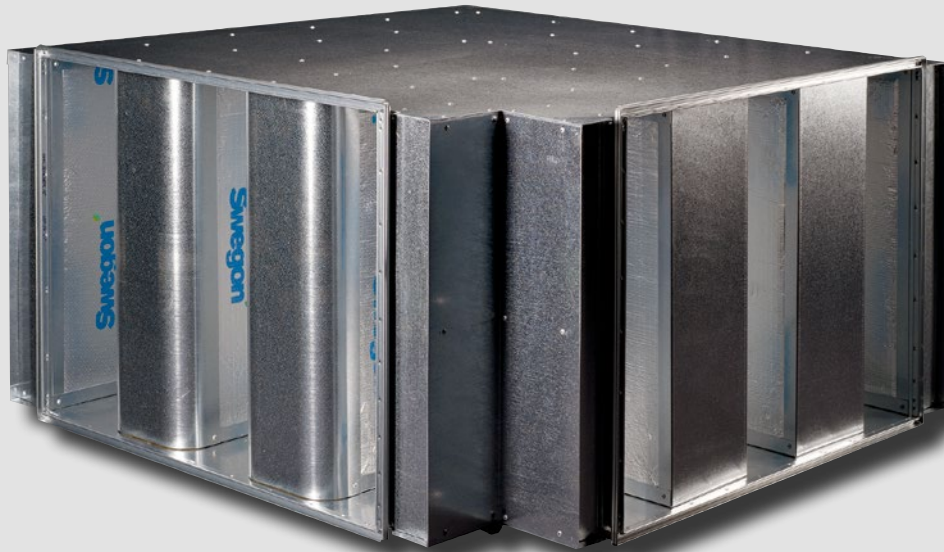


LARGO

Angle sound attenuator with recessed connection for rectangular ducts



QUICK FACTS

- Remarkably space-saving rectangular sound attenuator
- Excellent aerodynamic characteristics
- Very low pressure drop – acoustic baffles serve as guide vanes
- Type-approved, environmentally friendly sound attenuating material, ISOVER Cleantec® PLUS
- ISOVER Cleantec® PLUS is cleanable using a wet method
- Available with cleaning cover
- Available in a fire-resistant insulated version with 50 mm thick stone wool
- Connection sizes ranging from 400x300 to 2000x2000 mm
- Included in the MagiCAD database

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Technical description

General

The LARGO is an angle sound attenuator with aerodynamically designed baffle elements suitable for use both in ducts and in direct connection to ventilation units.

Its pressure drop is low in that the baffle elements also serve as guide vanes for deflecting the air stream.

Function

The LARGO's low pressure drop has been achieved by designing the acoustic baffle elements completely according to the basic laws of aerodynamics. To achieve this, the acoustic baffles are utilised according to the principle for deflecting the air stream by means of guide vanes. The means in many cases that the LARGO can replace a rectangular bend (without guide vanes) with maintained or even lower pressure drop.

The low pressure drop can e.g. be utilised for the following:

- For reducing the space requirement in that a smaller sound attenuator can be selected.
- For reducing the pressure rise in the fan if the size is maintained.
- For reducing the inherent sound generation in the system thanks to lower velocity and lower pressure rise.
- For adapting the sound attenuator more easily to the connected duct system.

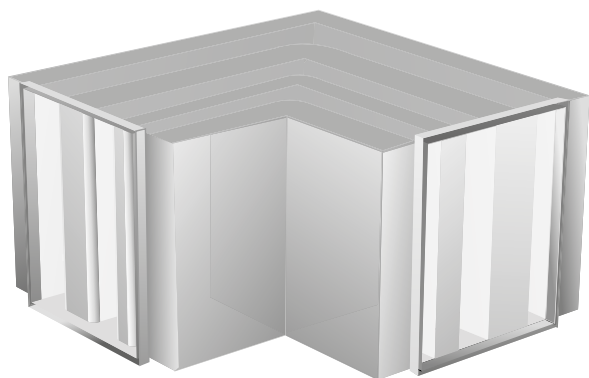


Figure 1. The LARGO produces a uniform velocity distribution downstream of the bend by utilizing the acoustic baffles as guide vanes.

