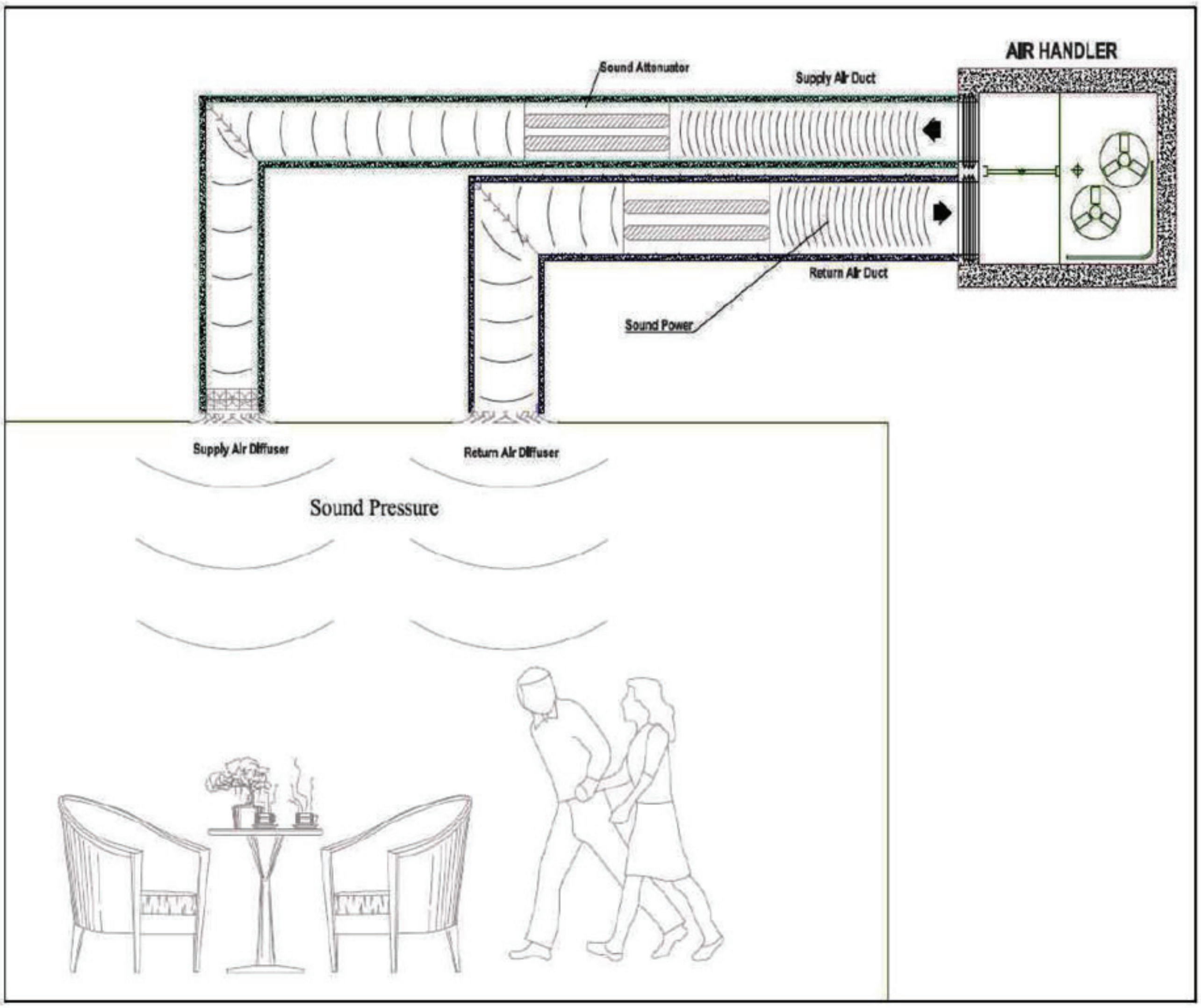
CASTLE
ENGINEERING
INDUSTRIES

SOUND ATTENUATOR

INTRODUCTION TO SILENCER

Within an HVAC system, sources of potential noise include AHUs (Air Handling Units), terminal units, and room air outlets. The sound waves produced by these elements propagate their energy through the ductwork, reaching the designated occupant areas, as depicted below.



Sound Power and Sound Pressure

are distinct in their definitions. Sound Power refers to the total energy emitted by a source in all directions over time. On the other hand, Sound Pressure is the measurement of pressure variation at the receiver's location.

Sound Pressure is influenced by the acoustic conditions of the environment. This includes factors such as nearby reflecting surfaces, the distance from the sound source to the receiver, the type of space, its size, the presence of barriers, and ambient noise intrusion. As a result, the sound pressure generated by an AHU depends on:

- The distance between the AHU and the room
- The dimensions of the room
- The sound-absorbing characteristics of interior furnishings
- Attenuating components like silencers, duct liners, duct branches, elbows, etc.

The AHU equipment supplier has provided the following sound power data in the table below. The quietest sound we can measure is 10^-12 Watts (0 dB), and the loudest noise, such as that of a space shuttle during take-off, can reach 10^8 Watts (200 dB).

