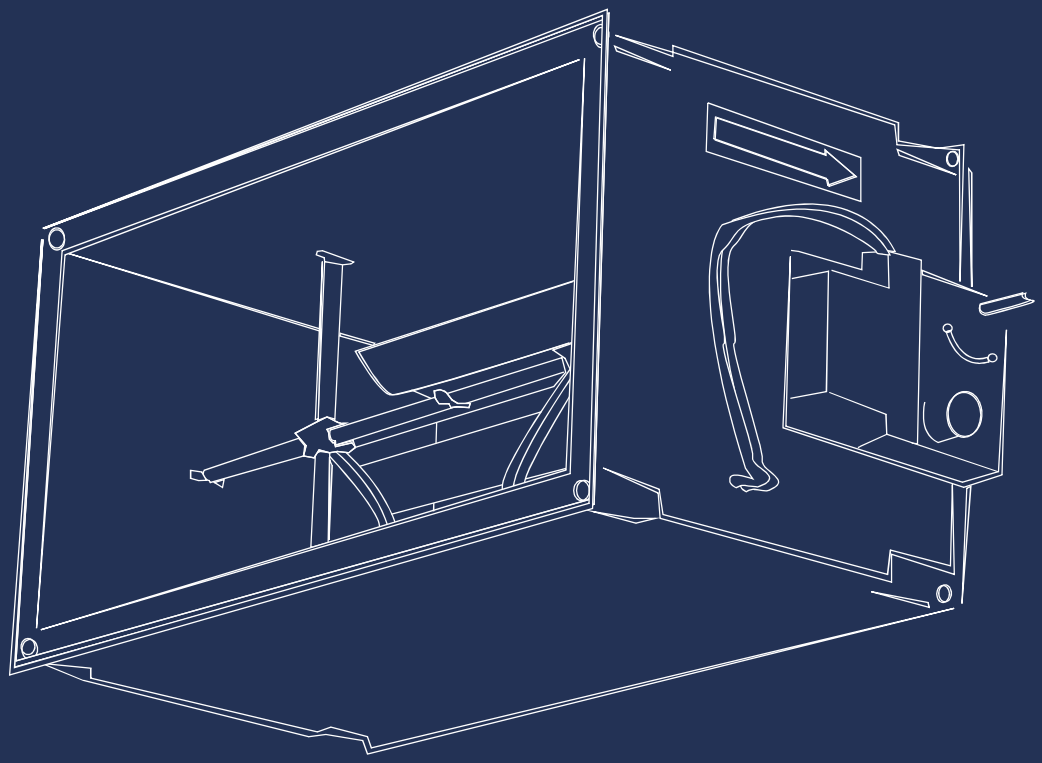


NK / NL series

Rectangular VAV and CAV air volume control terminals

BARCOL-AIR

Rectangular VAV and CAV
air volume control terminal

Table of contents

Rectangular VAV and CAV
air volume control terminal

Type designation:
*Single wall (N**K**.....)*
*Double wall (N**L**.....)*

Composition of type designation:

N - K - S - O - D - O - B / 1 / P

N Position 1: **Product group**

N = air volume control terminals

K Position 2: **Function**

K = single wall, rectangular volume control terminal
L = double wall rectangular volume control terminal

S Position 3: **Leakage rate**

None = low leakage rate VAV terminal
S = Very low leakage rate VAV terminal

O Position 4: **Controls**

O = without controls
R = Please contact Sales specialist if required

D Position 5: **Outlet**

A = rectangular outlet
D = retangular outlet with sound attenuator
N = rectangular outlet with plenum for electric reheat coil
G =rectangular outlet with hot water reheat coil

O Position 6: **Reheat coil**

O = without reheat coil
A = 1-row hot water reheat
B = 2-row hot water reheat
D = 4-row hot water reheat
E = 1-stage 230VAC/1-phase electric reheat coil
F = 2-stage 230VAC/1-phase electric reheat coil
G = 3-stage 230VAC/1-phase electric reheat coil
H = 1-stage 400VAC/3- electric reheat coil
J = 2-stage 400VAC/3-phase electric reheat coil
1 = non standard, specify separately

B Positon 7: **Sensor**

O = not applicable
B = Flo-cross® ,2x12 point averaging and signal amplifying air flow sensor (standard)
1 = non standard, specify separately

1 Position 8 : **Heating capacity**

1 = Heating capacity 1KW
None = No Heater

P Position 9 : **Casing material**

P = Galvanized steel + painting
S = SUS304 + Aluminium paint
None = Galvanized steel

Ordering example:

N K S O D O B	5 0 0	4 0 0
See above	Width (mm)	Height (mm)

Ordering information:

Standard terminals:

- quantity of terminals
- complete 8/9 digit code
- terminal size or model
- air volume setting (V_{max},V_{min} etc)
- control handing (omission defaults standard handing - right side)
- if applicable, electric reheat coil capacity

Non standard terminals:

- for non standard terminals a full description and / or drawing are requested

Rectangular VAV and CAV
air volume control terminal

Type description:
*Single wall (N**K**.....)*
*Double wall (N**L**.....)*

*N**K***

Application

Rectangular NK and NL types are pressure-independent VAV and CAV air volume control terminals.
The terminals are designed particularly for systems with large air volumes and duct size and for the accurate measurement and control of air volumes using the patented Flo-Cross airflow sensor.
In CAV application, the terminals maintain the required constant airflow independent of the inlet static pressure.
In VAV application, the terminals control the air volume to the room, to meet the cooling or heating loads or to control the room or air duct pressure.
The VAV or CAV terminals can be used either for supply or return air applications in new or refurbishment projects.
The terminals have single wall (type NK) or double wall (type NL) construction and can be optionally supplied with an additional sound attenuator or a hot water or electric reheater.

Features:

- Pressure independent control functions.
- Compact design.
- Volume control range 100% to 10%.
- Low pressure loss over the terminal.
- Single or double wall construction.
- Multi-leaf aerofoil aluminium damper blade with full shut off option.
- Low noise production.
- Suitable for large air volumes.
- Suitable for all control functions VAV, CAV, shut-off to maximise system energy savings.
- Flo-Cross, 2×12 points averaging and signal amplification airflow sensor, better than ensures air flow measurement accuracy of ±2.5% in its operation range.
- Maintenance free.

Technical information

Casing:
Single or double wall, air-tight construction made of galvanized sheet steel. Casing air leakage is class A according to standard EN1751. NKS low leakage version is class C according to standard EN1751.

Insulation:
In case of the NL type double wall construction 25mm insulation material is completely enclosed by the outer skin.

Damper:
Damper blade: aluminium, aerofoil 100mm wide opposed blade construction with gear linkage.Closed blade air leakage is class 1 according to standard EN1751.NKS low leakage version is class 4 according to standard EN1751 except model sizes 100mm and 200mm height which are class 3.

Flo-Cross:
Extruded aluminium construction with nylon core and feet.

Sound attenuator:
Constructed from galvanized sheet steel, internal acoustic insulation, erosion proof up to 30m/s.

Reheaters:
Choice of electric reheat coil 220-240VAC/1-phase or 380-415VAC/3-phase or hot water reheat coil.

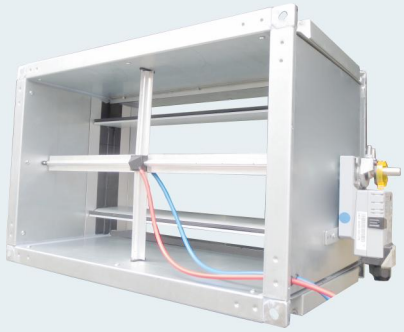
Controls:
Suitable for use with pneumatic, analogue, electronic or DDC controllers. Controls can be factory fitted, wired and calibrated.
A controls enclosure made from galvanised sheet steel can be provided as an option.

