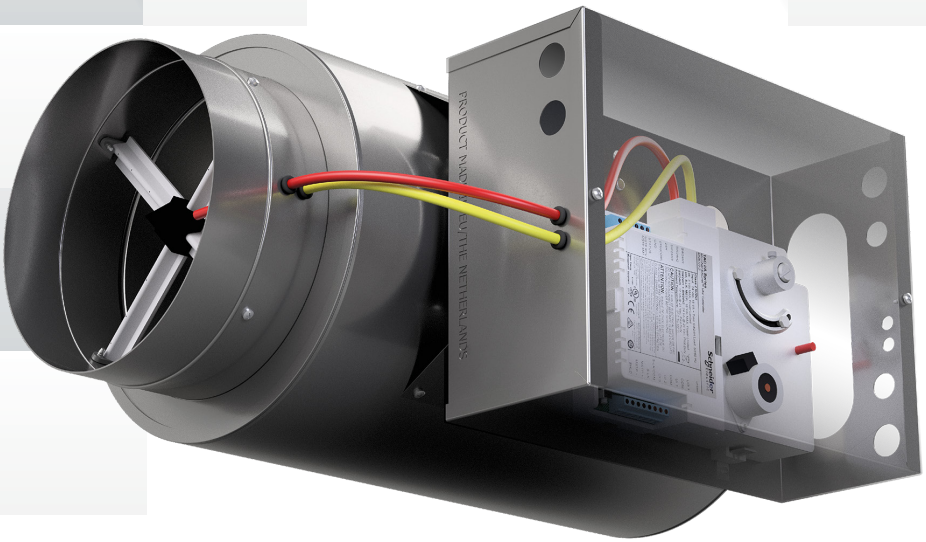
ONLINE SELECTION TOOL
www.airselect.nl



CIRCULAR VAV TERMINALS

PRESSURE INDEPENDENT TYPE

NA | NB TYPE

BARCOL-AIR
AIR DISTRIBUTION

Composition type designation:

N - B - O - J - D - O - B

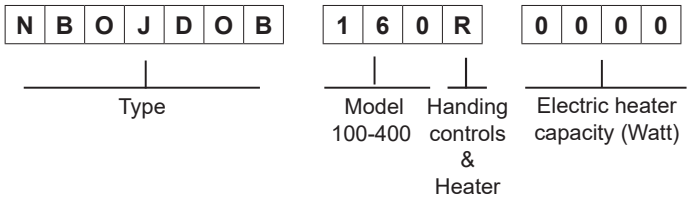
N Position 1: **Product group**

N = air volume control terminals

B Position 2: **Function**

A = single wall, circular volume control terminal
B = double wall, circular volume control terminal
1 = non standard, specify separately

Ordering example:



O Position 3: **Controls (manufacturer)**

O = without controls
For controls, contact our sales staff

Q Position 4: **Outlet**

A = rectangular outlet
B = circular outlet
C = 4 circular outlets ('Octopus')
E = with integral sound attenuator (only possible with a double wall unit, type NBOE...)
G = rectangular outlet and provision for integral hot water reheat coil
H = circular outlet and provision for integral hot water reheat coil
J = 4 circular outlets and provision for integral hot water reheat coil
N = rectangular outlet and provision for integral electric reheat coil
P = circular outlet and provision for integral electric reheat coil
Q = 4 circular outlets and provision for integral electric reheat coil
1 = non standard, specify separately

E Position 5: **Reheat coil**

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

O Position 6: **Controls (type & function)**

O = without controls
For controls, contact our sales staff
R = code for terminal with integral sound attenuator in combination with double wall return type unit.

B Position 7: **Sensor**

O = not applicable
B = Flo-Cross®, 2 x 12 point averaging and signal amplifying air flow sensor (standard)
1 = non standard, specify separately

Ordering information:

Standard terminals:

- quantity of terminals
- complete 7 digit code
- terminal size or model
- air volume setting (V_{max}, V_{min} etc)
- control handing (standard right side)
- if applicable, electric reheat coil capacity
- supply or return air

Non standard terminals:

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

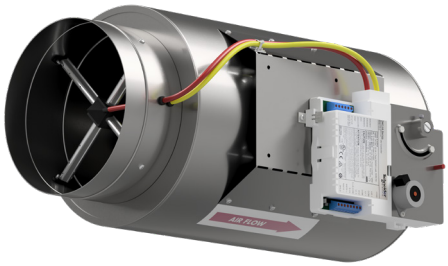
Ordering codes "Specials"

N..1... - 3010 = 4 balancing dampers in 'Octopus' outlet
N..1... - 3006 = 'Octopus' with 6 outlets instead of 4
N..1... - 3016 = 'Octopus' with 6 outlets incl. balancing dampers
N..1... - FL = Flange connection 30 mm for rectangular outlet

Circular VAV-terminals

Technical data

Type NA..... / NB.....



Application

Types NA and NB are circular pressure-independent VAV and CAV air volume control terminals. The terminals are designed particularly for systems with space and installation restrictions and for the accurate measurement and control of air volumes courtesy of the patented airflow sensor type Flo-Cross®.
In CAV application, the terminals maintain the required constant airflow independent to the inlet static pressure.

In VAV application, the terminals control the air volume to the room, depending on the cooling load required thus saving energy consumption in both cooling and heating applications.

Alternatively VAV terminals are ideal to be used for CO_2 control. Dependent of the indoor air quality, always the correct amount of fresh air will be supplied to the room. Off course the primary air handling system need to be suitable for this.

The VAV or CAV terminals can be used either for supply or return air applications in new or refurbishment projects. The terminals do have a single wall (NA) or double wall (NB) construction and can be delivered with a distribution plenum and a built-in hot water or electric reheat coil.

Features:
- Pressure independent control functions.
- Volume control range 100% down to 10%.
- Low pressure loss over the terminal.
- Single or double wall construction.
- Factory fitted distribution plenum with built-in hot water or electric reheat coil.
- Oval shaped damper blade for linear control characteristics.
- Low leakage damper, less than 2% of Vnom at 750 Pa.
- Low noise production.
- Suitable for all control functions (VAV, CAV, shut-off, etc.) to maximise system energy savings.
- Flo-Cross® 2 x 12 points averaging and signal amplifying airflow sensor, better than 2,5% accuracy even with irregular duct approach.
- Maintenance free.

Technical information

Casing:
Single or double wall, air-tight construction made of galvanized sheet steel (non spiral), casing leakage rate to Class II VDI 3803 or DIN 24 194 part 2. Duct-sleeve connections at the in- and outlet are suitable for DIN 24 145 or DIN 24 146 connections. In case of double wall construction 25 mm insulation material is used, completely enclosed by the double wall construction.

Insulation:
The terminal is supplied with 25 mm thermal and acoustical insulation (30 kg/m^3) complying to: NFPA90A and 90B surface burning characteristics, BS476 part 6 and 7 fire propagation, UL 181 class 0 surface spread of flame and UL 94 HF1 flamability.

Damper:
Damper blade: made of steel, sandwich construction of twin blade and neoprene gasket with low leakage according to DIN 1946, part 4.
Damper shaft: aluminium, ø12 mm with self lubricating Nylon bearings.

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

Distribution plenum:
Made of galvanized sheet steel with 13 mm internal isolation. Plenum with standard rectangular or multiple (4 x circular) outlet construction. Optional single, double, triple or six circular outlets are possible.
Outlet spigots are made of flame retardant polymer and optionally can be provided with volume control dampers made of galvanized sheet steel.

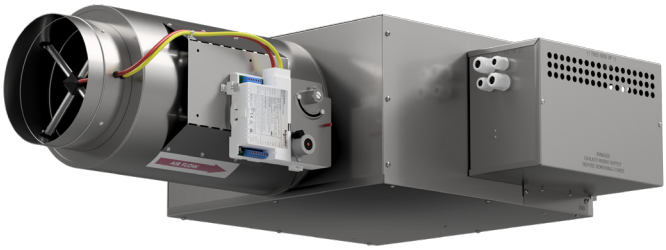
Reheat coil:
Choice of 1-, 2- or 4-row hot water reheat coil or electric reheat coil (230VAC/1-phase or 400VAC/3-phase).
More detailed technical information can be found in the separate NO documentation.

Controls:
Suitable for use with pneumatic, analogue electronic or DDC controllers. Controls can be factory fitted, wired and calibrated.
Controls enclosure (galvanized sheet steel) can be provided optionally.
Delivery format

Delivery format:

- The VAV or CAV terminal will be supplied as a single mounting assembly. Optional ordered distribution plenum, reheat coil and/or controls are factory fitted, wired and calibrated. The on site delivered terminal can directly be installed and commissioned.
- Controls location and hot water or electric connections are as a standard 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.
- For terminals ordered with ‘free-issue’ third party controls, wiring diagrams and mounting instructions must be provided.

Type NA..... / NB.....



Specify as:

Example:
Supply and install, variable air volume terminals, double-wall construction with distribution plenum with 4 circular outlets, constructed from galvanized sheet steel. The casing leakage rate shall be classified according to class II, VDI 3803/DIN 24 194
and the duct-sleeve connections shall be suitable for DIN 24 145 or DIN 24 146 respectively. The VAV terminals shall have a low leakage, sandwich construction and oval shaped damper blade with neoprene gasket and an aluminium damper shaft with self lubricating Nylon bearings.

A centre averaging airflow sensor with at least 2 x 12 test points and amplified signal, type Flo-Cross® shall control the airflow with an accuracy better than 2.5 %. The terminals shall be supplied with 1-row hot water reheat coil.

The controller shall be I/A Series, DDC controller:
LonMark® compatible, type MNL-V2RVx
or
BACnet® compatible, type MNB-V2.

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

Maximum air volume 250 l/s
Minimum air volume 60 l/s
Minimum air volume 120 l/s
(in case of reheat)
Terminal size 200 mm
Max. pressure loss 38 Pa
Max. discharge sound index
< NC30 (@250Pa Δp)
Max. radiated sound index
< NC30 (@250Pa Δp)

Ordering example:
type – model – handing
= NBOGAOB – 200R

Manufacturer: Barcol-Air, the Netherlands

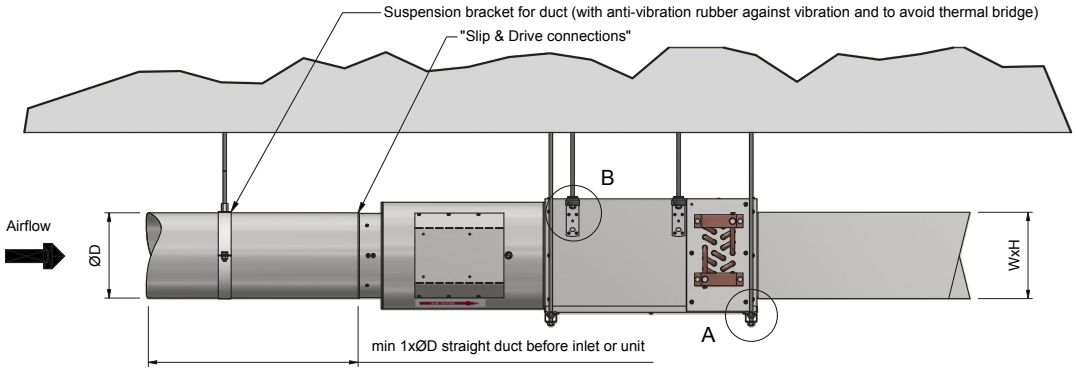
Installation instructions:

The Barcol-Air VAV terminals shall be installed using at least two support brackets (DIN-rail or L-profile), with anti-vibration rubber under the terminal. Each of these brackets shall be fixed with two threaded rods to the ceiling slab above.

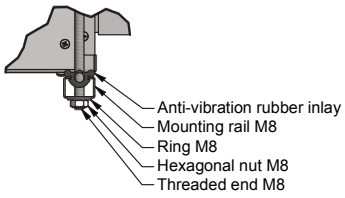
This installation method:
1. Shall prevent the body of the VAV terminal from high mechanical tension, which could damage the construction and performance of the terminal.
2. Shall prevent torsion on the VAV terminals, which could cause malfunction of the damper blades.
3. Provides some flexibility to the final location of the VAV terminals.
4. Use at least 1x diameter straight duct length before the VAV inlet.
5. Additional manual volume control dampers (VCD's) before the inlet are not required / recommended!!
6. All connections shall be thermally isolated.
7. Pressure sensing tubes of Flo-Cross® airflow sensor shall not be "kinked" or otherwise obstructed by the external duct insulation.

Installation of circular VAV terminals can be done in a similar way, with the only assumption that two circular support brackets with anti-vibration rubber (installation clamps) instead of DIN-rail or L-profile shall be used. To prevent the VAV terminal from rotation, we recommend to use a complete clamp (support + top bracket), so that the terminal is 'clammed' in between.

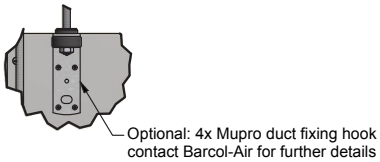
Optional 4 x Mupro fixing hooks can be used (see drawing).



View A (Standard mounting)



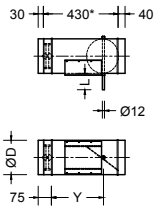
View B (Optional mounting)



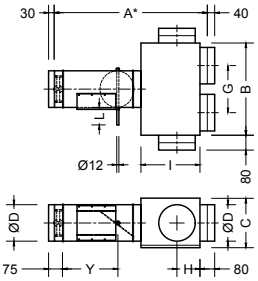
Mounting drawing type NBOG...

