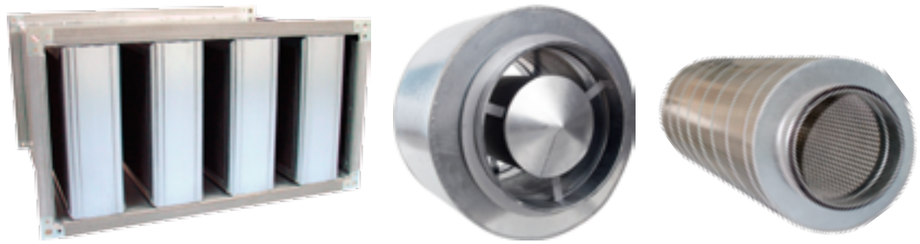
6/S1
v 3.3 (en)

SOUND ATTENUATORS

PZ, PZC, PZM, PK



klimaoprema

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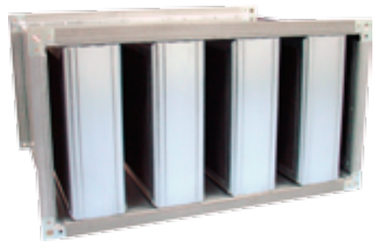
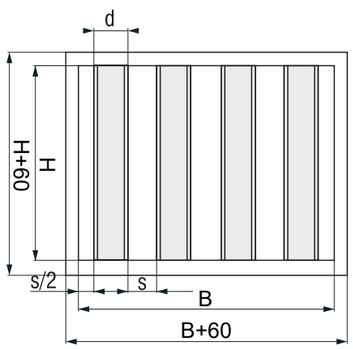
Definition of symbols:

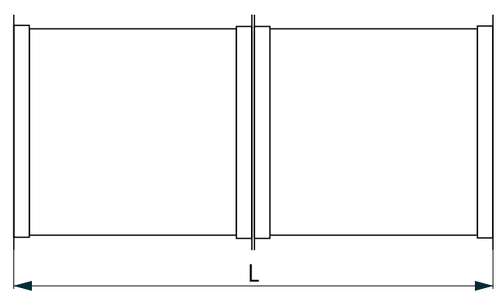
B [m]	- Attenuator width	f_m [Hz]	- Frequency
H [m]	- Attenuator height	L_W [dB]	- Sound power level
L [m]	- Attenuator length	L_{WA} [dB]	- Sound power level (A-weighting)
d [m]	- Splitter width	De [dB]	- Sound attenuation
s [m]	- Splitter gap	L_{pA} [dB(A)]	- Sound pressure level (A-weighting)
V [m³/h]	- Air flow rate		
v [m/s]	- Air velocity		
Δp [Pa]	- Pressure drop		



RECTANGULAR ATTENUATOR

- For sound attenuation in ventilation ducts and ventilated areas
- Aerodynamically shaped sound attenuation splitter reduces drag by 30% (energy savings)
- Sound attenuation splitters are made of flame retardant material, apsorption material
- Splitters are constructed in three standard thicknesses: d = 100 mm, d = 200 mm and d = 300 mm
- Rectangular sound attenuators are available in five standard cross-section dimensions: d/s = 100/50; 100/100; 200/100; 200/200 and 300/100
- Attenuator casing is made of galvanised steel, fitted with flanges meeting criteria given in the table on page 3
- Attenuators heavier than 300 kg are supplied in two or more sections, each single section lighter than 300 kg





SOUND ATTENUATION SPLITTER

- Absorption material rock-wool, non-flammable, according to Class A2, to DIN 4102, Part 1.
- Significant attenuation in frequency span form 63 to 8000Hz.
- Aerodynamic splitter shape.
- Splitter cover (lining):
  - **Glass fibre veil (V) -** Very thin protective cover on the splitter surface
  - **Reflective plates (R) -** Half of each side of the splitter (alternatively centre up and centre down) is fitted with galvanised tin plates
  - **Glass silk (S) -** At air velocities higher than 20m/s
  - **Reflective plates and glass silk (RS) -** Half of each side of the splitter (alternatively centre up and centre down) is fitted with galvanised tin plates with other surface covered in glass silk
  - **Reflective plates and glass fibre veil (RV) -** Half of each side of the splitter (alternatively centre up and centre down) is fitted with galvanised tin plates with other surface covered in glass fibre veil
  - **Perforated plate and glass silklass (PS) -** Half of each side of the splitter (alternatively centre up and centre down) is fitted with galvanised perforated tin plates with other surface covered in glass silk
  - **Reflective plates and glass fibre veil (PV) -** Half of each side of the splitter (alternatively centre up and centre down) is fitted with galvanised perforated tin plates with other surface covered in glass fibre veil

Meets standards VDI 6022, Part 1 and Part 3, DIN 1946, Part 2 and Part 4 and VDI 3803.

Standard attenuator dimensions and weights (no splitter lining)

H [mm]	L [mm]	Duct width B [mm]																			
		PZ 100/50 d/s = 100/50											PZ 100/100 d/s = 100/100							
		300	450	600	750	900	1050	1200	1350	1500	1650	1800	400	600	800	1000	1200	1400	1600	1800
300	500	12	16	20	24	28	32	36	41	45	49	53	13	18	23	27	32	37	41	46
	1000	20	27	34	41	48	55	62	69	76	83	90	22	30	38	46	54	62	70	78
	1500	29	39	49	58	68	78	88	98	108	118	128	32	43	54	66	77	88	100	111
	2000	37	50	63	76	88	101	114	127	140	153	165	41	55	70	85	99	114	129	143
600	500	18	24	29	34	40	45	50	56	61	66	72	19	25	31	37	43	49	55	61
	1000	31	40	49	58	67	76	85	94	103	112	121	33	43	53	63	73	83	93	103
	1500	43	56	68	81	94	106	119	132	144	157	170	46	60	74	88	102	116	130	145
	2000	55	71	88	104	121	137	153	170	186	202	219	59	77	95	113	132	150	168	186
900	500		31	38	44	51	58	64	71	77	84	91	26	33	40	47	55	62	69	76
	1000		52	63	74	85	96	107	118	129	140	151	43	55	67	79	91	103	115	127
	1500		72	88	103	119	134	150	165	181	196	212	60	77	94	111	127	144	161	178
	2000		93	113	133	153	173	193	212	232	252	272	77	99	120	142	164	186	207	229
1200	500			46	54	62	70	78	86	94	102	110		40	49	57	66	74	83	91
	1000			77	90	103	116	129	142	155	168	182		67	81	95	109	123	137	151
	1500			117	167	158	178	198	219	239	260	280		100	122	144	166	188	210	232
	2000			147	173	198	224	250	275	301	327	352		127	154	182	209	237	264	292
1500	500				78	90	102	114	126	138	150	162			69	81	94	106	119	132
	1000				120	138	156	174	192	210	228	245			106	125	144	163	182	201
	1500				162	186	210	234	258	281	305	329			144	169	195	220	245	270
	2000				204	234	264	293	323	353	383	412			182	213	245	277	308	340
1800	500					105	119	133	146	160	174	188				94	109	123	137	152
	1000					160	180	201	221	242	262	283				114	166	187	206	230
	1500					215	242	269	296	323	350	378				195	223	252	280	309
	2000					270	303	337	371	405	439	472				245	281	316	352	388

