuser length Angle	 x ... - ...°	= Diffuser length in mm = Outer leg length in mm (min. 250 mm, max. 500 mm), angle in °
(8)	Flow pattern	S2 S3 SX	= 2R2L (for LDB 12 <i>clean</i> , LDB 12 <i>style</i>) = 3R3L (for LDB 12 <i>small</i> , LDB 20 <i>classic</i> , LDB 50 <i>maxx</i>) = (special version)
(9)	Colour diffuser element	S W G SX	= RAL 9011 graphite black = RAL 9010 pure white = RAL 9007 grey aluminium = RAL (special colour, indicate RAL-shade, on request only)
(10)	Diffuser element (roller) type	A B	= Active, air-ducting (exhaust air, recirculated air or supply air) = Blind (non air-ducting)
(11)	Suspension	- AB DB	= Fixed at the plenum box resp. without = Suspension brackets = Double brackets
(12)	End caps	OE ME SX	= Without end caps, for flush mounting = End caps both sides (end angle for profiles 11 + 88, end plate for profiles 00 + 55) = (special version, e.g. support bracket)
(13)	Plenum box type	O S X	= Without = Standard plenum box, all dimensions acc. to our actual Technical Brochure = Special plenum box, dimensions according to sketch no. _____, attached
(14)	Second fix	- SF	= Factory-mounted without Second-Fix fixing (standard) = With Second-Fix fixing (subsequent fixing)
(15)	Thermal insulation	- DK	= Without = Air-insulated double skin plenum box
(16)	Sound absorber	- SD	= Without = With integrated sound absorber
(17)	Number of connections	0...6	= 0...6
(18)	Connection type	DLU SDA OS	= With throttling device DLU (standard for LDB 12 <i>clean</i> , LDB 12 <i>style</i> , LDB 20 <i>classic</i>) = With spigot (bayonet connection), without throttling device) = Without spigot, closed plenum box
(19)	Connecting spigot	80 100 125 140 160 200 -	= Indicate spigot dimension = " = " = " = " = " = Without

For details see Technical Brochure. Note: Not all combinations are practicable. In individual cases please contact LTG.

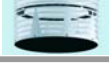
Product Overview

LTG Air Diffusers

LTG air diffusers for ceiling, wall or floor

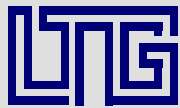
	Ceiling	Wall	Floor
Linear diffuser	 LDB	 LWmodule	 LDU
	 LDB LTG System clean	 LWmodule LTG System clean	 LDU-W
Swirl-diffuser	 DLA	_____	_____
Transfer air device	_____	 LDO-T	_____

Custom diffusers

	LDR and LDB 12M LTG System clean
	Step diffuser BLQ
	Displacement air diffuser DLD
	Displacement air diffuser DLQ

Engineering Services

	LTG Engineering Services Comfort Air Technology
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**AIR TECH
SYSTEMS**

Comfort Air Technology

Air-Water Systems
Air Diffusers
Air Distribution

Process Air Technology

Fans
Filtration technology
Humidification Technology

Engineering Services

Laboratory Test / Experiment
Field Measurement / Optimisation
Simulation / Analysis
R&D / Start-up

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