The LARGO contains all the positive characteristics that previous Swegon sound attenuators have offered. By taking the properties of relevant materials into account and utilising the basic laws of aerodynamics, Swegon has optimized its sound attenuators with regard to the following factors:

- The acoustic properties of the sound attenuating materials.
- The thickness of the acoustic baffles.
- The width of the spaces between baffles.
- The length of the acoustic baffles.
- The surface covering.

By combining the factors above, Swegon can always offer the best sound attenuation with the lowest pressure drop to satisfy client requirements.

Design

- The LARGO is made as standard of galvanized sheet steel to Corrosivity class C3 (VVS-AMA 2019 Standard).
- The ISOVER Cleantec® PLUS sound attenuating material has been granted type approval. (Type approval no. 2706/92 with regard to cleaning, fibre entrainment, resistance to ageing emissions, washable surfaces, etc.)
- The standard LARGO is supplied with slip clamp connections.

Maintenance

The LARGO is under normal operating conditions a maintenance-free sound attenuator. If there are requirements for cleanability, the LARGO can be ordered with factory-mounted cleaning cover. See Accessories. The cleaning cover then covers all the airflow passages to provide the best service accessibility. In many applications, it may however be appropriate to position the cleaning cover in the duct near the sound attenuator.

Environment

The declaration of construction materials is available for downloading from our website or can be ordered from one of our sales offices.

Installation

The slip-clamp flanges on this product are intended for use as connection pieces for ducts only.

The product should be suspended with a support beam under its entire width.

Special versions

In addition to the accessories and variants described in the catalogue there is scope for customised variants if required.

Swegon can then in consultation with the customer optimize the sound attenuator in relation to sound attenuation, size, air handling unit adaptation and choice of material (example: stainless steel, aluminium zinc, etc).

Please get in touch with Swegon for further information.

Accessories

Cleaning covers T1 and T2

For certain applications, a cleaning cover is required on or by the connection to the sound attenuator. For the LARGO, this is available as accessories LARGO T1 and T2 with cover which enables access to all the air passages between the baffles.

The acoustic data and pressure drop do not change if the LARGO T1 or LARGO T2 accessory is used.

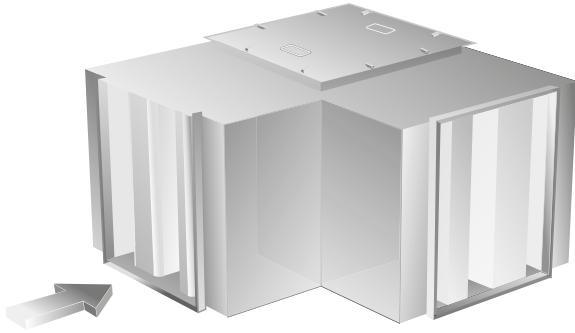


Figure 2. LARGO equipped with cleaning cover that covers all the airflow passages. LARGO T1-3 accessory, uninsulated cleaning cover, horizontal, upper.

Fire-resistant insulation T3

In many applications, sound attenuators are installed in fire-resistant insulated duct systems. In applications in which ventilation ducts are to be insulated with 50 mm thick fire-resistant stone wool, you can either install external insulation over the sound attenuator directly at the building site or place an order for the factory-insulated variant.

For the LARGO, the factory-insulated variant is available as an accessory.

The acoustic data and pressure drop do not change if the LARGO T3 accessory is used.

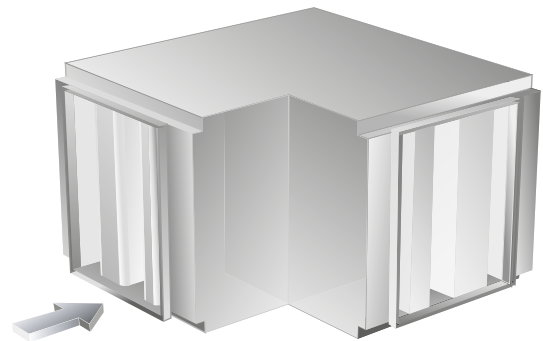


Figure 3. LARGO insulated with 50 mm thick fire-resistant stone wool. Accessory, LARGO T3

