Rectangular straight attenuator BDLD

Description

BDLD is a curved rectangular attenuator with convensional design with width and height dimensions that doesn't exceed the present connection dimensions.
Sizes available in horizontal mounting between (a x b) 400 x 300 mm to 2400 x 2400 mm and in vertical mounting between 400 x 300 mm and 2000 x 1500 mm.

Design
BDLD has an external shell of trapezoidal corrugated sheet metal for stabillity and reduced risk of oscillation.
BDLD is designed for low pressure drop with baffle combinations that attenuate aspecially low frequences well.
The type of insulation material is developed to provide good sound properties, low weight and to be cleanable.
BDLD meets the requirements of air tightness class C and pressure class 2 according to EN 1507:2006.
Tested according to ISO 7235.
BDLD is equipped with joining profile type RJFP / LS.

Tools for dimensioning and planning
he IT-online calculation tool lindQST or DIMsilencer are recommended for fast choise of attenuator or a complete and fast sound calculation of the duct system.

Order code

Product BDLD **a** **b** **x** **y** **e** **f**

BDLD

Width in mm , (a)
Horizontal mounting: 400 - 2400
Vertical mounting: 400 - 1500

Height in mm , (b)
Horizontal mounting 300 - 2400
Vertical mounting 300 - 2000

Standard Leg length (x) and (y)
(x):150, 300, 450 mm
(y):150, 300, 450 mm

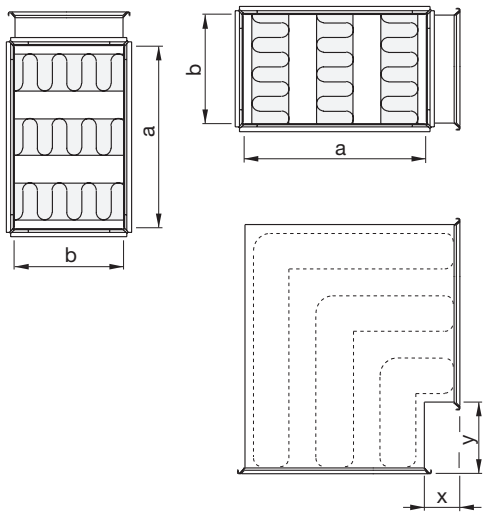
Code

Accessories
Specify your accessory type:
TRA, TRB*, TRC*, AIA, AIB, AIA+TRB, AIB+TRC

Example: BDLD - 800 - 600 - 150 - 150 - 3015 - TRA

Dimensions

Vertical mounting Horizontal mounting



Special sizes and materials, contact Lindab sales.

The attenuator is also available with the following accessories/ options:

TRA = Non-insulated inspection hatch.
TRB = Hatch intended for external insulation.*
TRC = Hatch intended for external insulation.*
AIA = 50 mm fire protection insulation.
Note! a and b dim. increase by 100 mm.
AIB = 100 mm fire protection insulation.
Note! a and b dim. increase by 200 mm.
AIA+TRB = 50 mm fire protection insulation and the appro priate cleaning cover.
Note! a and b dim. increase by 100 mm.
AIB+TRC = 100 mm fire protection insulation and the appropriate cleaning cover.
Note! a and b dim. increase by 200 mm.

** Specify insulation thickness when ordering.*

Rectangular straight attenuator BDLD

Manual designing for BDLD

A number of attenuators can be designed manually, for more combinations of attenuators and faster calculations use IT-online tool LindQST or DIMsilencer Manual method of calculation is shown below:

A Specify connection dimensions and flow-type location of the attenuator.

Width	800	mm
Heigh	1000	mm
Length	150	mm
Location	Exhaust air	

BDLD-800-1000-150-3008

B Specify the sound power level before the attenuator.
Read the insertion attenuation from the tables on page 7 – 9.
Calculate the sound power level after the attenuator irrespective of the air flow (selv generated noise).

