NEW

revo AIR

www.revo-air.nl

SOUND - INSULATING VENTS
PHZE
ECONOMICAL MODEL
ECOLOGICAL PRODUCTION

Acoustic louvres

PHZE

NEW MODELS:

200, 300, 400, 600 mm of depth

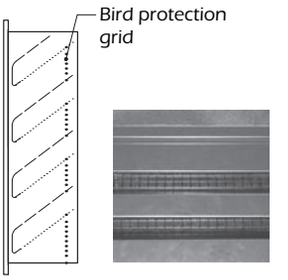
Description and use:

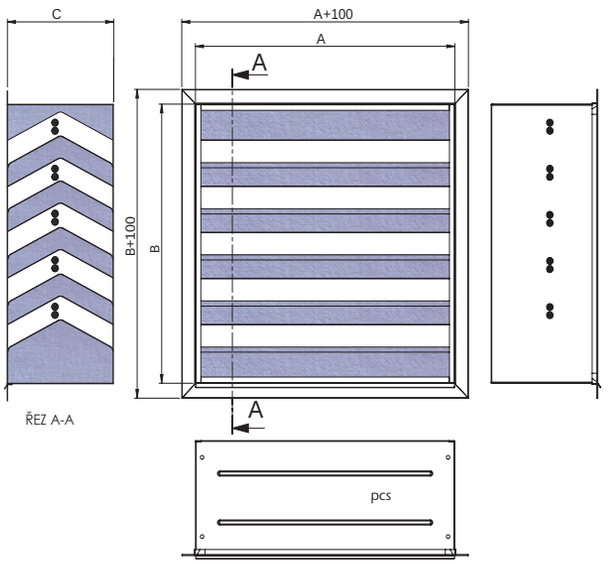
Acoustic louvres "PHZE" are made of plain galvanized steel or powder coated RAL (stainless steel or AlMg3 available upon reques). The louvres are filled with sound absorbing material covered with perforated metal plate for increased effectivity. There are 4 different depths available according to desired attenuation. The air inlets are equipped with bird protection grids as standard.

Construction angle of the sound absorbing blades allows also the installation as an end piece of an air duct (direct installation or with a frame).

Acoustic louvres are used for reduction of the noise comming out from various openings such as from engine rooms or noisy industrial areas.

Bird protection grid in detail:





Dimensions (standard delivery):

„A" (width) [mm]:
200; 300; 400; 500; 630; 800; 1000; 1250; 1400; 1600; 1800; 2000; 2250; 2500

„B" (height) [mm]:
350; 400; 500; 630; 800; 1000; 1250; 1400; 1600; 1800; 2000; 2250; 2500

„C" (depth) [mm]:
200; 300; 400; 600

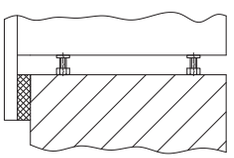
Other dimensions available on demand.

Acoustic parameters and planning:

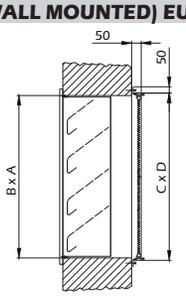
The attenuating capacity of the acoustic louvre can be calculated in the sellection software AKUAIR. The louvre has to be calculated with respect to the air flow in the cross section in front of the louvre [AxB dimension], to the desired attenuation value [sound pressure value at the defined point] and to the noise source [sound capacity Lw(a)].

Dimension indicated as "A" and "B" are actually about 30mm smaller than the opening due to easy installation.
(Example: For the duct of 1000x800mm acoustic louvres of the following dimensions will be delivered:
"A" actual = 970mm, "B" actual = 770mm)

LEVELING SCREW DETAIL (+FRAME)

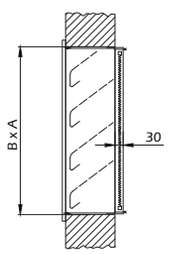


FILTER ADAPTER (WALL MOUNTED) EU3



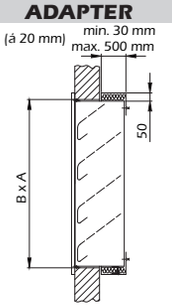
PHZE - NFN - C x D

FILTER ADAPTER EU3



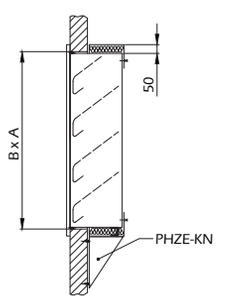
PHZE - NF - A x B

INSULATION ADAPTER



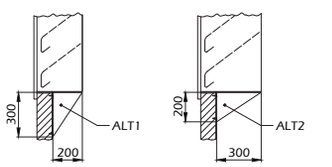
PHZE - NI - A x B / xx

INSULATION ADAPTER + WALL BRACKET



PHZE - NI - A x B / xx + KN

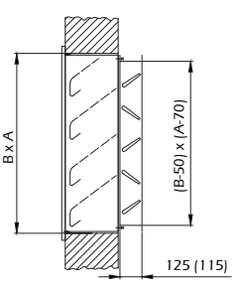
WALL BRACKET



Number of brackets:
do 1000 mm - 2 pcs
od 1000 mm - do 2000 mm - 3 ks
od 2000 mm - do 3000 mm - 4 pcs