Delivery format:

- The VAV or CAV terminal will be supplied as a single assembly.
  Optional ordered distribution plenum, reheat coil and/or controls are factory fitted, wired and calibrated. The on site delivered terminal is ready to be installed and commissioned.
- Controls location and hot water or electric connections are fitted on the right hand side of the terminal when looking in the direction of the airflow. On request, the terminal can be delivered with connections on the left hand side.
- When terminals are ordered with controls, these will be factory fitted, wired and calibrated upon request.

Rectangular VAV and CAV
air volume control terminal

Type description:
*Single wall (N**K**.....)*
*Double wall (N**L**.....)*



*N**L***

Specify as:

Example:
Supply and install rectangular variable air volume terminals with double-wall construction, constructed from galvanized sheet steel. The casing leakage rate shall be to class A according to standard EN1751, and the NKS low leakage version shall be class C according to standard EN1751.The closed blade damper air leakage shall be class 1 according to EN1751 and NKS low leakage version shall be class 4 according to standard EN1751,except for model sixes with 100mm and 200mm height which shall be class 3.
The duct connections shall be 30 mm flange type. The VAV terminals shall have a multi-leaf opposed blade dampers.

A Flo-Cross centre averaging airflow sensor with at least 2 x 12 test points and amplified signal shall control the airflow with sensing accuracy better than ±2.5%. The controller shall be I/A Series DDC controller: LON compatible, type MNL-V2RVx.

Controls must be factory fitted, wired and calibrated according to the following requirements:

Maximum air volume 1280 l/s
Minimum air volume 512 l/s
Terminal size 400 x 400 mm
Max. pressure loss 38 Pa
Max. discharge sound index < NC30 @250Pa
Max. radiated sound index < NC30 @250Pa

Ordering example: type - model - handing= NLODDOB - 0400×0400

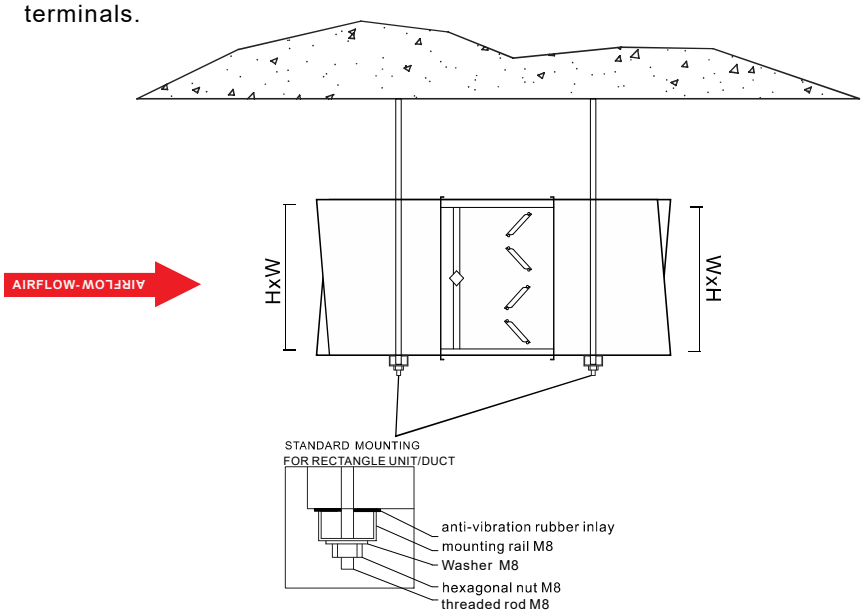
Manufacturer: Barcol-Air

Installation Instructions:

The Barcol-Air VAV terminals shall be installed using at least two support channels , with anti-vibration rubber under the terminal as shown in the drawing below. Each of these brackets shall be fixed with two threaded rods to the ceiling slab above.

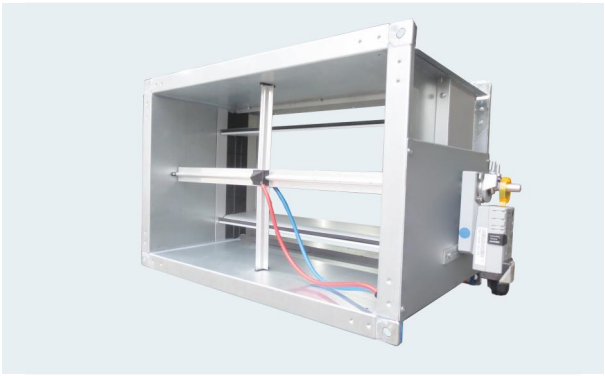
The installation method shall:
1. Prevent the body of the VAV terminal from high mechanical tension, which could damage the construction and performance of the terminal.
2. Prevent torsion on the VAV terminals, which could cause malfunction of the damper blades.
3. Provided some flexibility to the final location of the VAV terminals.
4. Use at least one equivalent diameter length of straight duct before the VAV inlet. With the same width and height as the VAV unit. One equivalent diameter=$\sqrt{(4xWxH)/\pi}$
5. Additional manual volume control dampers (VCD' s) shall not be used before the unit inlet.
6. All connections shall be thermally isolated.
7. The Flo-Cross airflow sensor pressure sensing tubes shall not be "kinked" or otherwise obstructed by the external duct insulation.

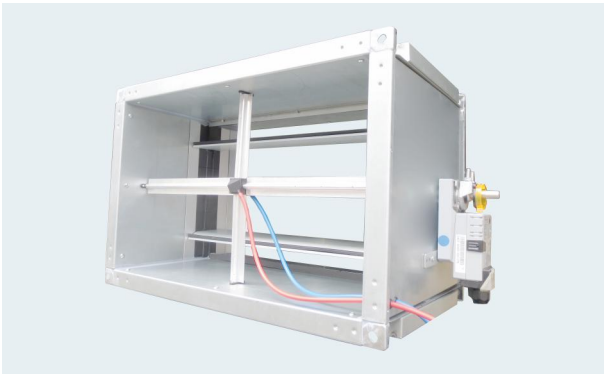
See drawing below.

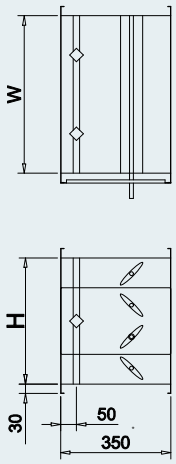


Rectangular VAV and CAV
air volume control terminal

Model overview:
Single wall – type NK.....
Double wall – type NL.....

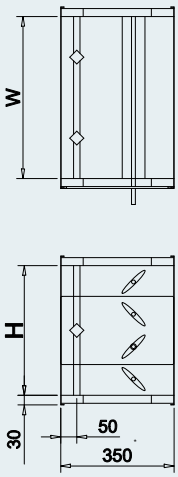






NKOAOB

Flange H x W



NLOAOB

Flange H x W

Dimensions NK/NL

H↓	W→	200	300	400	500	600	700	800	900	1000	1200
112		●	●	●							
212		●	●	●	●	●	●	●			
312			●	●	●	●	●	●	●	●	
412				●	●	●	●	●	●	●	●
512					●	●	●	●	●	●	●
612						●	●	●	●	●	●
712							●	●	●	●	●
812								●	●	●	●
912									●	●	●
1012										●	●

Notes
1.All dimensions in mm.
2.All flanges are 30mm wide.
3.Other dimensions are available on request.