Circular VAV-terminals

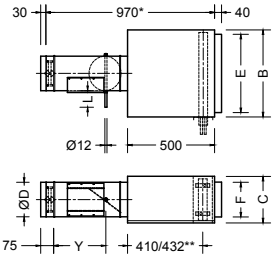
Dimensions type NA



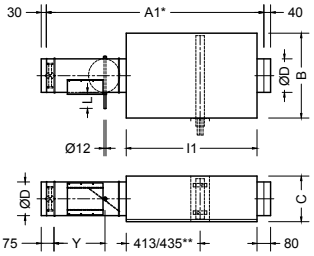
Type NAOBOOB



Type NAOCOOB



Type NAOG.OB



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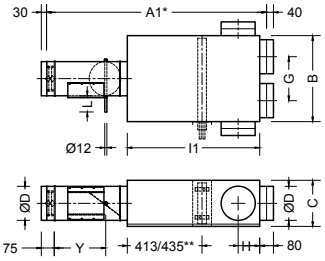
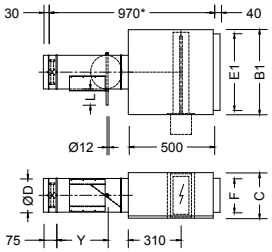
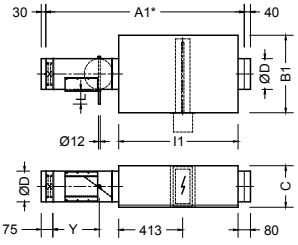


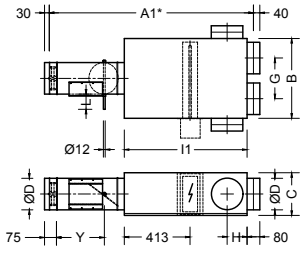
Type NAOJ.OB



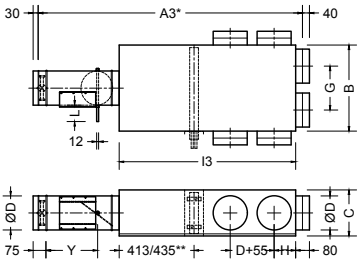
Type NAON.OB



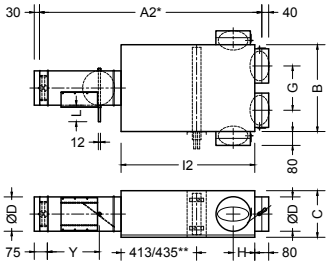
Type NAOP.OB



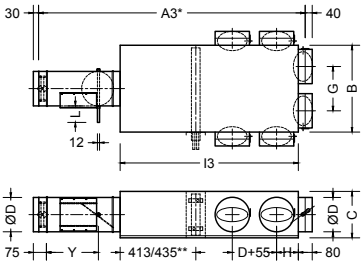
Type NAOQ.OB



Type NA.J... - 3006

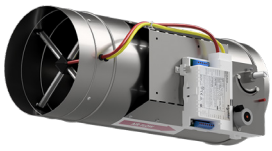


Type NA.J... - 3010



Type NA.J... - 3016

All dimensions in mm
** = Installed length.*
*** = Size varies with a 1-/2-row or 4-row hot water reheat coil.*



Type NAOBOOB

Type NAOJ.OB

Type NAOCOOB

Type NAON.OB

Dimensions NA terminals

Model	100	125	160	200	250	315	355	400
A*	780	780	780	830	880	930	990	1030
A1**	1230	1230	1230	1280	1330	1380	1440	1480
B	330	330	400	500	600	740	820	910
B1	330	330	400	400	600	600	600	600
C	228	228	248	268	318	408	408	458
ØD	98	123	158	198	248	313	353	398
E	275	275	350	450	550	690	770	850
E1	275	275	350	350	550	550	550	550
F	170	170	175	200	250	330	330	380
G	180	180	215	255	305	370	410	455
H	125	125	125	125	175	200	250	250
I	270	270	270	320	370	420	480	520
I1	720	720	720	770	820	870	930	970
Y	310	310	310	300	285	260	245	235
L	95	95	95	95	95	95	95	105

All dimensions in mm
** = Installed length.*
*** = Size varies with a 1-/2-row or 4-row hot water reheat coil.*

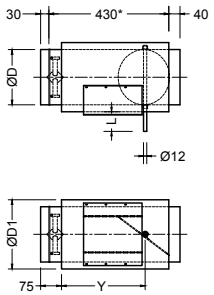
Kv values

Model	100	125	160	200	250	315	355	400
Kv (l/s / Pa)	5,5	8,5	15,0	24,9	35,4	58,9	74,3	92,6

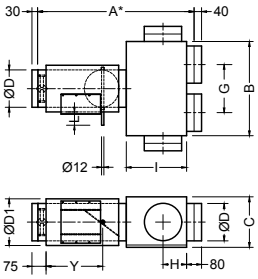
Flow = Kv x $\sqrt{\Delta p_{fc}}$
Δp_{fc} = Flo-Cross® signal
If Δp_{fc} = 30 Pa and VAV-size = 160
Flow = 15.0 x $\sqrt{30}$ = 82 l/s

Circular VAV-terminals

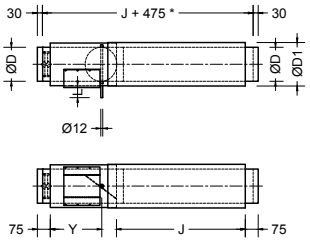
Dimensions type NB



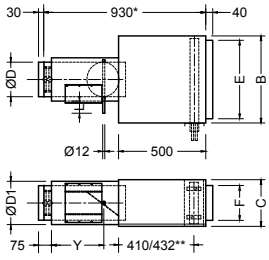
Type NBOBOOB



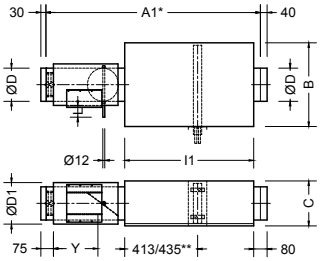
Type NBOCOOB



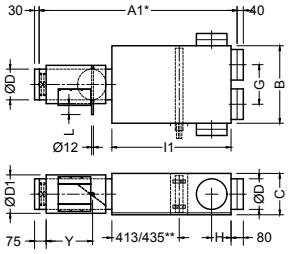
Type NBOEOOB / NBOEORB



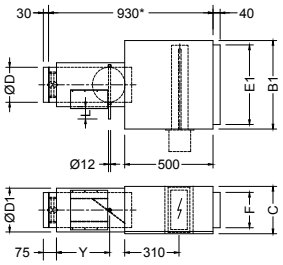
Type NBOG.OB



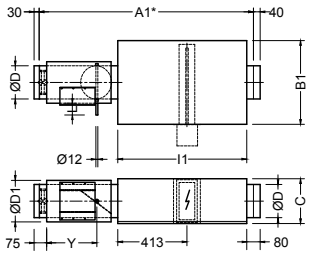
Type NBOH.OB



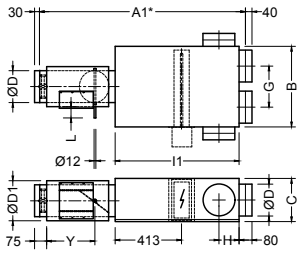
Type NBOJ.OB



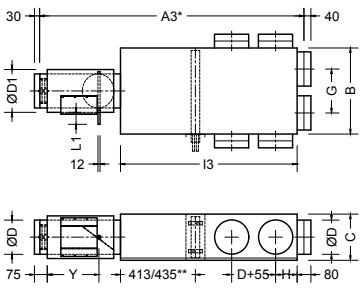
Type NBON.OB



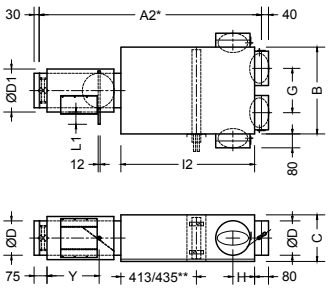
Type NBOP.OB



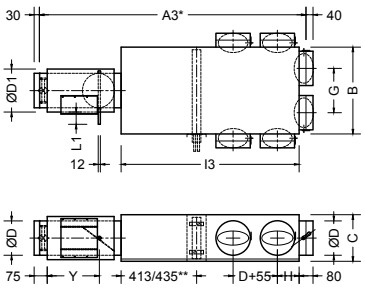
Type NBOQ.OB



Type NB.J... - 3006

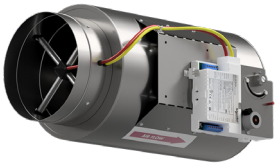


Type NB.J... - 3010



Type NB.J... - 3016

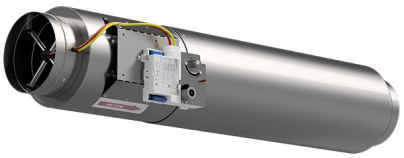
All dimensions in mm
** = Installed length.*
*** = Size varies with a 1-/2-row or 4-row hot water reheat coil.*



Type NBOBOOB

Type NBOJ.OB

Type NBOCOOB



Type NBOEOOB

Dimensions NB terminals

Model	100	125	160	200	250	315	355	400
A*	780	780	780	830	880	930	990	1030
A1**	1230	1230	1230	1280	1330	1380	1440	1480
B	330	330	400	500	600	740	820	910
B1	330	330	400	400	600	600	600	600
C	228	228	248	268	318	408	408	458
ØD	98	123	158	198	248	313	353	398
ØD1	150	180	200	250	300	355	400	450
E	275	275	350	450	550	690	770	850
E1	275	275	350	350	550	550	550	550
F	170	170	175	200	250	330	330	380
G	180	180	215	255	305	370	410	455
H	125	125	125	125	175	200	250	250
I	270	270	270	320	370	420	480	520
I1	720	720	720	770	820	870	930	970
J	600	600	600	750	750	900	900	900
Y	310	310	310	300	285	260	245	235
L	70	67,5	75	70	70	75	72,5	80

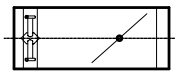
All dimensions in mm
** = Installed length.*
*** = Size varies with a 1-/2-row or 4-row hot water reheat coil.*

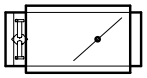
Kv values

Model	100	125	160	200	250	315	355	400
Kv (l/s / Pa)	5,5	8,5	15,0	24,9	35,4	58,9	74,3	92,6

Flow = Kv x $\sqrt{\Delta p_{fc}}$
Δp_{fc} = Flo-Cross® signal
If Δp_{fc} = 30 Pa en VAV-size = 160
Flow = 15.0 x $\sqrt{30}$ = 82 l/s

Type NAOBOOB (single wall)
NBOBOOB (double wall)