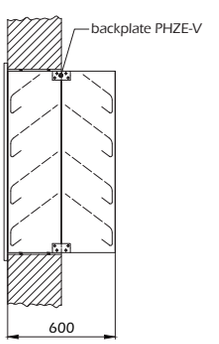
PHZE - KN

CONTROL DAMPER



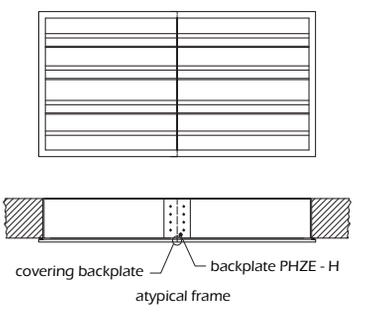
PHZE - RK - A x B

BACK-TO-BACK MOUNTING



PHZE - SPV

LOUVRE COUPLING SIDE-BY–SIDE WITH FRAMES

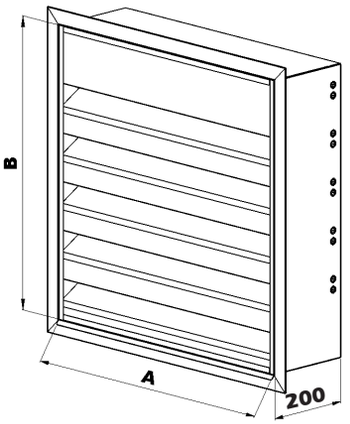


PHZE - SPH

Louvre weight [kg] and free cross section [%]			
PHZE 200	Weight per 1m²	Free cross section*	Characteristic
Louvre Height [mm]	kg	%	
350	46	19	A
400	46	19	A
500	40	32	B
630	37	38	C
800	37	38	C
1000	37	38	C
1250	33	41	D
1400	33	41	D
1600	33	41	D
1800	33	41	D
2000	33	41	D
2250	33	41	D
2500	33	41	D

* valid for the whole connection dimension (AxB)

"200" MM DEPTH



Calculation: $L_v = 10\log(10^{Lp_v/10} + 10^{Lp_{ž}/10}) + dL$

$$Lp_v = Lw_1 + 10\log\frac{Q}{(4x\,\pi\,xR^2)} \qquad Lp_{ž} = Lw_{ž}(A) + 10\log\frac{Q}{(4x\,\pi\,xR^2)}$$

$$Lw_1 = Lw_A - D_t - D$$

$$Lw_{ž}(A) = Lw\ (\text{diagram}) + \Delta Lw + Lw_a + Lw_{a\ oct}\ (\text{for the relevant frequency})$$

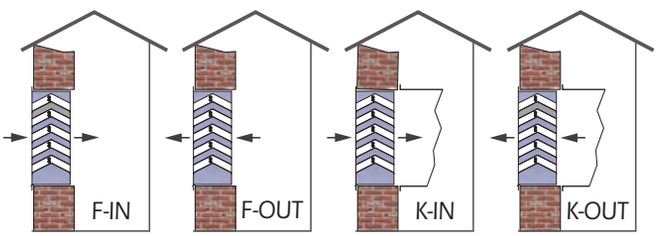
Lv = desired accoustic pressure at defined point
Lp_v = noise dispersion in the air duct reduced by the attenuation "D" of the acoustic louvre and routing
$Lp_{ž}$ = self noise of the louvre
dL = correction of reverberation noise in the outside (constant = 3)

Lw_1 = sound power lever of the system "dB(A)"
Lw_A = sound power of the noise source "dB(A)"
D_t = attenuation of the transmission
D = louvre attenuation

$Lw_{ž}(A)$= level of the louvre acoustic output at air speed given just before the louvre
R = distance of the point from the core of the louvre "m"
Q = directional coefficient (determined by the designer - most common value is 2)

Louvre attenuation D [dB]								
PHZE 200	frequency [Hz]							
	63	125	250	500	1000	2000	4000	8000
attenuation [dB]	4	6	7	12	12	13	14	14

Correction of the louvre self-noise according to its surface Δ Lw [dB]										
PHZE 200	surface of the louvre m²									
	0,3	0,5	0,7	0,8	1	1,5	2	4	6	10
correction [dB]	-5,2	-3	-1,5	-1	0	1,8	3	6	7,8	10