Rectangular VAV and CAV
air volume control terminal

Technical data:
*Single wall (N**K**.....)*
*Double wall (N**L**.....)*

Sound data Δp=125Pa

MODEL	Data refering to inlet spigot				Min ΔPs	Δp=125Pa																										
						discharge sound									radiated sound single wall										radiated sound double wall								
	Velocity	air volume				Lw in dB/Oct.(re 1pW)						Lp value			Lw in dB/Oct.(re 1pW)						Lp value			Lw in dB/Oct.(re 1pW)						Lp value		
						125 HZ	250 HZ	500 HZ	1K HZ	2K HZ	4K HZ	dB(A)	NC	NR	125 HZ	250 HZ	500 HZ	1K HZ	2K HZ	4K HZ	dB(A)	NC	NR	125 HZ	250 HZ	500 HZ	1K HZ	2K HZ	4K HZ	dB(A)	NC	NR
	m/s	l/s	cfm	m^3/h	Pa	dB									dB									dB								
100×100	2	20	42	72	1	52	51	48	35	35	30	37	33	36	39	41	35	29	25	25	24	20	23	38	40	34	27	23	23	21	-	-
	4	40	85	144	6	57	57	53	42	44	37	45	39	43	45	45	38	33	31	32	32	26	30	42	43	37	31	28	29	29	23	26
	6	60	127	216	13	59	59	55	45	46	40	47	41	44	46	46	40	35	34	35	34	28	31	44	44	38	32	30	31	31	25	28
	8	80	169	288	23	61	60	56	47	49	43	49	43	45	47	46	40	35	35	36	35	29	31	45	45	38	33	31	32	32	26	29
	10	100	212	360	35	64	64	60	53	54	48	52	47	51	51	49	42	38	39	40	38	33	37	48	47	41	36	36	37	35	30	33
200×100	2	40	85	144	1	53	52	49	36	37	31	38	34	38	40	42	36	30	26	26	25	21	25	39	41	35	28	24	24	22	-	-
	4	80	169	288	6	56	56	52	41	42	36	44	38	41	44	44	38	32	30	31	31	25	28	41	42	36	30	27	28	28	22	25
	6	120	254	432	13	59	59	55	45	46	40	47	41	44	46	46	40	35	34	35	34	28	31	44	44	38	32	30	31	31	25	28
	8	160	339	576	23	61	60	56	47	49	43	49	43	45	47	46	40	35	35	36	35	29	31	45	45	38	33	31	32	32	26	29
	10	200	424	720	35	64	64	60	53	54	48	52	47	51	51	49	42	38	39	40	38	33	37	48	47	41	36	36	37	35	30	33
200×200	2	80	169	288	1	52	51	48	35	35	30	37	33	36	39	41	35	29	25	25	24	20	23	38	40	34	27	23	23	21	-	-
	4	160	339	576	6	56	56	52	41	42	36	44	38	41	44	44	38	32	30	31	31	25	28	41	42	36	30	27	28	28	22	25
	6	240	508	864	13	59	59	55	45	46	40	47	41	44	46	46	40	35	34	35	34	28	31	44	44	38	32	30	31	31	25	28
	8	320	678	1152	23	61	61	57	49	50	44	50	44	47	48	47	41	36	36	37	36	30	33	45	45	39	34	32	33	33	27	30
	10	400	847	1440	35	64	64	60	53	54	48	52	47	51	51	49	42	38	39	40	38	33	37	48	47	41	36	36	37	35	30	33
300×100	2	60	127	216	1	52	51	48	35	35	30	37	33	36	39	41	35	29	25	25	24	20	23	38	40	34	27	23	23	21	-	-
	4	120	254	432	6	56	56	52	41	42	36	44	38	41	44	44	38	32	30	31	31	25	28	41	42	36	30	27	28	28	22	25
	6	180	381	648	13	59	59	55	45	46	40	47	41	44	46	46	40	35	34	35	34	28	31	44	44	38	32	30	31	31	25	28
	8	240	508	864	23	62	62	58	50	52	45	51	45	49	49	48	41	37	37	38	37	31	35	46	46	40	35	34	35	34	28	31
	10	300	636	1080	35	63	63	59	51	53	46	51	46	49	50	48	42	38	38	39	37	32	35	47	46	40	35	35	36	34	29	32
300×200	2	120	254	432	1	53	52	49	36	37	31	38	34	38	40	42	36	30	26	26	25	21	25	39	41	35	28	24	24	22	-	-
	4	240	508	864	6	56	56	52	41	42	36	44	38	41	44	44	38	32	30	31	31	25	28	41	42	36	30	27	28	28	22	25
	6	360	763	1296	13	59	59	55	45	46	40	47	41	44	46	46	40	35	34	35	34	28	31	44	44	38	32	30	31	31	25	28
	8	480	1017	1728	23	61	61	57	49	50	44	50	44	47	48	47	41	36	36	37	36	30	33	45	45	39	34	32	33	33	27	30
	10	600	1271	2160	35	65	65	61	54	56	49	53	48	53	52	49	43	39	40	42	39	34	39	49	48	41	37	37	38	36	31	34
300×300	2	180	381	648	1	52	51	48	35	35	30	37	33	36	39	41	35	29	25	25	24	20	23	38	40	34	27	23	23	21	-	-
	4	360	763	1296	6	56	56	52	41	42	36	44	38	41	44	44	38	32	30	31	31	25	28	41	42	36	30	27	28	28	22	25
	6	540	1144	1944	13	59	59	55	45	46	40	47	41	44	46	46	40	35	34	35	34	28	31	44	44	38	32	30	31	31	25	28
	8	720	1525	2592	23	61	61	57	49	50	44	50	44	47	48	47	41	36	36	37	36	30	33	45	45	39	34	32	33	33	27	30
	10	900	1907	3240	35	63	63	59	51	53	46	51	46	49	50	48	42	38	38	39	37	32	35	47	46	40	35	35	36	34	29	32
400×200	2	160	339	576	1	53	52	49	36	37	31	38	34	38	40	42	36	30	26	26	25	21	25	39	41	35	28	24	24	22	-	-
	4	320	678	1152	6	56	56	52	41	42	36	44	38	41	44	44	38	32	30	31	31	25	28	41	42	36	30	27	28	28	22	25
	6	480	1017	1728	13	59	59	55	45	46	40	47	41	44	46	46	40	35	34	35	34	28	31	44	44	38	32	30	31	31	25	28
	8	640	1356	2304	23	62	62	58	50	52	45	51	45	49	49	48	41	37	37	38	37	31	35	46	46	40	35	34	35	34	28	31
	10	800	1695	2880	35	65	65	61	54	56	49	53	48	53	52	49	43	39	40	42	39	34	39	49	48	41	37	37	38	36	31	34
400×300	2	240	508	864	1	52	51	48	35	35	30	37	33	36	39	41	35	29	25	25	24	20	23	38	40	34	27	23	23	21	-	-
	4	480	1017	1728	6	56	56	52	41	42	36	44	38	41	44	44	38	32	30	31	31	25	28	41	42	36	30	27	28	28	22	25
	6	720	1525	2592	13	59	59	55	45	46	40	47	41	44	46	46	40	35	34	35	34	28	31	44	44	38	32	30	31	31	25	28
	8	960	2034	3456	23	61	61	57	49	50	44	50	44	47	48	47	41	36	36	37	36	30	33	45	45	39	34	32	33	33	27	30
	10	1200	2542	4320	35	63	63	59	51	53	46	51	46	49	50	48	42	38	38	39	37	32	35	47	46	40	35	35	36	34	29	32
400×400	2	320	678	1152	1	53	52	49	36	37	31	38	34	38	40	42	36	30	26	26	25	21	25	39	41	35	28	24	24	22	-	-
	4	640	1356	2304	6	56	56	52	41	42	36	44	38	41	44	44	38	32	30	31	31	25	28	41	42	36	30	27	28	28	22	25
	6	960	2034	3456	13	59	59	55	45	46	40	47	41	44	46	46	40	35	34	35	34	28	31	44	44	38	32	30	31	31	25	28
	8	1280	2712	4608	23	62	62	58	50	52	45	51	45	49	49	48	41	37	37	38	37	31	35	46	46	40	35	34	35	34	28	31
	10	1600	3390	5760	35	64	64	60	53	54	48	52	47	51	51	49	42	38	39	40	38	33	37	48	47	41	36	36	37	35	30	33
500×200	2	200	424	720	1	53	52	49	36	37	31	38	34	38	40	42	36	30	26	26	25	21	25	39	41	35	28	24	24	22	-	-
	4	400	847	1440	6	56	56	52	41	42	36	44	38	41	44	44	38	32	30	31	31	25	28	41	42	36	30	27	28	28	22	25
	6	600	1271	2160	13	59	59	55	45	46	40	47	41	44	46	46	40	35	34	35	34	28	31	44	44	38	32	30	31	31	25	28
	8	800	1695	2880	23	61	61	57	49	50	44	50	44	47	48	47	41	36	36	37	36	30	33	45	45	39	34	32	33	33	27	30
	10	1000	2119	3600	35	64	64	60	53	54	48	52	47	51	51	49	42	38	39	40	38	33	37	48	47	41	36	36	37	35	30	33