Insertion attenuation

	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Resistance number	Self generated noise number inlet
Sound power level before attenuator	72	73	73	64	62	59	52	44		
Attenuation from table page 7 - 9	3	10	17	17	16	16	17	17	1,8	1,6
Sound power level after attenuator with-out self generated noise	69	63	56	47	46	43	35	27		

C Determine the pressure drop with help of the graph on page 4 and table on page 5.
In this case we have straight ducts before and after the attenuator.

Pressure drop

	Area	0,8 m²	Air flow	400 l/s
Graph on page 4, use resisstance number, area and air velocity	Air velocity	5 m/s	Pressure drop	28 Pa
Correction at disturbance according table on page 5	Factor	1	Pressure drop after correction	28 Pa

D Determine the self generated noise from the attenuator at present air flow.
Calculate the sound power level after the attenuator inclusive the self generated noise.

Self generated noise

	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Graph on page 6, use resistance number and air velocity	59	56	49	46	44	40	36	28
Correction for gross cross sectrion area	-1	-1	-1	-1	-1	-1	-1	-1
Self generated noise	58	55	48	45	43	39	35	27
Sound power level after the attenuator	69	64	57	49	48	44	38	30
(Longarithmical addition of self generated noise and sound power level after the attenuator withhout self generated noise)								

2020-09-02

Rectangular straight attenuator BDLD

The following table can be used for own manual calculations in accordance with the example on the previous page.

Designing table for BDLD

Width		mm
Heigh		mm
Length		mm
Location		

Insertion attenuation

	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Resistance number	Self generated noise number inlet
Sound power level before attenuator										
Attenuation from table page 7 - 9										
Sound power level after attenuator with-out self generated noise										

Pressure drop

	Area	0,8 m²	Air flow	400 l/s
Graph on page 3, use resisstance number, area and air velocity	Air velocity	m/s	Pressure drop	Pa
Correction at disturbance according table on page 4	Factor		Pressure drop after correction	Pa

Self generated noise

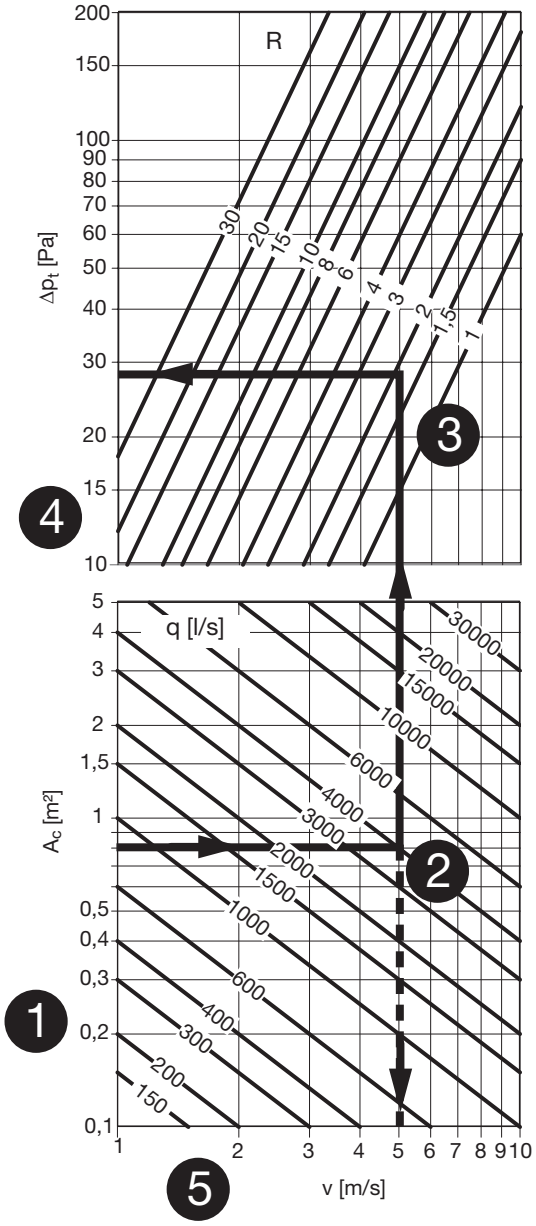
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Graph on page 5, use resistance number and air velocity								
Correction for gross cross sectrion area								
Self generated noise								
Sound power level after the attenuator								
(Longarithmical addition of self generated noise and sound power level after the attenuator withhout self generated noise)								

Rectangular straight attenuator BDLD

Pressure drop

Follow the directions below and the adjoining graph.