Sound Power Levels (in Watts):

- Power Generator: 10^-2 (100 dB)
- Air Handling Unit: 10^-3 (90 dB)
- Voice at Conversation Level: 10^-5 (70 dB)
- Exhaust Fan: 10^-6 (60 dB)
- Air Diffuser: 10^-7 (50 dB)
- Voice at Soft Whisper: 10^-9 (30 dB)
- Threshold of Hearing: 10^-12 (0 dB)

These values provide a range of sound power levels that can be used for reference and comparison when evaluating the noise generated by various sources.

Definitions

Attenuation:
The decrease in sound level per unit distance, whether through divergence, diffusion, absorption, or scattering.

A-weighted Sound Level:
The measurement of sound using the A-weighting network of a sound level meter. It provides an approximate indication of relative loudness for broadband sounds.

Background Noise:

The base noise level measured in the absence of building occupants and when all known sound sources are off.

Breakout Noise:

The transmission of noise from a fan or air system through duct walls.

Criteria:

Noise levels considered acceptable, subjectively or objectively, in a given environment. Common criteria include Noise Criteria Curves (NC Levels), Noise Rating Curves (NR Levels), and dB(A).

Decibel (dB):

The standard unit for measuring sound, used to quantify both sound pressure level and sound power level.

Direct SPL:

Noise transmitted directly from a source (like a grille or diffuser) without reflection.

Duct borne Noise:

Noise transmitted along ductwork, both upstream and downstream of a fan.

Flanking Noise (Breakout):

Noise transmitted through a barrier, often a fan casing or ductwork. It refers to indirect noise paths that can reduce the effectiveness of noise control measures.

Frequency (Hz):

The pitch of sound, defined by the number of sound pressure waves arriving per second at a fixed point.

Insertion Loss:

A measure of an attenuator's (or sometimes a partition's) noise reduction capability. This is determined by replacing a section of ductwork with an attenuator between two test rooms: one with the noise source and the other with sound level measuring equipment. The difference in recorded noise level is the insertion loss due to the attenuator.

Noise Outlet:

Typically, a grille or diffuser, serving as a terminal element on an extract or supply system.

Octave Bands:

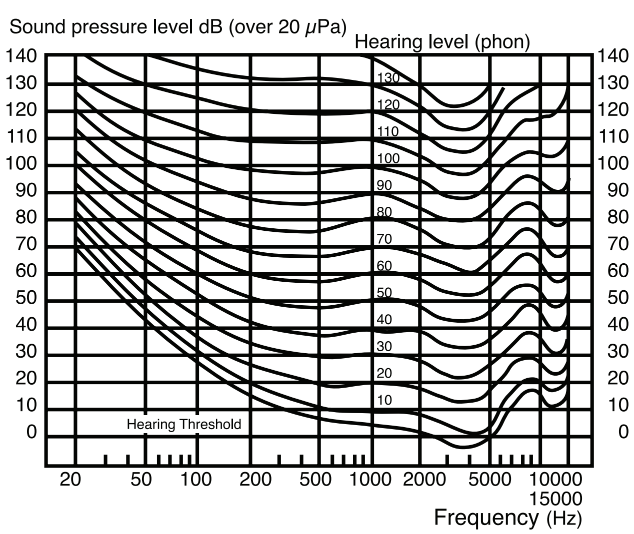
Subdivisions of the frequency range, identified by mid (or centre) frequencies. These include 63, 125, 250, 500, 1k, 4k, and 8k Hz, sometimes 31.5 Hz, as per international agreements.

Regenerated Noise:
Additional noise produced by the fan, caused by air passing over fixed duct elements such as grilles, dampers, air turns, and splitters in attenuators.
Reverberant SPL:
Noise transmitted through reflection off room surfaces.
Reverberant Time:
A measure of a room's acoustic 'reflectiveness.'
Sound Power Level (SWL):
A theoretical assessment of sound produced at the source, calculated from measured sound pressure levels at known distances from the source under specific acoustic conditions. SWL depends solely on the source and is independent of the environment or location. It's valuable for direct comparison with data from other manufacturers.
Sound Pressure Level (SPL):
A measured sound level indicating noise produced at the source, influenced by factors like reverberation and distance. The SPL of a fan may not be very informative, as environmental conditions during measurement may differ from the fan's actual location.

Our Perception of Sound:

We react differently to two sounds which have the STme sound pressure level and different frequencies. Curves which describe how people normally perceive sounds of varying strength and frequency have been constructed through experiments on large numbers of volunteers. These so-called hearing level curves are designated by the sound pressure level for each curve at a frequency of 1 kHz. The unit used for the curves is the phon.