1. Sound data is determined in a reverberation room according to ISO3741 and ISO5135 standards.
2. Lw in dB/Oct.(re 1pw) are sound power levels for discharge sound and case radiated sound data.
3. The discharge sound pressure levels are determined with the assumptions as mentioned in table 1 for downstream ductwork including a diffuser with insulated plenum box.
4. The radiated sound pressure levels are determined with the assumptions as mentioned in table 1 for ceiling plenum and suspended ceiling absorption.
5. Lp values are including a room absorption of 10dB/Oct.
6. dB(A), NC and NR are sound pressure levels. Figures less than 20 are indicated by "-"
7. Min ΔPs is static pressure drop across VAV air volume control terminal with damper fully open.
8. For non standard applications and/or selections please contact our technincal staff.

Table1: Assumptions for additional attenuation

Hz	125	250	500	1K	2K	4K
Discharge(dB)	5	10	20	30	30	25
Radiated(dB)	2	5	10	15	15	20

Rectangular VAV and CAV
air volume control terminal

Technical data:
*Single wall (N**K**.....)*
*Double wall (N**L**.....)*

Sound data Δp=125Pa

MODEL	Data refering to inlet spigot				Min ΔPs	Δp=125Pa																										
						discharge sound									radiated sound single wall									radiated sound double wall								
	Velocity	air volume				Lw in dB/Oct.(re 1pW)						Lp value			Lw in dB/Oct.(re 1pW)						Lp value			Lw in dB/Oct.(re 1pW)						Lp value		
						125 HZ	250 HZ	500 HZ	1K HZ	2K HZ	4K HZ	dB(A)	NC	NR	125 HZ	250 HZ	500 HZ	1K HZ	2K HZ	4K HZ	dB(A)	NC	NR	125 HZ	250 HZ	500 HZ	1K HZ	2K HZ	4K HZ	dB(A)	NC	NR
	m/s	l/s	cfm	m^3/h	Pa	dB									dB									dB								
500×300	2	300	636	1080	1	52	51	48	35	35	30	37	33	36	39	41	35	29	25	25	24	20	23	38	40	34	27	23	23	21	-	-
	4	600	1271	2160	6	56	56	52	41	42	36	44	38	41	44	44	38	32	30	31	31	25	28	41	42	36	30	27	28	28	22	25
	6	900	1907	3240	13	59	59	55	45	46	40	47	41	44	46	46	40	35	34	35	34	28	31	44	44	38	32	30	31	31	25	28
	8	1200	2542	4320	23	61	60	56	47	49	43	49	43	45	47	46	40	35	35	36	35	29	31	45	45	38	33	31	32	32	26	29
	10	1500	3178	5400	35	63	63	59	51	53	46	51	46	49	50	48	42	38	38	39	37	32	35	47	46	40	35	35	36	34	29	32
500×400	2	400	847	1440	1	53	52	49	36	37	31	38	34	38	40	42	36	30	26	26	25	21	25	39	41	35	28	24	24	22	-	-
	4	800	1695	2880	6	56	56	52	41	42	36	44	38	41	44	44	38	32	30	31	31	25	28	41	42	36	30	27	28	28	22	25
	6	1200	2542	4320	13	59	59	55	45	46	40	47	41	44	46	46	40	35	34	35	34	28	31	44	44	38	32	30	31	31	25	28
	8	1600	3390	5760	23	61	60	56	47	49	43	49	43	45	47	46	40	35	35	36	35	29	31	45	45	38	33	31	32	32	26	29
	10	2000	4237	7200	35	64	64	60	53	54	48	52	47	51	51	49	42	38	39	40	38	33	37	48	47	41	36	36	37	35	30	33
500×500	2	500	1059	1800	1	53	52	49	35	35	30	37	33	36	40	42	36	29	25	25	24	20	23	39	41	35	27	23	23	21	-	-
	4	1000	2119	3600	6	57	57	53	41	42	36	44	38	41	45	45	39	32	30	31	31	25	28	42	43	37	30	27	28	28	22	25
	6	1500	3178	5400	13	60	60	56	45	46	40	47	41	44	47	47	41	35	34	35	34	28	31	45	45	39	32	30	31	31	25	28
	8	2000	4237	7200	23	62	62	58	49	50	44	50	44	47	49	48	42	36	36	37	36	30	33	46	46	40	34	32	33	33	27	30
	10	2500	5297	9000	35	65	65	61	53	54	48	52	47	51	52	50	43	38	39	40	38	33	37	49	48	42	36	36	37	35	30	33
600×200	2	240	508	864	1	53	53	50	37	38	32	39	35	40	41	42	36	30	27	28	26	22	27	40	41	35	28	25	26	23	-	-
	4	480	1017	1728	6	56	56	52	41	42	36	44	38	41	44	44	38	32	30	31	31	25	28	41	42	36	30	27	28	28	22	25
	6	720	1525	2592	13	59	59	55	45	46	40	47	41	44	46	46	40	35	34	35	34	28	31	44	44	38	32	30	31	31	25	28
	8	960	2034	3456	23	62	62	58	50	52	45	51	45	49	49	48	41	37	37	38	37	31	35	46	46	40	35	34	35	34	28	31
	10	1200	2542	4320	35	65	65	61	54	56	49	53	48	53	52	49	43	39	40	42	39	34	39	49	48	41	37	37	38	36	31	34
600×300	2	360	763	1296	1	52	51	48	35	35	30	37	33	36	39	41	35	29	25	25	24	20	23	38	40	34	27	23	23	21	-	-
	4	720	1525	2592	6	56	56	52	41	42	36	44	38	41	44	44	38	32	30	31	31	25	28	41	42	36	30	27	28	28	22	25
	6	1080	2288	3888	13	59	59	55	45	46	40	47	41	44	46	46	40	35	34	35	34	28	31	44	44	38	32	30	31	31	25	28
	8	1440	3051	5184	23	62	62	58	50	52	45	51	45	49	49	48	41	37	37	38	37	31	35	46	46	40	35	34	35	34	28	31
	10	1800	3814	6480	35	63	63	59	51	53	46	51	46	49	50	48	42	38	38	39	37	32	35	47	46	40	35	35	36	34	29	32
600×400	2	480	1017	1728	1	54	53	50	36	37	31	38	34	38	41	43	37	30	26	26	25	21	25	40	42	36	28	24	24	22	-	-
	4	960	2034	3456	6	57	57	53	41	42	36	44	38	41	45	45	39	32	30	31	31	25	28	42	43	37	30	27	28	28	22	25
	6	1440	3051	5184	13	60	60	56	45	46	40	47	41	44	47	47	41	35	34	35	34	28	31	45	45	39	32	30	31	31	25	28
	8	1920	4068	6912	23	63	63	59	50	52	45	51	45	49	50	49	42	37	37	38	37	31	35	47	47	41	35	34	35	34	28	31
	10	2400	5085	8640	35	65	65	61	53	54	48	52	47	51	52	50	43	38	39	40	38	33	37	49	48	42	36	36	37	35	30	33
600×500	2	600	1271	2160	1	52	52	49	35	35	30	37	33	36	39	42	36	29	25	25	24	20	23	38	41	35	27	23	23	21	-	-
	4	1200	2542	4320	6	56	57	53	41	42	36	44	38	41	44	45	39	32	30	31	31	25	28	41	43	37	30	27	28	28	22	25
	6	1800	3814	6480	13	59	60	56	45	46	40	47	41	44	46	47	41	35	34	35	34	28	31	44	45	39	32	30	31	31	25	28
	8	2400	5085	8640	23	61	62	58	49	50	44	50	44	47	48	48	42	36	36	37	36	30	33	45	46	40	34	32	33	33	27	30
	10	3000	6356	10800	35	64	65	61	53	54	48	52	47	51	51	50	43	38	39	40	38	33	37	48	48	42	36	36	37	35	30	33
600×600	2	720	1525	2592	1	54	53	50	36	37	31	38	34	38	41	43	37	30	26	26	25	21	25	40	42	36	28	24	24	22	-	-
	4	1440	3051	5184	6	57	57	53	41	42	36	44	38	41	45	45	39	32	30	31	31	25	28	42	43	37	30	27	28	28	22	25
	6	2160	4576	7776	13	60	60	56	45	46	40	47	41	44	47	47	41	35	34	35	34	28	31	45	45	39	32	30	31	31	25	28
	8	2880	6102	10368	23	62	62	58	49	50	44	50	44	47	49	48	42	36	36	37	36	30	33	46	46	40	34	32	33	33	27	30
	10	3600	7627	12960	35	65	65	61	53	54	48	52	47	51	52	50	43	38	39	40	38	33	37	49	48	42	36	36	37	35	30	33
700×200	2	280	593	1008	1	53	53	50	37	38	32	39	35	40	41	42	36	30	27	28	26	22	27	40	41	35	28	25	26	23	-	-
	4	560	1186	2016	6	56	56	52	41	42	36	44	38	41	44	44	38	32	30	31	31	25	28	41	42	36	30	27	28	28	22	25
	6	840	1780	3024	13	59	59	55	45	46	40	47	41	44	46	46	40	35	34	35	34	28	31	44	44	38	32	30	31	31	25	28
	8	1120	2373	4032	23	62	62	58	50	52	45	51	45	49	49	48	41	37	37	38	37	31	35	46	46	40	35	34	35	34	28	31
	10	1400	2966	5040	35	63	63	59	51	53	46	51	46	49	50	48	42	38	38	39	37	32	35	47	46	40	35	35	36	34	29	32
700×300	2	420	890	1512	1	53	52	49	35	35	30	37	33	36	40	42	36	29	25	25	24	20	23	39	41	35	27	23	23	21	-	-
	4	840	1780	3024	6	57	57	53	41	42	36	44	38	41	45	45	39	32	30	31	31	25	28	42	43	37	30	27	28	28	22	25
	6	1260	2669	4536	13	60	60	56	45	46	40	47	41	44	47	47	41	35	34	35	34	28	31	45	45	39	32	30	31	31	25	28
	8	1680	3559	6048	23	63	63	59	50	52	45	51	45	49	50	49	42	37	37	38	37	31	35	47	47	41	35	34	35	34	28	31
	10	2100	4449	7560	35	65	65	61	53	54	48	52	47	51	52	50	43	38	39	40	38	33	37	49	48	42	36	36	37	35	30	33