H [mm]	L [mm]	Duct width B [mm]																			
		PZ 200/100 d/s = 200/100								PZ 200/200 d/s = 200/200						PZ 300/100 d/s = 300/100					
		600	900	1200	1500	1800	2100	2400	2700	800	1200	1600	2000	2400	2800	800	1200	1600	2000	2400	2800
300	500	19	28	34	42	50	57	65	72	22	30	39	48	57	66	25	36	46	57	67	78
	1000	33	46	59	72	85	98	112	125	37	52	67	82	97	113	43	61	80	98	116	134
	1500	46	65	84	102	121	140	159	177	52	74	95	117	138	160	61	87	113	139	165	191
	2000	60	84	108	133	157	181	205	230	67	95	123	151	179	207	79	113	147	180	210	248
600	500	28	38	47	57	67	77	87	97	30	41	52	64	75	86	36	50	64	78	92	106
	1000	47	64	81	98	115	132	149	166	51	70	89	108	127	146	61	85	109	133	157	181
	1500	66	90	114	138	162	186	210	234	71	98	125	152	179	206	86	120	154	188	222	256
	2000	85	116	147	178	209	240	271	303	92	127	162	196	231	266	111	155	199	246	287	331
900	500	36	48	61	73	85	98	110	122	38	52	66	79	93	106	46	64	81	99	116	134
	1000	60	81	102	123	144	165	186	207	64	87	110	133	156	179	78	108	138	167	197	227
	1500	85	114	144	173	203	232	262	291	91	123	155	188	220	252	110	152	194	236	278	331
	2000	109	147	185	224	262	300	338	376	117	159	200	242	284	325	142	196	251	305	359	413
1200	500	44	59	74	89	103	118	133	148	47	63	79	95	111	127	57	78	99	120	141	162
	1000	74	99	124	149	173	198	223	248	78	105	132	159	186	212	96	131	167	202	238	273
	1500	112	150	189	228	266	305	344	382	118	159	201	242	283	325	145	201	256	311	367	422
	2000	142	190	239	288	336	385	434	482	149	202	254	306	359	411	184	254	324	394	463	533
1500	500	62	84	106	128	150	171	193	215	65	88	111	134	157	180	81	112	143	174	205	236
	1000	98	131	164	198	231	264	298	331	102	137	172	208	243	279	127	174	222	270	318	366
	1500	133	178	223	268	313	358	403	448	139	187	234	282	330	378	172	237	302	366	431	496
	2000	169	225	281	338	394	451	507	564	176	236	296	356	417	477	218	300	381	463	544	625
1800	500	72	98	123	148	173	198	223	249	75	110	128	154	180	207	94	130	166	202	238	274
	1000	113	152	190	228	266	304	343	381	117	158	198	238	278	319	147	202	257	312	366	421
	1500	154	206	257	308	359	411	462	513	160	214	268	322	377	431	200	274	348	422	495	569
	2000	195	260	324	388	452	517	581	645	203	271	339	407	475	534	253	345	438	531	624	717

Standard attenuator dimensions and weights (with splitter lining)

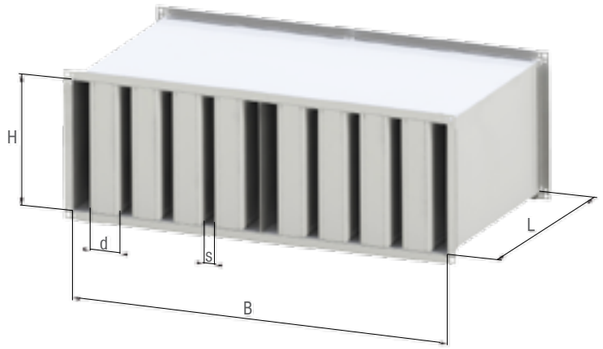
H [mm]	L [mm]	Duct width B [mm]																			
		PZ 100/50 d/s = 100/50											PZ 100/100 d/s = 100/100							
		300	450	600	750	900	1050	1200	1350	1500	1650	1800	400	600	800	1000	1200	1400	1600	1800
300	500	15	21	26	32	37	43	48	54	59	65	70	16	22	29	35	41	47	53	59
	1000	25	35	44	54	63	72	82	91	101	110	119	27	38	48	59	69	79	90	100
	1500	36	49	62	75	89	102	115	129	142	155	169	38	53	68	83	97	112	127	142
	2000	46	63	80	97	115	132	149	166	183	200	218	49	68	87	107	126	145	164	183
600	500	24	32	41	49	57	66	74	82	91	99	107	25	34	43	52	61	70	79	88
	1000	40	54	68	82	96	110	124	138	151	165	179	42	57	72	87	102	117	132	147
	1500	56	76	95	115	134	154	173	193	212	232	251	59	80	101	122	143	164	185	206
	2000	73	98	123	148	173	198	223	248	273	298	323	76	103	130	157	184	211	238	265
900	500		44	55	67	78	89	100	111	122	133	144	35	46	58	70	81	93	105	116
	1000		74	92	110	129	147	165	184	202	221	239	57	77	96	115	135	154	174	193
	1500		103	129	154	180	206	231	257	283	308	334	80	107	134	162	189	216	243	270
	2000		132	165	198	231	264	297	330	363	396	429	103	138	173	207	242	277	312	347
1200	500			70	84	98	112	125	139	153	167	181		58	73	87	101	116	130	145
	1000			116	139	162	184	207	230	253	276	299		96	120	144	168	192	215	239
	1500			171	205	239	273	307	341	375	410	444		141	177	212	248	283	319	354
	2000			217	260	303	436	389	432	475	518	562		179	224	269	314	359	404	449
1500	500				115	135	154	173	193	212	232	251			98	118	138	158	178	198
	1000				181	211	241	271	302	332	362	392			155	186	217	249	280	311
	1500				247	288	329	370	411	451	492	533			212	254	297	339	381	423
	2000				313	365	416	468	519	571	622	674			269	322	376	429	483	536
1800	500					158	181	204	226	249	272	294				139	162	185	208	232
	1000					248	283	318	353	388	423	458				218	254	290	326	362
	1500					337	385	432	480	527	575	622				297	346	395	444	493
	2000					426	486	546	606	666	726	786				376	438	499	561	623