Correction of the louvre self-noise according to the way of air flow and type of connection $Lw_{a\ oct}$ - frequencies								
	63	125	250	500	1000	2000	4000	8000
F-IN	-3	5	7	-2	-5	-12	-22	-29
F-OUT	-2	3	3	-4	-5	-10	-19	-24
K-IN	4	5	5	-3	-5	-7	-14	-20
K-OUT	6	1	3	-2	-5	-9	-12	-19

Diagram of the pressure loss [Pa]

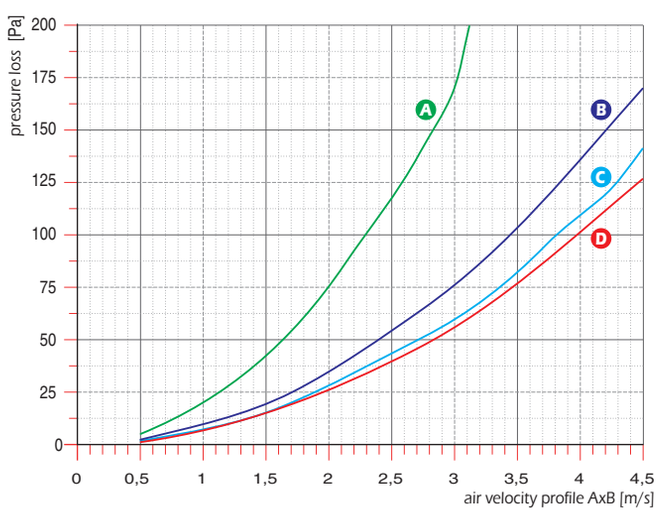
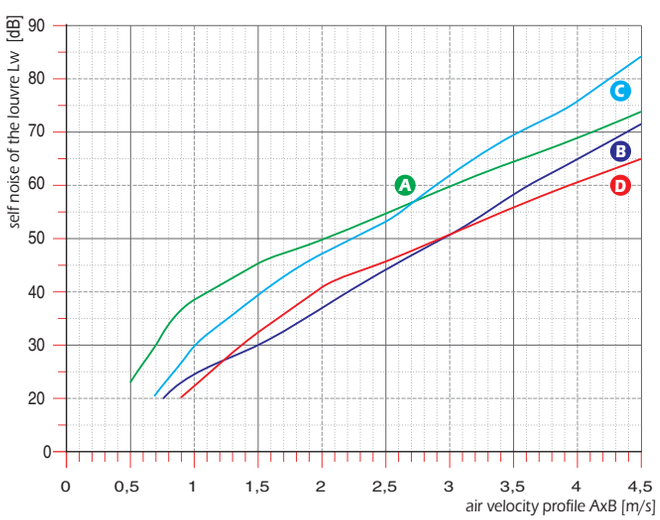


Diagram of the self noise Lw due to the air flow [dB]



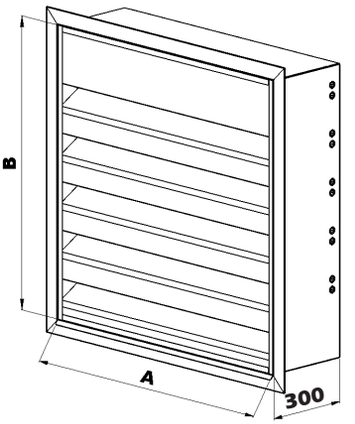
Correction of the pressure loss by the way of air flow and type of connection				
type of louvre	F-IN	F-OUT	K-IN	K-OUT
200	0,9	0,98	0,9	1

Correction according to the way of air flow and type of connection Lw_a				
type of louvre	F-IN	F-OUT	K-IN	K-OUT
200	-4	-3	-3	0

Louvre weight [kg] and free cross section [%]			
PHZE 300	Weight per 1m²	Free cross section*	Characteristic
Louvre Height [mm]	kg	%	
350	58	19	A
400	58	19	A
500	55	32	B
600	47	38	C
800	47	38	C
1000	47	38	C
1250	43	41	D
1400	43	41	D
1600	43	41	D
1800	43	41	D
2000	43	41	D
2250	43	41	D
2500	43	41	D

* valid for the whole connection dimension (AxB)

"300" MM DEPTH



Calculation: $L_v = 10\log(10^{Lp_v/10} + 10^{Lp_ž/10}) + dL$

$$Lp_v = Lw_1 + 10\log\frac{Q}{(4x\,\pi\,xR^2)} \qquad Lp_ž = Lw_ž(A) + 10\log\frac{Q}{(4x\,\pi\,xR^2)}$$

$$Lw_1 = Lw_A - D_t - D$$

$$Lw_ž(A) = Lw\,(\text{diagram}) + \Delta Lw + Lw_a + Lw_{a\,oct}\,(\text{for the relevant frequency})$$