1. Calculate the gross cross section area a × b in m².
2. Go horizontal in the graph to the present air flow, l/s.
3. Go up to the resistance number achieved from the tables on page 7 – 9.
4. Read the pressue drop over the attenuator, at straight duct connection before and after the attenuator, (factor 1,0). For other modes of connection see the table for correction on page 5.
5. Air flow velocity, which is used at the calculation of the self generated noise, can be read here.



Rectangular straight attenuator BDLD

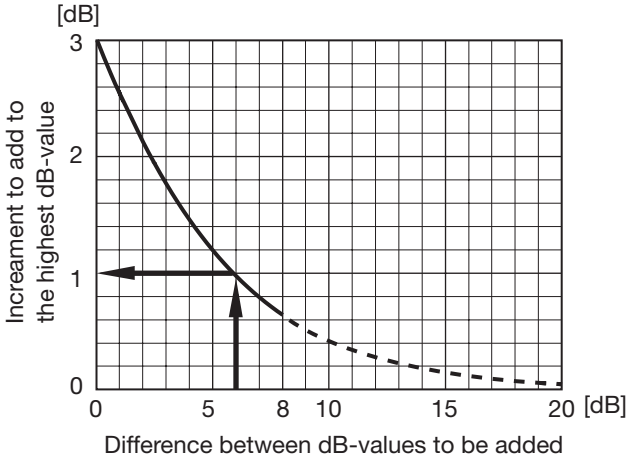
Pressure drop

Present pressure drop = Read pressure drop × below factor
D = The largest connection side (a or b) of the attenuator.

The table contains of a selection of the most common disturbance cases.

Before the attenuator				Attenuator	After the attenuator				Factor
Distance before the attenuator					Distance after the attenuator				
3xD	2xD	1xD	0xD		0xD	1xD	2xD	3xD	
			Duct	Attenuator	Duct				1,0
Bend				Attenuator	Duct				1,1
	Bend			Attenuator	Duct				1,2
		Bend		Attenuator	Duct				1,4
			Bend	Attenuator	Duct				1,5
			Duct	Attenuator		Bend			1,2
			Duct	Attenuator	Bend				1,3
Bend				Attenuator		Bend			1,3
Bend				Attenuator	Bend				1,4
	Bend			Attenuator		Bend			1,5
	Bend			Attenuator	Bend				1,6
		Bend		Attenuator		Bend			1,7
		Bend		Attenuator	Bend				1,8
			Bend	Attenuator		Bend			1,9
			Bend	Attenuator	Bend				2,0
			Chamber	Attenuator	Duct branch				2,0
			Duct	Attenuator	Chamber				3,0
			Chamber	Attenuator	Chamber				3,5

Logarithmic addition

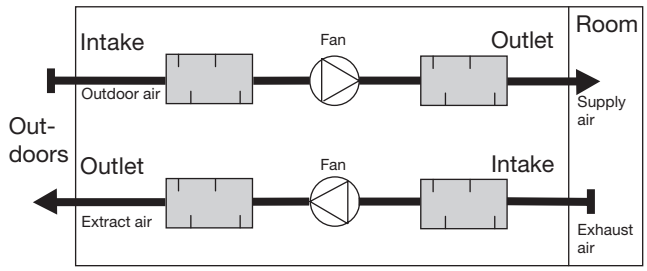


Rectangular straight attenuator BDLD

Self generated noise per frequence band

Follow the directions below and the adjoining graph.