H [mm]	L [mm]	Duct width B [mm]																			
		PZ 200/100 d/s = 200/100								PZ 200/200 d/s = 200/200						PZ 300/100 d/s = 300/100					
		600	900	1200	1500	1800	2100	2400	2700	800	1200	1600	2000	2400	2800	800	1200	1600	2000	2400	2800
300	500	23	32	42	51	61	70	80	89	25	36	47	57	68	79	29	42	55	68	81	93
	1000	38	54	70	86	102	118	134	150	42	60	78	96	114	132	49	71	92	114	135	157
	1500	54	76	99	121	144	166	189	211	60	85	110	136	161	186	69	100	130	160	190	220
	2000	69	98	127	156	185	214	243	277	77	109	142	175	207	240	89	128	167	206	245	284
600	500	35	49	62	76	90	104	117	131	37	52	67	82	97	112	45	63	82	100	119	137
	1000	58	81	103	126	149	171	194	217	62	87	111	136	161	185	73	104	134	165	195	226
	1500	81	112	144	176	207	239	271	302	86	121	156	190	225	259	102	145	187	229	272	314
	2000	104	144	185	225	266	307	347	388	111	155	200	244	288	332	131	185	240	294	348	403
900	500	47	65	83	101	119	137	155	173	50	69	88	107	126	145	60	84	108	132	157	181
	1000	77	107	136	166	195	224	254	283	81	113	144	176	207	239	97	137	176	216	255	294
	1500	108	148	189	230	271	312	353	393	113	157	201	244	288	332	135	190	244	299	353	408
	2000	138	190	242	295	347	399	451	504	145	201	257	313	369	425	173	242	312	382	451	521
1200	500	59	81	104	126	148	170	192	215	62	85	108	132	155	179	75	105	135	165	195	225
	1000	97	133	169	205	241	277	313	349	101	139	177	215	253	292	121	170	218	266	315	363
	1500	142	196	250	303	357	411	465	518	148	204	261	318	374	431	179	251	323	395	467	539
	2000	180	247	315	383	450	518	586	653	187	258	330	401	472	544	255	316	406	496	587	677
1500	500	81	112	143	174	205	237	268	299	83	116	148	180	213	245	103	145	188	230	273	315
	1000	126	173	221	268	316	363	411	458	130	179	229	278	328	378	159	232	286	350	414	478
	1500	171	235	299	362	426	490	554	618	177	243	310	377	444	510	214	300	385	471	556	642
	2000	216	296	376	457	537	617	697	777	223	307	391	475	559	643	270	377	484	591	698	805
1800	500	95	131	167	204	240	277	313	349	97	135	172	210	247	285	121	170	220	269	319	368
	1000	147	202	258	313	368	423	478	533	151	208	266	323	380	437	185	259	334	408	482	556
	1500	200	274	348	422	496	570	644	717	205	282	359	436	513	590	250	349	448	574	645	744
	2000	252	345	438	530	623	716	809	902	259	356	452	549	645	742	314	438	561	685	809	933

Connecting more attenuators

- Sections of the attenuator are connected with built-in flanges and bolts
- Contact flange surfaces can be additionally fixed by reinforcement holders
- Prior to attenuator delivery, sections of each attenuator are assembled and disassembled in the factory.