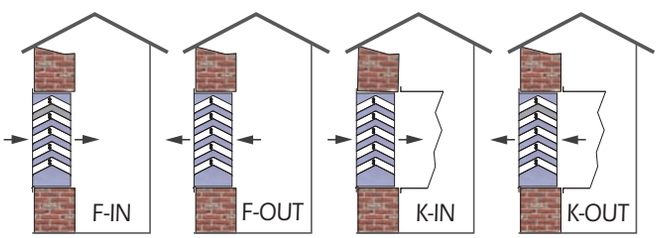
Lv = desired accoustic pressure at defined point
Lp_v = noise dispersion in the air duct reduced by the attenuation "D" of the acoustic louvre and routing
$Lp_ž$ = self noise of the louvre
dL = correction of reverberation noise in the outside (constant = 3)

Lw_1 = sound power lever of the system "dB(A)"
Lw_A = sound power of the noise source "dB(A)"
D_t = attenuation of the transmission
D = louvre attenuation

$Lw_ž(A)$= level of the louvre acoustic output at air speed given just before the louvre
R = distance of the point from the core of the louvre "m"
Q = directional coefficient (determined by the designer - most common value is 2)

Louvre attenuation D [dB]								
PHZE 300	frequency [Hz]							
	63	125	250	500	1000	2000	4000	8000
attenuation [dB]	7	8	8	17	18	19	18	19

Correction of the louvre self-noise according to its surface Δ Lw [dB]										
PHZE 300	surface of the louvre m²									
	0,3	0,5	0,7	0,8	1	1,5	2	4	6	10
correction [dB]	-5,2	-3	-1,5	-1	0	1,8	3	6	7,8	10



Correction of the louvre self-noise according to the way of air flow and type of connection $Lw_{a\,oct}$ - frequencies								
	63	125	250	500	1000	2000	4000	8000
F-IN	-3	5	7	-2	-5	-12	-22	-29
F-OUT	-2	3	3	-4	-5	-10	-19	-24
K-IN	4	5	5	-3	-5	-7	-14	-20
K-OUT	6	1	3	-2	-5	-9	-12	-19

Diagram of the pressure loss [Pa]

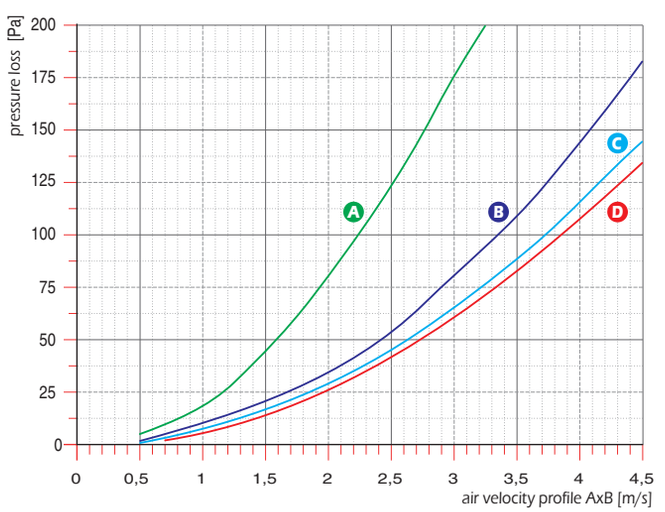
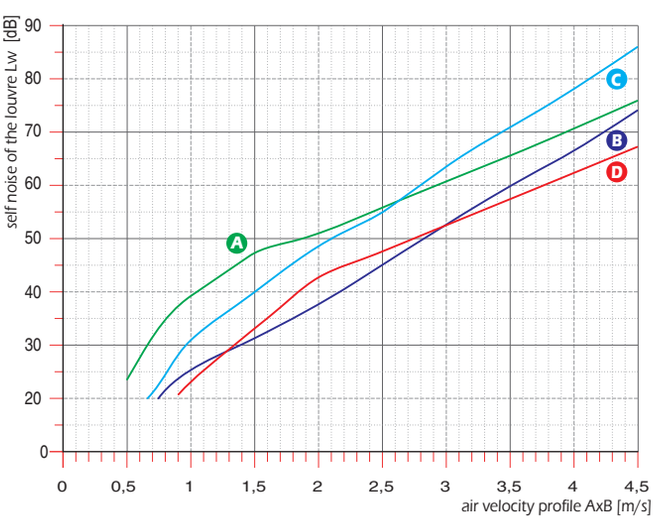


Diagram of the self noise Lw due to the air flow [dB]