Cleaning cover accessory

LARGO T1-1	Uninsulated cleaning cover, vertical, right-hand
LARGO T1-2	Uninsulated cleaning cover, vertical, left-hand
LARGO T1-3	Uninsulated cleaning cover, horizontal, upper
LARGO T1-4	Uninsulated cleaning cover, horizontal, lower
LARGO T2-1	Fire-resistant insulated cleaning cover, vertical, right-hand
LARGO T2-2	Fire-resistant insulated cleaning cover, vertical, left-hand
LARGO T2-3	Fire-resistant insulated cleaning cover, horizontal, upper
LARGO T2-4	Fire-resistant insulated cleaning cover, horizontal, lower

Fire-resistant insulation accessory

LARGO T3	Sound attenuator with fire-resistant insulation consisting of 50 mm thick stone wool.
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Perforated sheet metal lining T4

If the air contains a high concentration of particles or if for some other reason a more robust design is required, the acoustic baffles can be covered with perforated sheet steel over the ISOVER Cleantec® PLUS insulation; LARGO T4 accessory.

The acoustic data and pressure drop are affected when the LARGO T4 accessory is used.

Sheet metal lining accessory

LARGO T4	Perforated sheet metal lining
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Sizing

General

The specified technical data apply to the LARGO in the standard version. Dampers, duct bends and other equipment in the vicinity of the sound attenuator will increase its inherent sound generation and pressure drop. The specified data are based on a uniform air stream in and out of the sound attenuator. See also the section entitled: System effect and pressure drop.

If perforated sheet steel covers the baffle surfaces, this increases the level of inherent sound generation. See the section on Inherent sound generation.

Recessed connections involve a reduction in p-value (and thus in pressure drop) for the sound attenuator. The advantages achieved by placing a part of the sound attenuator's active section outside the airflow enable not only a lower pressure drop, but also a more favourable velocity profile downstream of the LARGO.

The outer dimension is specified in M_y in the Technical Data Table.

See also under Sizing, Dimension.

Dimensions

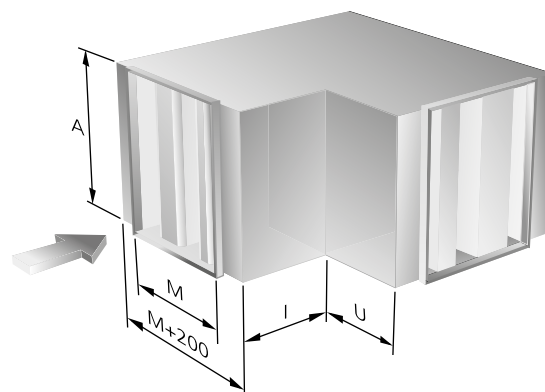


Figure 4a. horizontal installation

M = Width of the duct. A = Height of the duct.

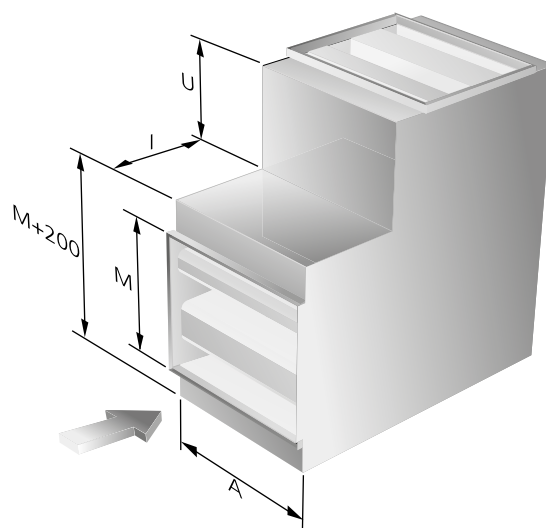


Figure 4b. Vertical installation

M = Height of the duct. A = Width of the duct.

M dim. 400, 500, 600, 700, 800, 1000, 1200, 1400, 1600, 1800, 2000

N.B.! Outer dim. (M_y) = $M+200$ mm.

A dim. 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1500, 1600, 1700, 1800, 1900, 2000

I+U dim. See the Technical Data Table.

In addition, other dimensions are available as a special version. The smallest possible dimension for I and U is 150 mm.

Weight Contact service!