1. Sound data is determined in a reverberation room according to ISO3741 and ISO5135 standards.
2. Lw in dB/Oct.(re 1pw) are sound power levels for discharge sound and case radiated sound data.
3. The discharge sound pressure levels are determined with the assumptions as mentioned in table 1 for downstream ductwork including a diffuser with insulated plenum box.
4. The radiated sound pressure levels are determined with the assumptions as mentioned in table 1 for ceiling plenum and suspended ceiling absorption.
5. Lp values are including a room absorption of 10dB/Oct.
6. dB(A), NC and NR are sound pressure levels. Figures less than 20 are indicated by "-"
7. Min ΔPs is static pressure drop across VAV air volume control terminal with damper fully open.
8. For non standard applications and/or selections please contact our technincal staff.

Table1: Assumptions for additional attenuation

Hz	125	250	500	1K	2K	4K
Discharge(dB)	5	10	20	30	30	25
Radiated(dB)	2	5	10	15	15	20

Rectangular VAV and CAV
air volume control terminal

Technical data:
*Single wall (N**K**.....)*
*Double wall (N**L**.....)*

Sound data Δp=125Pa

MODEL	Data refering to inlet spigot				Min ΔPs	Δp=125Pa																										
						discharge sound									radiated sound single wall										radiated sound double wall								
	Velocity	air volume				Lw in dB/Oct.(re 1pW)						Lp value			Lw in dB/Oct.(re 1pW)						Lp value			Lw in dB/Oct.(re 1pW)						Lp value		
						125 HZ	250 HZ	500 HZ	1K HZ	2K HZ	4K HZ	dB(A)	NC	NR	125 HZ	250 HZ	500 HZ	1K HZ	2K HZ	4K HZ	dB(A)	NC	NR	125 HZ	250 HZ	500 HZ	1K HZ	2K HZ	4K HZ	dB(A)	NC	NR
	m/s	l/s	cfm	m^3/h	Pa	dB									dB									dB								
700×400	2	560	1186	2016	1	54	53	50	36	37	31	38	34	38	41	43	37	30	26	26	25	21	25	40	42	36	28	24	24	22	-	-
	4	1120	2373	4032	6	57	57	53	41	42	36	44	38	41	45	45	39	32	30	31	31	25	28	42	43	37	30	27	28	28	22	25
	6	1680	3559	6048	13	60	60	56	45	46	40	47	41	44	47	47	41	35	34	35	34	28	31	45	45	39	32	30	31	31	25	28
	8	2240	4746	8064	23	63	63	59	50	52	45	51	45	49	50	49	42	37	37	38	37	31	35	47	47	41	35	34	35	34	28	31
	10	2800	5932	10080	35	67	67	62	55	57	50	54	49	55	54	51	44	40	41	43	40	35	41	51	49	43	38	38	39	37	32	35
700×500	2	700	1483	2520	1	54	53	50	36	37	31	38	34	38	41	43	37	30	26	26	25	21	25	40	42	36	28	24	24	22	-	-
	4	1400	2966	5040	6	57	57	53	41	42	36	44	38	41	45	45	39	32	30	31	31	25	28	42	43	37	30	27	28	28	22	25
	6	2100	4449	7560	13	60	60	56	45	46	40	47	41	44	47	47	41	35	34	35	34	28	31	45	45	39	32	30	31	31	25	28
	8	2800	5932	10080	23	63	63	59	50	52	45	51	45	49	50	49	42	37	37	38	37	31	35	47	47	41	35	34	35	34	28	31
	10	3500	7415	12600	35	63	63	59	50	52	45	50	45	47	50	49	42	37	37	38	36	31	33	47	47	41	35	34	35	33	28	31
700×600	2	840	1780	3024	1	54	54	51	36	37	31	38	34	38	41	44	38	30	26	26	25	21	25	40	43	37	28	24	24	22	-	-
	4	1680	3559	6048	6	57	58	54	41	42	36	44	38	41	45	46	40	32	30	31	31	25	28	42	44	38	30	27	28	28	22	25
	6	2520	5339	9072	13	60	61	57	45	46	40	47	41	44	47	48	42	35	34	35	34	28	31	45	46	40	32	30	31	31	25	28
	8	3360	7119	12096	23	62	62	58	47	49	43	49	43	45	48	48	42	35	35	36	35	29	31	46	47	40	33	31	32	32	26	29
	10	4200	8898	15120	35	64	65	61	51	53	46	51	46	49	51	50	44	38	38	39	37	32	35	48	48	42	35	35	36	34	29	32
700×700	2	980	2076	3528	1	54	54	51	36	37	31	38	34	38	41	44	38	30	26	26	25	21	25	40	43	37	28	24	24	22	-	-
	4	1960	4153	7056	6	57	58	54	41	42	36	44	38	41	45	46	40	32	30	31	31	25	28	42	44	38	30	27	28	28	22	25
	6	2940	6229	10584	13	60	61	57	45	46	40	47	41	44	47	48	42	35	34	35	34	28	31	45	46	40	32	30	31	31	25	28
	8	3920	8305	14112	23	62	62	58	47	49	43	49	43	45	48	48	42	35	35	36	35	29	31	46	47	40	33	31	32	32	26	29
	10	4900	10381	17640	35	67	68	63	55	57	50	54	49	55	54	52	45	40	41	43	40	35	41	51	50	44	38	38	39	37	32	35
800×200	2	320	678	1152	1	52	51	48	35	35	30	37	33	36	39	41	35	29	25	25	24	20	23	38	40	34	27	23	23	21	-	-
