## General information

If the noise emissions of a fan exceed the permitted level, passive measures must be taken to reduce noise. The use of attenuators according to the absorption principle is a good option here. This type of attenuator guarantees noise insulation with low pressure losses.

Helios offers attenuators that are perfectly suited to Helios fans. Pipeline and duct attenuators with corresponding housing forms are available. Of course, all types of attenuators can also be used with fans from other companies.

Helios attenuators have a coating of galvanised sheet steel and splitters of high-quality mineral wool, which are covered from the air flow by abrasion-resistant fleece.

## Technical information Sound absorption

The benchmark for sound absorption is the insertion attenuation according to DIN EN ISO 14163. It constitutes the sound level reduction in a pipeline or duct section with and without an attenuator calculated by way of a comparative measurement.

When performing the measurement without an attenuator, an acoustically hard spacer is used in its place. Thus the insertion attenuation is calculated:

$D_e = L_o - L_m$ dB
$L_O$: Level without attenuator
$L_m$: Level with attenuator

However, as the effectiveness of an attenuator is heavily dependent on the frequency, the insertion attenuation is stated as a function of the frequency range. The insulation of low-frequency noise requires a greater damper volume than the insulation of higher-frequency noise and is therefore associated with greater effort.

For this reason, knowledge of the noise spectrum (octave and one-third octave spectrum) of the fan is necessary when selecting an attenuator. When performing an acoustic assessment of a ventilation system, it should be noted that other system components, such as manifolds, changing cross sections and branches, also have a sound-insulating effect.

More exact information on this is found in the VDI Directive 2081 – Sound generation and noise reduction in air conditioning systems.
The lower limit of the sound emissions of a system is formed by the generation of flow noise in the attenuator and system components. These are amplified considerably as the flow rate increases. Therefore the flow rates should be kept as low as possible.

## Quick selection of an attenuator

An average insulation value is stated in the type table (column with the red background on the far right) for a quick selection of pipeline and duct attenuators. This value is to be deducted from the sound power level ($L_{WA}$ total) of the fan. As a result, you get the sound power level of the fan reduced by the noise insulation ($L_{WA}$ reduced).

This method of selection, which is different to the frequency band calculation, is based on rounding. A calculation according to the octavo (see adjacent example) produces more accurate values.

## Example:

**Available:**
Fan type VARD 225/2
**Selected:** Duct insulator RSD 225/600 (construction length = 600 mm)

Sound power level of the fan
**$L_{WA}$ total = 81 dB(A)**

Average sound absorption of the attenuator
**minus = 15 dB(A)**

= Reduced sound power level
**$L_{WA}$ reduced = 66 dB(A)**

## Designations

**$L_{WA}$ total** = sound power level of the fan in dB(A) (from the table above the set of characteristic curves).

**Average insulation value** = derived damping capacity of the attenuator in dB(A) (from the column with the red background of the attenuator type table).

**$L_{WA}$ reduced** = sound power level in dB(A) reduced by the use of an attenuator.

## Sound level calculation

To determine the sound level after using an attenuator, the insertion attenuation is to be deducted from the level of the band of the fan using the frequency band and the total sound level calculated from this. As a rule, this is done in octavos. For larger insertion attenuations, multiple attenuators with the same diameter may be arranged one after another. The example below explains the method.
Task at hand: Reducing the noise from a fan type VARD 225/2 (2800 $min^{-1}$) using a RSD 225/600 attenuator (basic length 2).

| | Octave medium frequency Hz | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | |
| A-weighted octave level $L_{WA,\,Okt}$ of fan VARD 225/2 | 51 | 62 | 74 | 76 | 76 | 72 | 63 | dB(A) |
| A-weighted total sound power level $L_{WA}$ | $L_{WA}$ = 81 dB(A) | | | | | | | |
| Insertion insulation level of the attenuator $D_e$ RSD 225/600 (2 x basic length) | 4 | 10 | 17 | 27 | 25 | 17 | 14 | dB |
| A-weighted octave level $L_{WA,\,Okt}$ of fan with attenuator | 47 | 52 | 57 | 49 | 51 | 55 | 49 | dB(A) |
| A-weighted total sound power level $L_{WA}$* of the fan with attenuator | $L_{WA}$* = $10 \cdot \lg(10^{4.7-0.1}+10^{5.2-0.1}+10^{5.7-0.1}+10^{4.9-0.1}+10^{5.1-0.1}+10^{5.5-0.1}+10^{4.9-0.1})$ = 61 dB(A) | | | | | | | |
| Relevant A-weighted sound pressure level at 1 m distance | $L_{pA}$* = 53 dB(A) | | | | | | | |

## Rectangular attenuator KSD

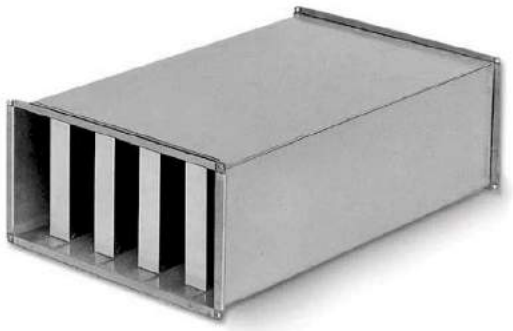
### Design – Installation

Casing made from galvanised sheet steel, with flanges to fit the fan dimensions, door installation in-line with the ducting inlet or outlet. In order to reduce structure-borne sound transmission, a flexible connector (VS or VS Ex) should be installed between fan/attenuator and ducting.

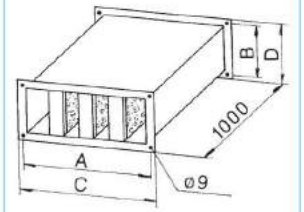
### Pressure loss

The attenuator will add an additional resistance to the duct system (see diagram), which must be considered when selecting a fan. These values apply for equal inflows. In case of unequal flow (e.g. rectangular fan outflow), a 1 metre section of straight ducting can be fitted between fan and attenuator or allow for higher resistance.

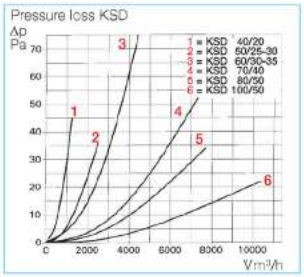
KSD



Dim. in mm see table




Pressure loss KSD

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| Type | Ref. no. | Duct size in cm | No. inserts | Dimensions in mm A | B | C | D | Weight approx. kg | Insertion insulation level $D_E$ dB at Hz 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | average insulation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KSD 40/20 | 8728 | 40/20 | 3 | 420 | 220 | 443 | 240 | 13 | 8 | 11 | 23 | 31 | 31 | 26 | 18 | 17 |
| KSD 50/25-30 | 8729 | 50/25-30 | 3 | 520 | 270/320 | 540 | 340 | 16.5 | 6 | 9 | 19 | 25 | 25 | 20 | 15 | 14 |
| KSD 60/30-35 | 8730 | 60/30-35 | 4 | 620 | 320/370 | 640 | 390 | 20 | 7 | 10 | 21 | 28 | 28 | 23 | 16 | 12 |
| KSD 70/40 | 8731 | 70/40 | 4 | 720 | 420 | 740 | 440 | 25 | 6 | 8 | 18 | 24 | 24 | 20 | 14 | 12 |
| KSD 80/50 | 8732 | 80/50 | 5 | 820 | 520 | 840 | 540 | 31 | 7 | 9 | 19 | 26 | 26 | 21 | 15 | 14 |
| KSD 100/50 | 8733 | 100/50 | 5 | 1020 | 520 | 1040 | 540 | 35 | 5 | 7 | 16 | 21 | 21 | 17 | 12 | 11 |

## Flexible circular attenuator FSD

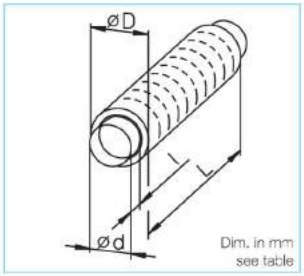
### Design – Installation

Robust flexible aluminium ducting with inner perforated face retaining the resin bounded attenuation packing of 50 mm thickness. Spigotted on both ends to fit into nominal size ducting or to be fixed with pipe clamp connectors BM on fan or ducting. The flexible body allows easy installation.

### Pressure loss

The pressure loss is 4 times the friction resistance.

FSD




Dim. in mm see table

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| Type | Ref. no. | Dimensions in mm L | Ø D | Ø d | l | Insertion insulation level dB at Hz 250 | 500 | 1000 | 2000 | Weight approx. kg | average insulation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FSD 100 | 0676 | 1000 | 210 | 99,5 | 60 | 17 | 33 | 48 | 40 | 1.1 | 25 |
| FSD 125 | 0677 | 1000 | 240 | 124,5 | 60 | 13 | 27 | 47 | 22 | 1.5 | 20 |
| FSD 160 | 0678 | 1000 | 262 | 159,5 | 60 | 12 | 26 | 45 | 20 | 2.0 | 19 |
| FSD 200 | 0679 | 1000 | 313 | 199,5 | 60 | 10 | 22 | 31 | 10 | 2.5 | 16 |
| FSD 250 | 0680 | 1000 | 363 | 249,5 | 85 | 8 | 15 | 26 | 8 | 3.2 | 12 |
| FSD 315 | 0681 | 1000 | 418 | 314,5 | 85 | 7 | 15 | 25 | 8 | 4.2 | 11 |
| FSD 355 | 0682 | 1000 | 464 | 354,5 | 85 | 5 | 13 | 19 | 8 | 4.7 | 9 |
| FSD 400 | 0683 | 1000 | 514 | 399,5 | 90 | 5 | 13 | 19 | 8 | 5.3 | 9 |

## Design – Installation

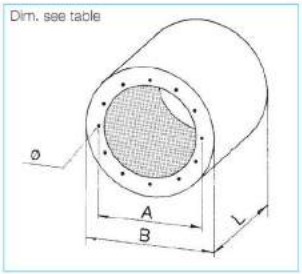
Casing made of galvanised sheet steel. Cladding with high-quality mineral wool covered with fleece to prevent abrasion. Dimensions and fixing holes of all sizes fit the nominal diameter of the fan (R 20). Fixing holes according to DIN 24155, Pt. 2.

## Insertion insulation

For larger insertion insulation, several attenuators with the same diameter can be installed in-line.

## Pressure loss

The resistance of the RSD attenuators is very low. When designing the system, twice the friction resistance should be into account.




RSD

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| Type Nominal Ø | Ref. no | Basic length | Dimensions in mm L | A | B | Hole Ø | Weight approx. kg | Insertion insulation level $D_E$ dB 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | average insulation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RSD 225/ 300 | 8734 | 1 | 300 | 259 | 404 | 6 x M 6 | 7 | 2 | 5 | 9 | 14 | 13 | 8 | 6 | 8 |
| RSD 225/ 600 | 8735 | 2 | 600 | 259 | 404 | 6 x M 6 | 12 | 4 | 10 | 17 | 27 | 25 | 17 | 14 | 15 |
| RSD 225/ 900 | 8736 | 3 | 900 | 259 | 404 | 6 x M 6 | 17 | 7 | 13 | 25 | 33 | 31 | 20 | 16 | 20 |
| RSD 250/ 300 | 8737 | 1 | 300 | 286 | 404 | 6 x M 6 | 7 | 3 | 5 | 8 | 8 | 9 | 7 | 5 | 8 |
| RSD 250/ 600 | 8738 | 2 | 600 | 286 | 404 | 6 x M 6 | 12 | 5 | 10 | 16 | 24 | 19 | 14 | 10 | 15 |
| RSD 250/ 900 | 8739 | 3 | 900 | 286 | 404 | 6 x M 6 | 16 | 6 | 12 | 22 | 28 | 21 | 15 | 11 | 18 |
| RSD 280/ 400 | 8740 | 1 | 400 | 322 | 454 | 8 x M 8 | 10 | 4 | 5 | 8 | 14 | 9 | 8 | 6 | 8 |
| RSD 280/ 800 | 8741 | 2 | 800 | 322 | 454 | 8 x M 8 | 18 | 7 | 9 | 16 | 28 | 18 | 17 | 14 | 14 |
| RSD 280/1200 | 8742 | 3 | 1200 | 322 | 454 | 8 x M 8 | 25 | 9 | 12 | 23 | 37 | 23 | 20 | 16 | 18 |
| RSD 315/ 400 | 8743 | 1 | 400 | 356 | 504 | 8 x M 8 | 11 | 3 | 3 | 7 | 13 | 8 | 7 | 5 | 5 |
| RSD 315/ 800 | 8744 | 2 | 800 | 356 | 504 | 8 x M 8 | 19 | 6 | 8 | 14 | 26 | 16 | 12 | 9 | 12 |
| RSD 315/1200 | 8745 | 3 | 1200 | 356 | 504 | 8 x M 8 | 28 | 9 | 12 | 21 | 36 | 18 | 17 | 14 | 18 |
| RSD 355/ 400 | 8746 | 1 | 400 | 395 | 564 | 8 x M 8 | 13 | 3 | 4 | 7 | 11 | 7 | 6 | 4 | 6 |
| RSD 355/ 800 | 8747 | 2 | 800 | 395 | 564 | 8 x M 8 | 23 | 6 | 7 | 13 | 22 | 14 | 12 | 8 | 11 |
| RSD 355/1200 | 8748 | 3 | 1200 | 395 | 564 | 8 x M 8 | 33 | 8 | 11 | 17 | 29 | 18 | 15 | 10 | 17 |
| RSD 400/ 400 | 8749 | 1 | 400 | 438 | 564 | 12 x M 8 | 12 | 3 | 4 | 6 | 9 | 7 | 5 | 3 | 6 |
| RSD 400/ 800 | 8750 | 2 | 800 | 438 | 564 | 12 x M 8 | 21 | 6 | 6 | 12 | 18 | 13 | 12 | 8 | 9 |
| RSD 400/1200 | 8751 | 3 | 1200 | 438 | 564 | 12 x M 8 | 30 | 7 | 10 | 14 | 22 | 18 | 13 | 9 | 15 |
| RSD 450/ 400 | 8752 | 1 | 400 | 487 | 634 | 12 x M 8 | 17 | 4 | 5 | 8 | 10 | 8 | 7 | 5 | 8 |
| RSD 450/ 800 | 8753 | 2 | 800 | 487 | 634 | 12 x M 8 | 27 | 6 | 7 | 13 | 18 | 13 | 12 | 9 | 11 |
| RSD 450/1200 | 8754 | 3 | 1200 | 487 | 634 | 12 x M 8 | 38 | 8 | 10 | 18 | 23 | 17 | 14 | 10 | 15 |
| RSD 500/ 600 | 8755 | 1 | 600 | 541 | 714 | 12 x M 8 | 27 | 4 | 5 | 9 | 11 | 9 | 9 | 6 | 8 |
| RSD 500/ 900 | 8756 | 2 | 900 | 541 | 714 | 12 x M 8 | 36 | 6 | 8 | 14 | 16 | 13 | 13 | 9 | 12 |
| RSD 500/1200 | 8757 | 3 | 1200 | 541 | 714 | 12 x M 8 | 45 | 8 | 11 | 22 | 24 | 17 | 16 | 12 | 17 |
| RSD 560/ 600 | 8758 | 1 | 600 | 605 | 804 | 8 x M 10 | 32 | 3 | 5 | 9 | 9 | 8 | 8 | 6 | 8 |
| RSD 560/1200 | 8759 | 2 | 1200 | 605 | 804 | 8 x M 10 | 52 | 6 | 10 | 19 | 19 | 16 | 13 | 10 | 15 |
| RSD 630/ 600 | 8760 | 1 | 600 | 674 | 900 | 8 x M 10 | 44 | 3 | 5 | 8 | 8 | 8 | 7 | 5 | 8 |
| RSD 630/1200 | 8761 | 2 | 1200 | 674 | 900 | 8 x M 10 | 68 | 5 | 10 | 16 | 15 | 15 | 11 | 8 | 15 |
| RSD 710/ 600 | 8762 | 1 | 600 | 751 | 1000 | 8 x M 10 | 51 | 3 | 5 | 7 | 7 | 7 | 6 | 4 | 8 |
| RSD 710/1200 | 8763 | 2 | 1200 | 751 | 1000 | 8 x M 10 | 80 | 5 | 10 | 14 | 13 | 13 | 10 | 7 | 15 |
| RSD 800/ 600 | 8764 | 1 | 600 | 837 | 1100 | 12 x M 10 | 57 | 2 | 5 | 7 | 6 | 6 | 5 | 4 | 8 |
| RSD 800/1200 | 8765 | 2 | 1200 | 837 | 1100 | 12 x M 10 | 88 | 5 | 9 | 13 | 11 | 11 | 9 | 6 | 14 |
| RSD 900/ 900 | 8766 | 1 | 900 | 934 | 1220 | 12 x M 10 | 82 | 2 | 4 | 10 | 9 | 6 | 5 | 4 | 6 |
| RSD 900/1800 | 8767 | 2 | 1800 | 934 | 1220 | 12 x M 10 | 135 | 4 | 9 | 21 | 17 | 13 | 9 | 8 | 14 |
| RSD 1000/ 900 | 8768 | 1 | 900 | 1043 | 1350 | 12 x M 10 | 96 | 2 | 4 | 8 | 7 | 5 | 4 | 3 | 6 |
| RSD 1000/1800 | 8769 | 2 | 1800 | 1043 | 1350 | 12 x M 10 | 157 | 4 | 7 | 16 | 14 | 10 | 7 | 6 | 11 |
| RSD 1120/ 900 | 8770 | 1 | 900 | 1174 | 1350 | 12 x M 10 | 81 | 2 | 3 | 7 | 6 | 4 | 3 | 3 | 5 |
| RSD 1120/1800 | 8771 | 2 | 1800 | 1174 | 1350 | 12 x M 10 | 136 | 3 | 6 | 14 | 11 | 8 | 6 | 5 | 9 |
| RSD 1250/ 900 | 8772 | 1 | 900 | 1311 | 1460 | 12 x M 10 | 86 | 1 | 2 | 5 | 4 | 3 | 2 | 2 | 3 |
| RSD 1250/1800 | 8773 | 2 | 1800 | 1311 | 1460 | 12 x M 10 | 146 | 2 | 4 | 11 | 9 | 7 | 5 | 4 | 6 |