Sound data ∆ p = 125 Pa

Model	data refering to inlet spigot					Δ p = 125 Pa																										
						discharge sound									radiated sound single wall									radiated sound double wall								
						L_w in dB/Oct. (re 1pW)						Lp values			L_w in dB/Oct. (re 1pW)						Lp values			L_w in dB/Oct. (re 1pW)						Lp values		
	velocity	air volume			min. Δ p_s	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR
	m/s	l/s	CFM	m^3/h	Pa	dB									dB									dB								
100	2	15	31	53	2	43	44	40	38	34	22	--	--	--	19	-	19	20	23	21	--	--	--	-	-	-	-	-	-	--	--	--
	4	29	62	106	7	49	50	46	44	40	29	23	--	--	26	23	26	27	30	28	--	--	--	22	-	-	-	-	-	--	--	--
	6	44	94	160	17	53	55	51	48	44	34	28	21	24	30	27	30	31	34	32	--	--	--	26	20	-	-	-	18	--	--	--
	8	59	125	213	30	57	58	54	52	49	39	31	26	28	33	30	33	34	37	35	--	--	--	29	23	19	19	19	21	--	--	--
	10	74	156	266	47	59	61	58	55	52	43	34	29	31	35	32	35	36	39	37	--	--	--	32	26	22	21	21	23	--	--	--
	12	89	188	320	68	62	64	61	58	56	47	37	32	34	37	34	37	38	41	39	21	--	--	33	27	23	23	23	25	--	--	--
125	2	23	49	84	2	40	43	40	39	34	25	--	--	--	28	24	25	22	23	17	--	--	--	-	-	-	-	-	-	--	--	--
	4	47	99	168	7	47	49	46	45	40	31	22	--	--	35	31	32	29	30	24	--	--	--	23	18	-	-	-	-	--	--	--
	6	70	149	253	16	52	54	51	49	44	36	27	21	23	39	35	36	33	34	28	--	--	--	27	22	19	18	-	19	--	--	--
	8	94	198	337	28	56	58	55	53	48	40	31	25	28	42	38	38	35	37	31	21	--	--	30	25	22	21	20	22	--	--	--
	10	117	248	421	44	59	61	59	56	51	44	34	29	31	44	40	41	38	39	33	23	--	--	33	28	25	23	22	24	--	--	--
	12	140	296	504	63	62	64	62	59	54	48	37	33	34	46	42	42	39	41	35	25	--	--	34	29	26	25	24	26	--	--	--
160	2	39	82	139	2	39	41	40	38	37	32	--	--	--	28	24	25	22	23	18	--	--	--	18	-	-	-	-	-	--	--	--
	4	78	164	279	7	47	48	46	44	41	36	22	--	--	35	31	32	29	30	25	--	--	--	25	20	19	-	-	-	--	--	--
	6	116	246	418	15	52	52	50	49	44	39	26	--	22	39	35	36	33	34	29	--	--	--	29	24	23	20	18	20	--	--	--
	8	155	328	558	26	56	56	54	52	48	42	30	24	26	42	38	38	35	37	31	21	--	--	32	27	26	23	21	23	--	--	--
	10	194	410	697	41	60	60	58	56	51	45	34	28	30	44	40	41	38	39	34	23	--	--	34	29	28	25	23	25	--	--	--
	12	232	491	835	59	63	63	61	59	54	48	37	31	33	46	42	42	39	41	35	25	--	--	36	31	30	27	25	27	--	--	--
200	2	61	129	219	2	39	34	37	34	30	23	--	--	--	29	24	24	23	23	18	--	--	--	19	-	-	-	-	-	--	--	--
	4	122	258	439	6	48	44	46	42	37	31	20	--	--	36	31	31	29	30	25	--	--	--	26	22	21	18	-	-	--	--	--
	6	183	387	658	14	54	51	52	47	42	36	26	--	--	40	35	35	33	34	29	--	--	--	30	26	25	22	20	21	--	--	--
	8	244	516	878	25	58	55	56	51	46	40	31	22	25	43	38	38	36	37	31	21	--	--	33	29	28	25	22	24	--	--	--
	10	305	645	1097	39	61	59	60	54	50	43	34	27	29	45	40	40	38	39	34	23	--	--	35	31	30	27	25	26	--	--	--
	12	366	775	1318	56	64	63	63	57	53	46	38	31	33	47	42	42	40	41	35	25	--	--	37	33	32	29	27	28	--	--	--
250	2	96	203	345	1	41	43	42	39	34	30	--	--	--	29	24	24	23	23	18	--	--	--	19	-	-	-	-	-	--	--	--
	4	192	406	690	6	50	51	50	45	40	35	25	--	20	36	31	31	29	30	25	--	--	--	26	21	21	18	-	-	--	--	--
	6	288	609	1035	13	56	56	55	50	44	39	30	23	26	40	35	35	33	34	29	--	--	--	30	25	25	22	20	21	--	--	--
	8	383	812	1380	23	60	60	59	53	47	43	34	28	30	43	38	38	36	37	31	21	--	--	33	28	28	25	23	24	--	--	--
	10	479	1015	1725	36	63	63	62	56	50	45	37	32	34	45	40	40	38	39	34	23	--	--	35	31	31	27	25	26	--	--	--
	12	575	1218	2070	52	66	66	65	59	53	48	40	35	37	47	42	42	40	41	35	25	--	--	37	32	32	29	27	28	--	--	--
315	2	153	324	550	1	42	45	41	41	38	33	--	--	--	30	24	24	23	23	19	--	--	--	21	18	18	-	-	-	--	--	--
	4	306	648	1101	5	52	52	48	47	43	38	25	--	21	37	31	31	30	30	26	--	--	--	28	25	25	22	18	19	--	--	--
	6	459	971	1651	12	58	57	54	52	48	42	31	24	26	41	35	35	34	34	30	--	--	--	32	29	29	26	22	23	--	--	--
	8	612	1295	2202	22	63	61	58	56	52	46	35	29	31	44	38	38	36	37	32	21	--	--	35	32	32	29	25	26	--	--	--
	10	764	1619	2752	34	67	64	62	59	55	50	39	34	35	46	40	40	39	39	35	23	--	--	38	34	34	31	27	28	--	--	--
	12	917	1942	3301	49	71	67	65	62	59	53	43	38	39	48	42	42	40	41	36	25	--	--	39	36	36	33	29	30	--	--	--
355	2	195	412	701	1	42	52	45	45	40	38	23	--	21	30	24	24	23	23	19	--	--	--	22	19	19	-	-	-	--	--	--
	4	389	824	1401	5	53	56	51	50	43	42	29	23	26	37	31	31	30	30	26	--	--	--	29	26	26	23	18	20	--	--	--
	6	584	1236	2102	12	59	60	56	54	46	45	33	28	30	41	35	35	34	34	30	--	--	--	33	30	30	27	23	24	--	--	--
	8	779	1649	2803	21	64	63	60	57	50	48	37	31	33	44	38	38	37	37	33	21	--	--	36	33	33	30	25	27	--	--	--
	10	973	2061	3503	33	68	66	64	61	53	52	41	35	37	46	40	40	39	39	35	23	--	--	38	35	35	32	28	29	--	--	--
	12	1168	2473	4205	47	72	69	67	64	56	55	44	40	40	48	42	42	41	41	37	25	--	--	40	37	37	34	30	31	--	--	--
400	2	248	524	891	1	43	54	46	46	42	36	25	21	23	30	24	24	23	23	19	--	--	--	22	19	19	-	-	-	--	--	--
	4	495	1049	1783	5	54	58	52	51	45	40	30	26	28	37	31	31	30	30	26	--	--	--	29	26	26	24	19	20	--	--	--
	6	743	1573	2674	11	60	62	57	55	48	43	35	30	32	41	35	35	34	34	30	--	--	--	33	30	30	28	23	24	--	--	--
	8	990	2097	3565	20	65	65	61	58	52	46	39	34	35	44	38	37	37	37	33	21	--	--	36	33	33	31	26	27	--	--	--
	10	1238	2621	4456	32	69	68	65	62	55	50	42	37	39	46	40	40	39	39	35	23	--	--	39	36	36	33	28	29	--	--	--
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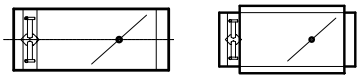
1. Sound data is determined in a reverberation room at an independent sound laboratory, according to ISO 3741 and ISO 5135 standards.
2. Lw in dB/Oct. (re 1pW) are sound power levels for discharge sound and case radiated sound. Figures less than 17 dB are indicated by "-".
3. The discharge sound pressure 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 10 dB/Oct.
6. dB(A), NC and NR index figures are sound pressure levels. Figures less than 20 are indicated by "--".
7. ∆ps is static pressure drop across VAV air volume control terminal with damper fully open.
8. For non standard applications and/or selections, please contatct our technical staff.

Table 1: 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

Type NAOBOOB (single wall)
NBOBOOB (double wall)



Sound data ∆ p = 250 Pa

Model	data refering to					Δ p = 250 Pa																							
	inlet spigot					discharge sound									radiated sound single wall									radiated sound double wall								
						L_w in dB/Oct. (re 1pW)						Lp values			L_w in dB/Oct. (re 1pW)						Lp values			L_w in dB/Oct. (re 1pW)						Lp values		
	velocity	air volume			min. Δ p_s	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR
	m/s	l/s	CFM	m^3/h	Pa	dB									dB									dB								
100	2	15	31	53	2	45	48	45	43	40	29	21	--	--	26	23	26	27	30	28	--	--	--	21	-	-	-	-	-	--	--	--
	4	29	62	106	7	51	53	51	48	45	35	27	20	23	33	30	33	34	37	35	--	--	--	28	22	18	-	-	18	--	--	--
	6	44	94	160	17	55	57	54	52	49	40	30	25	27	37	34	37	38	41	39	21	--	--	32	26	22	20	20	22	--	--	--
	8	59	125	213	30	58	60	57	55	53	44	33	28	30	40	37	40	41	44	42	24	--	22	35	29	25	23	23	25	--	--	--
	10	74	156	266	47	60	63	60	57	56	47	36	31	33	42	39	42	43	46	44	26	22	24	38	32	28	25	25	27	--	--	--
	12	89	188	320	68	62	65	63	60	58	50	38	34	36	44	41	44	45	48	46	28	24	26	39	33	29	27	27	29	--	--	--
125	2	23	49	84	2	43	47	46	43	40	33	20	--	--	35	31	31	28	30	24	--	--	--	22	17	-	-	-	-	--	--	--
	4	47	99	168	7	50	53	51	49	45	38	26	--	23	41	38	38	35	37	31	20	--	--	29	24	21	18	-	19	--	--	--
	6	70	149	253	16	54	57	55	53	48	41	30	25	27	45	42	42	39	41	35	24	--	--	33	28	25	22	21	23	--	--	--
	8	94	198	337	28	58	60	58	56	51	45	34	28	31	48	45	45	42	44	38	27	--	22	36	31	28	25	24	26	--	--	--
	10	117	248	421	44	61	63	61	58	54	48	36	32	34	50	47	47	44	46	40	29	22	24	39	34	31	27	26	28	--	--	--
	12	140	296	504	63	63	66	64	61	57	51	39	35	36	52	49	49	46	48	42	31	24	26	40	35	32	29	28	30	--	--	--
160	2	39	82	139	2	42	47	46	44	43	40	20	--	--	35	31	31	28	30	24	--	--	--	24	19	18	-	-	-	--	--	--
	4	78	164	279	7	50	53	52	50	47	43	26	--	22	41	38	38	35	37	31	20	--	--	31	26	25	20	18	20	--	--	--
	6	116	246	418	15	55	57	55	54	50	46	30	24	27	45	42	42	39	41	35	24	--	--	35	30	29	24	22	24	--	--	--
	8	155	328	558	26	59	60	59	57	53	48	34	28	30	48	45	45	42	44	38	27	--	22	38	33	32	27	25	27	--	--	--
	10	194	410	697	41	62	63	61	59	55	50	37	31	33	50	47	47	44	46	40	29	22	24	40	35	34	29	27	29	--	--	--
	12	232	491	835	59	65	66	64	62	57	52	39	34	36	52	49	49	46	48	42	31	24	26	42	37	36	31	29	31	--	--	--
200	2	61	129	219	2	43	38	41	39	36	30	--	--	--	36	31	31	29	30	24	--	--	--	25	21	20	-	-	-	--	--	--
	4	122	258	439	6	52	49	50	47	43	37	24	--	--	43	38	38	36	37	31	21	--	--	32	28	27	22	19	21	--	--	--
	6	183	387	658	14	57	55	56	51	47	42	30	22	24	47	42	42	40	41	35	25	--	--	36	32	31	26	23	25	--	--	--
	8	244	516	878	25	61	59	60	55	51	45	34	27	29	50	45	45	43	44	38	28	--	22	39	35	34	29	26	28	--	--	--
	10	305	645	1097	39	64	63	63	58	54	48	38	31	33	52	47	47	45	46	40	30	22	24	41	37	36	31	29	30	--	--	--
	12	366	775	1318	56	67	66	66	60	56	51	40	35	37	54	49	49	47	48	42	32	24	26	43	39	38	33	30	32	20	--	--
250	2	96	203	345	1	44	47	46	44	41	37	21	--	--	36	31	31	29	30	24	--	--	--	25	20	20	-	-	-	--	--	--
	4	192	406	690	6	53	55	54	50	46	42	29	23	25	43	38	38	36	37	31	21	--	--	32	27	27	22	20	21	--	--	--
	6	288	609	1035	13	59	60	59	54	50	46	34	28	31	47	42	42	40	41	35	25	--	--	36	31	31	26	24	25	--	--	--
	8	383	812	1380	23	63	64	62	57	53	48	38	33	34	50	45	45	43	44	38	28	--	22	39	34	34	29	27	28	--	--	--
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	12	575	1218	2070	52	69	70	68	62	57	53	43	39	40	54	49	49	47	48	42	32	24	26	43	38	38	33	31	32	20	--	--
315	2	153	324	550	1	45	50	45	46	45	40	23	--	--	37	31	31	29	30	25	--	--	--	27	24	24	19	-	-	--	--	--
	4	306	648	1101	5	54	56	52	52	50	44	29	23	26	43	37	38	36	36	32	21	--	--	34	31	31	26	22	23	--	--	--
	6	459	971	1651	12	60	60	57	56	53	48	34	28	30	47	41	42	40	40	36	25	--	--	38	35	35	30	26	27	--	--	--
	8	612	1295	2202	22	65	64	61	59	56	51	38	32	34	50	44	44	43	43	39	27	--	21	41	38	38	33	29	30	--	--	--
	10	764	1619	2752	34	69	67	64	62	59	54	41	36	37	52	46	47	45	45	41	30	21	23	44	40	40	35	31	32	22	--	--
	12	917	1942	3301	49	72	69	67	65	61	57	44	40	40	54	48	48	47	47	43	31	23	25	45	42	42	37	33	34	24	--	--
355	2	195	412	701	1	45	57	50	51	47	47	29	24	27	37	31	31	30	30	26	--	--	--	28	25	25	20	-	-	--	--	--
	4	389	824	1401	5	55	61	56	55	50	49	33	29	31	44	38	38	37	37	33	21	--	--	35	32	32	27	22	24	--	--	--
	6	584	1236	2102	12	61	64	60	58	52	51	37	32	34	48	42	42	41	41	37	25	--	--	39	36	36	31	26	28	--	--	--
	8	779	1649	2803	21	66	66	63	61	55	54	40	35	37	50	45	45	44	44	40	28	--	22	42	39	39	34	29	31	20	--	--
	10	973	2061	3503	33	70	69	66	64	57	56	43	38	39	53	47	47	46	46	42	30	22	24	44	41	41	36	32	33	22	--	--
	12	1168	2473	4205	47	73	71	69	66	59	59	46	42	42	54	49	49	48	48	44	32	24	26	46	43	43	38	33	35	24	--	--
400	2	248	524	891	1	46	59	51	52	49	45	30	27	29	37	31	30	30	30	26	--	--	--	28	25	25	21	-	17	--	--	--
	4	495	1049	1783	5	56	63	57	56	52	47	35	31	33	44	37	37	37	36	33	21	--	--	35	32	32	28	23	24	--	--	--
	6	743	1573	2674	11	62	66	61	59	54	49	38	35	36	48	41	41	41	40	37	25	--	--	39	36	36	32	27	28	--	--	--
	8	990	2097	3565	20	67	68	64	62	57	52	41	38	39	50	44	44	43	43	39	27	--	21	42	39	39	35	30	31	21	--	--
	10	1238	2621	4456	32	71	71	67	65	59	54	44	40	42	53	46	46	46	45	42	30	21	23	45	42	42	37	32	33	23	--	--
	12	1485	3145	5346	46	74	73	70	67	61	57	47	43	44	54	48	48	47	47	43	31	23	25	46	43	43	39	34	35	25	--	--

1. Sound data is determined in a reverberation room at an independent sound laboratory, according to ISO 3741 and ISO 5135 standards.
2. Lw in dB/Oct. (re 1pW) are sound power levels for discharge sound and case radiated sound. Figures less than 17 dB are indicated by "-".
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.
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5. Lp values are including a room absorption of 10 dB/Oct.
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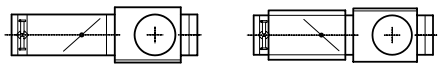
7. ∆ps is static pressure drop across VAV air volume control terminal with damper fully open.
8. For non standard applications and/or selections, please contatct our technical staff.