	4	640	1356	2304	6	56	56	52	41	42	36	44	38	41	44	44	38	32	30	31	31	25	28	41	42	36	30	27	28	28	22	25
	6	960	2034	3456	13	59	59	55	45	46	40	47	41	44	46	46	40	35	34	35	34	28	31	44	44	38	32	30	31	31	25	28
	8	1280	2712	4608	23	61	61	57	49	50	44	50	44	47	48	47	41	36	36	37	36	30	33	45	45	39	34	32	33	33	27	30
	10	1600	3390	5760	35	62	62	58	50	52	45	50	45	47	49	48	41	37	37	38	36	31	33	46	46	40	35	34	35	33	28	31
800×300	2	480	1017	1728	1	54	53	50	36	37	31	38	34	38	41	43	37	30	26	26	25	21	25	40	42	36	28	24	24	22	-	-
	4	960	2034	3456	6	57	57	53	41	42	36	44	38	41	45	45	39	32	30	31	31	25	28	42	43	37	30	27	28	28	22	25
	6	1440	3051	5184	13	60	60	56	45	46	40	47	41	44	47	47	41	35	34	35	34	28	31	45	45	39	32	30	31	31	25	28
	8	1920	4068	6912	23	62	61	57	47	49	43	49	43	45	48	47	41	35	35	36	35	29	31	46	46	39	33	31	32	32	26	29
	10	2400	5085	8640	35	64	64	60	51	53	46	51	46	49	51	49	43	38	38	39	37	32	35	48	47	41	35	35	36	34	29	32
800×400	2	640	1356	2304	1	53	53	50	36	37	31	38	34	38	40	43	37	30	26	26	25	21	25	39	42	36	28	24	24	22	-	-
	4	1280	2712	4608	6	56	57	53	41	42	36	44	38	41	44	45	39	32	30	31	31	25	28	41	43	37	30	27	28	28	22	25
	6	1920	4068	6912	13	59	60	56	45	46	40	47	41	44	46	47	41	35	34	35	34	28	31	44	45	39	32	30	31	31	25	28
	8	2560	5424	9216	23	61	62	58	49	50	44	50	44	47	48	48	42	36	36	37	36	30	33	45	46	40	34	32	33	33	27	30
	10	3200	6780	11520	35	64	65	61	53	54	48	52	47	51	51	50	43	38	39	40	38	33	37	48	48	42	36	36	37	35	30	33
800×500	2	800	1695	2880	1	54	53	50	36	37	31	38	34	38	41	43	37	30	26	26	25	21	25	40	42	36	28	24	24	22	-	-
	4	1600	3390	5760	6	57	57	53	41	42	36	44	38	41	45	45	39	32	30	31	31	25	28	42	43	37	30	27	28	28	22	25
	6	2400	5085	8640	13	60	60	56	45	46	40	47	41	44	47	47	41	35	34	35	34	28	31	45	45	39	32	30	31	31	25	28
	8	3200	6780	11520	23	63	63	59	50	52	45	51	45	49	50	49	42	37	37	38	37	31	35	47	47	41	35	34	35	34	28	31
	10	4000	8475	14400	35	66	66	62	54	56	49	53	48	53	53	50	44	39	40	42	39	34	39	50	49	42	37	37	38	36	31	34
800×600	2	960	2034	3456	1	54	55	52	37	38	32	39	35	40	42	44	38	30	27	28	26	22	27	41	43	37	28	25	26	23	-	-
	4	1920	4068	6912	6	57	58	54	41	42	36	44	38	41	45	46	40	32	30	31	31	25	28	42	44	38	30	27	28	28	22	25
	6	2880	6102	10368	13	60	61	57	45	46	40	47	41	44	47	48	42	35	34	35	34	28	31	45	46	40	32	30	31	31	25	28
	8	3840	8136	13824	23	62	63	59	49	50	44	50	44	47	49	49	43	36	36	37	36	30	33	46	47	41	34	32	33	33	27	30
	10	4800	10169	17280	35	64	65	61	51	53	46	51	46	49	51	50	44	38	38	39	37	32	35	48	48	42	35	35	36	34	29	32
800×700	2	1120	2373	4032	1	54	53	50	36	37	31	38	34	38	41	43	37	30	26	26	25	21	25	40	42	36	28	24	24	22	-	-
	4	2240	4746	8064	6	57	57	53	41	42	36	44	38	41	45	45	39	32	30	31	31	25	28	42	43	37	30	27	28	28	22	25
	6	3360	7119	12096	13	60	60	56	45	46	40	47	41	44	47	47	41	35	34	35	34	28	31	45	45	39	32	30	31	31	25	28
	8	4480	9492	16128	23	62	61	57	47	49	43	49	43	45	48	47	41	35	35	36	35	29	31	46	46	39	33	31	32	32	26	29
	10	5600	11864	20160	35	67	67	62	55	57	50	54	49	55	54	51	44	40	41	43	40	35	41	51	49	43	38	38	39	37	32	35

1. Sound data is determined in a reverberation room according to ISO3741 and ISO5135 standards.
2. Lw in dB/Oct.(re 1pw) are sound power levels for discharge sound and case radiated sound data.
3. The discharge sound pressure levels are determined with the assumptions as mentioned in table 1 for downstream ductwork including a diffuser with insulated plenum box.
4. The radiated sound pressure levels are determined with the assumptions as mentioned in table 1 for ceiling plenum and suspended ceiling absorption.
5. Lp values are including a room absorption of 10dB/Oct.
6. dB(A), NC and NR are sound pressure levels. Figures less than 20 are indicated by "-"
7. Min ΔPs is static pressure drop across VAV air volume control terminal with damper fully open.
8. For non standard applications and/or selections please contact our technincal staff.