Connection along width

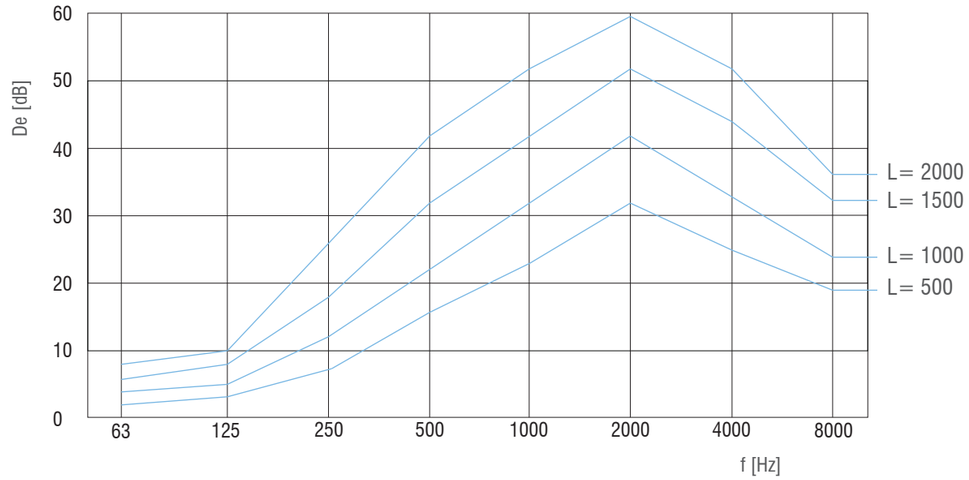


Connection along length

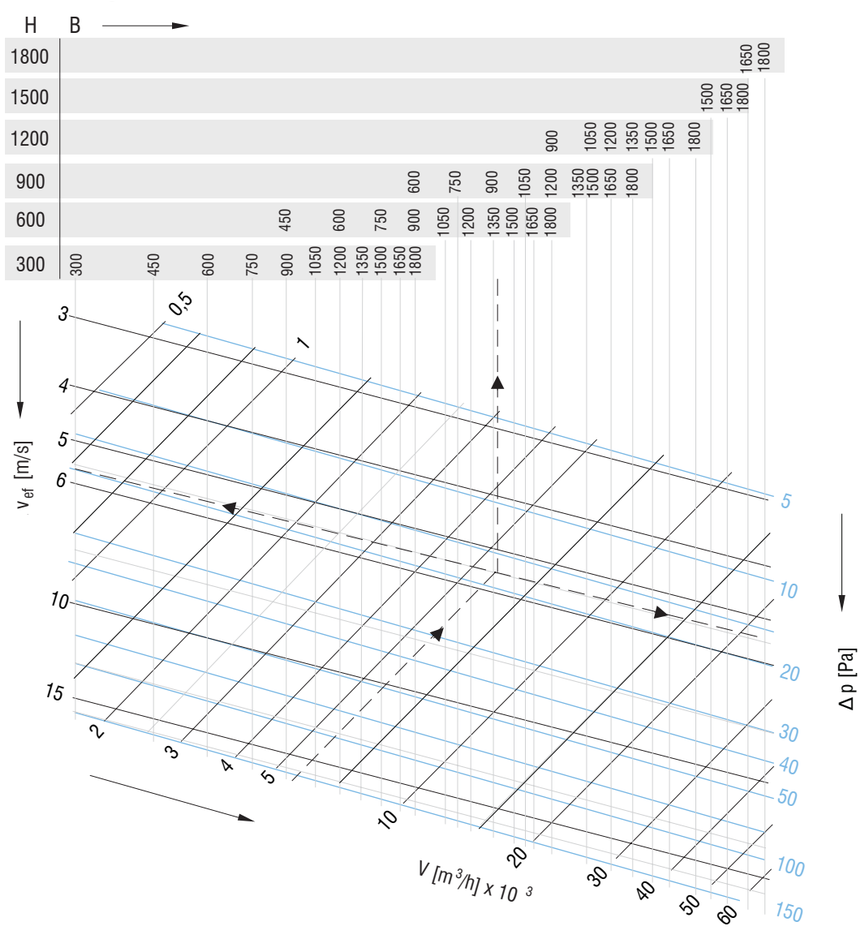
Connection along height

Four and eight sectional attenuator

Attenuation diagram, type PZ 100/50



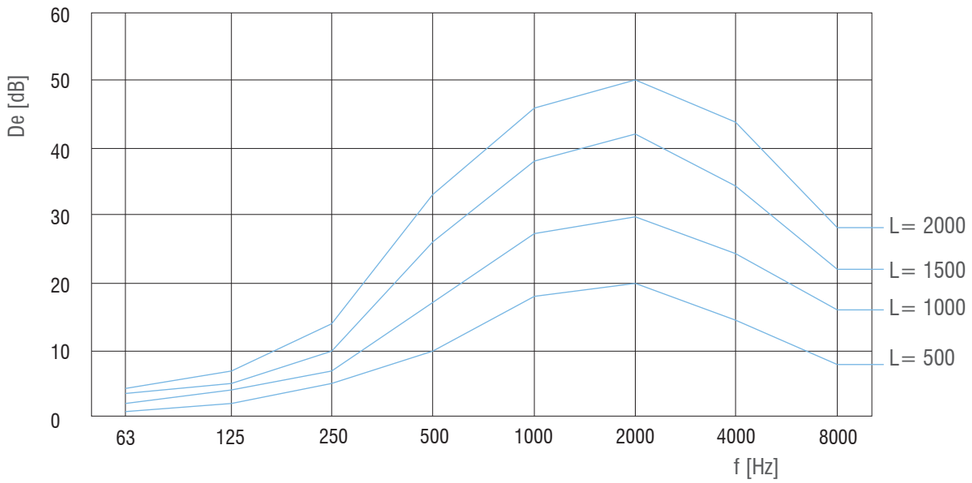
Selection diagram



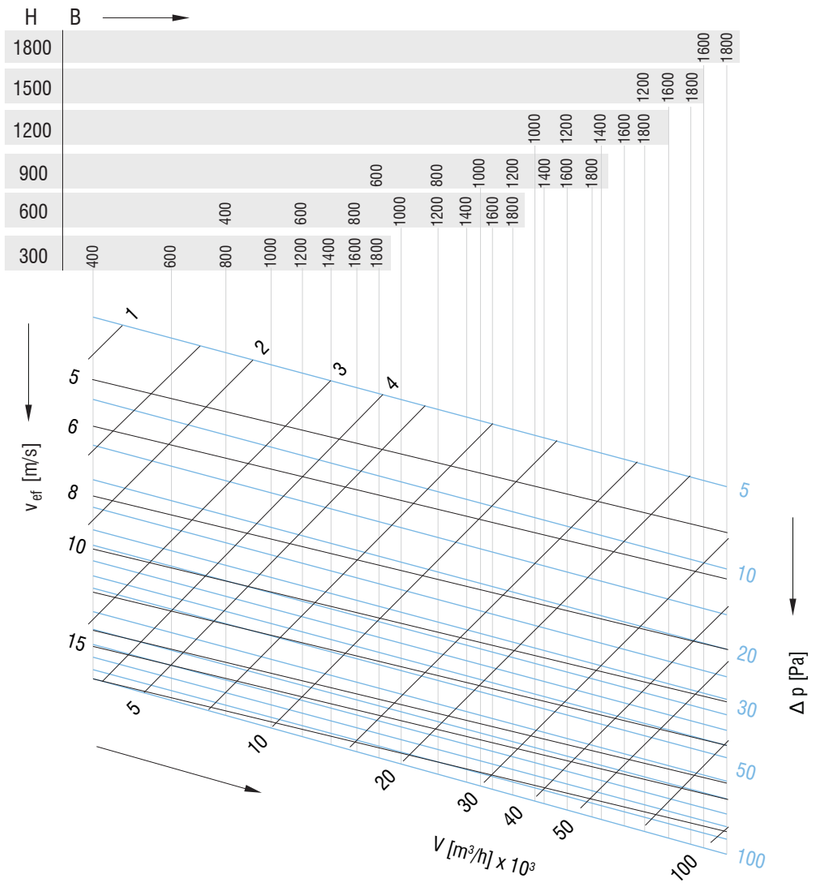
d/s = 100/50

Width B [mm]	No. of splitters
300	2
450	3
600	4
750	5
900	6
1050	7
1200	8
1350	9
1500	10
1650	11
1800	12

Attenuation diagram, type PZ 100/100



Selection diagram

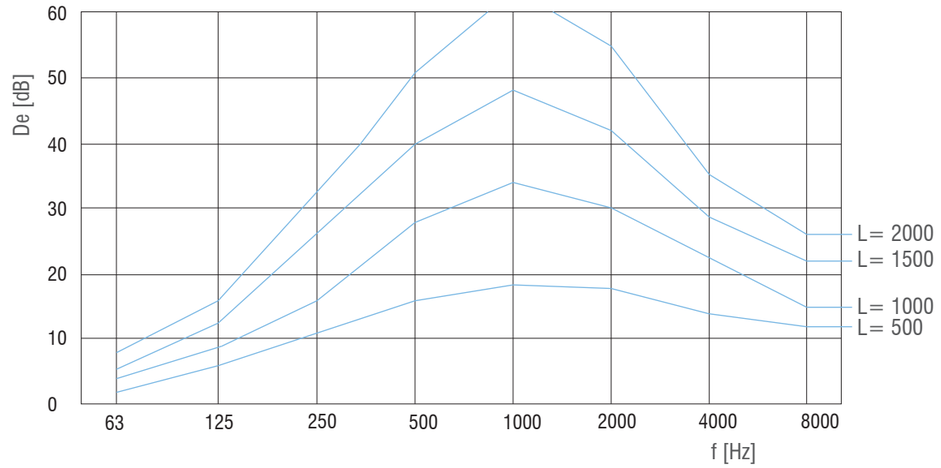


d/s = 100/100

Width B [mm]	No. of splitters
400	2
600	3
800	4
1000	5
1200	6
1400	7
1600	8
1800	9

SOUND ATTENUATORS

Attenuation diagram, type PZ-R 100/50



Example:

Given:
Airflow rate: V=5500 m³/h
Required attenuation: 24 dB (A) at 250 Hz

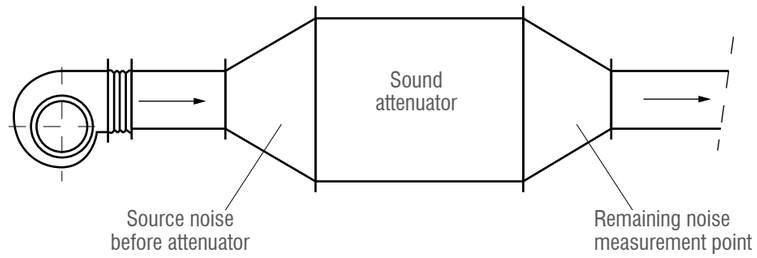
Solution:

Dg 1: PZ-R 100/50
Attenuator length: L = 1500 mm

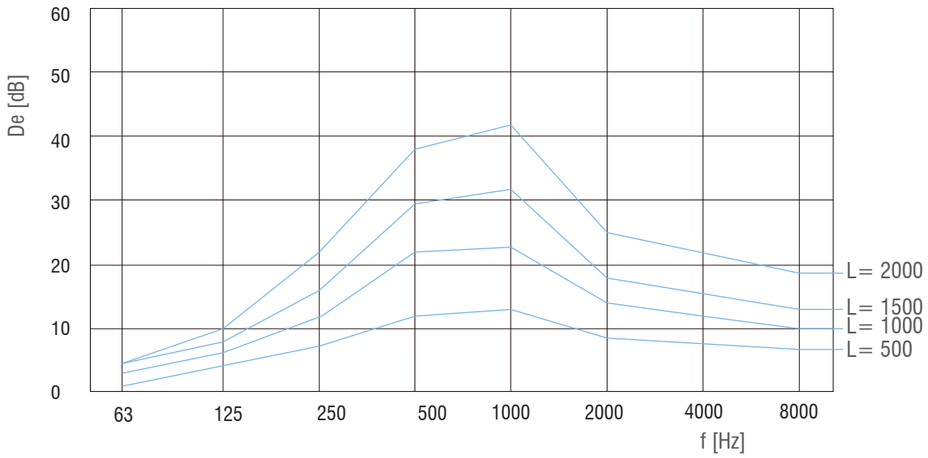
Dg 2: Effective air velocity v_{ef} = 5,5 m/s
Pressure drop Δ P_{tot} = 17 Pa
Attenuator cross-section B x H = 1350 x 600 or 900 x 900

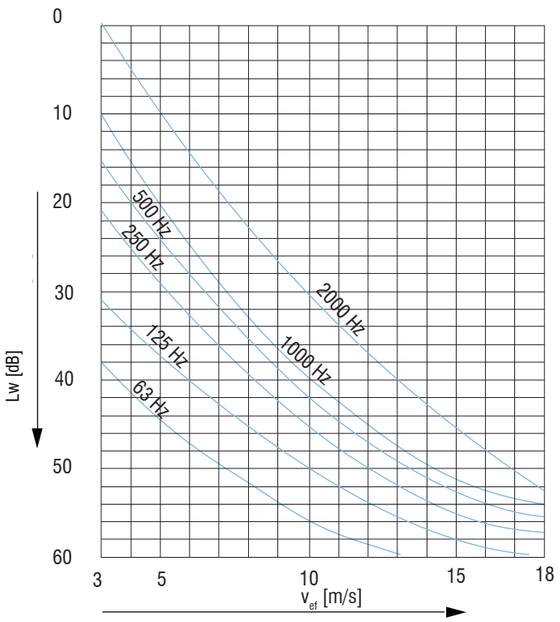
Dg. 7: Frequency Hz	125	250	500
Flow regenerated noise dB (A)	39	31	27
A_{tot} = B x H= 0,81 m2			
Tab. 9: correction dB (A)	-2	-2	-2
Total air flow regenerated noise dB(A)	37	29	25

In each octave band noise values determined above have to be by 9 dB(A) lower than the attenuated source noise measured after the attenuator (see Figure).

