MALCON MARINE AND LAND CONSTRUCTION

Supply air nozzle

GD



Description

GD is a rubber supply air nozzle suitable for ventilation of large areas where long throws are required. The nozzle can be adjusted for directional airflow, and can be installed directly into circular ducts, (min. Ø250 mm), or duct walls, (min. height = 100 mm). The nozzle can be used for both heated and cooled air.

- Directional airflow
- Long throws
- Simple installation

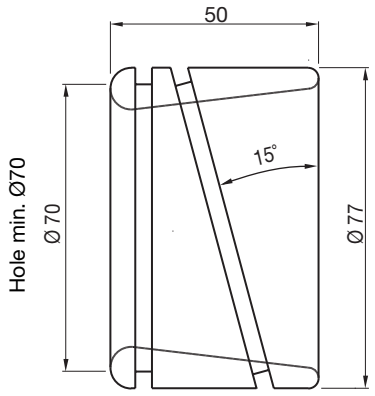
Maintenance

The visible parts of the nozzle can be wiped with a damp cloth.

Ordering example

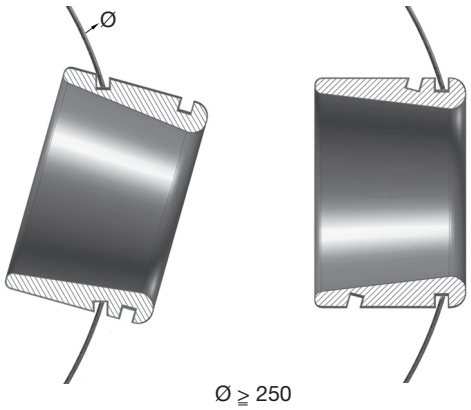
Product	**GD**	**GDPROP**
Type		
Accessories		
Afdækningsprop		

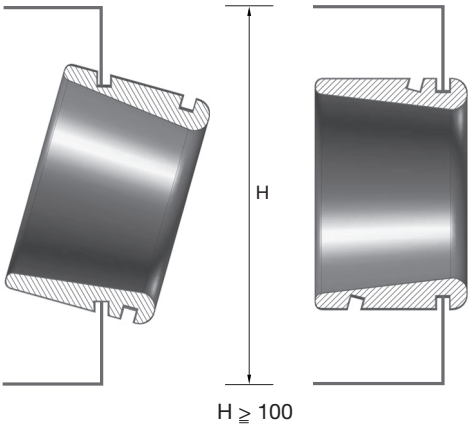
Dimensions



Free area: 0.0027 m^2
Straight groove: for rectangular duct.
Oblique groove: for circular duct.

mounted in duct





Materials and finish

Nozzle: EPDM rubber, hardness 60, black

We reserve the right to make changes without prior notice
2018-09-17

Lindab®

Supply air nozzle GD

Technical data

Capacity

Volume flow q_v [l/s] and [m^3/h], total pressure Δp_t[Pa], throw $l_{0.3}$ and sound level L_{WA} [dB(A)] can be seen in the diagrams.

Throw $l_{0.3}$

Throw $l_{0.3}$ can be seen in the diagrams for isothermal air at a terminal velocity of 0.3 m/s.

Resulting sound effect level

The sound effect level from the nozzles must be added logarithmically to the sound effect level from the flow noise in the duct. See sample calculation, section *Nozzle calculations*.

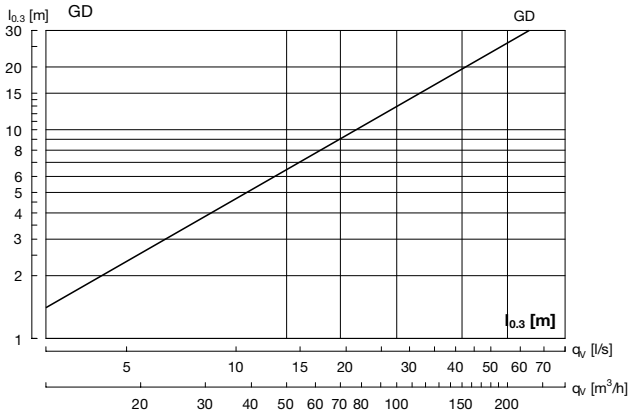
Frequency-related sound effect level

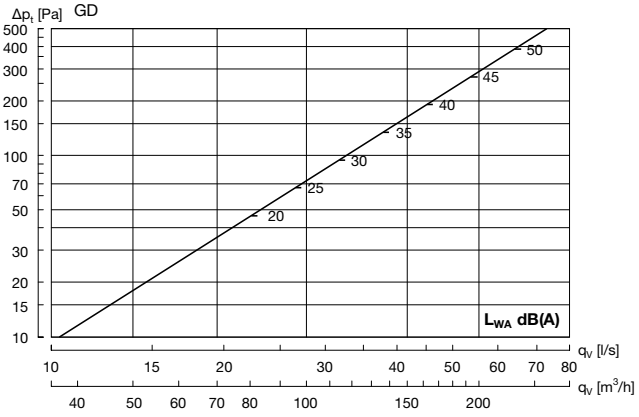
The sound effect level in the frequency band is defined as $L_{wok} = L_{WA} + K_{ok}$. K_{ok} values can be seen in the table below.