Table1: Assumptions for additional attenuation

Hz	125	250	500	1K	2K	4K
Discharge(dB)	5	10	20	30	30	25
Radiated(dB)	2	5	10	15	15	20

Rectangular VAV and CAV
air volume control terminal

Technical data:
*Single wall (N**K**.....)*
*Double wall (N**L**.....)*

Sound data Δp=125Pa

MODEL	Data refering to inlet spigot				Min ΔPs	Δp=125Pa																										
						discharge sound									radiated sound single wall										radiated sound double wall								
	Velocity	air volume				Lw in dB/Oct.(re 1pW)						Lp value			Lw in dB/Oct.(re 1pW)						Lp value			Lw in dB/Oct.(re 1pW)						Lp value		
						125 HZ	250 HZ	500 HZ	1K HZ	2K HZ	4K HZ	dB(A)	NC	NR	125 HZ	250 HZ	500 HZ	1K HZ	2K HZ	4K HZ	dB(A)	NC	NR	125 HZ	250 HZ	500 HZ	1K HZ	2K HZ	4K HZ	dB(A)	NC	NR
	m/s	l/s	cfm	m^3/h	Pa	dB									dB									dB								
800×800	2	1280	2712	4608	1	54	54	51	37	38	32	39	35	40	42	43	37	30	27	28	26	22	27	41	42	36	28	25	26	23	-	-
	4	2560	5424	9216	6	57	57	53	41	42	36	44	38	41	45	45	39	32	30	31	31	25	28	42	43	37	30	27	28	28	22	25
	6	3840	8136	13824	13	60	60	56	45	46	40	47	41	44	47	47	41	35	34	35	34	28	31	45	45	39	32	30	31	31	25	28
	8	5120	10847	18432	23	62	61	57	47	49	43	49	43	45	48	47	41	35	35	36	35	29	31	46	46	39	33	31	32	32	26	29
	10	6400	13559	23040	35	64	64	60	51	53	46	51	46	49	51	49	43	38	38	39	37	32	35	48	47	41	35	35	36	34	29	32
900×300	2	540	1144	1944	1	54	53	50	36	37	31	38	34	38	41	43	37	30	26	26	25	21	25	40	42	36	28	24	24	22	-	-
	4	1080	2288	3888	6	57	57	53	41	42	36	44	38	41	45	45	39	32	30	31	31	25	28	42	43	37	30	27	28	28	22	25
	6	1620	3432	5832	13	60	60	56	45	46	40	47	41	44	47	47	41	35	34	35	34	28	31	45	45	39	32	30	31	31	25	28
	8	2160	4576	7776	23	62	62	58	49	50	44	50	44	47	49	48	42	36	36	37	36	30	33	46	46	40	34	32	33	33	27	30
	10	2700	5720	9720	35	63	63	59	50	52	45	50	45	47	50	49	42	37	37	38	36	31	33	47	47	41	35	34	35	33	28	31
900×400	2	720	1525	2592	1	54	53	50	36	37	31	38	34	38	41	43	37	30	26	26	25	21	25	40	42	36	28	24	24	22	-	-
	4	1440	3051	5184	6	57	57	53	41	42	36	44	38	41	45	45	39	32	30	31	31	25	28	42	43	37	30	27	28	28	22	25
	6	2160	4576	7776	13	60	60	56	45	46	40	47	41	44	47	47	41	35	34	35	34	28	31	45	45	39	32	30	31	31	25	28
	8	2880	6102	10368	23	62	61	57	47	49	43	49	43	45	48	47	41	35	35	36	35	29	31	46	46	39	33	31	32	32	26	29
	10	3600	7627	12960	35	65	65	61	53	54	48	52	47	51	52	50	43	38	39	40	38	33	37	49	48	42	36	36	37	35	30	33
900×500	2	900	1907	3240	1	54	55	52	37	38	32	39	35	40	42	44	38	30	27	28	26	22	27	41	43	37	28	25	26	23	-	-
	4	1800	3814	6480	6	57	58	54	41	42	36	44	38	41	45	46	40	32	30	31	31	25	28	42	44	38	30	27	28	28	22	25
	6	2700	5720	9720	13	60	61	57	45	46	40	47	41	44	47	48	42	35	34	35	34	28	31	45	46	40	32	30	31	31	25	28
	8	3600	7627	12960	23	63	64	60	50	52	45	51	45	49	50	50	43	37	37	38	37	31	35	47	48	42	35	34	35	34	28	31
	10	4500	9534	16200	35	63	64	60	50	52	45	50	45	47	50	50	43	37	37	38	36	31	33	47	48	42	35	34	35	33	28	31
900×600	2	1080	2288	3888	1	54	54	51	37	38	32	39	35	40	42	43	37	30	27	28	26	22	27	41	42	36	28	25	26	23	-	-
	4	2160	4576	7776	6	57	57	53	41	42	36	44	38	41	45	45	39	32	30	31	31	25	28	42	43	37	30	27	28	28	22	25
	6	3240	6864	11664	13	60	60	56	45	46	40	47	41	44	47	47	41	35	34	35	34	28	31	45	45	39	32	30	31	31	25	28
	8	4320	9153	15552	23	62	62	58	49	50	44	50	44	47	49	48	42	36	36	37	36	30	33	46	46	40	34	32	33	33	27	30
	10	5400	11441	19440	35	64	64	60	51	53	46	51	46	49	51	49	43	38	38	39	37	32	35	48	47	41	35	35	36	34	29	32
900×700	2	1260	2669	4536	1	54	54	51	37	38	32	39	35	40	42	43	37	30	27	28	26	22	27	41	42	36	28	25	26	23	-	-
	4	2520	5339	9072	6	57	57	53	41	42	36	44	38	41	45	45	39	32	30	31	31	25	28	42	43	37	30	27	28	28	22	25
	6	3780	8008	13608	13	60	60	56	45	46	40	47	41	44	47	47	41	35	34	35	34	28	31	45	45	39	32	30	31	31	25	28
	8	5040	10678	18144	23	63	63	59	50	52	45	51	45	49	50	49	42	37	37	38	37	31	35	47	47	41	35	34	35	34	28	31
	10	6300	13347	22680	35	65	65	61	53	54	48	52	47	51	52	50	43	38	39	40	38	33	37	49	48	42	36	36	37	35	30	33
900×800	2	1440	3051	5184	1	55	54	51	36	37	31	38	34	38	42	44	38	30	26	26	25	21	25	41	43	37	28	24	24	22	-	-
	4	2880	6102	10368	6	58	58	54	41	42	36	44	38	41	46	46	40	32	30	31	31	25	28	43	44	38	30	27	28	28	22	25
	6	4320	9153	15552	13	61	61	57	45	46	40	47	41	44	48	48	42	35	34	35	34	28	31	46	46	40	32	30	31	31	25	28
	8	5760	12203	20736	23	63	63	59	49	50	44	50	44	47	50	49	43	36	36	37	36	30	33	47	47	41	34	32	33	33	27	30
	10	7200	15254	25920	35	66	66	62	53	54	48	52	47	51	53	51	44	38	39	40	38	33	37	50	49	43	36	36	37	35	30	33
900×900	2	1620	3432	5832	1	55	54	51	36	37	31	38	34	38	42	44	38	30	26	26	25	21	25	41	43	37	28	24	24	22	-	-
	4	3240	6864	11664	6	58	58	54	41	42	36	44	38	41	46	46	40	32	30	31	31	25	28	43	44	38	30	27	28	28	22	25
	6	4860	10297	17496	13	61	61	57	45	46	40	47	41	44	48	48	42	35	34	35	34	28	31	46	46	40	32	30	31	31	25	28
	8	6480	13729	23328	23	64	64	60	50	52	45	51	45	49	51	50	43	37	37	38	37	31	35	48	48	42	35	34	35	34	28	31
	10	8100	17161	29160	35	66	66	62	53	54	48	52	47	51	53	51	44	38	39	40	38	33	37	50	49	43	36	36	37	35	30	33
1000×300	2	600	1271	2160	1	53	53	50	36	37	31	38	34	38	40	43	37	30	26	26	25	21	25	39	42	36	28	24	24	22	-	-
	4	1200	2542	4320	6	56	57	53	41	42	36	44	38	41	44	45	39	32	30	31	31	25	28	41	43	37	30	27	28	28	22	25
	6	1800	3814	6480	13	59	60	56	45	46	40	47	41	44	46	47	41	35	34	35	34	28	31	44	45	39	32	30	31	31	25	28
	8	2400	5085	8640	23	61	62	58	49	50	44	50	44	47	48	48	42	36	36	37	36	30	33	45	46	40	34	32	33	33	27	30
	10	3000	6356	10800	35	63	64	60	51	53	46	51	46	49	50	49	43	38	38	39	37	32	35	47	47	41	35	35	36	34	29	32
1000×400	2	800	1695	2880	1	54	54	51	37	38	32	39	35	40	42	43	37	30	27	28	26	22	27	41	42	36	28	25	26	23	-	-
	4	1600	3390	5760	6	57	57	53	41	42	36	44	38	41	45	45	39	32	30	31	31	25	28	42	43	37	30	27	28	28	22	25
	6	2400	5085	8640	13	60	60	56	45	46	40	47	41	44	47	47	41	35	34	35	34	28	31	45	45	39	32	30	31	31	25	28
	8	3200	6780	11520	23	62	61	57	47	49	43	49	43	45	48	47	41	35	35	36	35	29	31	46	46	39	33	31	32	32	26	29
	10	4000	8475	14400	35	66	66	62	54	56	49	53	48	53	53	50	44	39	40	42	39	34	39	50	49	42	37	37	38	36	31	34