Hearing Level Curves or Noise Criteria (NC) Diagram



NC DATA TABLE

Noise Criterion	Octave Band Center Frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
	Sound Pressure Levels (dB)							
NC15	47	36	29	22	17	14	12	11-
NC20	51	40	33	26	22	19	17	16-
NC25	54	44	37	31	27	24	22	21-
NC30	57	48	41	35	31	29	28	27-
NC35	60	52	45	40	36	34	33	32-
NC40	64	56	50	45	41	39	38	37-
NC45	67	60	54	49	46	44	43	42-
NC50	71	64	58	54	51	49	48	47-
NC55	74	67	62	58	56	54	53	52-
NC60	77	71	67	63	61	59	58	57-
NC65	80	75	71	68	66	64	63	62-
NC70	83	79	75	72	71	70	69	68-

DB Level Increase for Equal Sound Sources

Sound Sources	Level Increase in dB	Sound Sources	Level Increase in dB
1	0	8	9
2	3	9	9.5
3	4.8	10	10
4	6	12	10.8
5	7	16	12
6	7.8	20	13
7	8.5	-	-

Table1: Indoor Design Goals for Air Conditioning Sound Control

Situation	NC
Section 1 - Studios and Auditoria	
Sound Broadcasting (drama)	15
Sound Broadcasting (general), TV (general), Recording Studio	20
TV (audience studio)	25
Concert Hall, Theatre	20 - 25
Lecture Theatre, Cinema	25 - 30
Section 2 - Hospitals	
Audiometric Room	20 - 25
Operating Theatre, Single Bed Ward	30 - 35
Multi-bed Ward, Waiting room	35
Corridor, Laboratory	35 - 40
Wash Room, Toilet, Kitchen	35 - 45
Staff Room, Recreation Room	30 - 40
Section 3 - Hotels	
Individual Room, Suite	20 - 30
Ballroom, Banquet Room	30 - 35
Corridor, Lobby	35 - 40
Kitchen, Laundry	40 -45
Section 4 - Restaurants, Shops and Stores	
Restaurant, Department Store (upper floor)	35 - 40
Club, Public House, Cafeteria, Canteen, Retail Store (main floor)	40 - 45
Section 5 - Offices	
Boardroom, Large Conference Room	25 - 30
Small Conference Room, Executive Office, Reception Room	30 - 35
Open Plan Office	35
Drawing Office, Computer Suite	35 - 45
Section 6 - Public Buildings	
Court Room	25 - 30
Assembly Hall	25 - 35
Library, Bank, Museum	30 - 35
Wash Room, Toilet	35 - 45
Swimming Pool, Sports Arena	40 - 45
Garage, Car Park	55
Section 7 - Ecclesiastical and Academic Buildings	
Church, Mosque	25 - 30
Classroom, Lecture Theatre	25 - 35
Laboratory, Workshop	35 - 40
Corridor, Gymnasium	35 - 45
Section 8 - Industrial	
Warehouse, Garage	45 - 50
Workshop (light engineering)	45 - 55
Workshop (heavy engineering)	50 - 65
Section 9 - Private Dwelling (Urban)	
Bedroom	25
Living Room	30

INTRODUCTION TO SOUND ATTENUATORS

Overview:

Our range of attenuators has been developed to address diverse needs from consulting engineers, owners, and contractors. They offer a cost-effective solution for a wide array of noise control challenges encountered in the HVAC sector.

Our standard line of attenuators is designed to tackle common issues prevalent in the HVAC industry. However, if none of our standard silencers meet your specific requirements, we are equipped to develop a customized solution tailored to your needs.

Material:

All CASTLE attenuators are crafted from galvanized steel sheets in accordance with ASTM A924 and ASTM A653 standards (replacing ASTM A525/A527). Additionally, attenuators are offered in the following materials:

- Stainless steel as per ASTM 240 type 304 or 316.
- Epoxy coated (internally and externally).

Surface Finish:

CASTLE galvanized attenuators feature G90 surface coating or 275g/m2 zinc coating with a regular spangle finish.

Stainless steel attenuators are crafted with a 2B mill finish.

Epoxy coated attenuators can be customized to meet client specifications regarding color and coating thickness.

Acoustic Infill:

The "Acoustic Infill" material used in all CASTLE attenuators is inert, non-flammable, non-hygroscopic, and does not support vermin or fungus. It is rot-proof and odorless. The "Acoustic Infill" is faced with glass tissue or an equivalent material. This infill material is guaranteed against erosion at air velocities of up to 30 m/s and temperatures of up to 121°C.

The acoustic infill undergoes testing for the following parameters:

Surface Burning Characteristics: UL 723, ASTM E84, ASTM E136

Mold Growth: ASTM D2020, UL 181

Moisture Absorption: ASTM D-07 B, ASTM C550

Fire Resistance: NFPA 90A

Acoustic Performance: ASTM C1071, ASTM C423-77

RECTANGULAR SOUND ATTENUATOR

Description:

The straight rectangular cased attenuator is primarily used to reduce fan and machinery noise to meet required or allowable noise levels. The ST attenuator offers several advanced features, including aerodynamic splitters, side liners, slide-on flanges, and protection of the acoustic infill with galvanized perforated sheet metal.

Construction:

Type ST attenuator casings and splitters are manufactured from galvanized sheet metal with a minimum gauge of Ga.20. The casings are formed with lock-formed seams sealed with mastic sealant, complying with SMACNA and DW 144 Standards. STF-30 slide-on flanges are standard fittings. The splitters contain acoustic infill that meets Class O Building Regulations. The infill is faced with glass tissue and protected behind galvanized perforated metal, providing dual protection against damage and fibre erosion at air velocities up to 30 m/s. The splitters are radiused at both ends to minimize air pressure loss and regenerated noise.

Alternative Construction:

1. STH18:

Type STH18 is similar to Type ST but with casing thickness increased to Ga.18 to comply with ductwork codes such as SMACNA standards for high pressure and DW 144 Class C or D.