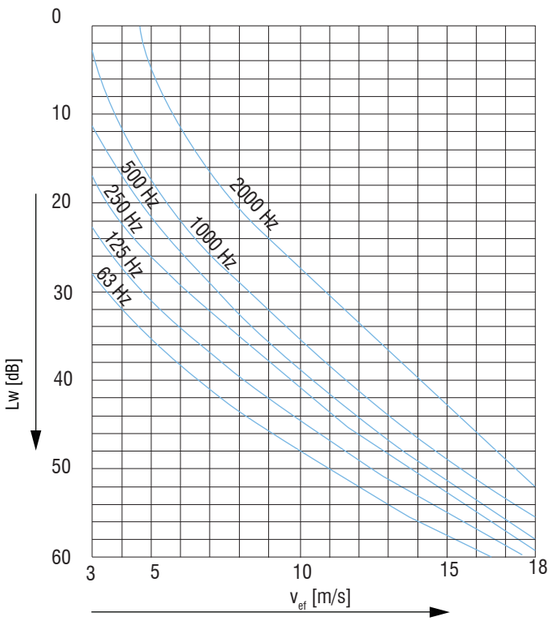


Attenuation diagram, type PZ-R 100/100





Airflow regenerated noise diagram for d/s = 100/50
(based on outlet size B x H = A_{tot} = 1m²)

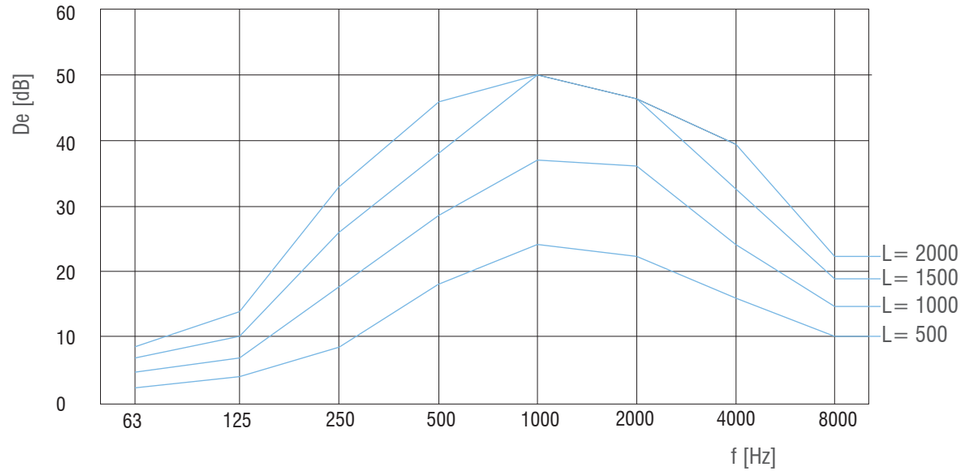


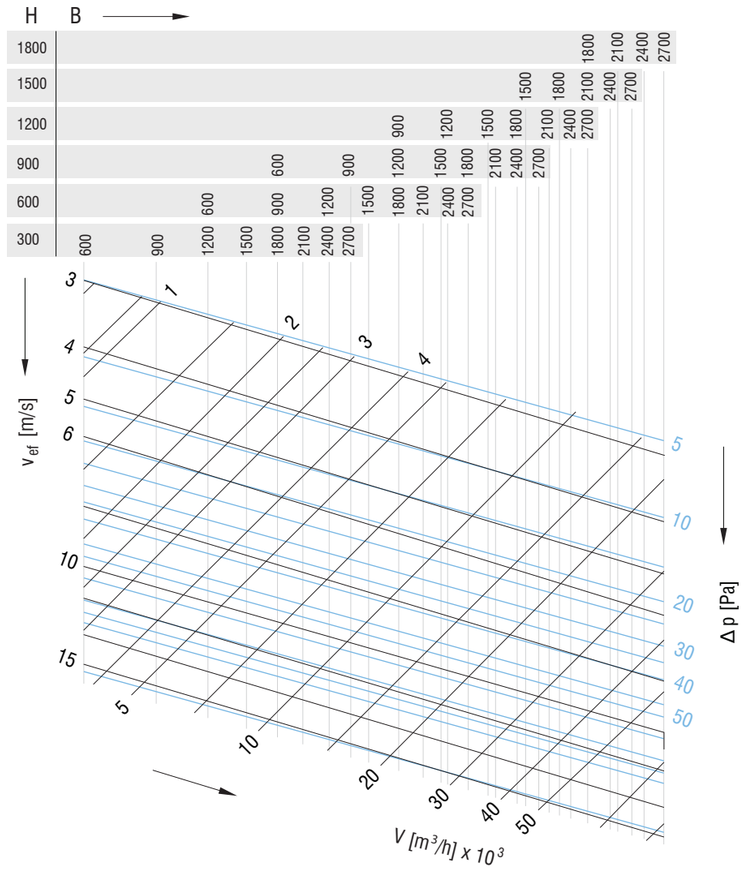
Airflow regenerated noise diagram for d/s = 100/100
(based on outlet size B x H = A_{tot} = 1m²)