6 Decide from the location of the attenuator wheth er it is the supply or exhaust graph that shall be used. (Rule of memory - the side that leads away from the fan, i.e. at supply air the outlet graph is used and at exhaust air the in-take graph.)



7 Go horizontally into the present graph, at present air velocity, to the self generated noise number.

8 Then go vertically up to the crossing of the differ ent frequency band lines.

9 Read the self generated noise, at gross cross section area 1 m², for each frequency band straight out to the left. In the example only the 8000 Hz-reading is shown.

10 Add or subtract the correction for the present gross cross section area.

Sound power level after the attenuator

The sound power level after the attenuatorcan be calcu-lated for all frequences by a logarithmical addition of:

”The self generated noise” and ”The sound power level before the attenuator”.

The shown example gives at 8000 Hz:

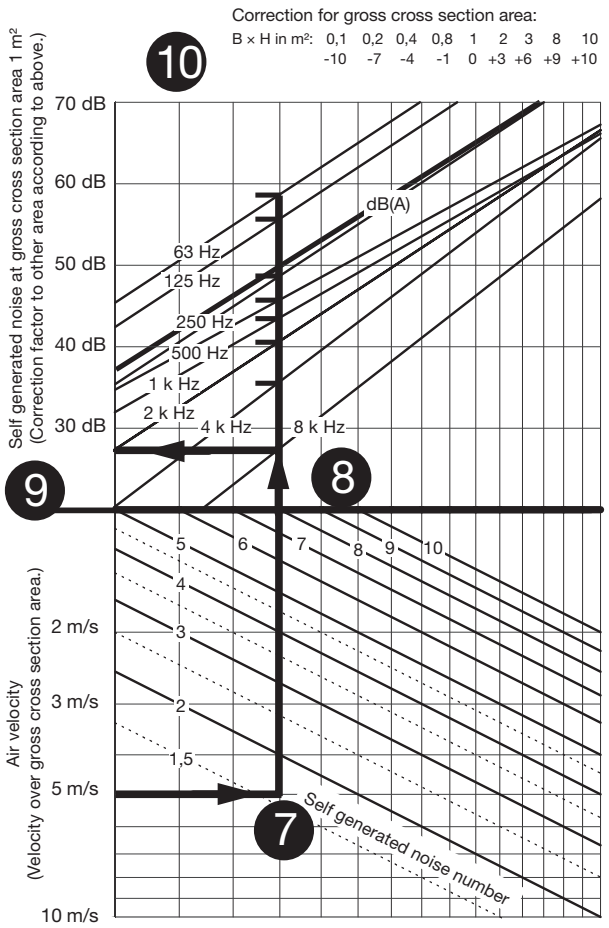
Self generated noise = 28 dB - 1 dB = 27dB