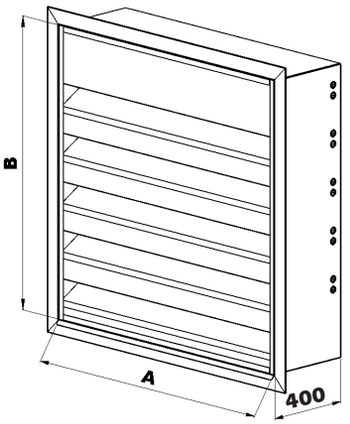
Correction of the pressure loss by the way of air flow and type of connection				
type of louvre	F-IN	F-OUT	K-IN	K-OUT
300	0,9	0,98	0,9	1

Correction according to the way of air flow and type of connection Lw_a				
type of louvre	F-IN	F-OUT	K-IN	K-OUT
300	-4	-3	-3	0

Louvre weight [kg] and free cross section [%]			
PHZE 400	Weight per 1m²	Free cross section*	Characteristic
Louvre Height [mm]	kg	%	
350	90	25	A
400	90	25	A
500	90	25	A
630	83	36	B
800	83	36	B
1000	83	36	B
1250	78	41	C
1400	78	41	C
1600	78	41	C
1800	78	41	C
2000	78	41	C
2250	78	41	C
2500	78	41	C

* valid for the whole connection dimension (AxB)

"400" MM DEPTH



Calculation: $L_v = 10\log(10^{Lp_v/10} + 10^{Lp_{ż}/10}) + dL$

$$Lp_v = Lw_l + 10\log\frac{Q}{(4x\,\pi\,xR^2)} \qquad Lp_{ż} = Lw_{ż}(A) + 10\log\frac{Q}{(4x\,\pi\,xR^2)}$$

$$Lw_l = Lw_A - D_t - D$$

$$Lw_{ż}(A) = Lw\,(\text{diagram}) + \Delta Lw + Lw_a + Lw_{a\ oct}\,(\text{for the relevant frequency})$$

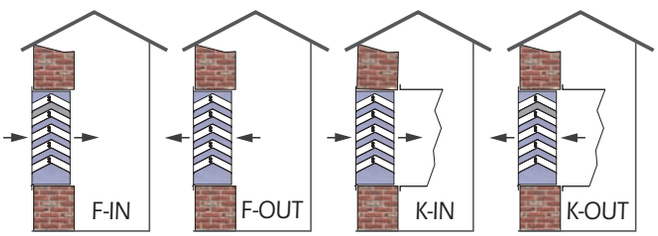
Lv = desired accoustic pressure at defined point
Lp_v = noise dispersion in the air duct reduced by the attenuation "D" of the acoustic louvre and routing
$Lp_{ż}$ = self noise of the louvre
dL = correction of reverberation noise in the outside (constant = 3)

Lw_l = sound power lever of the system "dB(A)"
Lw_A = sound power of the noise source "dB(A)"
D_t = attenuation of the transmission
D = louvre attenuation

$Lw_{ż}(A)$= level of the louvre acoustic output at air speed given just before the louvre
R = distance of the point from the core of the louvre "m"
Q = directional coefficient (determined by the designer - most common value is 2)

Louvre attenuation D [dB]								
PHZE 400	frequency [Hz]							
	63	125	250	500	1000	2000	4000	8000
attenuation [dB]	15	10	12	22	23	23	23	24

Correction of the louvre self-noise according to its surface Δ Lw [dB]										
PHZE 400	surface of the louvre m²									
	0,3	0,5	0,7	0,8	1	1,5	2	4	6	10
correction [dB]	-5,2	-3	-1,5	-1	0	1,8	3	6	7,8	10



Correction of the louvre self-noise according to the way of air flow and type of connection $Lw_{a\ oct}$ - frequencies								
	63	125	250	500	1000	2000	4000	8000
F-IN	0	9	6	-1	-2	-6	-9	-20
F-OUT	0	9	6	-1	-2	-6	-9	-20
K-IN	2	3	-1	-5	-5	-7	-11	-17
K-OUT	2	2	-2	-5	-8	-8	-9	-14

Diagram of the pressure loss [Pa]