2. STM:

Type STM is similar to Type ST, but the acoustic infill is enveloped in a Melinex polyester film.

3.STH:

Type STH is similar to Type ST but features horizontal splitters, typically with a maximum width dimension of 1200mm.

4.STRS:

Type STRS is similar to Type ST but with rolled steel angle end flanges drilled to a standard pattern.

Sectionalized Construction:

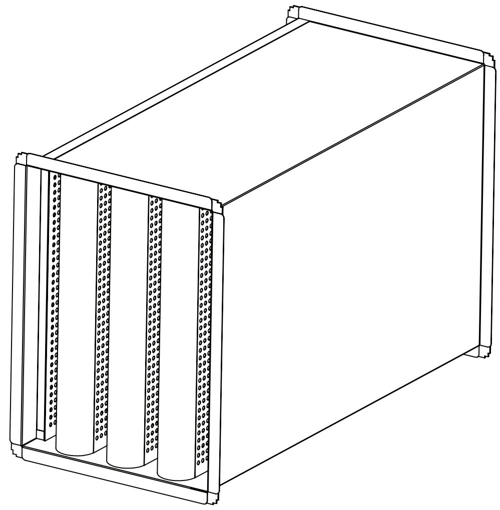
ST attenuators are typically supplied in sections when any of the following dimensions are exceeded: Width (W) = 2100mm, Height (H) = 1800mm, Length (L) = 2100mm.

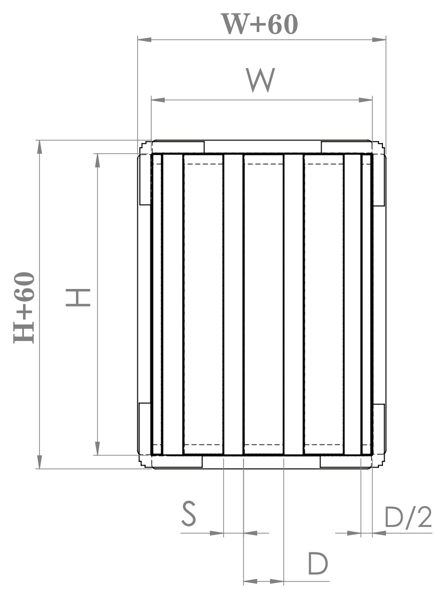
The assembly of sectionalized attenuators is done on-site by others. CASTLE will provide comprehensive details regarding the configuration and assembly of the attenuator.

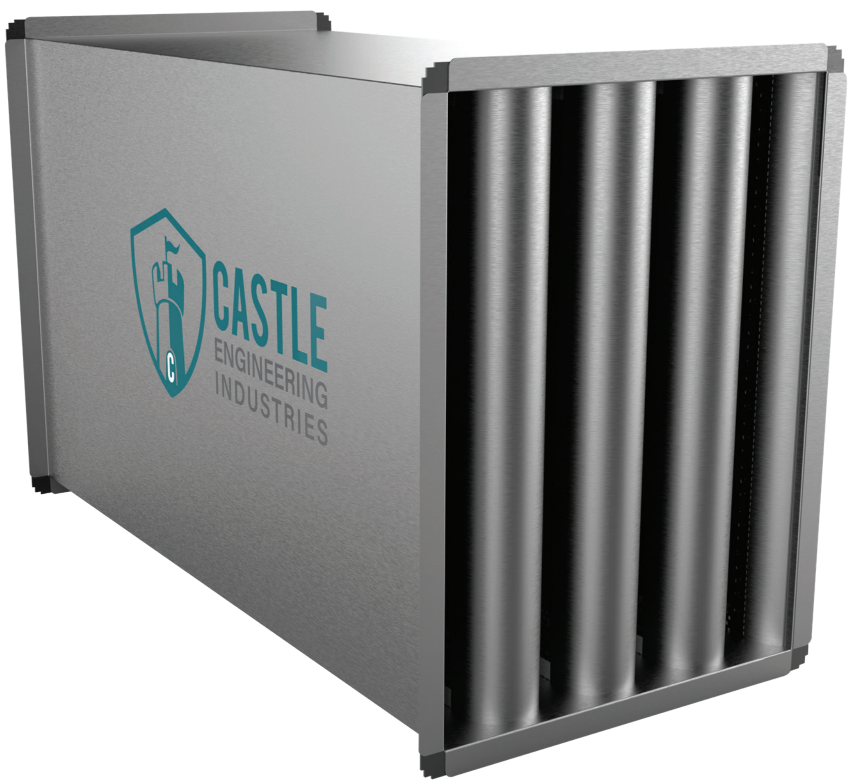
Dimensions:

Rec SOUND ATTENUATOR

material:galvanized
frame: 1.25mm
spliters: 0.8mm
perforated sheets: 0.8mm
meniral wool







BEND ATTENUATOR

Description:

The vertical-mounted cased bend rectangular attenuator is primarily designed to reduce fan and machinery noise to meet required or allowable noise levels. The ST attenuator offers various advanced features, including aerodynamic splitters, side liners, slide-on flanges, and protection of the acoustic infill with galvanized perforated sheet metal.