Table 1: 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

Sound data

Type NAOCOOB (single wall)
NBOCOOB (double wall)



Sound data ∆ p = 125 Pa

Model	velocity	air volume			min. Δ p_s	Δ p = 125 Pa																										
	data refering to inlet spigot					discharge sound									radiated sound single wall									radiated sound double wall								
						L_w in dB/Oct. (re 1pW)						Lp values			L_w in dB/Oct. (re 1pW)						Lp values			L_w in dB/Oct. (re 1pW)						Lp values		
						125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR
	m/s	l/s	CFM	m^3/h	Pa	dB									dB									dB								
100	2	15	31	53	2	34	32	22	18	-	-	--	--	--	19	-	19	20	23	21	--	--	--	-	-	-	-	-	-	--	--	--
	4	29	62	106	10	40	38	28	24	18	-	--	--	--	26	23	26	27	30	28	--	--	--	22	-	-	-	-	-	--	--	--
	6	44	94	160	22	44	43	33	28	22	-	--	--	--	30	27	30	31	34	32	--	--	--	26	20	-	-	-	18	--	--	--
	8	59	125	213	38	48	46	36	32	27	-	--	--	--	33	30	33	34	37	35	--	--	--	29	23	19	19	19	21	--	--	--
	10	74	156	266	60	50	49	40	35	30	19	23	--	--	35	32	35	36	39	37	--	--	--	32	26	22	21	21	23	--	--	--
	12	89	188	320	86	53	52	43	38	34	23	25	--	21	37	34	37	38	41	39	21	--	--	33	27	23	23	23	25	--	--	--
125	2	23	49	84	2	31	31	22	19	-	-	--	--	--	28	24	25	22	23	17	--	--	--	-	-	-	-	-	-	--	--	--
	4	47	99	168	7	38	37	28	25	18	-	--	--	--	35	31	32	29	30	24	--	--	--	23	18	-	-	-	-	--	--	--
	6	70	149	253	17	43	42	33	29	22	-	--	--	--	39	35	36	33	34	28	--	--	--	27	22	19	18	-	19	--	--	--
	8	94	198	337	30	47	46	37	33	26	-	--	--	--	42	38	38	35	37	31	21	--	--	30	25	22	21	20	22	--	--	--
	10	117	248	421	46	50	49	41	36	29	20	23	--	--	44	40	41	38	39	33	23	--	--	33	28	25	23	22	24	--	--	--
	12	140	296	504	67	53	52	44	39	32	24	26	--	22	46	42	42	39	41	35	25	--	--	34	29	26	25	24	26	--	--	--
160	2	39	82	139	2	30	29	22	18	-	-	--	--	--	28	24	25	22	23	18	--	--	--	18	-	-	-	-	-	--	--	--
	4	78	164	279	6	38	36	28	24	19	-	--	--	--	35	31	32	29	30	25	--	--	--	25	20	19	-	-	-	--	--	--
	6	116	246	418	14	43	40	32	29	22	-	--	--	--	39	35	36	33	34	29	--	--	--	29	24	23	20	18	20	--	--	--
	8	155	328	558	26	47	44	36	32	26	18	--	--	--	42	38	38	35	37	31	21	--	--	32	27	26	23	21	23	--	--	--
	10	194	410	697	40	51	48	40	36	29	21	22	--	--	44	40	41	38	39	34	23	--	--	34	29	28	25	23	25	--	--	--
	12	232	491	835	57	54	51	43	39	32	24	26	--	20	46	42	42	39	41	35	25	--	--	36	31	30	27	25	27	--	--	--
200	2	61	129	219	1	30	22	19	-	-	-	--	--	--	29	24	24	23	23	18	--	--	--	19	-	-	-	-	-	--	--	--
	4	122	258	439	6	39	32	28	22	-	-	--	--	--	36	31	31	29	30	25	--	--	--	26	22	21	18	-	-	--	--	--
	6	183	387	658	13	45	39	34	27	20	-	--	--	--	40	35	35	33	34	29	--	--	--	30	26	25	22	20	21	--	--	--
	8	244	516	878	23	49	43	38	31	24	-	--	--	--	43	38	38	36	37	31	21	--	--	33	29	28	25	22	24	--	--	--
	10	305	645	1097	36	52	47	42	34	28	19	23	--	--	45	40	40	38	39	34	23	--	--	35	31	30	27	25	26	--	--	--
	12	366	775	1318	52	55	51	45	37	31	22	27	--	21	47	42	42	40	41	35	25	--	--	37	33	32	29	27	28	--	--	--
250	2	96	203	345	1	32	31	24	19	-	-	--	--	--	29	24	24	23	23	18	--	--	--	19	-	-	-	-	-	--	--	--
	4	192	406	690	5	41	39	32	25	18	-	--	--	--	36	31	31	29	30	25	--	--	--	26	21	21	18	-	-	--	--	--
	6	288	609	1035	11	47	44	37	30	22	-	--	--	--	40	35	35	33	34	29	--	--	--	30	25	25	22	20	21	--	--	--
	8	383	812	1380	19	51	48	41	33	25	19	23	--	--	43	38	38	36	37	31	21	--	--	33	28	28	25	23	24	--	--	--
	10	479	1015	1725	30	54	51	44	36	28	21	26	--	21	45	40	40	38	39	34	23	--	--	35	31	31	27	25	26	--	--	--
	12	575	1218	2070	43	57	54	47	39	31	24	29	22	24	47	42	42	40	41	35	25	--	--	37	32	32	29	27	28	--	--	--
315	2	153	324	550	1	36	37	23	21	-	-	--	--	--	30	24	24	23	23	19	--	--	--	21	18	18	-	-	-	--	--	--
	4	306	648	1101	5	46	44	30	27	21	-	--	--	--	37	31	31	30	30	26	--	--	--	28	25	25	22	18	19	--	--	--
	6	459	971	1651	11	52	49	36	32	26	18	23	--	--	41	35	35	34	34	30	--	--	--	32	29	29	26	22	23	--	--	--
	8	612	1295	2202	19	57	53	40	36	30	22	28	21	23	44	38	38	36	37	32	21	--	--	35	32	32	29	25	26	--	--	--
	10	764	1619	2752	29	61	56	44	39	33	26	32	26	28	46	40	40	39	39	35	23	--	--	38	34	34	31	27	28	--	--	--
	12	917	1942	3301	42	65	59	47	42	37	29	35	31	32	48	42	42	40	41	36	25	--	--	39	36	36	33	29	30	--	--	--
355	2	195	412	701	1	36	44	27	25	18	-	--	--	--	30	24	24	23	23	19	--	--	--	22	19	19	-	-	-	--	--	--
	4	389	824	1401	4	47	48	33	30	21	18	21	--	--	37	31	31	30	30	26	--	--	--	29	26	26	23	18	20	--	--	--
	6	584	1236	2102	10	53	52	38	34	24	21	26	--	21	41	35	35	34	34	30	--	--	--	33	30	30	27	23	24	--	--	--
	8	779	1649	2803	18	58	55	42	37	28	24	30	23	25	44	38	38	37	37	33	21	--	--	36	33	33	30	25	27	--	--	--
	10	973	2061	3503	28	62	58	46	41	31	28	33	28	29	46	40	40	39	39	35	23	--	--	38	35	35	32	28	29	--	--	--
	12	1168	2473	4205	40	66	61	49	44	34	31	37	32	33	48	42	42	41	41	37	25	--	--	40	37	37	34	30	31	--	--	--
400	2	248	524	891	1	37	46	28	26	20	-	--	--	--	30	24	24	23	23	19	--	--	--	22	19	19	-	-	-	--	--	--
	4	495	1049	1783	4	48	50	34	31	23	-	22	--	--	37	31	31	30	30	26	--	--	--	29	26	26	24	19	20	--	--	--
	6	743	1573	2674	9	54	54	39	35	26	19	27	21	23	41	35	35	34	34	30	--	--	--	33	30	30	28	23	24	--	--	--
	8	990	2097	3565	17	59	57	43	38	30	22	31	24	27	44	38	37	37	37	33	21	--	--	36	33	33	31	26	27	--	--	--
	10	1238	2621	4456	26	63	60	47	42	33	26	35	29	30	46	40	40	39	39	35	23	--	--	39	36	36	33	28	29	--	--	--
	12	1485	3145	5346	38	67	63	50	45	36	29	38	34	34	48	42	41	41	41	37	25	--	--	40	37	37	35	30	31	--	--	--

1. Sound data is determined in a reverberation room at an independent sound laboratory, according to ISO 3741 and ISO 5135 standards.
2. Lw in dB/Oct. (re 1pW) are sound power levels for discharge sound and case radiated sound. Figures less than 17 dB are indicated by "-".
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 10 dB/Oct.
6. dB(A), NC and NR index figures are sound pressure levels. Figures less than 20 are indicated by "--".
7. ∆ps is static pressure drop across VAV air volume control terminal with damper fully open.
8. For non standard applications and/or selections, please contatct our technical staff.

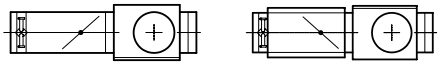
Table 1: Assumptions for additional attenuation

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

Table 2: Insertion Loss

Model	125	250	500	1k	2k	4k	Hz
100	9	10	11	13	15	15	dB
125	8	9	10	12	14	14	dB
160	8	9	10	12	14	14	dB
200	7	8	9	11	13	13	dB
250	7	8	9	11	13	13	dB
315	7	8	9	11	13	13	dB
355	7	8	9	11	13	13	dB
400	7	8	9	11	13	13	dB

Type NAOCOOB (single wall)
NBOCOOB (double wall)



Sound data ∆ p = 250 Pa

Model	data refering to inlet spigot					Δ p = 250 Pa																										
						discharge sound									radiated sound single wall									radiated sound double wall								
						L_w in dB/Oct. (re 1pW)						Lp values			L_w in dB/Oct. (re 1pW)						Lp values			L_w in dB/Oct. (re 1pW)						Lp values		
	velocity	air volume			min. Δ p_s	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR
	m/s	l/s	CFM	m^3/h	Pa	dB									dB									dB								
100	2	15	31	53	2	36	36	27	23	18	-	--	--	--	26	23	26	27	30	28	--	--	--	21	-	-	-	-	-	--	--	--
	4	29	62	106	10	42	41	33	28	23	-	--	--	--	33	30	33	34	37	35	--	--	--	28	22	18	-	-	18	--	--	--
	6	44	94	160	22	46	45	36	32	27	-	--	--	--	37	34	37	38	41	39	21	--	--	32	26	22	20	20	22	--	--	--
	8	59	125	213	38	49	48	39	35	31	20	22	--	--	40	37	40	41	44	42	24	--	22	35	29	25	23	23	25	--	--	--
	10	74	156	266	60	51	51	42	37	34	23	24	--	20	42	39	42	43	46	44	26	22	24	38	32	28	25	25	27	--	--	--
	12	89	188	320	86	53	53	45	40	36	26	27	--	23	44	41	44	45	48	46	28	24	26	39	33	29	27	27	29	--	--	--
125	2	23	49	84	2	34	35	28	23	18	-	--	--	--	35	31	31	28	30	24	--	--	--	22	17	-	-	-	-	--	--	--
	4	47	99	168	7	41	41	33	29	23	-	--	--	--	41	38	38	35	37	31	20	--	--	29	24	21	18	-	19	--	--	--
	6	70	149	253	17	45	45	37	33	26	17	--	--	--	45	42	42	39	41	35	24	--	--	33	28	25	22	21	23	--	--	--
	8	94	198	337	30	49	48	40	36	29	21	22	--	--	48	45	45	42	44	38	27	--	22	36	31	28	25	24	26	--	--	--
	10	117	248	421	46	52	51	43	38	32	24	25	--	21	50	47	47	44	46	40	29	22	24	39	34	31	27	26	28	--	--	--
	12	140	296	504	67	54	54	46	41	35	27	27	21	24	52	49	49	46	48	42	31	24	26	40	35	32	29	28	30	--	--	--
160	2	39	82	139	2	33	35	28	24	21	-	--	--	--	35	31	31	28	30	24	--	--	--	24	19	18	-	-	-	--	--	--
	4	78	164	279	6	41	41	34	30	25	19	--	--	--	41	38	38	35	37	31	20	--	--	31	26	25	20	18	20	--	--	--
	6	116	246	418	14	46	45	37	34	28	22	--	--	--	45	42	42	39	41	35	24	--	--	35	30	29	24	22	24	--	--	--
	8	155	328	558	26	50	48	41	37	31	24	22	--	--	48	45	45	42	44	38	27	--	22	38	33	32	27	25	27	--	--	--
	10	194	410	697	40	53	51	43	39	33	26	25	--	20	50	47	47	44	46	40	29	22	24	40	35	34	29	27	29	--	--	--
	12	232	491	835	57	56	54	46	42	35	28	28	20	23	52	49	49	46	48	42	31	24	26	42	37	36	31	29	31	--	--	--
200	2	61	129	219	1	34	26	23	19	-	-	--	--	--	36	31	31	29	30	24	--	--	--	25	21	20	-	-	-	--	--	--
	4	122	258	439	6	43	37	32	27	21	-	--	--	--	43	38	38	36	37	31	21	--	--	32	28	27	22	19	21	--	--	--
	6	183	387	658	13	48	43	38	31	25	18	--	--	--	47	42	42	40	41	35	25	--	--	36	32	31	26	23	25	--	--	--
	8	244	516	878	23	52	47	42	35	29	21	23	--	--	50	45	45	43	44	38	28	--	22	39	35	34	29	26	28	--	--	--
	10	305	645	1097	36	55	51	45	38	32	24	26	--	21	52	47	47	45	46	40	30	22	24	41	37	36	31	29	30	--	--	--
	12	366	775	1318	52	58	54	48	40	34	27	29	23	24	54	49	49	47	48	42	32	24	26	43	39	38	33	30	32	20	--	--
250	2	96	203	345	1	35	35	28	24	19	-	--	--	--	36	31	31	29	30	24	--	--	--	25	20	20	-	-	-	--	--	--
	4	192	406	690	5	44	43	36	30	24	18	--	--	--	43	38	38	36	37	31	21	--	--	32	27	27	22	20	21	--	--	--
	6	288	609	1035	11	50	48	41	34	28	22	22	--	--	47	42	42	40	41	35	25	--	--	36	31	31	26	24	25	--	--	--
	8	383	812	1380	19	54	52	44	37	31	24	26	--	22	50	45	45	43	44	38	28	--	22	39	34	34	29	27	28	--	--	--
	10	479	1015	1725	30	57	55	47	40	33	27	29	22	25	52	47	47	45	46	40	30	22	24	41	37	37	31	29	30	--	--	--
	12	575	1218	2070	43	60	58	50	42	35	29	32	25	28	54	49	49	47	48	42	32	24	26	43	38	38	33	31	32	20	--	--
315	2	153	324	550	1	39	42	27	26	23	-	--	--	--	37	31	31	29	30	25	--	--	--	27	24	24	19	-	-	--	--	--
	4	306	648	1101	5	48	48	34	32	28	20	21	--	--	43	37	38	36	36	32	21	--	--	34	31	31	26	22	23	--	--	--
	6	459	971	1651	11	54	52	39	36	31	24	26	--	22	47	41	42	40	40	36	25	--	--	38	35	35	30	26	27	--	--	--
	8	612	1295	2202	19	59	56	43	39	34	27	30	24	26	50	44	44	43	43	39	27	--	21	41	38	38	33	29	30	--	--	--
	10	764	1619	2752	29	63	59	46	42	37	30	34	28	29	52	46	47	45	45	41	30	21	23	44	40	40	35	31	32	22	--	--
	12	917	1942	3301	42	66	61	49	45	39	33	37	32	33	54	48	48	47	47	43	31	23	25	45	42	42	37	33	34	24	--	--
355	2	195	412	701	1	39	49	32	31	25	23	20	--	--	37	31	31	30	30	26	--	--	--	28	25	25	20	-	-	--	--	--
	4	389	824	1401	4	49	53	38	35	28	25	25	--	22	44	38	38	37	37	33	21	--	--	35	32	32	27	22	24	--	--	--
	6	584	1236	2102	10	55	56	42	38	30	27	29	23	26	48	42	42	41	41	37	25	--	--	39	36	36	31	26	28	--	--	--
	8	779	1649	2803	18	60	58	45	41	33	30	32	26	28	50	45	45	44	44	40	28	--	22	42	39	39	34	29	31	20	--	--
	10	973	2061	3503	28	64	61	48	44	35	32	35	30	31	53	47	47	46	46	42	30	22	24	44	41	41	36	32	33	22	--	--
	12	1168	2473	4205	40	67	63	51	46	37	35	38	34	35	54	49	49	48	48	44	32	24	26	46	43	43	38	33	35	24	--	--
400	2	248	524	891	1	40	51	33	32	27	21	22	--	20	37	31	30	30	30	26	--	--	--	28	25	25	21	-	17	--	--	--
	4	495	1049	1783	4	50	55	39	36	30	23	27	22	25	44	37	37	37	36	33	21	--	--	35	32	32	28	23	24	--	--	--
	6	743	1573	2674	9	56	58	43	39	32	25	30	25	28	48	41	41	41	40	37	25	--	--	39	36	36	32	27	28	--	--	--
	8	990	2097	3565	17	61	60	46	42	35	28	34	28	30	50	44	44	43	43	39	27	--	21	42	39	39	35	30	31	21	--	--
	10	1238	2621	4456	26	65	63	49	45	37	30	37	31	33	53	46	46	46	45	42	30	21	23	45	42	42	37	32	33	23	--	--
	12	1485	3145	5346	38	68	65	52	47	39	33	40	35	36	54	48	48	47	47	43	31	23	25	46	43	43	39	34	35	25	--	--