Sound power level before the attenuator - the attenuation: 44 dB - 17 dB = 27dB

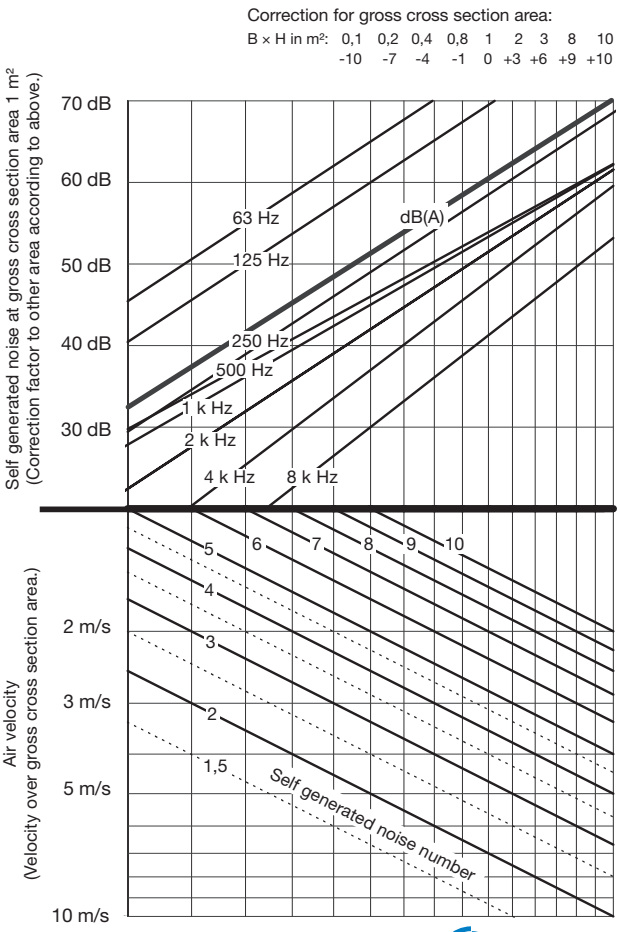
Logarithmic addition of 27 and 27 = 30 dB

(See graph for logarithmical addition on page 5.)

Self generated noise in intake BDLD



Self generated noise in outlet BDLD



2020-09-02

Rectangular straight attenuator BDLD

Width a mm	Code	Leg length (x+y)/2 mm	Static insertion attenuation / octave band [dB]								Resis-tance number	Self gener-ated noise number Intake/Outlet
			63	125	250	500	1000	2000	4000	8000		
400	3006	150	1	6	16	17	17	14	13	15	3,3	2,0
400	3009	150	1	7	12	12	13	12	11	12	3,3	2,0
400	3010	150	1	8	14	14	14	13	12	13	7,1	2,7
400	3006	300	1	8	20	23	25	20	17	17	3,6	2,0
400	3009	300	1	8	15	16	17	14	13	13	3,4	2,0
400	3010	300	2	10	18	19	20	16	14	15	7,4	2,7
400	3006	450	1	9	23	29	34	26	21	20	3,8	2,0
400	3009	450	2	10	19	20	22	17	14	14	3,5	2,0
400	3010	450	2	12	22	24	26	20	17	16	7,6	2,7
500	3006	150	1	7	15	15	15	14	13	14	2,0	1,7
500	3007	150	2	8	21	22	20	17	17	19	6,0	2,5
500	3014	150	2	11	15	15	15	14	13	14	12,4	3,3
500	3006	300	1	8	18	19	21	18	16	16	2,1	1,7
500	3007	300	2	10	25	29	31	27	23	23	6,7	2,5
500	3014	300	3	13	20	21	21	18	16	16	12,8	3,3
500	3006	450	2	9	20	24	27	22	18	18	2,2	1,7
500	3007	450	3	12	29	35	42	36	29	27	7,5	2,5
500	3014	450	4	16	25	26	27	22	18	18	13,2	3,3
600	3006	150	2	7	14	14	14	14	14	14	1,5	1,5
600	3007	150	2	9	19	19	18	16	17	18	3,3	2,0
600	3008	150	3	11	26	27	24	20	20	22	9,6	3,0
600	3006	300	2	8	17	17	18	16	15	16	1,5	1,5
600	3007	300	2	10	23	25	27	23	20	21	3,6	2,0
600	3008	300	4	13	30	34	34	29	26	27	11,1	3,0