Table

	Centre frequency Hz							
Size	**63**	**125**	**250**	**500**	**1K**	**2K**	**4K**	**8K**
GD	9	-2	0	1	-6	-14	-21	-25

Supply air





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Supply air nozzle

Calculation

Resulting sound effect level
To calculate the resulting sound effect level from the nozzles, add the sound effect level from the nozzles (L_{WA} nozzle) and the sound effect level from the flow noise in the duct (L_{WA} duct) logarithmically.

Diagram 1, sound effect duct, L_{WA} duct.

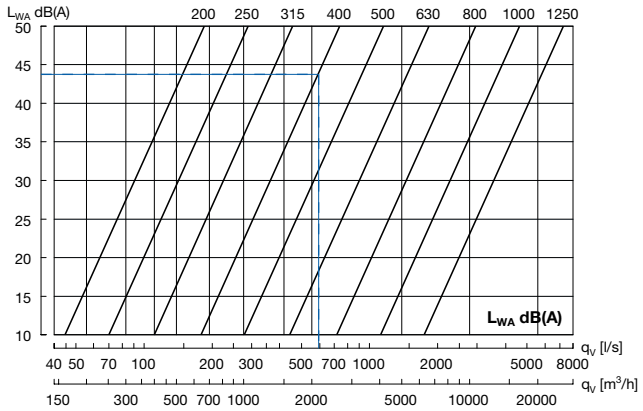
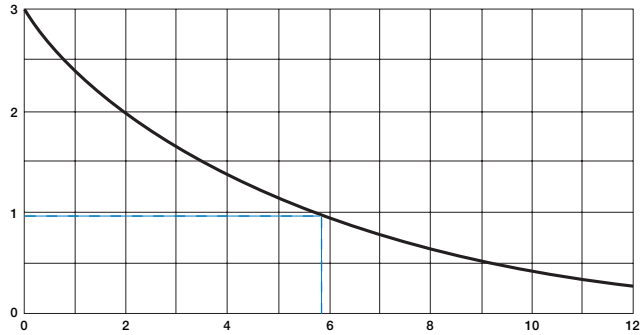
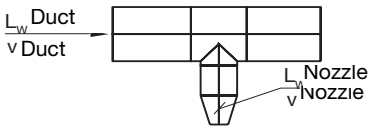


Diagram 2, addition of sound levels.
Difference to be added to the highest dB value (dB)



Difference between the dB values (dB)



Sample calculation:

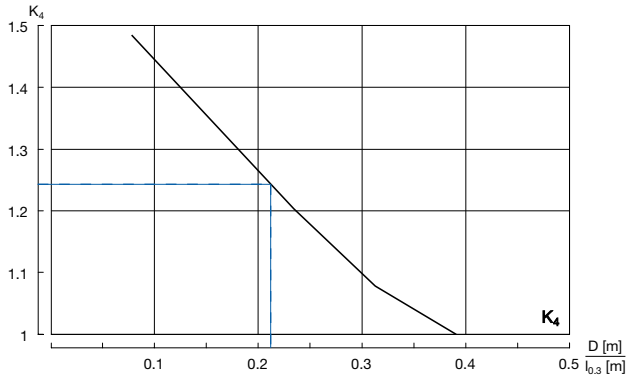
LAD-200	q = 100 l/s
ΔP_t nozzle	90 Pa

Duct size:
In order to achieve a sensible distribution of the air out to the nozzles without using a damper, it is recommended that the pressure loss in the nozzle be 3 times higher than the dynamic pressure in the duct system.

Selected duct dimension	Ø 400
Number of nozzles at joint	6
Volume of air in the duct	6 x 100 = 600 l/s
L_{WA} duct (can be seen in diagram 1)	43 dB(A)
L_{WA} nozzle (can be seen in product diagram)	37 dB(A)
Difference between db values	6 dB(A)
Value to be added to the highest dB value (diagram 2)	1 dB(A)
Resulting sound effect level:	43 +1 = 44 dB(A)

Extension of throw for two nozzles, positioned side by side:

If two nozzles are positioned next to each other, the air jets will be amplified, thereby extending the throw. To calculate this, use the diagram below, in which the distance between the nozzles is designated D. The calculation factor K_4 must be multiplied by the throw l_{03}. The throw is not extended further with more nozzles.



Sample calculation:

LAD-125. Distance D = 1.5 metres.