Correction table

A_{tot} [m²]	0,25	0,5	0,75	1	1,25	1,5	2
Correction dB (A)	-6	-3	-2	0	1	2	3

Attenuation diagram, type PZ 200/100

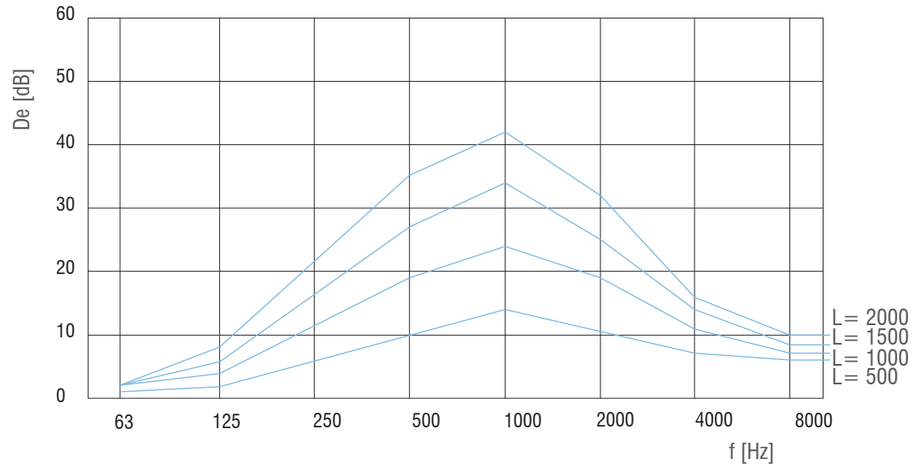




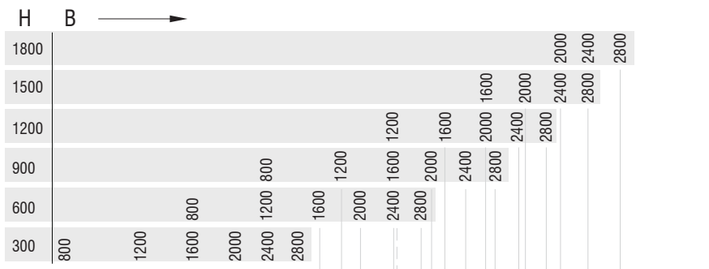
d/s = 200/100

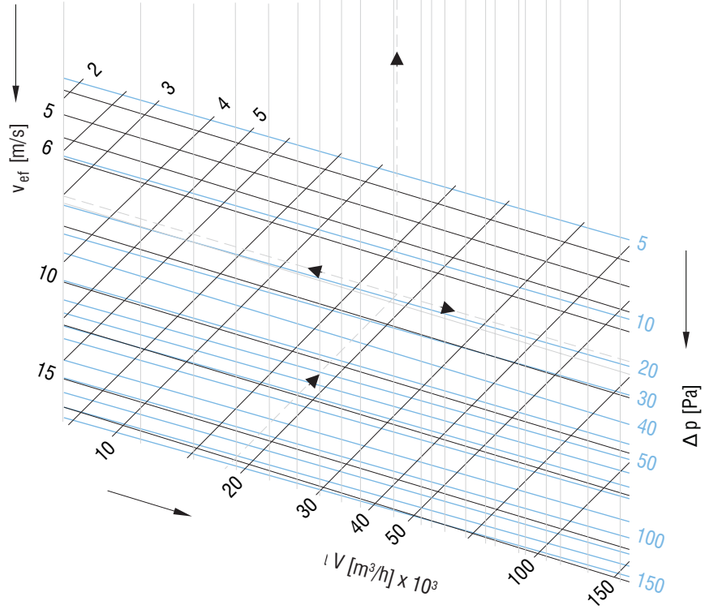
Width B [mm]	No. of splitters
600	2
950	3
1200	4
1500	5
1800	6
2100	7
2400	8
2700	9

Attenuation diagram, type PZ 200/200



Selection diagram

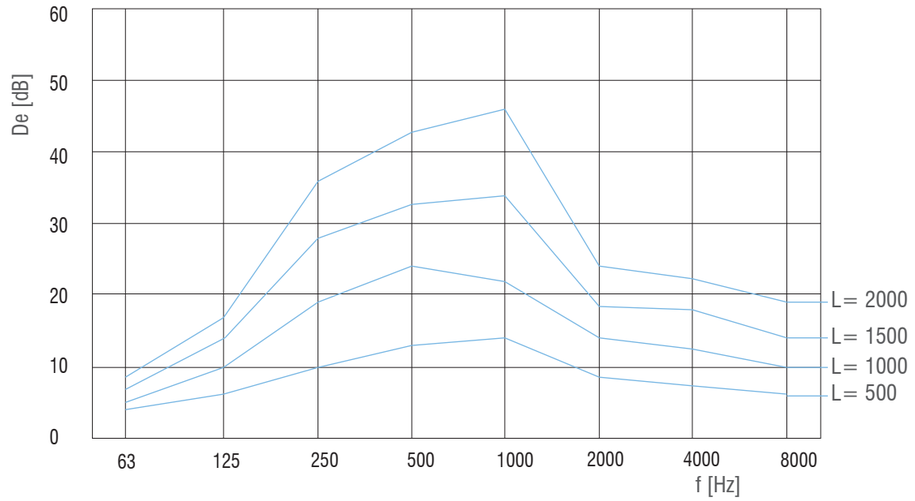




d/s = 200/200

Width B [mm]	No. of splitters
800	2
1300	3
1600	4
2000	5
2400	6
2800	7

Attenuation diagram, type PZ-R 200/100



Example:

Given:
Airflow rate: V=1800 m³/h
Required attenuation: 18 dB (A) at 250 Hz

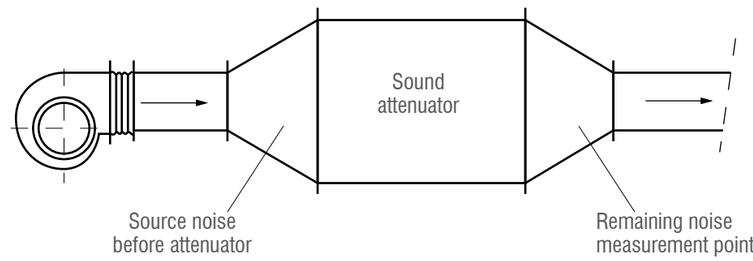
Solution:

Dg 1: PZ-R 200/100
Attenuator length: L = 1500 mm

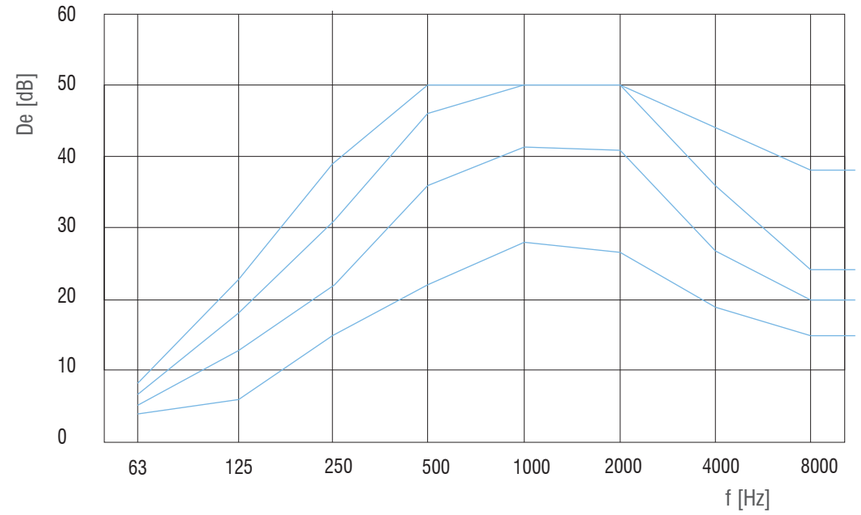
Dg 2: Effective air velocity v_{ef} = 7 m/s
Pressure drop Δp_{tot} = 17 Pa
Attenuator cross-section B x H = 2400 x 600 or 1600 x 900