Construction:

The construction of cased bend attenuators is generally similar to the straight version. To minimize airflow resistance, turning vanes are incorporated into the design. Dimension L1 and L2 refer to the air entry and discharge legs, respectively, measured along the centre path of the bend until the intersection point, so that L1 + L2 equals L. Unless specified otherwise, bend attenuators would be supplied with L1 equal to L2.

Alternative Construction:

1. STBH18:

• Type STBH18 is similar to type STB but with the casing thickness increased to Ga.18 to comply with ductwork codes such as SMACNA standards for high pressure and DW 144 Class C or D.

2.STBM:

• Type STBM is similar to Type ST, but the acoustic infill is enveloped in a Melinex polyester film.

3.STBRS:

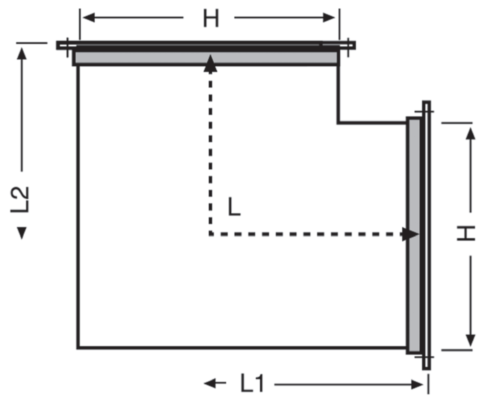
• Type STBRS is similar to Type STB, but with rolled steel angle end flanges drilled to a standard pattern.

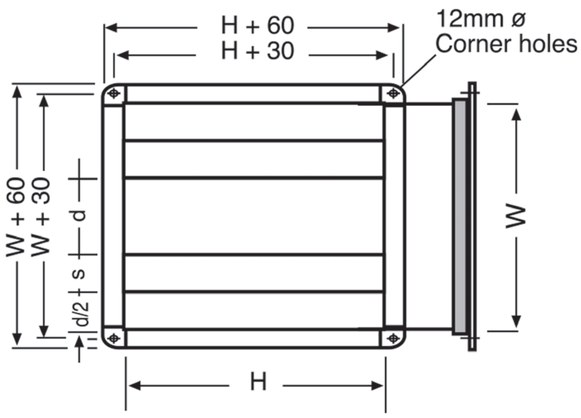
Sectionalized Construction:

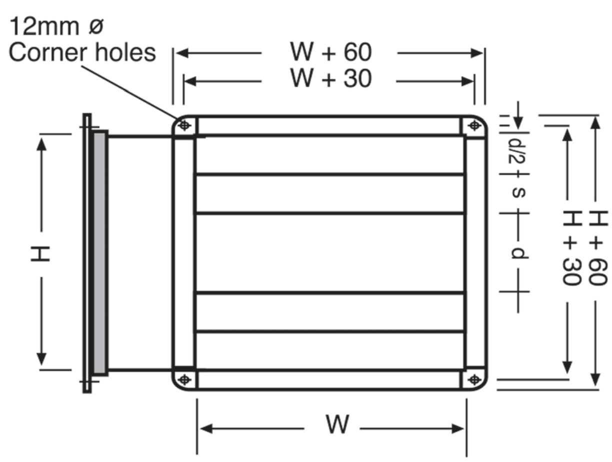
STB attenuators are typically supplied in sections when any of the following dimensions are exceeded: Width (W) = 2100mm, Height (H) = 1800mm, Length (L) = 2100mm. The assembly of sectionalized attenuators is done on-site by others. CASTLE will provide comprehensive details regarding the configuration and assembly of the attenuator.

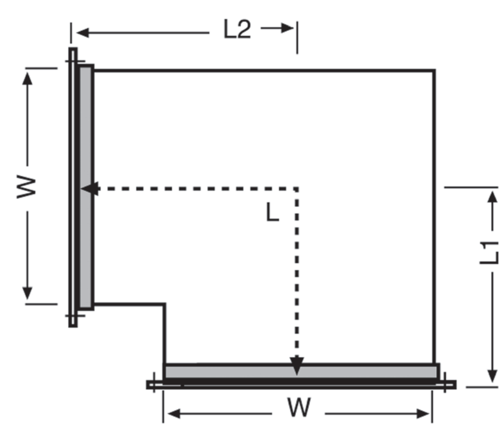
Dimensions:

Vertical Bend Attenuator: Type STB









Attenuator Performance

Attenuators have been rated, tested, and derived from tests meeting the requirements of BS 4718:1971 as conducted by SRL of the UK.
No deviations of insertion loss with airflow were recorded across the range of velocities used in this catalogue. Static insertion loss figures are provided in Table 3.
Full regenerated noise data is available for ST attenuators, enabling the calculation of installed insertion loss. Table 2 provides guidelines for maximum face velocity against design noise level requirements, to limit attenuator regenerated noise.
Pressure loss data assumes uniform airflow to the attenuator's face in a duct-to-duct layout. Units installed in situations with poor inlet or discharge conditions could experience higher pressure losses than catalogued.
In most applications, the need to maintain a reasonable pressure drop across the attenuator automatically ensures that flow noise generated within the attenuator is insignificant compared to the permissible sound power emerging. However, if extremely low levels need to be achieved or if the sound power from the fan is relatively low, the flow noise generated by the attenuator can be significant and reduce its effective insertion loss. This is why when an acoustic consultant specifies the attenuator performance, they usually specify the required insertion loss. This allows the attenuator manufacturer to select a unit of the appropriate size, ensuring that the flow generated within it does not reduce the effective insertion loss below the required level.
Assuming correct installation, the acoustic and aerodynamic performance of splitters only will be similar to that of a cased attenuator.