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3. The discharge sound pressure levels are determined with the assumptions as mentioned in table 1 for downstream ductwork including a diffuser with insulated plenum box.
4. The radiated sound pressure levels are determined with the assumptions as mentioned in table 1 for ceiling plenum and suspended ceiling absorption.
5. Lp values are including a room absorption of 10dB/Oct.
6. dB(A), NC and NR are sound pressure levels. Figures less than 20 are indicated by "-"
7. Min ΔPs is static pressure drop across VAV air volume control terminal with damper fully open.
8. For non standard applications and/or selections please contact our technincal staff.

Table1: Assumptions for additional attenuation

Hz	125	250	500	1K	2K	4K
Discharge(dB)	5	10	20	30	30	25
Radiated(dB)	2	5	10	15	15	20

Rectangular VAV and CAV
air volume control terminal

Technical data:
*Single wall (N**K**.....)*
*Double wall (N**L**.....)*

Sound data Δp=125Pa

MODEL	Data refering to inlet spigot				Min ΔPs	Δp=125Pa																										
						discharge sound									radiated sound single wall									radiated sound double wall								
	Velocity	air volume				Lw in dB/Oct.(re 1pW)						Lp value			Lw in dB/Oct.(re 1pW)						Lp value			Lw in dB/Oct.(re 1pW)						Lp value		
						125 HZ	250 HZ	500 HZ	1K HZ	2K HZ	4K HZ	dB(A)	NC	NR	125 HZ	250 HZ	500 HZ	1K HZ	2K HZ	4K HZ	dB(A)	NC	NR	125 HZ	250 HZ	500 HZ	1K HZ	2K HZ	4K HZ	dB(A)	NC	NR
	m/s	l/s	cfm	m^3/h	Pa	dB									dB									dB								
1000×500	2	1000	2119	3600	1	54	53	50	36	37	31	38	34	38	41	43	37	30	26	26	25	21	25	40	42	36	28	24	24	22	-	-
	4	2000	4237	7200	6	57	57	53	41	42	36	44	38	41	45	45	39	32	30	31	31	25	28	42	43	37	30	27	28	28	22	25
	6	3000	6356	10800	13	60	60	56	45	46	40	47	41	44	47	47	41	35	34	35	34	28	31	45	45	39	32	30	31	31	25	28
	8	4000	8475	14400	23	63	63	59	50	52	45	51	45	49	50	49	42	37	37	38	37	31	35	47	47	41	35	34	35	34	28	31
	10	5000	10593	18000	35	64	64	60	51	53	46	51	46	49	51	49	43	38	38	39	37	32	35	48	47	41	35	35	36	34	29	32
1000×600	2	1200	2542	4320	1	54	53	50	36	37	31	38	34	38	41	43	37	30	26	26	25	21	25	40	42	36	28	24	24	22	-	-
	4	2400	5085	8640	6	57	57	53	41	42	36	44	38	41	45	45	39	32	30	31	31	25	28	42	43	37	30	27	28	28	22	25
	6	3600	7627	12960	13	60	60	56	45	46	40	47	41	44	47	47	41	35	34	35	34	28	31	45	45	39	32	30	31	31	25	28
	8	4800	10169	17280	23	62	61	57	47	49	43	49	43	45	48	47	41	35	35	36	35	29	31	46	46	39	33	31	32	32	26	29
	10	6000	12712	21600	35	65	65	61	53	54	48	52	47	51	52	50	43	38	39	40	38	33	37	49	48	42	36	36	37	35	30	33
1000×700	2	1400	2966	5040	1	55	54	51	36	37	31	38	34	38	42	44	38	30	26	26	25	21	25	41	43	37	28	24	24	22	-	-
	4	2800	5932	10080	6	58	58	54	41	42	36	44	38	41	46	46	40	32	30	31	31	25	28	43	44	38	30	27	28	28	22	25
	6	4200	8898	15120	13	61	61	57	45	46	40	47	41	44	48	48	42	35	34	35	34	28	31	46	46	40	32	30	31	31	25	28
	8	5600	11864	20160	23	64	64	60	50	52	45	51	45	49	51	50	43	37	37	38	37	31	35	48	48	42	35	34	35	34	28	31
	10	7000	14831	25200	35	64	64	60	50	52	45	50	45	47	51	50	43	37	37	38	36	31	33	48	48	42	35	34	35	33	28	31
1000×800	2	1600	3390	5760	1	55	54	51	36	37	31	38	34	38	42	44	38	30	26	26	25	21	25	41	43	37	28	24	24	22	-	-
	4	3200	6780	11520	6	58	58	54	41	42	36	44	38	41	46	46	40	32	30	31	31	25	28	43	44	38	30	27	28	28	22	25
	6	4800	10169	17280	13	61	61	57	45	46	40	47	41	44	48	48	42	35	34	35	34	28	31	46	46	40	32	30	31	31	25	28
	8	6400	13559	23040	23	63	63	59	49	50	44	50	44	47	50	49	43	36	36	37	36	30	33	47	47	41	34	32	33	33	27	30
	10	8000	16949	28800	35	67	67	63	54	56	49	53	48	53	54	51	45	39	40	42	39	34	39	51	50	43	37	37	38	36	31	34
1000×900	2	1800	3814	6480	1	55	54	51	36	37	31	38	34	38	42	44	38	30	26	26	25	21	25	41	43	37	28	24	24	22	-	-
	4	3600	7627	12960	6	58	58	54	41	42	36	44	38	41	46	46	40	32	30	31	31	25	28	43	44	38	30	27	28	28	22	25
	6	5400	11441	19440	13	61	61	57	45	46	40	47	41	44	48	48	42	35	34	35	34	28	31	46	46	40	32	30	31	31	25	28
	8	7200	15254	25920	23	63	62	58	47	49	43	49	43	45	49	48	42	35	35	36	35	29	31	47	47	40	33	31	32	32	26	29
	10	9000	19068	32400	35	65	65	61	51	53	46	51	46	49	52	50	44	38	38	39	37	32	35	49	48	42	35	35	36	34	29	32
1000×1000	2	2000	4237	7200	1	55	54	51	36	37	31	38	34	38	42	44	38	30	26	26	25	21	25	41	43	37	28	24	24	22	-	-
	4	4000	8475	14400	6	58	58	54	41	42	36	44	38	41	46	46	40	32	30	31	31	25	28	43	44	38	30	27	28	28	22	25
	6	6000	12712	21600	13	61	61	57	45	46	40	47	41	44	48	48	42	35	34	35	34	28	31	46	46	40	32	30	31	31	25	28
	8	8000	16949	28800	23	64	64	60	50	52	45	51	45	49	51	50	43	37	37	38	37	31	35	48	48	42	35	34	35	34	28	31
	10	10000	21186	36000	35	67	67	63	54	56	49	53	48	53	54	51	45	39	40	42	39	34	39	51	50	43	37	37	38	36	31	34

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