1. Sound data is determined in a reverberation room at an independent sound laboratory, according to ISO 3741 and ISO 5135 standards.
2. Lw in dB/Oct. (re 1pW) are sound power levels for discharge sound and case radiated sound. Figures less than 17 dB are indicated by "-".
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.
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6. dB(A), NC and NR index figures are sound pressure levels. Figures less than 20 are indicated by "--".
7. ∆ps is static pressure drop across VAV air volume control terminal with damper fully open.
8. For non standard applications and/or selections, please contatct our technical staff.

Table 1: 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

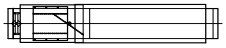
Table 2: Insertion Loss

Model	125	250	500	1k	2k	4k	Hz
100	9	10	11	13	15	15	dB
125	8	9	10	12	14	14	dB
160	8	9	10	12	14	14	dB
200	7	8	9	11	13	13	dB
250	7	8	9	11	13	13	dB
315	7	8	9	11	13	13	dB
355	7	8	9	11	13	13	dB
400	7	8	9	11	13	13	dB

Circular VAV-terminals

Sound data

Type NBOEOOB / NBOEORB (double wall)



Sound data ∆ p = 125 Pa

Model	data refering to inlet spigot					Δ p = 125 Pa																	
						discharge sound									radiated sound double wall								
						L_w in dB/Oct. (re 1pW)						Lp values			L_w in dB/Oct. (re 1pW)						Lp values		
	velocity	air volume			min. Δ p_s	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR
	m/s	l/s	CFM	m^3/h	Pa	dB									dB								
100	2	15	31	53	2	32	33	29	18	24	-	--	--	--	-	-	-	-	-	-	--	--	--
	4	29	62	106	7	43	42	35	24	27	-	--	--	--	22	-	-	-	-	-	--	--	--
	6	44	94	160	17	49	48	38	27	29	18	21	--	--	26	20	-	-	-	18	--	--	--
	8	59	125	213	30	53	51	40	30	31	20	25	--	21	29	23	19	19	19	21	--	--	--
	10	74	156	266	47	57	54	42	32	32	22	29	21	24	32	26	22	21	21	23	--	--	--
	12	89	188	320	68	60	56	43	33	33	23	31	24	26	33	27	23	23	23	25	--	--	--
125	2	23	49	84	2	32	37	34	26	27	20	--	--	--	-	-	-	-	-	-	--	--	--
	4	47	99	168	7	42	46	40	32	32	25	--	--	--	23	18	-	-	-	-	--	--	--
	6	70	149	253	16	48	51	44	35	34	27	23	--	20	27	22	19	18	-	19	--	--	--
	8	94	198	337	28	52	54	46	37	36	29	27	21	24	30	25	22	21	20	22	--	--	--
	10	117	248	421	44	55	57	48	39	37	30	30	25	27	33	28	25	23	22	24	--	--	--
	12	140	296	504	63	58	60	50	41	39	32	32	27	30	34	29	26	25	24	26	--	--	--
160	2	39	82	139	2	36	39	35	32	28	28	--	--	--	18	-	-	-	-	-	--	--	--
	4	78	164	279	7	45	47	42	37	34	32	--	--	--	25	20	19	-	-	-	--	--	--
	6	116	246	418	15	51	52	45	41	37	35	25	--	21	29	24	23	20	18	20	--	--	--
	8	155	328	558	26	54	55	48	43	39	37	28	22	25	32	27	26	23	21	23	--	--	--
	10	194	410	697	41	57	58	50	45	40	38	31	25	28	34	29	28	25	23	25	--	--	--
	12	232	491	835	59	60	60	52	46	42	39	33	28	30	36	31	30	27	25	27	--	--	--
200	2	61	129	219	2	38	36	37	35	28	29	--	--	--	19	-	-	-	-	-	--	--	--
	4	122	258	439	6	47	44	44	40	34	33	--	--	--	26	22	21	18	-	-	--	--	--
	6	183	387	658	14	52	49	48	43	37	36	24	--	--	30	26	25	22	20	21	--	--	--
	8	244	516	878	25	56	52	51	46	40	38	28	--	22	33	29	28	25	22	24	--	--	--
	10	305	645	1097	39	58	55	53	47	42	39	30	23	25	35	31	30	27	25	26	--	--	--
	12	366	775	1318	56	61	57	55	49	43	40	32	26	27	37	33	32	29	27	28	--	--	--
250	2	96	203	345	1	40	41	42	36	31	31	--	--	--	19	-	-	-	-	-	--	--	--
	4	192	406	690	6	49	49	48	41	36	35	23	--	--	26	21	21	18	-	-	--	--	--
	6	288	609	1035	13	55	53	52	44	39	37	28	--	22	30	25	25	22	20	21	--	--	--
	8	383	812	1380	23	59	56	55	47	41	39	31	23	25	33	28	28	25	23	24	--	--	--
	10	479	1015	1725	36	62	58	58	48	43	40	33	27	28	35	31	31	27	25	26	--	--	--
	12	575	1218	2070	52	64	60	59	50	44	41	36	30	31	37	32	32	29	27	28	--	--	--
315	2	153	324	550	1	42	44	41	42	42	37	--	--	--	21	18	18	-	-	-	--	--	--
	4	306	648	1101	5	52	51	47	46	46	40	25	--	21	28	25	25	22	18	19	--	--	--
	6	459	971	1651	12	58	56	51	49	48	41	30	23	25	32	29	29	26	22	23	--	--	--
	8	612	1295	2202	22	62	59	54	51	49	42	34	28	29	35	32	32	29	25	26	--	--	--
	10	764	1619	2752	34	65	61	56	52	50	43	37	32	33	38	34	34	31	27	28	--	--	--
	12	917	1942	3301	49	68	63	57	53	51	44	39	35	36	39	36	36	33	29	30	--	--	--
355	2	195	412	701	1	43	47	46	47	43	44	20	--	--	22	19	19	-	-	-	--	--	--
	4	389	824	1401	5	54	54	52	50	45	46	28	21	24	29	26	26	23	18	20	--	--	--
	6	584	1236	2102	12	60	59	56	52	47	47	33	26	29	33	30	30	27	23	24	--	--	--
	8	779	1649	2803	21	64	62	58	54	48	47	36	30	32	36	33	33	30	25	27	--	--	--
	10	973	2061	3503	33	67	64	60	55	48	48	39	34	35	38	35	35	32	28	29	--	--	--
	12	1168	2473	4205	47	70	66	62	56	49	48	42	38	38	40	37	37	34	30	31	--	--	--
400	2	248	524	891	1	43	48	48	49	46	42	22	--	--	22	19	19	-	-	-	--	--	--
	4	495	1049	1783	5	54	56	54	52	48	43	29	24	26	29	26	26	24	19	20	--	--	--
	6	743	1573	2674	11	60	61	57	54	48	43	34	29	31	33	30	30	28	23	24	--	--	--
	8	990	2097	3565	20	65	64	59	55	49	44	38	33	35	36	33	33	31	26	27	--	--	--
	10	1238	2621	4456	32	68	67	61	56	50	44	41	36	37	39	36	36	33	28	29	--	--	--
	12	1485	3145	5346	46	71	69	63	56	50	44	43	39	40	40	37	37	35	30	31	--	--	--

1. Sound data is determined in a reverberation room at an independent sound laboratory, according to ISO 3741 and ISO 5135 standards.
2. Lw in dB/Oct. (re 1pW) are sound power levels for discharge sound and case radiated sound. Figures less than 17 dB are indicated by "-".
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 10 dB/Oct.
6. dB(A), NC and NR index figures are sound pressure levels. Figures less than 20 are indicated by "--".
7. ∆ps is static pressure drop across VAV air volume control terminal with damper fully open.
8. For non standard applications and/or selections, please contatct our technical staff.

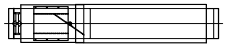
Table 1: Assumptions for additional attenuation

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

Table 2: Insertion Loss

Model	125	250	500	1k	2k	4k	Hz
100	9	10	11	13	15	15	dB
125	8	9	10	12	14	14	dB
160	8	9	10	12	14	14	dB
200	7	8	9	11	13	13	dB
250	7	8	9	11	13	13	dB
315	7	8	9	11	13	13	dB
355	7	8	9	11	13	13	dB
400	7	8	9	11	13	13	dB

Type NBOEOOB / NBOEORB (double wall)