Technical Data

M dim. (mm)	Code	I+U (mm)	Static integral attenuation, (dB) to ISO 7235								P- value	My dim. (mm)
			63	125	250	500	1K	2K	4K	8K		
400	0435	300	6	12	22	35	42	45	33	27	3	600
400	0465	600	7	15	28	44	50	50	39	31	3.2	600
400	0495	900	8	18	32	50	50	50	44	34	3.4	600
500	0535	300	5	12	20	30	38	35	25	22	1.6	700
500	0565	600	6	14	24	37	47	37	28	24	1.7	700
500	0595	900	7	16	28	45	50	50	31	26	1.8	700
600	0636	300	5	10	18	27	34	26	20	19	1.1	800
600	0666	600	6	12	22	33	42	31	21	20	1.2	800
600	0696	900	7	14	25	39	49	35	22	21	1.3	800
600	0638	300	5	12	21	31	38	36	26	22	1.8	800
600	0668	600	6	14	25	38	48	38	29	24	1.9	800
600	0698	900	7	16	29	46	50	50	32	26	2	800
700	0736	300	7	15	26	42	46	50	37	29	4.4	900
700	0766	600	8	18	30	50	50	50	42	32	4.6	900
700	0796	900	8	20	36	50	50	50	47	35	4.9	900
800	0836	300	7	15	24	40	50	46	32	26	2.7	1000
800	0866	600	8	17	29	47	50	50	36	28	2.9	1000
800	0896	900	9	19	34	50	50	50	40	30	3	1000
800	0837	300	8	16	26	31	42	34	23	23	2.5	1000
800	0867	600	9	19	30	37	49	38	24	23	2.6	1000
800	0897	900	10	22	34	42	50	42	25	24	2.7	1000
1000	1036	300	10	22	39	50	50	50	42	34	5.2	1200
1000	1066	600	11	25	45	50	50	50	46	36	5.5	1200
1000	1096	900	12	28	49	50	50	50	50	34	5.9	1200
1000	1038	300	8	18	33	50	50	50	30	25	2.3	1200
1000	1068	600	9	20	36	50	50	50	34	28	2.4	1200
1000	1098	900	10	22	39	50	50	50	38	31	2.8	1200
1200	1236	300	7	16	26	45	50	48	29	24	2.9	1400
1200	1266	600	8	18	32	50	50	50	32	26	3.1	1400
1200	1237	300	9	21	34	41	50	46	27	24	4.5	1400
1200	1267	600	11	26	38	49	50	48	29	25	4.7	1400
1400	1436	300	7	15	25	40	50	36	21	19	2	1600
1400	1466	600	8	17	28	46	50	39	23	21	2.1	1600
1400	1438	300	8	16	26	35	46	42	25	22	2.4	1600
1400	1468	600	9	19	31	49	50	46	27	24	2.5	1600
1600	1636	300	8	18	33	50	50	50	30	25	3	1800
1600	1666	600	9	20	36	50	50	50	34	28	3.2	1800
1600	1637	300	11	27	41	50	50	50	33	29	6.4	1800
1600	1667	600	13	31	48	50	50	50	37	31	6.8	1800
1800	1836	300	11	26	40	50	50	48	26	24	3.8	2000
1800	1837	300	15	34	49	50	50	50	50	41	7.7	2000
2000	2035	300	13	31	48	50	50	50	37	31	8.3	2200

Dimension/Sound attenuation

- Calculate the required sound attenuation manually or by means of Swegon's ProSilencer acoustic calculation software (available at www.swegon.com).
- Determine how the angle sound attenuator should angle off – horizontally or vertically. In the horizontal version the acoustic baffles are standing and in the vertical version they are lying.
- Proceed from the M dimension, (see Technical Data) and select sound attenuators on the basis of required sound attenuation. Note that the LARGO has a recessed connection, which means that the sound attenuator adds 200 mm outside the specified M dimension, i.e. My.
- Check also what I+U dimension the sound attenuator will have.
- To standard, the legs of the angle are equally long: i.e. I=U (I= inlet, U= outlet viewed in direction of airflow).
- Check the A dimension of the sound attenuator to optimize the pressure drop. Take the system effect into consideration.
- The p-value read under Technical Data is used for determining the pressure drop of the sound attenuator. The higher the p-value, the higher the pressure drop, see Nomogram 1.
- Check the sound attenuator's level of inherent sound generation.

Pressure drop

- Calculate the gross face area, $M \times A$ (m²).
- Find the contemplated airflow in Nomogram 1 (m³/s).
- Go vertically upward to the p-value obtained for the selected sound attenuator under Technical Data.
- Read the pressure drop that refers to duct/duct installation.
- If you select connection alternatives other than standard, correct the pressure drop using Diagram 1.