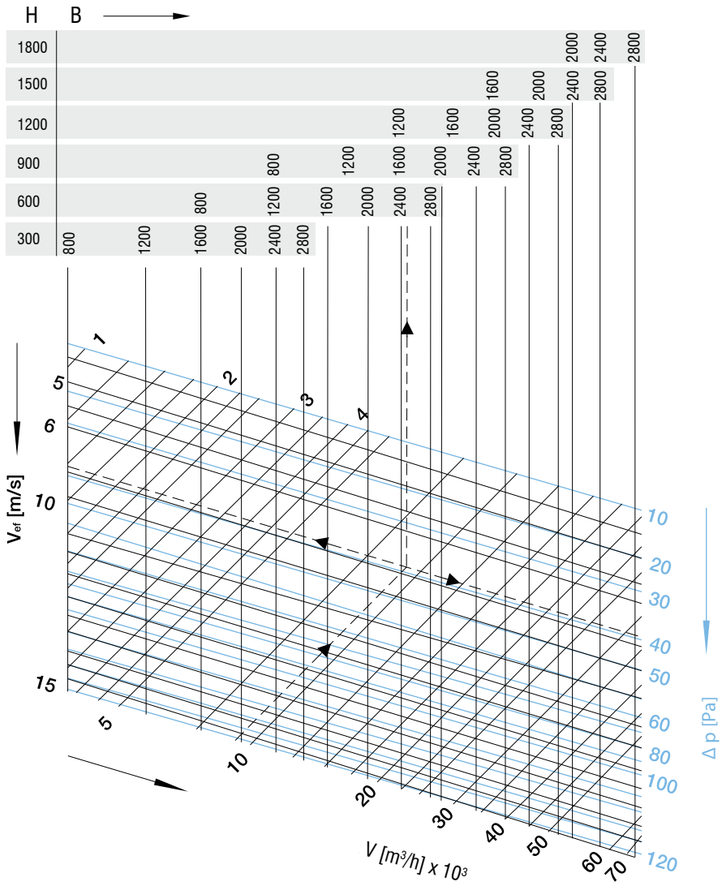
Dg. 7: Frequency Hz	125	250	500
Flow regenerated noise dB (A)	37	32	29
A_{tot} = B x H= 0,81 m²			
Tab. 9: correction dB (A)	2	2	2
Total air flow regenerated noise dB(A)	39	34	31

In each octave band noise values determined above have to be by 9 dB(A) lower than the attenuated source noise measured after the attenuator (see Figure).



Attenuation diagram, type PZ 300/100

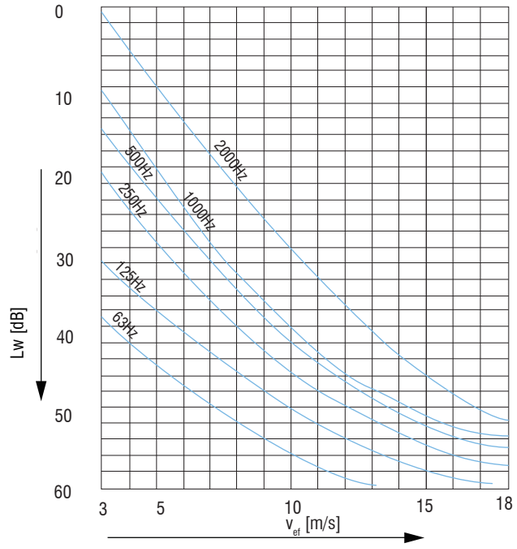




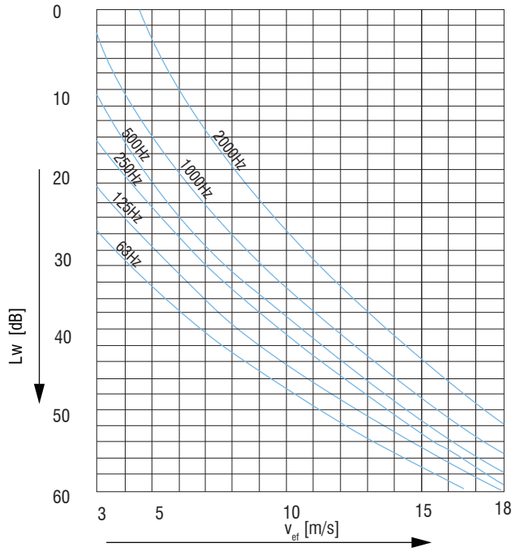
d/s = 300/100

Width B [mm]	No. of splitters
800	2
1300	3
1600	4
2000	5
2400	6
2800	7

Airflow regenerated noise diagram for d/s = 200/100;
(based on outlet size B x H = A_{tot} = 1m²)



Airflow regenerated noise diagram for d/s = 300/100
(based on outlet size B x H = A_{tot} = 1m²)

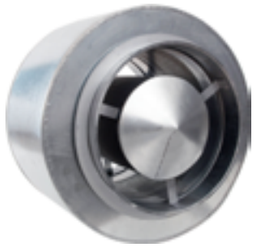


A_{tot} [m²]	0,25	0,5	0,75	1	1,25	1,5	2
Correction dB (A)	-6	-3	-2	0	1	2	3

Ordering key:

Sound attenuator	**PZ - d / s - B x H x L - V**
Splitter width / gap	
Dimensions	
Splitter coverings:	
V - Glass fibre veil	
RS - Reflective plate and glass silk	
PS - Perforated plate and glass silk	
S - Glass silk	
RV - Reflective plate and glass fibre veil	
PV - Perforated plate and glas fibre veil	

Splitter	**PK - d x H x L - V**
Dimensions	
Designations as for attenuator	



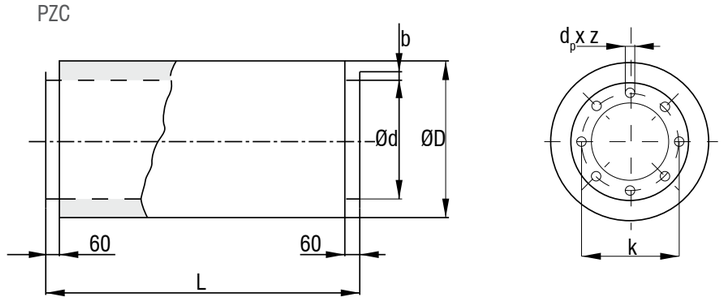
ROUND ATTENUATOR - PZC

- Outer casing is made of galvanised sheet steel, filled with sound absorbing material. Inner duct of the attenuator is made of perforated galvanised sheet steel