Sound data ∆ p = 250 Pa

Model	data refering to inlet spigot				min. Δ p_s	Δ p = 250 Pa																	
						discharge sound									radiated sound double wall								
						L_w in dB/Oct. (re 1pW)						Lp values			L_w in dB/Oct. (re 1pW)						Lp values		
	velocity	air volume				125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR
	m/s	l/s	CFM	m^3/h	Pa	dB									dB								
100	2	15	31	53	2	32	36	35	24	29	20	--	--	--	21	-	-	-	-	-	--	--	--
	4	29	62	106	7	43	45	40	30	32	25	--	--	--	28	22	18	-	-	18	--	--	--
	6	44	94	160	17	49	50	44	33	34	27	23	--	--	32	26	22	20	20	22	--	--	--
	8	59	125	213	30	54	54	46	36	36	29	27	20	23	35	29	25	23	23	25	--	--	--
	10	74	156	266	47	57	56	48	37	37	31	30	24	26	38	32	28	25	25	27	--	--	--
	12	89	188	320	68	60	59	49	39	38	32	33	27	29	39	33	29	27	27	29	--	--	--
125	2	23	49	84	2	33	40	40	31	32	28	--	--	--	22	17	-	-	-	-	--	--	--
	4	47	99	168	7	43	48	46	37	36	32	21	--	--	29	24	21	18	-	19	--	--	--
	6	70	149	253	16	49	54	49	40	39	35	26	20	23	33	28	25	22	21	23	--	--	--
	8	94	198	337	28	53	57	51	43	41	37	29	25	27	36	31	28	25	24	26	--	--	--
	10	117	248	421	44	56	60	53	44	42	38	32	28	30	39	34	31	27	26	28	--	--	--
	12	140	296	504	63	59	62	55	46	43	39	35	30	33	40	35	32	29	28	30	--	--	--
160	2	39	82	139	2	38	42	40	36	33	34	--	--	--	24	19	18	-	-	-	--	--	--
	4	78	164	279	7	47	50	46	42	38	39	23	--	--	31	26	25	20	18	20	--	--	--
	6	116	246	418	15	52	55	50	45	41	41	28	22	24	35	30	29	24	22	24	--	--	--
	8	155	328	558	26	56	58	53	47	43	43	31	26	28	38	33	32	27	25	27	--	--	--
	10	194	410	697	41	59	61	55	49	45	44	34	29	31	40	35	34	29	27	29	--	--	--
	12	232	491	835	59	62	63	56	51	46	46	36	31	33	42	37	36	31	29	31	--	--	--
200	2	61	129	219	2	41	40	41	39	32	34	--	--	--	25	21	20	-	-	-	--	--	--
	4	122	258	439	6	50	48	48	44	38	38	23	--	--	32	28	27	22	19	21	--	--	--
	6	183	387	658	14	55	52	52	47	41	41	27	--	22	36	32	31	26	23	25	--	--	--
	8	244	516	878	25	58	56	55	50	44	43	31	23	26	39	35	34	29	26	28	--	--	--
	10	305	645	1097	39	61	58	57	51	46	44	33	26	28	41	37	36	31	29	30	--	--	--
	12	366	775	1318	56	63	60	59	53	47	45	35	29	31	43	39	38	33	30	32	20	--	--
250	2	96	203	345	1	42	46	46	41	35	36	--	--	--	25	20	20	-	-	-	--	--	--
	4	192	406	690	6	52	53	53	46	41	40	27	20	23	32	27	27	22	20	21	--	--	--
	6	288	609	1035	13	57	57	57	49	43	43	31	25	27	36	31	31	26	24	25	--	--	--
	8	383	812	1380	23	61	60	60	52	46	44	34	28	31	39	34	34	29	27	28	--	--	--
	10	479	1015	1725	36	64	63	62	53	47	45	37	31	33	41	37	37	31	29	30	--	--	--
	12	575	1218	2070	52	66	64	64	55	49	46	39	33	35	43	38	38	33	31	32	20	--	--
315	2	153	324	550	1	44	47	45	47	47	42	21	--	--	27	24	24	19	-	-	--	--	--
	4	306	648	1101	5	54	55	51	51	50	45	28	22	25	34	31	31	26	22	23	--	--	--
	6	459	971	1651	12	60	59	55	54	52	46	33	27	29	38	35	35	30	26	27	--	--	--
	8	612	1295	2202	22	64	62	58	55	54	47	36	31	33	41	38	38	33	29	30	--	--	--
	10	764	1619	2752	34	67	65	60	57	55	48	39	34	35	44	40	40	35	31	32	22	--	--
	12	917	1942	3301	49	70	67	61	58	55	49	41	37	37	45	42	42	37	33	34	24	--	--
355	2	195	412	701	1	44	50	50	51	47	49	24	--	--	28	25	25	20	-	-	--	--	--
	4	389	824	1401	5	55	57	56	55	50	51	31	25	27	35	32	32	27	22	24	--	--	--
	6	584	1236	2102	12	61	62	59	57	51	52	35	30	32	39	36	36	31	26	28	--	--	--
	8	779	1649	2803	21	65	65	62	58	52	53	39	34	35	42	39	39	34	29	31	20	--	--
	10	973	2061	3503	33	69	67	64	59	53	53	41	36	38	44	41	41	36	32	33	22	--	--
	12	1168	2473	4205	47	71	69	65	60	53	54	44	39	40	46	43	43	38	33	35	24	--	--
400	2	248	524	891	1	44	51	52	53	50	47	25	--	20	28	25	25	21	-	17	--	--	--
	4	495	1049	1783	5	55	59	57	56	52	48	32	26	29	35	32	32	28	23	24	--	--	--
	6	743	1573	2674	11	61	63	61	58	53	48	36	32	33	39	36	36	32	27	28	--	--	--
	8	990	2097	3565	20	66	66	63	59	54	49	40	35	37	42	39	39	35	30	31	21	--	--
	10	1238	2621	4456	32	69	69	65	60	54	49	43	38	40	45	42	42	37	32	33	23	--	--
	12	1485	3145	5346	46	72	71	66	61	55	49	45	41	42	46	43	43	39	34	35	25	--	--

1. Sound data is determined in a reverberation room at an independent sound laboratory, according to ISO 3741 and ISO 5135 standards.
2. Lw in dB/Oct. (re 1pW) are sound power levels for discharge sound and case radiated sound. Figures less than 17 dB are indicated by "-".
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 10 dB/Oct.
6. dB(A), NC and NR index figures are sound pressure levels. Figures less than 20 are indicated by "--".
7. ∆ps is static pressure drop across VAV air volume control terminal with damper fully open.
8. For non standard applications and/or selections, please contatct our technical staff.

Table 1: 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

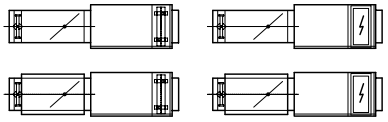
Table 2: Insertion Loss

Model	125	250	500	1k	2k	4k	Hz
100	9	10	11	13	15	15	dB
125	8	9	10	12	14	14	dB
160	8	9	10	12	14	14	dB
200	7	8	9	11	13	13	dB
250	7	8	9	11	13	13	dB
315	7	8	9	11	13	13	dB
355	7	8	9	11	13	13	dB
400	7	8	9	11	13	13	dB

Circular VAV-terminals

Sound data

Type NAOG.OB NAOH.OB NAON.OB (single wall)
NBOG.OB NBOH.OB NBON.OB (double wall)



Sound data ∆ p = 125 Pa

Model	data refering to inlet spigot					Δ p = 125 Pa																							
						discharge sound									radiated sound single wall									radiated sound double wall								
						L_w in dB/Oct. (re 1pW)						Lp values			L_w in dB/Oct. (re 1pW)						Lp values			L_w in dB/Oct. (re 1pW)						Lp values		
	velocity	air volume			min. Δ p_s	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR
	m/s	l/s	CFM	m^3/h	Pa	dB									dB									dB								
100	2	15	31	53	3	38	37	28	26	21	-	--	--	--	19	-	19	20	23	21	--	--	--	-	-	-	-	-	-	--	--	--
	4	29	62	106	11	44	43	34	31	27	-	--	--	--	26	23	26	27	30	28	--	--	--	22	-	-	-	-	-	--	--	--
	6	44	94	160	24	48	47	38	35	32	20	20	--	--	30	27	30	31	34	32	--	--	--	26	20	-	-	-	18	--	--	--
	8	59	125	213	43	51	50	41	38	35	24	23	--	--	33	30	33	34	37	35	--	--	--	29	23	19	19	19	21	--	--	--
	10	74	156	266	67	53	53	44	42	39	28	26	--	22	35	32	35	36	39	37	--	--	--	32	26	22	21	21	23	--	--	--
	12	89	188	320	96	55	55	47	44	42	32	28	22	25	37	34	37	38	41	39	21	--	--	33	27	23	23	23	25	--	--	--
125	2	23	49	84	3	35	35	28	27	22	-	--	--	--	28	24	25	22	23	17	--	--	--	-	-	-	-	-	-	--	--	--
	4	47	99	168	10	42	42	34	32	27	-	--	--	--	35	31	32	29	30	24	--	--	--	23	18	-	-	-	-	--	--	--
	6	70	149	253	23	46	46	38	36	31	21	--	--	--	39	35	36	33	34	28	--	--	--	27	22	19	18	-	19	--	--	--
	8	94	198	337	40	50	50	42	40	35	25	23	--	--	42	38	38	35	37	31	21	--	--	30	25	22	21	20	22	--	--	--
	10	117	248	421	63	53	53	45	43	38	29	26	--	22	44	40	41	38	39	33	23	--	--	33	28	25	23	22	24	--	--	--
	12	140	296	504	91	55	55	48	45	41	32	29	23	25	46	42	42	39	41	35	25	--	--	34	29	26	25	24	26	--	--	--
160	2	39	82	139	2	34	34	28	26	24	18	--	--	--	28	24	25	22	23	18	--	--	--	18	-	-	-	-	-	--	--	--
	4	78	164	279	9	41	40	33	32	28	21	--	--	--	35	31	32	29	30	25	--	--	--	25	20	19	-	-	-	--	--	--
	6	116	246	418	21	46	45	37	36	32	24	--	--	--	39	35	36	33	34	29	--	--	--	29	24	23	20	18	20	--	--	--
	8	155	328	558	38	50	48	41	39	35	27	22	--	--	42	38	38	35	37	31	21	--	--	32	27	26	23	21	23	--	--	--
	10	194	410	697	59	53	51	44	42	37	30	25	--	21	44	40	41	38	39	34	23	--	--	34	29	28	25	23	25	--	--	--
	12	232	491	835	85	56	54	47	45	40	33	28	21	24	46	42	42	39	41	35	25	--	--	36	31	30	27	25	27	--	--	--
200	2	61	129	219	2	34	27	25	22	18	-	--	--	--	29	24	24	23	23	18	--	--	--	19	-	-	-	-	-	--	--	--
	4	122	258	439	9	43	37	34	30	25	-	--	--	--	36	31	31	29	30	25	--	--	--	26	22	21	18	-	-	--	--	--
	6	183	387	658	21	48	43	39	34	29	21	--	--	--	40	35	35	33	34	29	--	--	--	30	26	25	22	20	21	--	--	--
	8	244	516	878	38	52	47	43	38	33	24	23	--	--	43	38	38	36	37	31	21	--	--	33	29	28	25	22	24	--	--	--
	10	305	645	1097	59	55	51	46	40	36	27	26	--	20	45	40	40	38	39	34	23	--	--	35	31	30	27	25	26	--	--	--
	12	366	775	1318	85	57	54	49	43	38	30	29	22	23	47	42	42	40	41	35	25	--	--	37	33	32	29	27	28	--	--	--
250	2	96	203	345	2	36	36	29	27	22	-	--	--	--	29	24	24	23	23	18	--	--	--	19	-	-	-	-	-	--	--	--
	4	192	406	690	9	44	43	37	33	28	21	--	--	--	36	31	31	29	30	25	--	--	--	26	21	21	18	-	-	--	--	--
	6	288	609	1035	21	50	48	42	37	31	24	22	--	--	40	35	35	33	34	29	--	--	--	30	25	25	22	20	21	--	--	--
	8	383	812	1380	38	53	52	45	40	34	27	26	--	21	43	38	38	36	37	31	21	--	--	33	28	28	25	23	24	--	--	--
	10	479	1015	1725	59	57	55	48	42	37	30	29	22	24	45	40	40	38	39	34	23	--	--	35	31	31	27	25	26	--	--	--
	12	575	1218	2070	85	59	57	51	45	39	32	32	25	27	47	42	42	40	41	35	25	--	--	37	32	32	29	27	28	--	--	--
315	2	153	324	550	2	40	42	29	29	26	18	--	--	--	30	24	24	23	23	19	--	--	--	21	18	18	-	-	-	--	--	--
	4	306	648	1101	9	49	48	36	34	31	23	22	--	--	37	31	31	30	30	26	--	--	--	28	25	25	22	18	19	--	--	--
	6	459	971	1651	21	55	53	41	39	35	27	27	--	22	41	35	35	34	34	30	--	--	--	32	29	29	26	22	23	--	--	--
	8	612	1295	2202	38	60	57	45	43	39	31	31	25	26	44	38	38	36	37	32	21	--	--	35	32	32	29	25	26	--	--	--
	10	764	1619	2752	59	64	60	48	46	42	34	35	30	31	46	40	40	39	39	35	23	--	--	38	34	34	31	27	28	--	--	--
	12	917	1942	3301	85	67	63	52	49	45	38	38	34	35	48	42	42	40	41	36	25	--	--	39	36	36	33	29	30	--	--	--
355	2	195	412	701	2	40	49	33	33	27	24	--	--	--	30	24	24	23	23	19	--	--	--	22	19	19	-	-	-	--	--	--
	4	389	824	1401	9	50	53	39	37	31	27	25	--	22	37	31	31	30	30	26	--	--	--	29	26	26	23	18	20	--	--	--
	6	584	1236	2102	21	56	56	43	41	34	30	29	23	26	41	35	35	34	34	30	--	--	--	33	30	30	27	23	24	--	--	--
	8	779	1649	2803	38	61	59	47	44	37	33	33	27	29	44	38	38	37	37	33	21	--	--	36	33	33	30	25	27	--	--	--
	10	973	2061	3503	59	65	62	50	47	40	36	36	31	32	46	40	40	39	39	35	23	--	--	38	35	35	32	28	29	--	--	--
	12	1168	2473	4205	85	68	64	53	50	43	40	39	35	36	48	42	42	41	41	37	25	--	--	40	37	37	34	30	31	--	--	--
400	2	248	524	891	2	41	51	34	34	29	22	22	--	--	30	24	24	23	23	19	--	--	--	22	19	19	-	-	-	--	--	--
	4	495	1049	1783	9	51	55	40	38	33	25	27	22	24	37	31	31	30	30	26	--	--	--	29	26	26	24	19	20	--	--	--
	6	743	1573	2674	21	57	58	44	42	36	28	31	25	28	41	35	35	34	34	30	--	--	--	33	30	30	28	23	24	--	--	--
	8	990	2097	3565	38	62	61	48	45	39	31	35	29	31	44	38	37	37	37	33	21	--	--	36	33	33	31	26	27	--	--	--
	10	1238	2621	4456	59	66	64	51	48	42	34	38	32	34	46	40	40	39	39	35	23	--	--	39	36	36	33	28	29	--	--	--
	12	1485	3145	5346	85	69	66	54	51	45	38	41	37	37	48	42	41	41	41	37	25	--	--	40	37	37	35	30	31	--	--	--

1. Sound data is determined in a reverberation room at an independent sound laboratory, according to ISO 3741 and ISO 5135 standards.
2. Lw in dB/Oct. (re 1pW) are sound power levels for discharge sound and case radiated sound. Figures less than 17 dB are indicated by "-".
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 10 dB/Oct.
6. dB(A), NC and NR index figures are sound pressure levels. Figures less than 20 are indicated by "--".
7. ∆ps is static pressure drop across VAV air volume control terminal with damper fully open.
8. For non standard applications and/or selections, please contatct our technical staff.