Description:
Space noise levels can be influenced by attenuator self-noise. As a guideline, it is recommended not to exceed the indicated face velocities. For systems with fewer than three outlets or less than 5m of ductwork, select a size for 5NC lower. For design levels of NC30 or below, the selection should be verified by Castle .

Table2: Installed insertion loss (Velocity)

Required Space Noise Level (NC)	Face Velocity (v_t m/s)			
	Attenuator Type			
	SA 20 - 75	SA 20 - 100	SA 20 - 150	SA 20 - 200
25	2.4	3.2	3.9	5.0
30	3.2	4.2	5.5	6.2
35	3.8	5.0	6.7	7.4
40	4.6	5.7	7.7	8.9
45	5.4	6.6	8.6	10.4
50	6.2	7.6	9.7	11.6

Table3: Static Insertion Loss (dB)

Table tatic Insertion Loss (dB)

SA 20 - 75 Attenuators		Octave Centre Frequency (f_m in Hz)							
Type	Length (mm)	63	125	250	500	1k	2k	4k	8k
SA 20 - 75	600	9	13	22	36	45	39	33	29
SA 20 - 75	900	10	16	27	41	49	47	38	33
SA 20 - 75	1200	11	18	31	46	50	50	43	38
SA 20 - 75	1500	12	21	36	50	50	50	48	42
SA 20 - 75	1800	13	24	41	50	50	50	50	46
SA 20 - 75	2100	14	26	45	50	50	50	50	50
SA 20 - 75	2400	15	29	50	50	50	50	50	50

SA 20 - 100 Attenuators		Octave Centre Frequency (f_m in Hz)							
Type	Length (mm)	63	125	250	500	1k	2k	4k	8k
SA 20 - 100	600	7	10	18	34	46	40	33	29
SA 20 - 100	900	8	12	22	37	50	46	36	31
SA 20 - 100	1200	9	14	26	40	50	50	39	33
SA 20 - 100	1500	9	17	30	44	50	50	41	35
SA 20 - 100	1800	10	19	34	47	50	50	44	37
SA 20 - 100	2100	11	21	38	50	50	50	47	39
SA 20 - 100	2400	11	24	42	50	50	50	49	41

SA 20 - 150 Attenuators		Octave Centre Frequency (f_m in Hz)							
Type	Length (mm)	63	125	250	500	1k	2k	4k	8k
SA 20 - 150	600	8	12	17	34	44	28	23	22
SA 20 - 150	900	8	14	20	37	47	32	26	24
SA 20 - 150	1200	9	15	23	40	50	36	29	26
SA 20 - 150	1500	10	17	26	43	53	40	32	28
SA 20 - 150	1800	11	18	29	46	57	44	35	31
SA 20 - 150	2100	11	20	32	49	40	48	38	33
SA 20 - 150	2400	12	21	35	50	50	50	41	35

SA 20 - 200 Attenuators		Octave Centre Frequency (f_m in Hz)							
Type	Length (mm)	63	125	250	500	1k	2k	4k	8k
SA 20 - 200	600	7	11	16	25	27	23	21	20
SA 20 - 200	900	8	12	18	30	33	26	23	21
SA 20 - 200	1200	8	14	21	35	39	30	25	23
SA 20 - 200	1500	9	15	23	40	44	33	28	24
SA 20 - 200	1800	9	17	26	45	50	37	30	26
SA 20 - 200	2100	10	18	28	50	50	40	32	27
SA 20 - 200	2400	11	19	30	50	50	43	34	28

ATTENUATOR SELECTION

Quick Selection:
The Castle leaflet titled 'Sound and Noise Control' and other technical resources describe the method for a full acoustic analysis. If attenuator performance requirements have been established using this method, reference should be made to Table 3.
However, to assist engineers in producing attenuator selections for design planning, Table 4 has been developed. It is recommended that CASTLE engineers review the attenuator selections when detailed system data is available.

For noise level requirements of NC30 or below, CASTLE should be consulted for analysis.
Larger and alternative cross-sections can be selected from Tables 5 to 8. Note that the width dimension (for Type ST) or height dimension (for Type STH) must be in a 'modular' increment. Air pressure loss can be obtained from the tables for the appropriate face velocity.
For atmosphere side noise assessment, please consult our technical office.