600	3006	450	2	9	19	21	23	19	17	17	1,6	1,5
600	3007	450	3	12	26	31	36	29	24	23	3,8	2,0
600	3008	450	4	15	34	40	45	39	33	31	12,7	3,0
700	3008	150	3	9	18	18	17	16	16	18	2,3	1,8
700	3011	150	4	12	22	22	20	18	19	20	8,0	2,8
700	3012	150	3	11	17	17	16	16	16	17	5,0	2,3
700	3008	300	3	11	21	22	23	21	19	20	2,4	1,8
700	3011	300	4	14	27	29	31	26	23	24	8,7	2,8
700	3012	300	4	13	21	22	22	20	18	19	5,2	2,3
700	3008	450	3	12	24	27	30	25	22	22	2,5	1,8
700	3011	450	5	16	31	36	41	34	28	27	9,4	2,8
700	3012	450	4	15	25	27	28	24	21	20	5,4	2,3
800	3008	150	3	10	17	17	16	16	17	17	1,8	1,6
800	3009	150	4	11	22	21	19	19	19	21	3,3	2,0
800	3012	150	4	12	20	20	18	18	18	20	4,7	2,3
800	3015	150	6	16	26	26	23	21	22	23	19,2	4,0
800	3008	300	3	11	20	21	21	20	19	19	1,8	1,6
800	3009	300	4	13	25	27	28	25	23	23	3,6	2,0
800	3012	300	4	14	24	26	26	23	22	22	5,0	2,3
800	3015	300	7	19	31	34	33	30	27	28	21,1	4,0
800	3008	450	3	12	23	25	27	23	21	20	1,9	1,6
800	3009	450	4	14	28	33	37	31	27	26	3,8	2,0
800	3012	450	5	16	28	31	33	28	25	24	5,3	2,3
800	3015	450	8	21	37	41	44	40	33	32	22,9	4,0
900	3008	150	3	10	17	16	15	16	17	17	1,5	1,5
900	3010	150	5	13	25	25	22	21	22	23	4,5	2,3
900	3011	150	7	15	30	31	26	23	25	27	9,6	3,0
900	3013	150	5	13	19	18	17	17	18	19	3,3	2,0
900	3008	300	3	11	19	19	20	19	18	19	1,5	1,5
900	3010	300	5	15	29	31	32	29	27	27	5,0	2,3
900	3011	300	7	17	34	38	37	33	31	32	11,1	3,0
900	3013	300	5	14	22	23	23	21	21	21	3,5	2,0
900	3008	450	3	12	22	23	24	22	20	20	1,6	1,5
900	3010	450	6	16	33	38	43	37	31	31	5,5	2,3
900	3011	450	7	19	38	44	47	42	37	36	12,7	3,0
900	3013	450	5	16	26	28	29	25	23	23	3,6	2,0