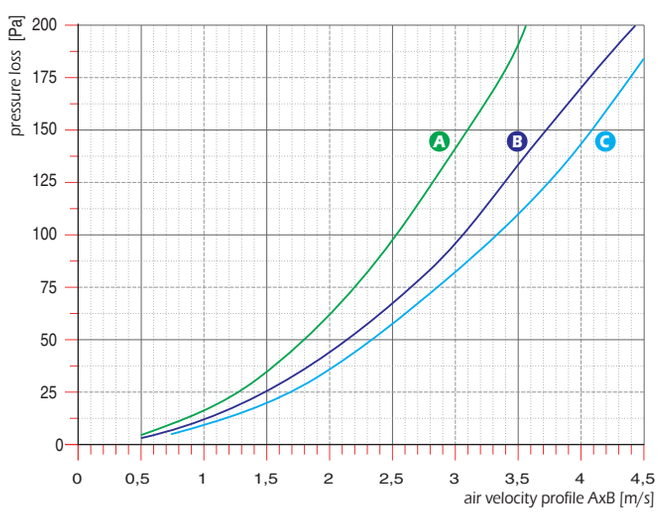
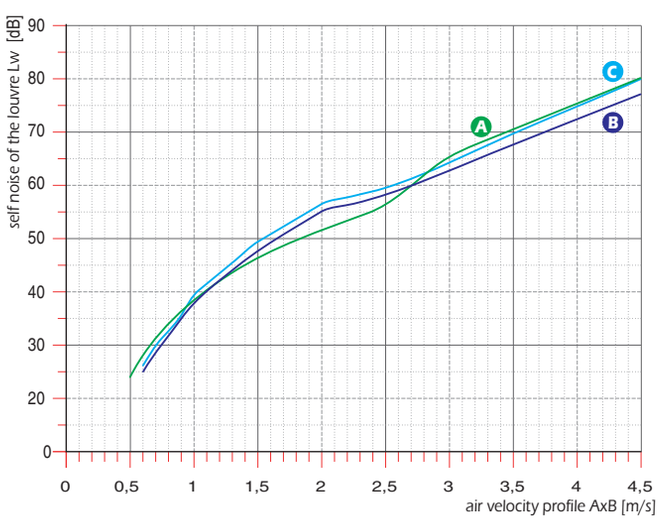


Diagram of the self noise Lw due to the air flow [dB]



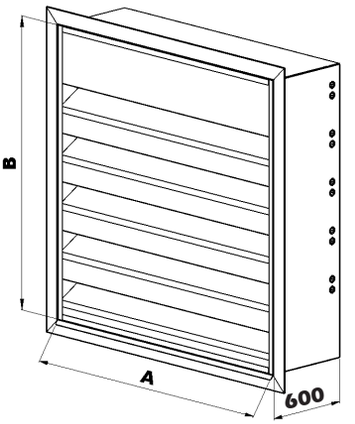
Correction of the pressure loss by the way of air flow and type of connection				
type of louvre	F-IN	F-OUT	K-IN	K-OUT
400	0,92	0,92	0,9	1

Correction according to the way of air flow and type of connection Lw_a				
type of louvre	F-IN	F-OUT	K-IN	K-OUT
400	0	-3	-3	-4

Louvre weight [kg] and free cross section [%]			
PHZE 600	Weight per 1m²	Free cross section*	Characteristic
Louvre Height [mm]	kg	%	
350	116	19	A
400	116	19	A
500	110	32	B
630	94	38	C
800	94	38	C
1000	94	38	C
1250	86	41	D
1400	86	41	D
1600	86	41	D
1800	86	41	D
2000	86	41	D
2250	86	41	D
2500	86	41	D

* valid for the whole connection dimension (AxB)

"600" MM DEPTH



Calculation: $L_v = 10\log(10^{Lp_v/10} + 10^{Lp_ž/10}) + dL$

$$Lp_v = Lw_1 + 10\log\frac{Q}{(4x\,\pi\,xR^2)} \qquad Lp_ž = Lw_ž(A) + 10\log\frac{Q}{(4x\,\pi\,xR^2)}$$

$$Lw_1 = Lw_A - D_t - D$$

$$Lw_ž(A) = Lw\,(\text{diagram}) + \Delta Lw + Lw_a + Lw_{a\,oct}\,(\text{for the relevant frequency})$$

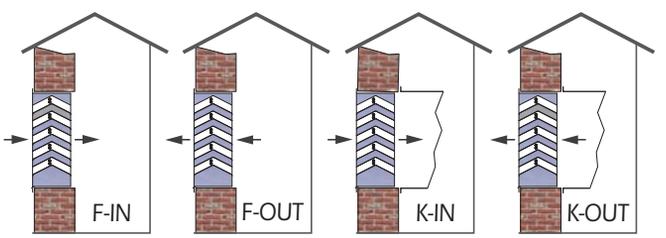
Lv = desired accoustic pressure at defined point
Lp_v = noise dispersion in the air duct reduced by the attenuation "D" of the acoustic louvre and routing
$Lp_ž$ = self noise of the louvre
dL = correction of reverberation noise in the outside (constant = 3)

Lw_1 = sound power lever of the system "dB(A)"
Lw_A = sound power of the noise source "dB(A)"
D_t = attenuation of the transmission
D = louvre attenuation

$Lw_ž(A)$= level of the louvre acoustic output at air speed given just before the louvre
R = distance of the point from the core of the louvre "m"
Q = directional coefficient (determined by the designer - most common value is 2)

Louvre attenuation D [dB]								
PHZE 600	frequency [Hz]							
	63	125	250	500	1000	2000	4000	8000
attenuation [dB]	7	9	12	26	27	25	27	29