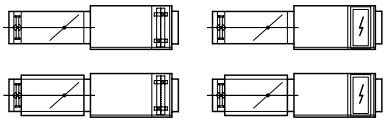
Table 1: Assumptions for additional attenuation

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

Table 2: Insertion Loss

Model	125	250	500	1k	2k	4k	Hz
100	3	4	6	11	10	12	dB
125	3	4	6	11	10	12	dB
160	2	6	10	10	10	11	dB
200	2	5	10	10	10	11	dB
250	2	5	10	11	10	10	dB
315	1	4	9	10	10	10	dB
355	1	4	9	10	10	10	dB
400	1	3	8	10	10	10	dB

Type NAOG.OB NAOH.OB NAON.OB (single wall)
NBOG.OB NBOH.OB NBON.OB (double wall)



Sound data ∆ p = 250 Pa

Model	data refering to inlet spigot					∆ p = 250 Pa																							
						discharge sound									radiated sound single wall									radiated sound double wall								
						L_w in dB/Oct. (re 1pW)						Lp values			L_w in dB/Oct. (re 1pW)						Lp values			L_w in dB/Oct. (re 1pW)						Lp values		
	velocity	air volume			min. ∆ p_s	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR
	m/s	l/s	CFM	m^3/h	Pa	dB									dB									dB								
100	2	15	31	53	3	40	41	34	31	28	-	--	--	--	26	23	26	27	30	28	--	--	--	21	-	-	-	-	-	--	--	--
	4	29	62	106	11	46	46	39	36	33	21	--	--	--	33	30	33	34	37	35	--	--	--	28	22	18	-	-	18	--	--	--
	6	44	94	160	24	50	50	42	39	37	25	23	--	--	37	34	37	38	41	39	21	--	--	32	26	22	20	20	22	--	--	--
	8	59	125	213	43	52	53	45	42	40	29	26	--	22	40	37	40	41	44	42	24	--	22	35	29	25	23	23	25	--	--	--
	10	74	156	266	67	54	55	47	44	43	32	28	22	25	42	39	42	43	46	44	26	22	24	38	32	28	25	25	27	--	--	--
	12	89	188	320	96	56	57	50	47	45	35	30	25	27	44	41	44	45	48	46	28	24	26	39	33	29	27	27	29	--	--	--
125	2	23	49	84	3	38	40	34	32	28	19	--	--	--	35	31	31	28	30	24	--	--	--	22	17	-	-	-	-	--	--	--
	4	47	99	168	10	45	46	39	37	33	24	--	--	--	41	38	38	35	37	31	20	--	--	29	24	21	18	-	19	--	--	--
	6	70	149	253	23	49	50	43	40	36	27	23	--	--	45	42	42	39	41	35	24	--	--	33	28	25	22	21	23	--	--	--
	8	94	198	337	40	52	53	46	43	39	30	26	--	22	48	45	45	42	44	38	27	--	22	36	31	28	25	24	26	--	--	--
	10	117	248	421	63	55	55	48	45	41	33	28	22	25	50	47	47	44	46	40	29	22	24	39	34	31	27	26	28	--	--	--
	12	140	296	504	91	57	58	51	48	43	36	31	25	28	52	49	49	46	48	42	31	24	26	40	35	32	29	28	30	--	--	--
160	2	39	82	139	2	38	40	34	32	32	26	--	--	--	35	31	31	28	30	24	--	--	--	24	19	18	-	-	-	--	--	--
	4	78	164	279	9	45	46	40	38	35	29	--	--	--	41	38	38	35	37	31	20	--	--	31	26	25	20	18	20	--	--	--
	6	116	246	418	21	50	49	43	41	38	31	23	--	--	45	42	42	39	41	35	24	--	--	35	30	29	24	22	24	--	--	--
	8	155	328	558	38	53	52	46	44	40	33	26	--	22	48	45	45	42	44	38	27	--	22	38	33	32	27	25	27	--	--	--
	10	194	410	697	59	56	55	48	46	42	35	29	22	25	50	47	47	44	46	40	29	22	24	40	35	34	29	27	29	--	--	--
	12	232	491	835	85	58	57	51	49	44	37	31	25	27	52	49	49	46	48	42	31	24	26	42	37	36	31	29	31	--	--	--
200	2	61	129	219	2	39	32	29	27	24	-	--	--	--	36	31	31	29	30	24	--	--	--	25	21	20	-	-	-	--	--	--
	4	122	258	439	9	47	41	38	35	31	23	--	--	--	43	38	38	36	37	31	21	--	--	32	28	27	22	19	21	--	--	--
	6	183	387	658	21	52	47	43	39	35	27	23	--	--	47	42	42	40	41	35	25	--	--	36	32	31	26	23	25	--	--	--
	8	244	516	878	38	55	51	47	42	38	30	27	--	21	50	45	45	43	44	38	28	--	22	39	35	34	29	26	28	--	--	--
	10	305	645	1097	59	58	54	50	44	41	33	30	22	24	52	47	47	45	46	40	30	22	24	41	37	36	31	29	30	--	--	--
	12	366	775	1318	85	60	57	52	47	43	35	32	25	27	54	49	49	47	48	42	32	24	26	43	39	38	33	30	32	20	--	--
250	2	96	203	345	2	40	41	34	32	29	23	--	--	--	36	31	31	29	30	24	--	--	--	25	20	20	-	-	-	--	--	--
	4	192	406	690	9	48	48	42	38	34	28	22	--	--	43	38	38	36	37	31	21	--	--	32	27	27	22	20	21	--	--	--
	6	288	609	1035	21	53	53	46	42	37	31	26	--	22	47	42	42	40	41	35	25	--	--	36	31	31	26	24	25	--	--	--
	8	383	812	1380	38	57	56	49	45	40	34	30	23	26	50	45	45	43	44	38	28	--	22	39	34	34	29	27	28	--	--	--
	10	479	1015	1725	59	60	59	52	47	42	36	32	26	29	52	47	47	45	46	40	30	22	24	41	37	37	31	29	30	--	--	--
	12	575	1218	2070	85	62	61	54	49	44	37	35	29	31	54	49	49	47	48	42	32	24	26	43	38	38	33	31	32	20	--	--
315	2	153	324	550	2	43	47	34	35	33	26	--	--	--	37	31	31	29	30	25	--	--	--	27	24	24	19	-	-	--	--	--
	4	306	648	1101	9	52	53	40	40	37	30	26	--	23	43	37	38	36	36	32	21	--	--	34	31	31	26	22	23	--	--	--
	6	459	971	1651	21	58	57	45	43	40	33	31	24	27	47	41	42	40	40	36	25	--	--	38	35	35	30	26	27	--	--	--
	8	612	1295	2202	38	62	60	48	46	43	36	34	28	30	50	44	44	43	43	39	27	--	21	41	38	38	33	29	30	--	--	--
	10	764	1619	2752	59	66	63	51	49	46	39	37	32	33	52	46	47	45	45	41	30	21	23	44	40	40	35	31	32	22	--	--
	12	917	1942	3301	85	69	65	54	52	48	41	40	36	36	54	48	48	47	47	43	31	23	25	45	42	42	37	33	34	24	--	--
355	2	195	412	701	2	43	54	38	39	35	33	25	21	24	37	31	31	30	30	26	--	--	--	28	25	25	20	-	-	--	--	--
	4	389	824	1401	9	53	58	44	43	38	35	30	25	28	44	38	38	37	37	33	21	--	--	35	32	32	27	22	24	--	--	--
	6	584	1236	2102	21	59	60	48	46	40	37	33	28	30	48	42	42	41	41	37	25	--	--	39	36	36	31	26	28	--	--	--
	8	779	1649	2803	38	63	63	51	48	42	39	36	31	33	50	45	45	44	44	40	28	--	22	42	39	39	34	29	31	20	--	--
	10	973	2061	3503	59	67	65	53	51	44	41	39	34	35	53	47	47	46	46	42	30	22	24	44	41	41	36	32	33	23	--	--
	12	1168	2473	4205	85	70	67	56	53	46	43	42	38	38	54	49	49	48	48	44	32	24	26	46	43	43	38	33	35	24	--	--
400	2	248	524	891	2	44	56	39	40	37	31	27	23	26	37	31	30	30	30	26	--	--	--	28	25	25	21	-	17	--	--	--
	4	495	1049	1783	9	54	60	45	44	40	33	31	28	30	44	37	37	37	36	33	21	--	--	35	32	32	28	23	24	--	--	--
	6	743	1573	2674	21	60	62	49	47	42	35	35	31	33	48	41	41	41	40	37	25	--	--	39	36	36	32	27	28	--	--	--
	8	990	2097	3565	38	64	65	52	49	44	37	38	33	35	50	44	44	43	43	39	27	--	21	42	39	39	35	30	31	21	--	--
	10	1238	2621	4456	59	68	67	54	52	46	39	40	36	37	53	46	46	46	45	42	30	21	23	45	42	42	37	32	33	23	--	--
	12	1485	3145	5346	85	71	69	57	54	48	41	43	39	40	54	48	48	47	47	43	31	23	25	46	43	43	39	34	35	25	--	--

1. Sound data is determined in a reverberation room at an independent sound laboratory, according to ISO 3741 and ISO 5135 standards.
2. Lw in dB/Oct. (re 1pW) are sound power levels for discharge sound and case radiated sound. Figures less than 17 dB are indicated by "-".
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 10 dB/Oct.
6. dB(A), NC and NR index figures are sound pressure levels. Figures less than 20 are indicated by "--".
7. ∆ps is static pressure drop across VAV air volume control terminal with damper fully open.
8. For non standard applications and/or selections, please contatct our technical staff.

Table 1: 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

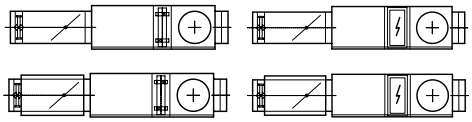
Table 2: Insertion Loss

Model	125	250	500	1k	2k	4k	Hz
100	3	4	6	11	10	12	dB
125	3	4	6	11	10	12	dB
160	2	6	10	10	10	11	dB
200	2	5	10	10	10	11	dB
250	2	5	10	11	10	10	dB
315	1	4	9	10	10	10	dB
355	1	4	9	10	10	10	dB
400	1	3	8	10	10	10	dB

Circular VAV-terminals

Sound data

Type NAOJ.OB NAOQ.OB (single wall)
NBOJ.OB NBOQ.OB (double wall)