Rectangular straight attenuator BDLD

Width a mm	Code	Leg length (x+y)/2 mm	Static insertion attenuation / octave band [dB]								Resis-tance number	Self gener-ated noise number Intake/Outlet
			63	125	250	500	1000	2000	4000	8000		
1000	3009	150	5	12	20	19	18	18	19	20	2,0	1,7
1000	3010	150	6	13	24	23	20	20	21	23	3,3	2,0
1000	3011	150	7	15	28	28	24	23	24	26	6,0	2,5
1000	3014	150	9	18	32	32	27	24	26	29	19,2	4,0
1000	3009	300	5	13	23	23	23	22	22	22	2,1	1,7
1000	3010	300	6	15	27	29	29	27	25	26	3,6	2,0
1000	3011	300	7	16	32	35	35	32	30	30	6,7	2,5
1000	3014	300	10	21	37	39	37	34	32	33	22,0	4,0
1000	3009	450	5	14	25	27	29	26	24	24	2,2	1,7
1000	3010	450	6	16	31	35	38	33	29	28	3,8	2,0
1000	3011	450	7	18	36	41	45	42	36	35	7,5	2,5
1000	3014	450	10	24	42	46	48	43	39	38	24,8	4,0
1200	3010	150	6	13	19	17	17	18	19	20	1,5	1,5
1200	3011	150	7	14	22	21	19	20	21	22	2,1	1,7
1200	3012	150	8	15	26	24	21	22	24	25	3,3	2,0
1200	3014	150	11	18	34	34	28	26	29	31	9,6	3,0
1200	3018	150	12	21	34	34	28	26	29	31	19,2	4,0
1200	3010	300	6	14	21	21	21	21	21	21	1,5	1,5
1200	3011	300	7	15	25	25	25	24	24	24	2,3	1,7
1200	3012	300	8	17	29	30	30	28	27	28	3,6	2,0
1200	3014	300	11	20	38	41	38	36	35	36	11,1	3,0
1200	3018	300	13	24	39	41	38	36	35	36	22,0	4,0
1200	3010	450	6	15	24	24	25	24	23	22	1,6	1,5
1200	3011	450	7	16	28	30	31	29	27	26	2,4	1,7
1200	3012	450	8	18	32	36	39	34	31	31	3,8	2,0
1200	3014	450	11	22	42	47	49	45	41	40	12,7	3,0
1200	3018	450	14	27	44	48	49	45	41	40	24,8	4,0
1400	3012	150	8	15	21	19	18	20	22	22	1,6	1,6
1400	3013	150	9	16	24	22	20	22	23	25	2,3	1,8
1400	3014	150	10	17	27	26	22	23	26	27	3,3	2,0
1400	3015	150	12	19	31	30	25	25	28	30	5,0	2,3
1400	3016	150	13	20	35	34	28	27	30	33	8,0	2,8
1400	3020	150	16	24	36	36	29	28	31	34	19,2	4,0
1400	3022	150	11	20	23	21	19	21	23	24	5,0	2,3
1400	3012	300	8	16	24	23	23	23	23	24	1,7	1,6
1400	3013	300	9	17	27	27	26	26	26	27	2,4	1,8
1400	3014	300	10	19	31	32	31	30	29	30	3,6	2,0
1400	3015	300	12	20	35	36	35	34	33	33	5,5	2,3
1400	3016	300	14	22	39	41	38	37	36	37	9,2	2,8
1400	3020	300	17	27	41	43	39	38	37	38	22,0	4,0
1400	3022	300	11	22	27	26	25	25	25	25	5,2	2,3
1400	3012	450	8	17	26	27	27	26	25	25	1,8	1,6
1400	3013	450	9	19	30	32	33	31	29	29	2,5	1,8
1400	3014	450	10	20	34	38	39	36	33	32	3,8	2,0
1400	3015	450	12	22	39	42	46	42	38	37	6,1	2,3
1400	3016	450	14	24	43	47	49	46	42	41	10,4	2,8
1400	3020	450	17	29	46	50	50	47	44	43	24,8	4,0
1400	3022	450	11	24	31	31	31	29	28	27	5,4	2,3
1600	3013	150	9	16	23	20	19	21	23	24	1,8	1,6
1600	3015	150	11	18	28	26	22	24	26	28	3,3	2,0
1600	3016	150	13	20	31	30	25	26	28	30	4,7	2,3
1600	3017	150	14	21	35	34	27	28	31	33	7,1	2,7
1600	3023	150	10	20	21	19	17	20	22	22	3,3	2,0
1600	3025	150	17	26	33	32	26	27	30	32	19,2	4,0
1600	3013	300	9	17	25	24	24	24	25	25	1,8	1,6
1600	3015	300	12	20	31	32	31	30	30	31	3,6	2,0
1600	3016	300	13	21	35	36	35	34	33	34	5,2	2,3
1600	3017	300	15	23	39	40	38	37	36	37	8,0	2,7
1600	3023	300	11	21	24	23	22	23	23	23	3,4	2,0
1600	3025	300	18	29	39	40	37	36	36	36	21,1	4,0