Correction of the louvre self-noise according to its surface Δ Lw [dB]										
PHZE 600	surface of the louvre m²									
	0,3	0,5	0,7	0,8	1	1,5	2	4	6	10
correction [dB]	-5,2	-3	-1,5	-1	0	1,8	3	6	7,8	10



Correction of the louvre self-noise according to the way of air flow and type of connection $Lw_{a\,oct}$ - frequencies								
	63	125	250	500	1000	2000	4000	8000
F-IN	0	9	6	-1	-2	-6	-9	-20
F-OUT	0	9	6	-1	-2	-6	-9	-20
K-IN	2	3	-1	-5	-5	-7	-11	-17
K-OUT	2	2	-2	-5	-8	-8	-9	-14

Diagram of the pressure loss [Pa]

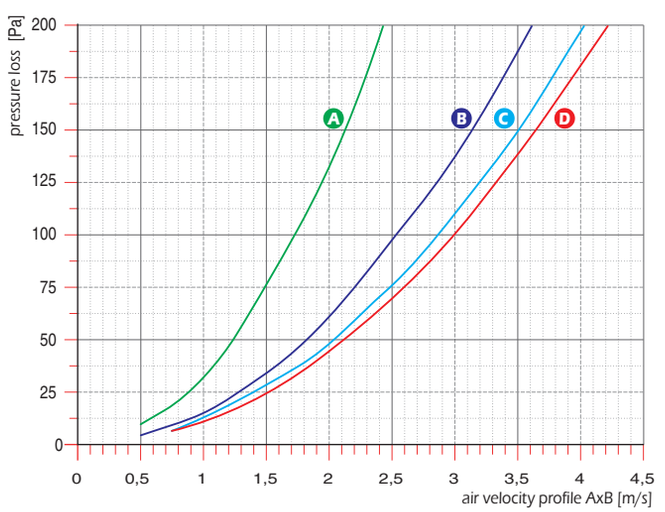
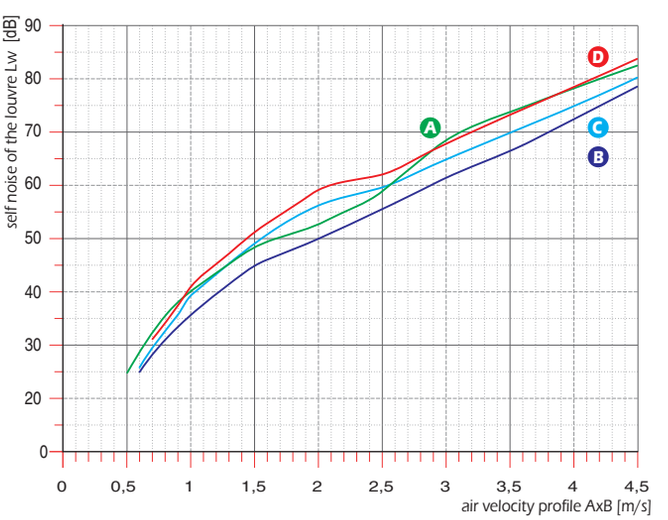


Diagram of the self noise Lw due to the air flow [dB]

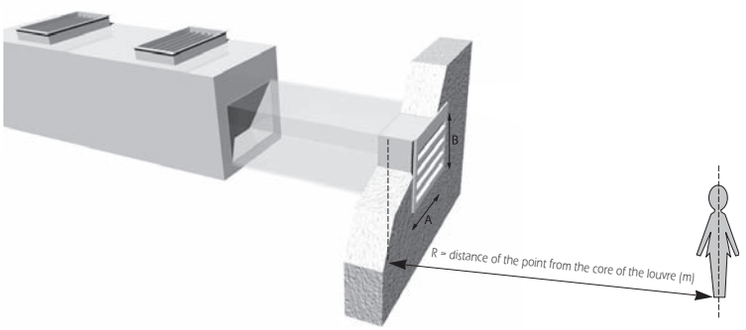


Correction of the pressure loss by the way of air flow and type of connection				
type of louvre	F-IN	F-OUT	F-IN	F-OUT
600	0,92	0,92	0,9	1

Correction according to the way of air flow and type of connection Lw_a				
type of louvre	K-OUT	K-IN	F-OUT	F-IN
600	0	-3	-3	-4

Example of calculation:

METHODICS OF DESIGNING ACOUSTIC LOUVER



Calculation: $L_v = 10\log(10^{Lp_v/10} + 10^{Lp_ž/10}) + dL$

$$Lp_v = Lw_1 + 10\log\frac{Q}{(4x\,\pi\,xR^2)}$$

$$Lp_ž = Lw_ž(A) + 10\log\frac{Q}{(4x\,\pi\,xR^2)}$$

$$Lw_1 = Lw_A - D_t - D$$

$$Lw_ž(A) = Lw\,(diagram) + \Delta Lw + Lw_a + Lw_{a\,oct}$$

Lv = desired accoustic pressure at defined point

Lp_v = noise dispersion in the air duct reduced by teh attenuation "D" of the acoustic louvre and routing