Volume of air:	q = 15 l/s

Diagram throw under selected nozzle

Specified throw:	$l_{0.3}$ = 7 m
D [m] / $l_{0.3}$[m]	1.5 / 7 = 0.21

K_4 calculation factor

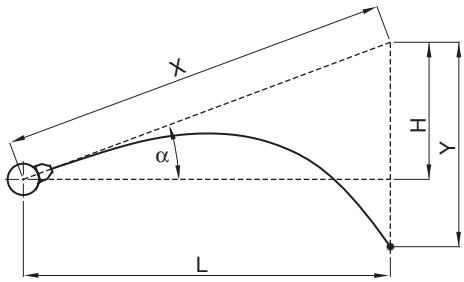
Can be seen in the diagram	K_4 = 1.25

Resulting throw
K_4 x $l_{0.3}$ = 1.25 x 7 m = 8.75 m

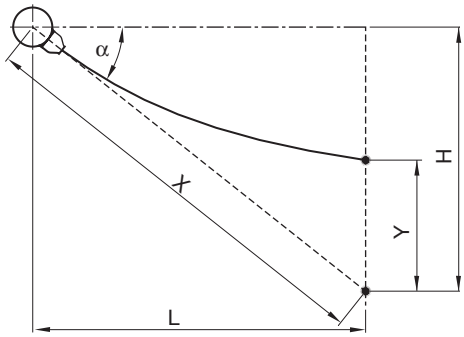
Supply air nozzle

Calculation

Supply air with cooled air



Supply air with heated air



$$X = \frac{L}{\cos \alpha} = \frac{H}{\sin \alpha}$$

$$H = L \times \tan \alpha$$

Terminal velocity V_X:

$$v_x = K_1 \times \frac{q}{X}$$

Deflection Y:

$$Y = K_2 \times \frac{X^3}{q^2} \times \Delta t$$

Sample calculation: Cooled air

LAD-200: $q = 400\ m^3/h$
$\Delta t = 6K \quad \alpha = 30°$
Final velocity $v_x = 0,3\ m/s$

$$v_x = K_1 \times \frac{q}{X}$$

$$X = K_1 \times \frac{q}{v_x} = 0,020 \times \frac{400}{0,3} = 27\ m$$

$$Y = K_2 \times \frac{X^3}{q^2} \times \Delta t = 24 \times \frac{27^3}{400^2} \times 6 = 17,7\ m$$

$H = X \times \sin \alpha = 27 \times 0,5 = 13,5\ m$
$L = X \times \cos \alpha = 27 \times 0,87 = 23,4\ m$

Sample calculation: Heated air

LAD-200: $q = 400\ m^3/h$
$\Delta t = 6K \quad \alpha = 60°$
Final velocity $v_x = 0,3\ m/s$

$$X = K_1 \times \frac{q}{v_x} = 0,020 \times \frac{400}{0,3} = 27\ m$$

$$Y = K_2 \times \frac{X^3}{q^2} \times \Delta t = 24 \times \frac{27^3}{400^2} \times 6 = 17,7\ m$$

$H = X \times \sin \alpha = 27 \times 0,87 = 23,4\ m$
$L = X \times \cos \alpha = 27 \times 0,5 = 13,5\ m$

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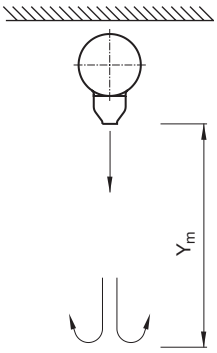
Supply air nozzle

Calculation

Calculation factors:

Size	Free area A m²	K_1 m³/h	K_1 l/s	K_2 m³/h	K_2 l/s	K_3 m³/h	K_3 l/s
LAD							
125	0.0029	0.037	0.133	3.9	0.30	0.24	0.86
160	0.0071	0.023	0.083	15.6	1.20	0.122	0.44
200	0.0095	0.020	0.072	24.0	1.85	0.097	0.35
250	0.0165	0.0153	0.055	54.4	4.2	0.064	0.230
315	0.0254	0.0122	0.044	104	8.0	0.046	0.166
400	0.0398	0.0097	0.035	206	15.9	0.033	0.119
DAD							
160	0.0056	0.026	0.094	10.7	0.83	0.145	0.52
200	0.0095	0.020	0.072	24.0	1.85	0.097	0.35
250	0.0154	0.0157	0.057	49.0	3.78	0.068	0.24
315	0.0240	0.0127	0.046	96.0	7.41	0.048	0.17
GD							
	0.0027	0.038	0.137	3.5	0.27	0.26	0.92
GTI-1							
200	0.0200	0.0090	0.032	114	8.8	0.048	0.173
250	0.0310	0.0073	0.026	219	16.9	0.034	0.122
315	0.0490	0.0058	0.021	435	34	0.024	0.086
400	0.0780	0.0046	0.017	875	68	0.017	0.062

Vertical supply air with heated air



$$Y_m = K_3 \times \frac{q}{\sqrt{\Delta t}} \text{ (m)}$$

Sample calculation:

LAD-160 $q = 200\ m^3/h$
$\Delta t = 10\ K$

The distance to the turning point of the air jet:

$$Y_m = K_3 \times \frac{q}{\sqrt{\Delta t}} \text{ (m)}$$

$$Y_m = 0{,}122 \times \frac{200}{\sqrt{10}} \text{ (m)}$$

$$Y_m = 7{,}7\ m$$