Multiply the pressure drop in Nomogram 1 by the value obtained in Diagram 1 in relation to how the sound attenuator is to be installed.

Example 1:

An angle sound attenuator in the horizontal version is positioned by a ventilation unit in a fan room. The airflow is 4 m³/s and the sound attenuator is mounted in a duct having a width of 1000 mm. A LARGO 1036 sound attenuator (M=1000, My =1200) with a p-value of 5.2 has been selected from Technical Data.

The sound attenuator has connection dimensions: M dim. = 1000 mm and A dim. =1300 mm. The gross face area will then be 1.3 m². Nomogram 1 gives a pressure drop of approx. 29 Pa.

If the sound attenuator is instead installed in a duct/plenum, multiply the pressure drop by 1.9 according to Diagram 1. You will then obtain a pressure drop of approx. 55 Pa.

Nomogram 1. Determining the pressure drop

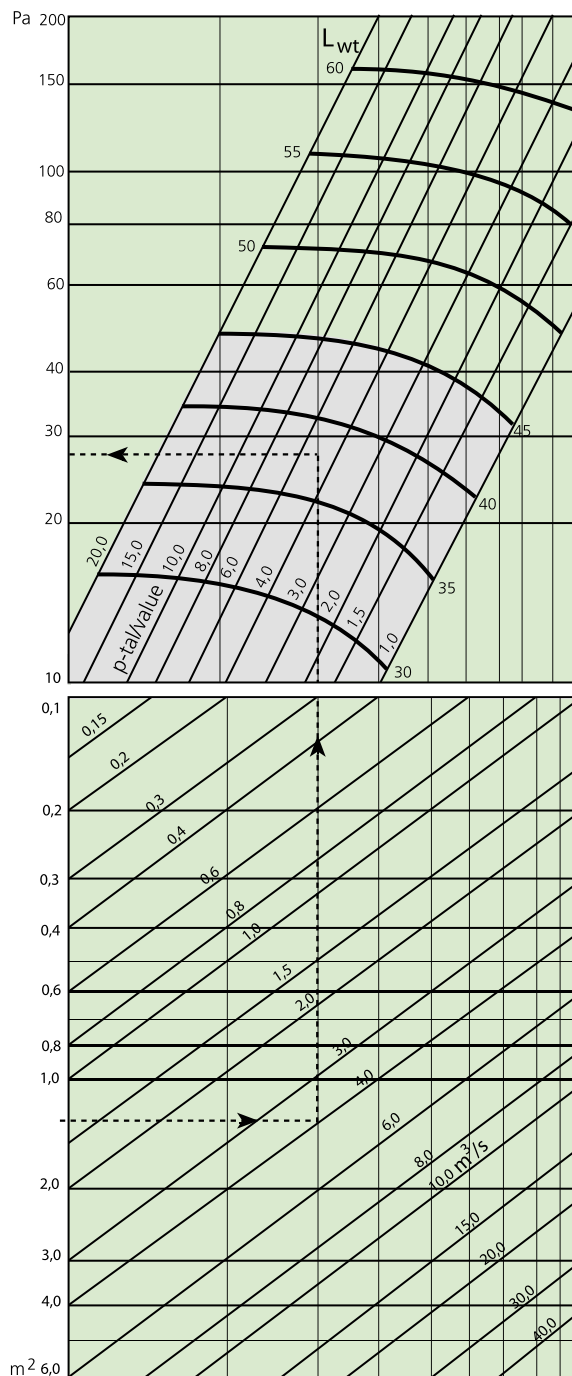
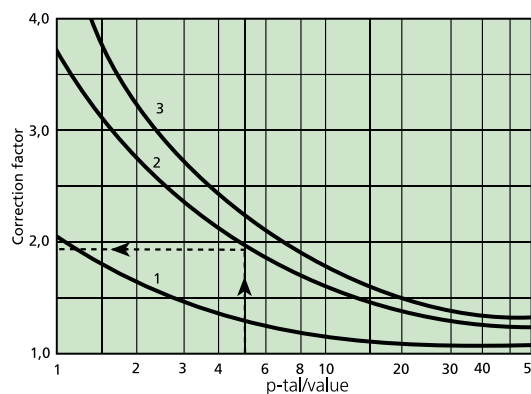


Diagram 1. Correction for other airflows



Curve 1: Plenum-Duct, Curve 2: Duct-Plenum, Curve 3: Plenum-Plenum

Inherent sound generation

A sound attenuator not only attenuates sound, it also generates inherent sound when air passes through it at high velocity and if the pressure drop is substantial. Normally no problems will occur if the recommended operating range marked in Nomogram 1 is observed.