$Lp_ž$ = self noise of the louvre

dL = correction of reverberation noise in the outside (constant = 3)

Lw_1 = sound power lever of the system "dB(A)"

Lw_A = sound power of the noise source "dB(A)"

D_t = attenuation of the transmission

D = louvre attenuation

$Lw_ž(A)$= sound power level of the louvre at defined air stream speed right in front of the louvre

R = distance of the point from the core of the louvre "m"

Q = directional coefficient (determined by the designer - most common value is 2)

Example of calculation:

To design the louvre based on the parameters of the source of the noise in order to achieve the value of 60 dB(A) in distance of 3m from the louvre.

Depth of louvre 300 MM - selected size 1000/1000 MM

Air mass 5500 m^3/h

Type of installation K-OUT

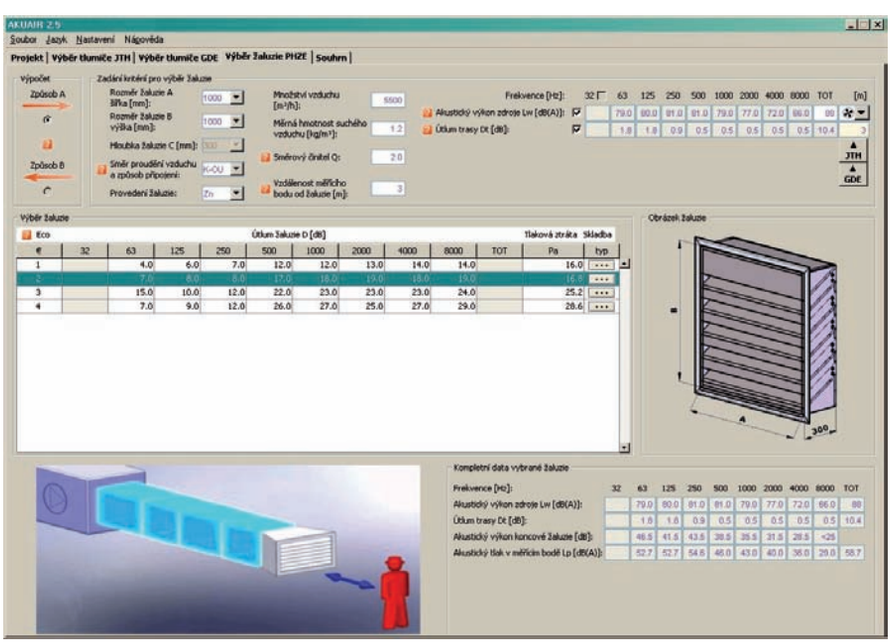
Directional coeficient of sound reflection Q=2

Calculation									
	63	125	250	500	1000	2000	4000	8000	
LwA - Source of the noise	79	80	81	81	79	77	72	66	
Dt - attenuation of the transmittion	1,8	1,8	0,9	0,5	0,5	0,5	0,5	0,5	
D - attenuation of the louvre	7	8	8	17	18	19	18	19	
Lwž(A) - self noise of the louvre	46,5	41,5	43,5	38,5	35,5	31,5	28,5	25	**TOT**
Lv - acoustic pressure [dB(A)]	**52,7**	**52,7**	**54,6**	**46**	**43**	**40**	**36**	**29**	**58,7**

Pressure loss according to the diagram: 17 Pa x correction for K-OUT (=1) = 17 Pa

Example of calculation in the software

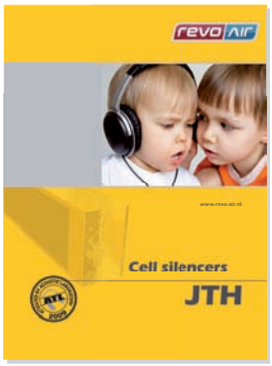
AKUAIR®



CALCULATION SOFTWARE

In order to simplify the selection of the louvres and other insulating products based on the complex noise situation and the source of the noise, the manufacturer created the computer software AKUAIR

Cell silencers JTH



Cell silencers JTHE

Panel silencers Glideflow - GDE

KEY FOR AN ORDER:

PHZE - 1250 / 1000 / 200 / RAL9010 / XX

„Width"
200 ÷ 2500 mm

„Height"
350 ÷ 2500 mm

„Depth"
200 mm
300 mm
400 mm
600 mm

„Colour finish"
standard RAL 9010 (white)
All RAL range

„Material finish"
Zn - zinc-coated metal sheet
Al - sheet aluminium
Ni - stainless steel
XX - different finish (yellow brass, copper, etc.)

PHZE 06/11-ENG

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