Sound data ∆ p = 125 Pa

Model	data refering to inlet spigot					Δ p = 125 Pa																										
						discharge sound									radiated sound single wall									radiated sound double wall								
						L_w in dB/Oct. (re 1pW)						Lp values			L_w in dB/Oct. (re 1pW)						Lp values			L_w in dB/Oct. (re 1pW)						Lp values		
	velocity	air volume			min. Δ p_s	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR
	m/s	l/s	CFM	m^3/h	Pa	dB									dB									dB								
100	2	15	31	53	3	32	30	20	-	-	-	--	--	--	19	-	19	20	23	21	--	--	--	-	-	-	-	-	-	--	--	--
	4	29	62	106	11	38	36	26	21	-	-	--	--	--	26	23	26	27	30	28	--	--	--	22	-	-	-	-	-	--	--	--
	6	44	94	160	24	42	40	30	25	20	-	--	--	--	30	27	30	31	34	32	--	--	--	26	20	-	-	-	18	--	--	--
	8	59	125	213	43	45	43	33	28	23	-	--	--	--	33	30	33	34	37	35	--	--	--	29	23	19	19	19	21	--	--	--
	10	74	156	266	67	47	46	36	32	27	-	--	--	--	35	32	35	36	39	37	--	--	--	32	26	22	21	21	23	--	--	--
	12	89	188	320	96	49	48	39	34	30	20	22	--	--	37	34	37	38	41	39	21	--	--	33	27	23	23	23	25	--	--	--
125	2	23	49	84	3	29	28	20	-	-	-	--	--	--	28	24	25	22	23	17	--	--	--	-	-	-	-	-	-	--	--	--
	4	47	99	168	10	36	35	26	22	-	-	--	--	--	35	31	32	29	30	24	--	--	--	23	18	-	-	-	-	--	--	--
	6	70	149	253	23	40	39	30	26	19	-	--	--	--	39	35	36	33	34	28	--	--	--	27	22	19	18	-	19	--	--	--
	8	94	198	337	40	44	43	34	30	23	-	--	--	--	42	38	38	35	37	31	21	--	--	30	25	22	21	20	22	--	--	--
	10	117	248	421	63	47	46	37	33	26	-	--	--	--	44	40	41	38	39	33	23	--	--	33	28	25	23	22	24	--	--	--
	12	140	296	504	91	49	48	40	35	29	20	22	--	--	46	42	42	39	41	35	25	--	--	34	29	26	25	24	26	--	--	--
160	2	39	82	139	2	28	27	20	-	-	-	--	--	--	28	24	25	22	23	18	--	--	--	18	-	-	-	-	-	--	--	--
	4	78	164	279	9	35	33	25	22	-	-	--	--	--	35	31	32	29	30	25	--	--	--	25	20	19	-	-	-	--	--	--
	6	116	246	418	21	40	38	29	26	20	-	--	--	--	39	35	36	33	34	29	--	--	--	29	24	23	20	18	20	--	--	--
	8	155	328	558	38	44	41	33	29	23	-	--	--	--	42	38	38	35	37	31	21	--	--	32	27	26	23	21	23	--	--	--
	10	194	410	697	59	47	44	36	32	25	18	--	--	--	44	40	41	38	39	34	23	--	--	34	29	28	25	23	25	--	--	--
	12	232	491	835	85	50	47	39	35	28	21	22	--	--	46	42	42	39	41	35	25	--	--	36	31	30	27	25	27	--	--	--
200	2	61	129	219	2	28	20	-	-	-	-	--	--	--	29	24	24	23	23	18	--	--	--	19	-	-	-	-	-	--	--	--
	4	122	258	439	9	37	30	26	20	-	-	--	--	--	36	31	31	29	30	25	--	--	--	26	22	21	18	-	-	--	--	--
	6	183	387	658	21	42	36	31	24	17	-	--	--	--	40	35	35	33	34	29	--	--	--	30	26	25	22	20	21	--	--	--
	8	244	516	878	38	46	40	35	28	21	-	--	--	--	43	38	38	36	37	31	21	--	--	33	29	28	25	22	24	--	--	--
	10	305	645	1097	59	49	44	38	30	24	-	--	--	--	45	40	40	38	39	34	23	--	--	35	31	30	27	25	26	--	--	--
	12	366	775	1318	85	51	47	41	33	26	18	22	--	--	47	42	42	40	41	35	25	--	--	37	33	32	29	27	28	--	--	--
250	2	96	203	345	2	30	29	21	-	-	-	--	--	--	29	24	24	23	23	18	--	--	--	19	-	-	-	-	-	--	--	--
	4	192	406	690	9	38	36	29	23	-	-	--	--	--	36	31	31	29	30	25	--	--	--	26	21	21	18	-	-	--	--	--
	6	288	609	1035	21	44	41	34	27	19	-	--	--	--	40	35	35	33	34	29	--	--	--	30	25	25	22	20	21	--	--	--
	8	383	812	1380	38	47	45	37	30	22	-	--	--	--	43	38	38	36	37	31	21	--	--	33	28	28	25	23	24	--	--	--
	10	479	1015	1725	59	51	48	40	32	25	18	22	--	--	45	40	40	38	39	34	23	--	--	35	31	31	27	25	26	--	--	--
	12	575	1218	2070	85	53	50	43	35	27	20	25	--	--	47	42	42	40	41	35	25	--	--	37	32	32	29	27	28	--	--	--
315	2	153	324	550	2	34	35	21	19	-	-	--	--	--	30	24	24	23	23	19	--	--	--	21	18	18	-	-	-	--	--	--
	4	306	648	1101	9	43	41	28	24	19	-	--	--	--	37	31	31	30	30	26	--	--	--	28	25	25	22	18	19	--	--	--
	6	459	971	1651	21	49	46	33	29	23	-	21	--	--	41	35	35	34	34	30	--	--	--	32	29	29	26	22	23	--	--	--
	8	612	1295	2202	38	54	50	37	33	27	19	25	--	--	44	38	38	36	37	32	21	--	--	35	32	32	29	25	26	--	--	--
	10	764	1619	2752	59	58	53	40	36	30	22	29	22	24	46	40	40	39	39	35	23	--	--	38	34	34	31	27	28	--	--	--
	12	917	1942	3301	85	61	56	44	39	33	26	32	26	28	48	42	42	40	41	36	25	--	--	39	36	36	33	29	30	--	--	--
355	2	195	412	701	2	34	42	25	23	-	-	--	--	--	30	24	24	23	23	19	--	--	--	22	19	19	-	-	-	--	--	--
	4	389	824	1401	9	44	46	31	27	19	-	--	--	--	37	31	31	30	30	26	--	--	--	29	26	26	23	18	20	--	--	--
	6	584	1236	2102	21	50	49	35	31	22	18	23	--	--	41	35	35	34	34	30	--	--	--	33	30	30	27	23	24	--	--	--
	8	779	1649	2803	38	55	52	39	34	25	21	27	--	21	44	38	38	37	37	33	21	--	--	36	33	33	30	25	27	--	--	--
	10	973	2061	3503	59	59	55	42	37	28	24	30	24	25	46	40	40	39	39	35	23	--	--	38	35	35	32	28	29	--	--	--
	12	1168	2473	4205	85	62	57	45	40	31	28	33	28	29	48	42	42	41	41	37	25	--	--	40	37	37	34	30	31	--	--	--
400	2	248	524	891	2	35	44	26	24	17	-	--	--	--	30	24	24	23	23	19	--	--	--	22	19	19	-	-	-	--	--	--
	4	495	1049	1783	9	45	48	32	28	21	-	--	--	--	37	31	31	30	30	26	--	--	--	29	26	26	24	19	20	--	--	--
	6	743	1573	2674	21	51	51	36	32	24	-	24	--	20	41	35	35	34	34	30	--	--	--	33	30	30	28	23	24	--	--	--
	8	990	2097	3565	38	56	54	40	35	27	19	28	21	24	44	38	37	37	37	33	21	--	--	36	33	33	31	26	27	--	--	--
	10	1238	2621	4456	59	60	57	43	38	30	22	31	25	27	46	40	40	39	39	35	23	--	--	39	36	36	33	28	29	--	--	--
	12	1485	3145	5346	85	63	59	46	41	33	26	34	29	30	48	42	41	41	41	37	25	--	--	40	37	37	35	30	31	--	--	--

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6. dB(A), NC and NR index figures are sound pressure levels. Figures less than 20 are indicated by "--".
7. ∆ps is static pressure drop across VAV air volume control terminal with damper fully open.
8. For non standard applications and/or selections, please contatct our technical staff.

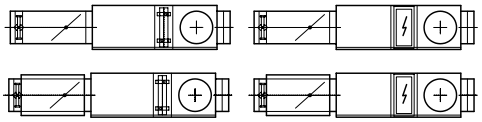
Table 1: Assumptions for additional attenuation

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

Table 2: Insertion Loss

Model	125	250	500	1k	2k	4k	Hz
100	13	17	23	26	28	30	dB
125	12	15	22	25	27	29	dB
160	12	15	22	25	27	29	dB
200	11	15	21	24	26	28	dB
250	11	15	21	24	26	28	dB
315	8	11	21	24	26	26	dB
355	8	11	21	24	26	26	dB
400	8	11	21	24	26	26	dB

Type NAOJ.OB NAOQ.OB (single wall)
NBOJ.OB NBOQ.OB (double wall)



Sound data ∆ p = 250 Pa

Model	velocity	air volume			min. Δ p_s	Δ p = 250 Pa									radiated sound single wall									radiated sound double wall								
	data refering to inlet spigot					discharge sound						Lp values									Lp values									Lp values			
						L_w in dB/Oct. (re 1pW)									L_w in dB/Oct. (re 1pW)									L_w in dB/Oct. (re 1pW)								
						125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	dB(A)	NC	NR
	m/s	l/s	CFM	m^3/h	Pa	dB									dB									dB								
100	2	15	31	53	3	34	34	26	21	-	-	--	--	--	26	23	26	27	30	28	--	--	--	21	-	-	-	-	-	--	--	--
	4	29	62	106	11	40	39	31	26	21	-	--	--	--	33	30	33	34	37	35	--	--	--	28	22	18	-	-	18	--	--	--
	6	44	94	160	24	44	43	34	29	25	-	--	--	--	37	34	37	38	41	39	21	--	--	32	26	22	20	20	22	--	--	--
	8	59	125	213	43	46	46	37	32	28	-	--	--	--	40	37	40	41	44	42	24	--	22	35	29	25	23	23	25	--	--	--
	10	74	156	266	67	48	48	39	34	31	20	21	--	--	42	39	42	43	46	44	26	22	24	38	32	28	25	25	27	--	--	--
	12	89	188	320	96	50	50	42	37	33	23	23	--	--	44	41	44	45	48	46	28	24	26	39	33	29	27	27	29	--	--	--
125	2	23	49	84	3	32	33	26	22	-	-	--	--	--	35	31	31	28	30	24	--	--	--	22	17	-	-	-	-	--	--	--
	4	47	99	168	10	39	39	31	27	21	-	--	--	--	41	38	38	35	37	31	20	--	--	29	24	21	18	-	19	--	--	--
	6	70	149	253	23	43	43	35	30	24	-	--	--	--	45	42	42	39	41	35	24	--	--	33	28	25	22	21	23	--	--	--
	8	94	198	337	40	46	46	38	33	27	18	--	--	--	48	45	45	42	44	38	27	--	22	36	31	28	25	24	26	--	--	--
	10	117	248	421	63	49	48	40	35	29	21	22	--	--	50	47	47	44	46	40	29	22	24	39	34	31	27	26	28	--	--	--
	12	140	296	504	91	51	51	43	38	31	24	24	--	20	52	49	49	46	48	42	31	24	26	40	35	32	29	28	30	--	--	--
160	2	39	82	139	2	32	33	26	22	20	-	--	--	--	35	31	31	28	30	24	--	--	--	24	19	18	-	-	-	--	--	--
	4	78	164	279	9	39	39	32	28	23	17	--	--	--	41	38	38	35	37	31	20	--	--	31	26	25	20	18	20	--	--	--
	6	116	246	418	21	44	42	35	31	26	19	--	--	--	45	42	42	39	41	35	24	--	--	35	30	29	24	22	24	--	--	--
	8	155	328	558	38	47	45	38	34	28	21	--	--	--	48	45	45	42	44	38	27	--	22	38	33	32	27	25	27	--	--	--
	10	194	410	697	59	50	48	40	36	30	23	22	--	--	50	47	47	44	46	40	29	22	24	40	35	34	29	27	29	--	--	--
	12	232	491	835	85	52	50	43	39	32	25	24	--	--	52	49	49	46	48	42	31	24	26	42	37	36	31	29	31	--	--	--
200	2	61	129	219	2	33	25	21	17	-	-	--	--	--	36	31	31	29	30	24	--	--	--	25	21	20	-	-	-	--	--	--
	4	122	258	439	9	41	34	30	25	19	-	--	--	--	43	38	38	36	37	31	21	--	--	32	28	27	22	19	21	--	--	--
	6	183	387	658	21	46	40	35	29	23	-	--	--	--	47	42	42	40	41	35	25	--	--	36	32	31	26	23	25	--	--	--
	8	244	516	878	38	49	44	39	32	26	18	20	--	--	50	45	45	43	44	38	28	--	22	39	35	34	29	26	28	--	--	--
	10	305	645	1097	59	52	47	42	34	29	21	23	--	--	52	47	47	45	46	40	30	22	24	41	37	36	31	29	30	--	--	--
	12	366	775	1318	85	54	50	44	37	31	23	26	--	20	54	49	49	47	48	42	32	24	26	43	39	38	33	30	32	20	--	--
250	2	96	203	345	2	34	34	26	22	-	-	--	--	--	36	31	31	29	30	24	--	--	--	25	20	20	-	-	-	--	--	--
	4	192	406	690	9	42	41	34	28	22	-	--	--	--	43	38	38	36	37	31	21	--	--	32	27	27	22	20	21	--	--	--
	6	288	609	1035	21	47	46	38	32	25	19	--	--	--	47	42	42	40	41	35	25	--	--	36	31	31	26	24	25	--	--	--
	8	383	812	1380	38	51	49	41	35	28	22	23	--	--	50	45	45	43	44	38	28	--	22	39	34	34	29	27	28	--	--	--
	10	479	1015	1725	59	54	52	44	37	30	24	26	--	21	52	47	47	45	46	40	30	22	24	41	37	37	31	29	30	--	--	--
	12	575	1218	2070	85	56	54	46	39	32	25	28	21	24	54	49	49	47	48	42	32	24	26	43	38	38	33	31	32	20	--	--
315	2	153	324	550	2	37	40	26	25	21	-	--	--	--	37	31	31	29	30	25	--	--	--	27	24	24	19	-	-	--	--	--
	4	306	648	1101	9	46	46	32	30	25	18	--	--	--	43	37	38	36	36	32	21	--	--	34	31	31	26	22	23	--	--	--
	6	459	971	1651	21	52	50	37	33	28	21	24	--	--	47	41	42	40	40	36	25	--	--	38	35	35	30	26	27	--	--	--
	8	612	1295	2202	38	56	53	40	36	31	24	28	20	23	50	44	44	43	43	39	27	--	21	41	38	38	33	29	30	--	--	--
	10	764	1619	2752	59	60	56	43	39	34	27	31	24	26	52	46	47	45	45	41	30	21	23	44	40	40	35	31	32	22	--	--
	12	917	1942	3301	85	63	58	46	42	36	29	34	28	30	54	48	48	47	47	43	31	23	25	45	42	42	37	33	34	24	--	--
355	2	195	412	701	2	37	47	30	29	23	21	--	--	--	37	31	31	30	30	26	--	--	--	28	25	25	20	-	-	--	--	--
	4	389	824	1401	9	47	51	36	33	26	23	23	--	20	44	38	38	37	37	33	21	--	--	35	32	32	27	22	24	--	--	--
	6	584	1236	2102	21	53	53	40	36	28	25	26	20	23	48	42	42	41	41	37	25	--	--	39	36	36	31	26	28	--	--	--
	8	779	1649	2803	38	57	56	43	38	30	27	30	23	25	50	45	45	44	44	40	28	--	22	42	39	39	34	29	31	20	--	--
	10	973	2061	3503	59	61	58	45	41	32	29	32	26	28	53	47	47	46	46	42	30	22	24	44	41	41	36	32	33	23	--	--
	12	1168	2473	4205	85	64	60	48	43	34	31	35	30	31	54	49	49	48	48	44	32	24	26	46	43	43	38	33	35	24	--	--
400	2	248	524	891	2	38	49	31	30	25	19	20	--	--	37	31	30	30	30	26	--	--	--	28	25	25	21	-	17	--	--	--
	4	495	1049	1783	9	48	53	37	34	28	21	25	--	22	44	37	37	37	36	33	21	--	--	35	32	32	28	23	24	--	--	--
	6	743	1573	2674	21	54	55	41	37	30	23	28	22	25	48	41	41	41	40	37	25	--	--	39	36	36	32	27	28	--	--	--
	8	990	2097	3565	38	58	58	44	39	32	25	31	25	28	50	44	44	43	43	39	27	--	21	42	39	39	35	30	31	21	--	--
	10	1238	2621	4456	59	62	60	46	42	34	27	34	28	30	53	46	46	46	45	42	30	21	23	45	42	42	37	32	33	23	--	--
	12	1485	3145	5346	85	65	62	49	44	36	29	36	31	32	54	48	48	47	47	43	31	23	25	46	43	43	39	34	35	25	--	--

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400	8	11	21	24	26	26	dB

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