Flow-generated sound curves have been plotted in Nomogram 1 as an aid for accurate calculations. You are welcome to use ProSilencer in which we not only specify inherent sound but also pressure drop. Specified L_{wt} values are sound power level for LARGO with reference value 10^{-12} W for an airflow of $1 \text{ m}^3/\text{s}$. By correcting L_{wt} with K_1 for the LARGO, you can obtain the sound power level in each octave band. For LARGO with perforated sheet steel, first add 12 dB to specified L_{wt} and then correct it with K_2 .

Hz	63	125	250	500	1K	2K	4K	8K
K_1	-5	-5	-9	-11	-14	-17	-18	-20
K_2	-1	-2	-10	-17	-22	-24	-25	-20

Correction for airflows other than $1 \text{ m}^3/\text{s}$ should be done through Diagram 2 below.

Generally speaking, the inherent sound should be 8-10 dB lower in each octave band than the requirement for sound power level downstream of the sound attenuator.

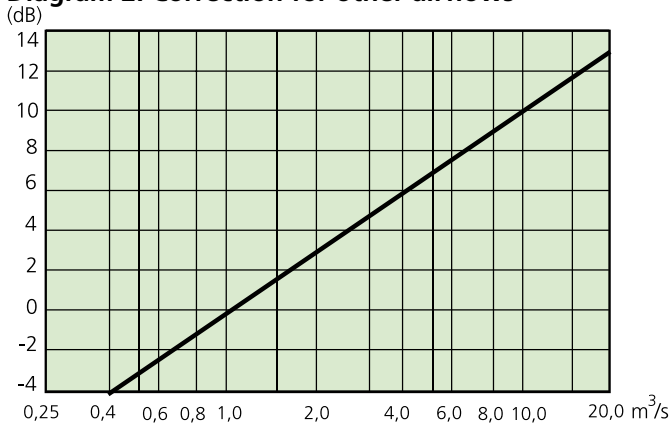
Example:

A sound attenuator in the horizontal version is located by a ventilation unit in a fan room. The airflow is $4 \text{ m}^3/\text{s}$ and the sound attenuator is mounted in a duct having a width of 1,000 mm. LARGO 1036 sound attenuator with a p-value of 5.2 has been selected from Technical Data. With a height of 1300 mm, the gross face area will be 1.3 m^2 .

Nomogram 1 gives $L_{wt}=38 \text{ dB}$. Correct with K_1 to break down the sound into octave bands and for $4 \text{ m}^3/\text{s}$ according to Diagram 2:

Hz	63	125	250	500	1K	2K	4K	8K
L_{wt}	38	38	38	38	38	38	38	38
K_1	-5	-5	-9	-11	-14	-17	-18	-20
$4 \text{ m}^3/\text{s}$	6	6	6	6	6	6	6	6
L_w	39	39	35	33	30	27	26	24

Diagram 2. Correction for other airflows



System effect

Sound attenuator installed upstream or downstream of a bend

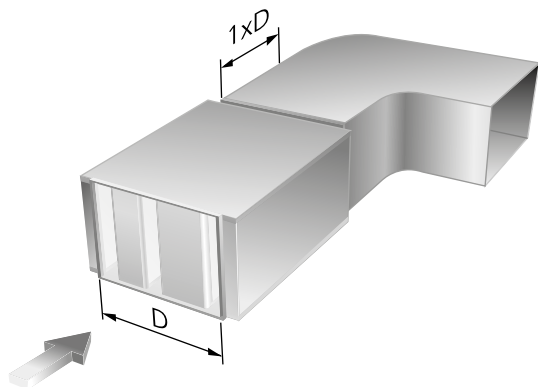


Figure 5. Sound attenuator upstream or downstream of a bend

The corrections below should be multiplied by the pressure drops specified in the diagram.