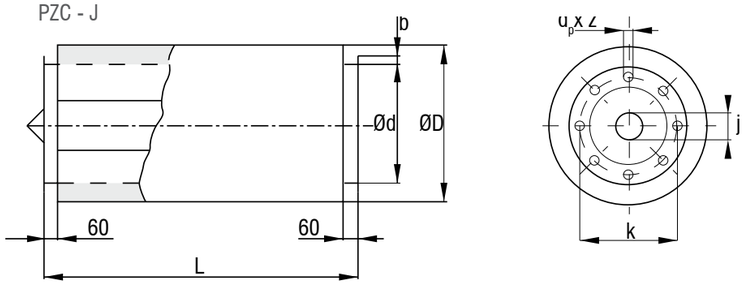
Options

Version with pod

PZC



PZC - J



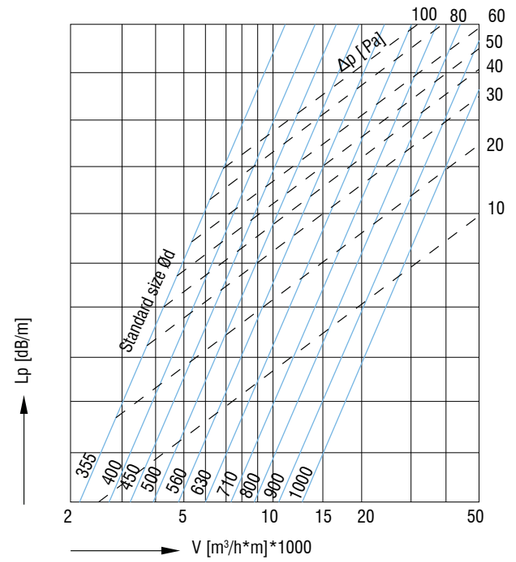
Standard diameter	Flow area [m²]	øD [mm]	ø j [mm]	Attenuator weight						øk [mm]	b [mm]	s [mm]	ødpxz
				L=500		L=1000		L=1500					
				PZC	PZC-J	PZC	PZC-J	PZC	PZC-J				
355	0,100	555	224	23	28	40	48	57	68	392	30	4	9,5x8
400	0,126	600	250	25	31	44	53	62	76	438	30	4	9,5x8
450	0,158	650	280	28	35	48	59	68	84	488	30	4	9,5x8
500	0,198	700	315	30	39	52	66	74	93	538	30	4	9,5x8
560	0,251	760	355	33	43	57	73	81	104	600	35	4	9,5x12
630	0,316	830	399	37	49	63	83	89	117	670	35	4	9,5x12
710	0,397	910	450	41	55	70	94	98	132	750	35	4	9,5x12
800	0,499	1000	500	46	62	77	106	109	149	840	35	4	9,5x16
900	0,628	1100	560	51	71	86	120	120	169	940	35	4	9,5x16
1000	0,785	1200	630	56	80	94	136	132	191	1041	35	4	9,5x16

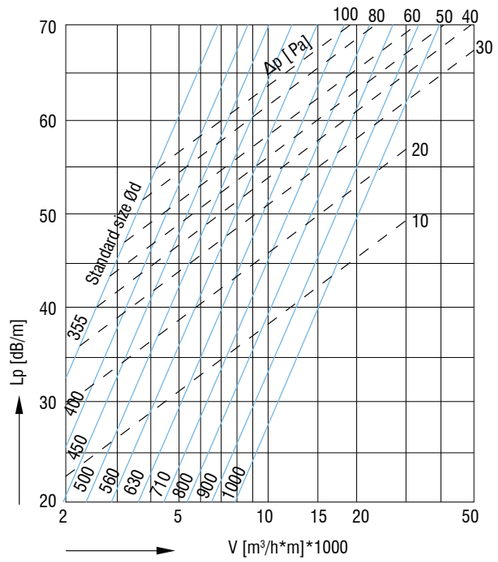
Ordering key

Round attenuator	**PZC**	**- J**	**- 560**	**- L**
J - attenuator with pod				
Standard size ød				
Attenuator length				

Attenuation D_e [dB]

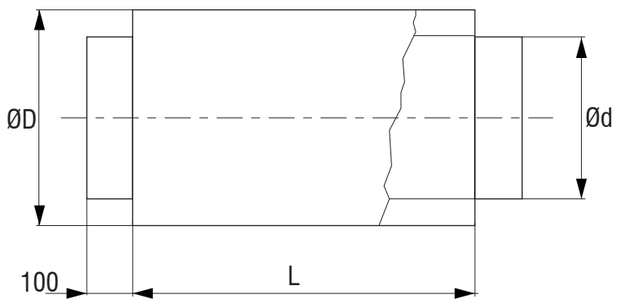
Frequency [Hz]	63		125		250		500		1000		2000		4000		8000	
Diameter	PZC	PZC-J	PZC	PZC-J	PZC	PZC-J	PZC	PZC-J	PZC	PZC-J	PZC	PZC-J	PZC	PZC-J	PZC	PZC-J
Attenuator length: L=500																
355	2	2	3	4	6	7	11	12	10	20	6	23	3	20	3	15
400	2	2	3	3	5	6	10	12	8	19	5	21	3	17	2	13
Attenuator length: L=1000																
355	2	3	7	9	11	14	21	24	23	42	12	43	7	39	4	27
400	2	3	6	8	10	13	20	24	19	42	9	41	6	34	4	23
450	2	3	5	7	9	12	19	23	14	42	7	37	4	28	3	19
500	2	3	4	6	8	11	18	22	10	43	4	34	3	23	3	15
560		3		6		11		21		40		31		21		14
630		3		6		11		21		36		28		18		13
710		3		5		10		20		32		24		15		11
800		3		5		10		19		28		20		12		10
900		2		5		10		18		23		15		8		8
1000		2		4		9		17		18		10		5		7
Attenuator length: L=1500																
355	3	3	9	11	14	17	27	31	35	48	19	50	8	43	6	37
400	3	4	8	10	14	16	26	30	29	50	15	50	7	40	5	31
450	3	4	7	9	13	15	25	29	22	50	11	50	6	36	5	25
500	3	4	6	8	12	14	24	28	16	50	6	50	4	33	4	19
560	3	4	5	8	11	14	23	27	14	49	6	46	4	30	4	18
630	2	4	4	7	10	13	21	27	12	48	5	42	4	26	3	16
710	2	3	4	7	9	13	19	26	10	47	4	37	3	22	3	15
800	1	3	3	6	8	12	17	25	7	46	3	32	3	17	2	13
900		3		5		11		24		45		26		12		11
1000		2		5		11		23		43		20		6		9





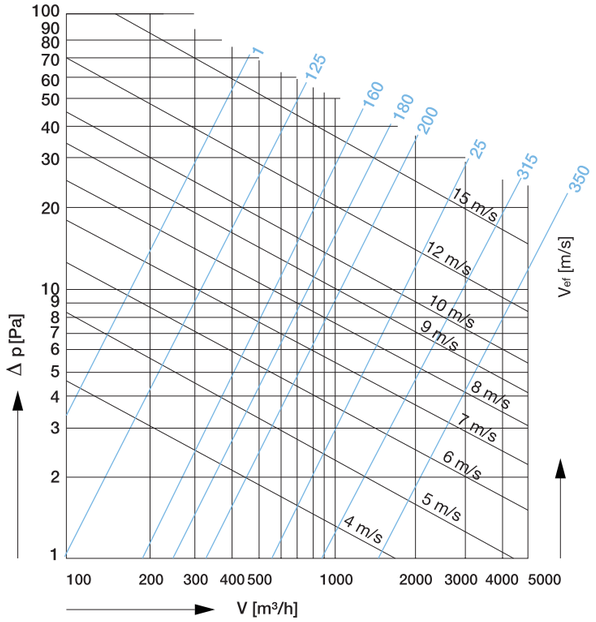
INTERSPACE ATTENUATOR - PZM

- PZM attenuators are made of galvanised sheet steel, containing sound-absorbing material infill.

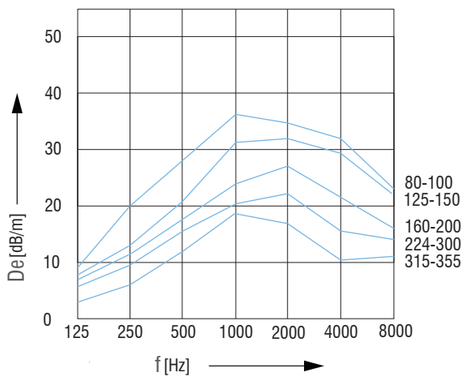


Dimensions of interspace sound attenuator			
Standard size ød [mm]	ød-2 [mm]	øD [mm]	Lenghts L[mm]
100	98	200	L=500,1000, 1500
125	123	225	
160	158	260	
200	198	300	
250	248	350	
300	298	400	
315	313	415	

Standard sizes



Insertion loss per meter length



Ordering key

Interspace Sound Attenuator	**PZM**	**- 200**	**- 1000**
Diameter ød			
Attenuator length			

NOTES: