

## ■ 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:

$$D_e = L_o - L_m \text{ dB}$$

$L_o$ : 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 octave (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 octaves. 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<sup>-1</sup>) 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 $L_{WA}$	$L_{WA} = 81 \text{ dB(A)}$							
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	$L_{WA}^* = 10 \cdot \lg(10^{47 \cdot 0.1} + 10^{52 \cdot 0.1} + 10^{57 \cdot 0.1} + 10^{49 \cdot 0.1} + 10^{51 \cdot 0.1} + 10^{55 \cdot 0.1} + 10^{49 \cdot 0.1}) = 61 \text{ dB(A)}$							
Relevant A-weighted sound pressure level at 1 m distance	$L_{pA}^* = 53 \text{ dB(A)}$							

### 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.

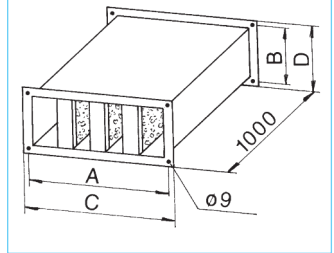
#### Pressure loss

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.

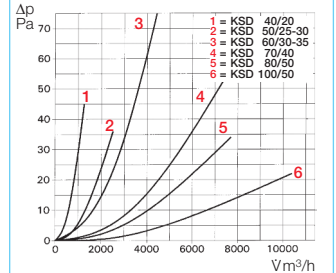
### KSD



Dim. in mm see table



Pressure loss KSD



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Type	Ref. no.	Duct size in cm	No. inserts	Dimensions in mm				Weight approx. kg	Insertion insulation level D <sub>e</sub> dB at Hz				average insulation			
				A	B	C	D		125	250	500	1000		2000	4000	8000
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

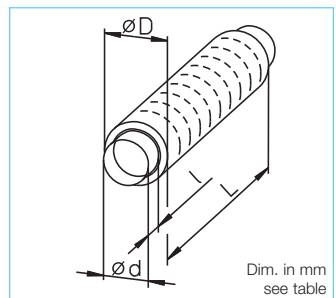
#### Design – Installation

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



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Type	Ref. no.	L	Dimensions in mm			Insertion insulation level dB at Hz				Weight approx. kg	average insulation
			Ø D	Ø d	l	250	500	1000	2000		
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**

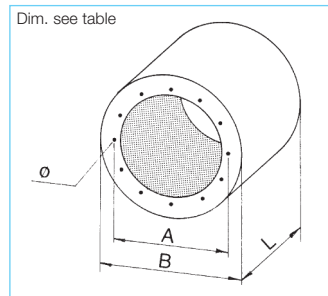
Casing made of galvanised sheet steel. Cladding with high-quality mineral wool covered with fleece to prevent abrasion. Dimensions and fixing holes of all sizes fit the nominal diameter of the fan (R 20). Fixing holes according to DIN 24155, Pt. 2.

**■ 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.



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Type Nominal Ø	Ref. no	Basic length	L	Dimensions in mm			Hole Ø	Weight approx. kg	Insertion insulation level D <sub>e</sub> dB								average insulation
				A	B				125	250	500	1000	2000	4000	8000		
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	