Sound attenuator upstream of a bend		Sound attenuator downstream of a bend	
Distance	Corr. factor	Distance	Corr. factor
3xD	1.1	1xD	1.2
2xD	1.2	0 (direct)	1.3
1xD	1.35		
0 (direct)	1.5		

Distance and D refer to the distance between the sound attenuator and bend or the biggest side of the sound attenuator. Total pressure drop = sound attenuator's pressure drop according to Nomogram 1 x correction factor above.

Sound attenuator installed upstream or downstream of a plenum

The total pressure drop across the sound attenuator can be obtained by multiplying the correction factor according to Diagram 1 by the pressure drop according to Nomogram 1.

Sound attenuator installed upstream or downstream of a duct branch

Sound attenuator installed downstream of a duct branch can be compared with one installed downstream of a plenum. See Curve 1 in Diagram 1.

The total pressure drop across the sound attenuator can be obtained by multiplying the correction factor by the pressure drop according to Nomogram 1.

Sound attenuator installed upstream of a duct branch can in a corresponding way be compared with one installed upstream of a plenum. See Curve 2 in Diagram 1.

The total pressure drop across the sound attenuator can be obtained by multiplying the correction factor by the pressure drop according to Nomogram 1.

Sound attenuator installed by a ventilation unit

It is difficult to produce correct correction factors for sound attenuators installed by ventilation units. This is mainly due to the fact that different air handling unit manufacturers have different solutions on the fan outlet. The most common solution is one where a relatively small fan outlet (produces high outlet velocity) is combined with a large duct connection (producing air velocities of approx. 4-6 m/s). Generally speaking, the angle of the transition between fan outlet and duct should not exceed 15 degrees. To ensure satisfactory distribution of the air stream, it is advantageous to utilise a diffuser.

Sound attenuator installed by a damper

A sound attenuator installed by a damper can give rise to substantial pressure drops. As the damper angle is increased, greater difference in velocity profile is generated. This produces increased air velocity between the sound attenuator baffles and thus increases the pressure drop.

Sound attenuators connected in series

If the sound attenuators are connected in series, the basic rule should be to avoid a change in velocity profile between the dampers connected in series. If the length of straight ducting can be arranged to be sufficiently long (4 x D), you can at best calculate the stated pressure drop per individual sound attenuator. An important aspect is also to make sure that the acoustic baffles of one sound attenuator do not cover the spaces between the baffles of the next sound attenuator. For advice concerning series connection, contact Swegon.

Ordering key

Product

Rectangular sound attenuator

LARGO a aaa bbbb x cccc, dddd, eeee

Version:

Code:

According to Technical Data

Dimensions:

M x A, I, U

Accessories

- LARGO T1-1 = Uninsulated cleaning cover, vertical, right-hand
- LARGO T1-2 = Uninsulated cleaning cover, vertical, left-hand
- LARGO T1-3 = Uninsulated cleaning cover, horizontal, upper
- LARGO T1-4 = Uninsulated cleaning cover, horizontal, lower
- LARGO T2-1 = Fire-resistant insulated cleaning cover, vertical, right-hand
- LARGO T2-2 = Fire-resistant insulated cleaning cover, vertical, left-hand
- LARGO T2-3 = Fire-resistant insulated cleaning cover, horizontal, upper
- LARGO T2-4 = Fire-resistant insulated cleaning cover, horizontal, lower
- LARGO T3 = Sound attenuator, Fire-resistant insulated with 50 mm thick stone wool
- LARGO T4 = Perforated sheet metal lining

Specification text

Example of a specification text conforming to Swedish VVS AMA Standard.

Swegon's type LARGO rectangular sound attenuator, with the following functions:

- Type-approved insulation material, ISOVER Cleantec® PLUS
- Low pressure drop due to the aerodynamic design of the bend.
- Sound attenuation in dB (to be specified in clear text for the various frequency bands).
- Pressure drop in Pa (to be specified in clear text).

Size	LARGO aaa bbbb x cccc, dddd, eeee	xx items
	LARGO T	xx items

Ordering example

The angle sound attenuator with code 0636 (recessed connections) conforms to the sound attenuating requirements that have been calculated. The sound attenuator shall have acoustic baffles covered with perforated sheet steel.

Ordering key:	LARGO a 0636 600x600, 150, 150
	LARGO T4