Rectangular straight attenuator BDLD

Width a mm	Code	Leg length (x+y)/2 mm	Static insertion attenuation / octave band [dB]								Resis-tance number	Self gener-ated noise number Intake/Outlet
			63	125	250	500	1000	2000	4000	8000		
1600	3013	450	9	18	28	28	29	28	27	27	1,9	1,6
1600	3015	450	12	21	35	38	40	36	34	33	3,8	2,0
1600	3016	450	13	23	39	43	46	42	38	38	5,7	2,3
1600	3017	450	15	25	43	47	49	46	42	42	9,0	2,7
1600	3023	450	11	23	27	27	26	26	25	25	3,5	2,0
1600	3025	450	19	32	45	47	48	46	41	40	22,9	4,0
1800	3014	150	9	16	23	21	19	21	23	24	1,9	1,6
1800	3016	150	11	18	28	26	22	24	26	28	3,3	2,0
1800	3019	150	16	22	37	37	29	29	32	35	9,6	3,0
1800	3026	150	12	21	23	21	19	21	23	24	4,5	2,3
1800	3027	150	14	23	28	26	22	24	26	28	9,6	3,0
1800	3030	150	15	25	27	25	22	23	26	27	11,8	3,3
1800	3014	300	9	17	26	25	25	25	25	26	2,0	1,6
1800	3016	300	12	20	31	32	31	30	30	31	3,6	2,0
1800	3019	300	16	24	41	43	40	38	38	39	11,1	3,0
1800	3026	300	12	23	27	26	24	25	25	26	4,7	2,3
1800	3027	300	15	26	33	33	31	30	30	31	10,1	3,0
1800	3030	300	16	27	32	32	30	29	29	30	12,5	3,3
1800	3014	450	9	19	28	29	30	29	28	27	2,1	1,6
1800	3016	450	12	21	35	38	40	36	34	33	3,8	2,0
1800	3019	450	16	26	46	50	50	48	45	44	12,7	3,0
1800	3026	450	12	24	30	30	30	28	28	27	4,9	2,3
1800	3027	450	16	28	38	40	40	36	34	33	10,7	3,0
1800	3030	450	16	30	37	38	37	35	33	32	13,1	3,3
2000	3016	150	9	17	24	22	19	22	24	24	2,0	1,7
2000	3018	150	11	18	28	26	22	24	26	28	3,3	2,0
2000	3019	150	13	19	30	29	24	25	28	30	4,4	2,2
2000	3020	150	14	20	33	32	26	27	30	32	6,0	2,5
2000	3021	150	15	22	36	36	28	28	32	34	8,4	2,9
2000	3026	150	18	25	37	37	29	29	32	35	19,2	4,0
2000	3029	150	16	24	30	28	24	25	28	29	12,4	3,3
2000	3016	300	9	18	26	26	25	25	26	26	2,1	1,7
2000	3018	300	12	20	31	32	31	30	30	31	3,6	2,0
2000	3019	300	13	21	34	35	35	33	33	33	4,8	2,2
2000	3020	300	14	22	37	39	37	36	36	36	6,7	2,5
2000	3021	300	15	24	40	42	39	38	38	38	9,7	2,9
2000	3026	300	19	28	42	44	40	38	38	39	22,0	4,0
2000	3029	300	16	27	35	36	34	32	32	33	13,3	3,3
2000	3016	450	10	19	29	30	31	29	28	28	2,2	1,7
2000	3018	450	12	21	35	38	40	36	34	33	3,8	2,0
2000	3019	450	13	23	38	42	46	41	37	37	5,3	2,2
2000	3020	450	14	24	41	45	48	46	41	40	7,5	2,5
2000	3021	450	16	25	44	49	50	47	44	43	11,0	2,9
2000	3026	450	19	31	47	51	50	48	45	44	24,8	4,0
2000	3029	450	17	29	41	43	44	40	37	36	14,2	3,3

Good Thinking

At Lindab, good thinking is a philosophy that guides us in everything we do. We have made it our mission to create a healthy indoor climate – and to simplify the construction of sustainable buildings. We do that by designing innovative products and solutions that are easy to use, as well as offering efficient availability and logistics. We are also working on ways to reduce our impact on our environment and climate. We do that by developing methods to produce our solutions using a minimum of energy and natural resources, and by reducing negative effects on the environment. We use steel in our products. It's one of few materials that can be recycled an infinite number of times without losing any of its properties. That means less carbon emissions in nature and less energy wasted.

We simplify construction