Method of Selection
1. From Table 1, select the recommended space NC level for the type of area concerned.
2. From Table 4, select an attenuator based on the appropriate fan static pressure, type of ventilated space, and space NC level.
3. Check Table 2 for the maximum permissible face velocity of the attenuator required for the space NC level.
4. From Tables 5 to 8, as applicable, select a cross-section for the attenuator based on the required volume flow rate and to meet the maximum desirable face velocity/pressure loss.
5. Selection example:
• ST20-150 / 700W x 600H x 1500L"

Table 4: Attenuator Quick Selection Chart

		Type of ventilated area being served by low velocity systems utilizing DW 142 Classes A or B ductwork									High velocity CV/ VAV systems incorporating terminal units and utilizing DW 142 Class C ductwork.
		Rooms with average furnishing: floors carpeted, including:			Rooms with limited furnishings: mainly hard surfaces, including:			Rooms without soft furnishings, including:			
		Offices, Banks, Libraries, Lecture rooms, Restaurants Hotel rooms, Department stores.			Hospital areas, Supermarkets, Computer rooms, Clean rooms, Laboratories, Cafes, Dance Halls, Museums, Canteens, Toilets.			Kitchens, Swimming Pools, Sports Halls, Covered garages, Warehouses.			
Fan Static Pressure		250 Pa	500 Pa	1000 Pa	250 Pa	500 Pa	1000 Pa	250 Pa	500 Pa	1000 Pa	2000 Pa Max
Criterion Type		Attenuator Length (mm)			Attenuator Length (mm)			Attenuator Length (mm)			Attenuator Length (mm)
NC 45	SA20-100	900	900	900	900	900	1200	900	900	1500	1200
	SA20-150	900	1200	1200	1200	1500	1800	1500	900	2100	1800
NC 40	SA20-100	900	900	1200	1200	1200	1500	1200	1500	1500	1500
	SA20-150	1200	1500	1800	1500	1800	2100	1800	2100	2100	2100
NC 35	SA20-100	1200	1200	1500	1500	1500	1800	1500	1800	1800	1800
	SA20-150	1500	1800	2100	1800	2100	1400	1800	2100	2400	2400

ATTENUATOR PERFORMANCE I TYPE ST- 75

Table 5: Pressure Loss - Cross Section Sizing

Pressure Loss (Δp, Pa)		15	25	35	50	60	75	85	100	110	125
Face Velocity (v_t m/s)		1.6	2.1	2.4	2.9	3.2	3.5	3.8	4.0	4.3	4.6
Attenuator Self Noise guide Against Face Velocity (v_t)				NC 25		NC 30		NC 35			NC 40
Width (mm)	Height (mm)	Volume Flow Rate (V l/s)									
275	150	65	85	100	120	130	145	155	165	175	190
	300	130	170	200	240	260	290	310	330	350	380
ONE	450	200	260	300	360	400	430	470	500	530	570
MODULE	600	260	350	400	480	530	580	630	660	710	760
	750	330	430	500	600	660	720	780	830	890	950
	900	400	520	590	720	790	870	940	990	1060	1140
550	300	260	350	400	480	530	580	630	660	710	760
	450	400	520	590	720	790	870	940	990	1060	1140
TWO	600	530	690	790	960	1060	1160	1250	1320	1420	1520
MODULES	750	660	870	990	1200	1320	1440	1570	1650	1770	1900
	900	790	1040	1190	1440	1580	1730	1880	1980	2130	2280
	1050	920	1210	1390	1670	1850	2020	2190	2310	2480	2660
825	450	590	780	890	1080	1190	1300	1410	1490	1600	1710
	600	790	1040	1190	1440	1580	1730	1880	1980	2130	2280
THREE	750	990	1300	1490	1790	1980	2170	2350	2480	2660	2850
MODULES	900	1190	1560	1780	2150	2380	2600	2820	2970	3190	3420
	1050	1390	1820	2080	2510	2770	3030	3290	3470	3720	3980
	1200	1580	2080	2380	2870	3170	3470	3760	3960	4260	4550
1100	600	1060	1390	1580	1910	2110	2310	2510	2640	2840	3040
	750	1320	1730	1980	2390	2640	2890	3140	3300	3550	3800
FOUR	900	1580	2080	2380	2870	3170	3470	3760	3960	4260	4550
MODULES	1050	1850	2430	2770	3350	3700	4040	4390	4620	4970	5310
	1200	2110	2770	3170	3830	4220	4620	5020	5280	5680	6070
	1350	2380	3120	3560	4310	4750	5200	5640	5940	6390	6830
1375	750	1650	2170	2480	2990	3300	3610	3920	4130	4430	4740
	900	1980	2600	2970	3590	3960	4330	4700	4950	5320	5690
FIVE	1050	2310	3030	3460	4190	4620	5050	5490	5780	6210	6640
MODULES	1200	2640	3470	3960	4790	5280	5780	6270	6600	7100	7590
	1350	2970	3900	4460	5380	5940	6500	7050	7430	7980	8540
	1500	3300	4330	4950	5980	6600	7220	7840	8250	8870	9490
1650	900	2380	3120	3560	4310	4750	5200	5640	5940	6390	6830
	1050	2770	3640	4160	5020	5540	6060	6590	6930	7450	7970
SIX	1200	3170	4160	4750	5740	6340	6930	7520	7920	8510	9110
MODULES	1350	3560	4680	5350	6460	7130	7800	8460	8910	9580	10250
	1500	3960	5200	5940	7180	7920	8660	9400	9900	10640	11390
	1650	4360	5720	6530	7900	8710	9530	10350	10890	11710	12520
	1800	4750	6240	7130	8610	9500	10400	11290	11880	12770	13660
1925	1050	3230	4240	4850	5860	6470	7070	760	8090	8690	9300
	1200	3700	4850	5540	6700	7390	8090	8780	9240	9930	10630
SEVEN	1350	4160	5460	6240	7540	8320	9100	9880	10400	11170	11950
MODULES	1500	4620	6060	6930	8370	9240	10110	10970	11550	12420	13280
	1650	5080	6670	7620	9210	10160	11120	12070	12700	13660	14610
	1800	5540	7280	8320	10050	11090	12130	13170	13860	14900	15940
	1950	6010	7880	9010	10890	12010	13140	14260	15020	16140	17270
	2100	6470	8490	9700	11720	12940	14150	15360	16170	17380	18600
2200	1200	4220	5540	6340	7660	8450	9240	10030	10560	11350	12140
	1350	4750	6240	7130	8610	9500	10400	11290	11880	12770	13660
EIGHT	1500	5280	6930	7920	9570	10560	11550	12540	13200	14190	15180
MODULES	1650	5810	7620	8710	10530	11620	12710	13790	14520	15610	16700
	1800	6340	8320	950	11480	12670	13860	15050	15840	17030	18220
	1950	6860	9010	10300	12440	13730	15020	16300	17160	18450	19730
	2100	7390	9700	11090	13500	14780	16170	17560	18480	19870	21250
	2250	7920	10400	11880	14360	15840	17330	18810	19800	21290	22770
2475	1350	5350	7020	8020	9690	10690	11960	12700	13370	14370	15370
	1500	5940	7800	8910	10770	11880	12990	14110	14850	15960	17080
NINE	1650	6530	8580	9800	11840	13070	14290	15520	16330	17560	18790
MODULES	1800	7130	9360	10690	12920	14260	15590	16930	17820	19160	20490
	1950	7720	10140	11580	14000	15440	16890	18340	19300	20750	22200
	2100	8320	10910	12470	15070	16630	18190	19750	20790	22350	23910
	2250	8910	11690	13370	16150	17820	19490	21160	22280	23950	25620
	2400	9500	12470	14260	17230	19010	20790	22570	23760	25540	27320

The pressure loss data above relates to a straight attenuator 1200mm long. The following factors are applicable to other lengths:

Length 'L' (mm)	600	900	1200	1500	1800	2100	2400
Δ p Factor	x 0.90	x0.95	0	x1.05	x1.10	x1.15	x1.20

For splitter bend attenuators add 35% to the pressure loss for the straight attenuator.

ATTENUATOR PERFORMANCE I TYPE ST- 100

Table 6: Pressure Loss - Cross Section Sizing

Pressure Loss (Δp, Pa)		15	25	35	50	60	75	85	100	110	125
Face Velocity (v_t m/s)		2.1	2.7	3.2	3.8	4.2	4.7	5.0	5.4	5.7	6.0
Attenuator Self Noise guide Against Face Velocity (v_t)				NC 25		NC 30		NC 35			NC 40
Width (mm)	Height (mm)	Volume Flow Rate (V l/s)									
300	150	95	120	145	170	190	210	225	245	255	270
	300	190	240	290	340	380	420	450	490	510	540
ONE	450	280	360	430	510	570	630	680	730	770	810
MODULE	600	380	490	580	680	760	850	900	970	1030	1080
	750	470	610	720	860	950	1060	1130	1220	1280	1350
	900	570	730	860	1030	1130	1270	1350	1460	1540	1620
600	300	380	490	580	680	760	850	900	970	1030	1080
	450	570	730	860	1030	1130	1270	1350	1460	1540	1620
TWO	600	760	970	1150	1370	1510	1690	1800	1940	2050	2160
MODULES	750	950	1200	1440	1710	1890	2120	2250	2430	2570	2700
	900	1130	1460	1730	2050	2270	2540	2700	2920	3080	3240
	1050	1320	1700	2020	2390	2650	2960	3150	3400	3590	3780
900	1200	1510	1940	2300	2740	3020	3380	3600	3830	4100	4320
	450	850	1090	1300	1540	1700	1900	2030	2190	2310	2430
THREE	600	1130	1460	1730	2050	2270	2540	2700	2920	3080	3240
MODULES	750	1420	1820	2160	2570	2840	3170	3380	3650	3850	4050
	900	1700	2190	2590	3080	3400	3810	4050	4370	4620	4860
	1050	1990	2550	3020	3590	3970	4440	4730	5100	5390	5670
1200	1200	2270	2920	3460	4100	4540	5080	5400	5830	6160	6480
	1350	2550	3280	3890	4620	5100	5710	6080	6560	6930	7290
FOUR	600	1510	1940	2300	2740	3020	3380	3600	3830	4100	4320
MODULES	750	1890	2430	2880	3420	3780	4230	4500	4860	5130	5400
	900	2270	2920	3460	4100	4540	5080	5400	5830	6160	6480
	1050	2650	3400	4030	4790	5290	5920	6300	6800	7180	7560
1500	1200	3020	3890	4610	5470	6050	6790	7200	7780	8210	8640
	1350	3400	4370	5180	6160	6800	7610	8100	8750	9230	9720
	1500	3780	4860	5760	6840	7560	8560	900	9720	10260	10800
	750	2360	3040	3600	4280	4730	5290	5630	6080	6410	6750
	900	2840	3650	4320	5130	5670	6350	6750	7290	7700	8100
FIVE	1050	3310	4250	5040	5990	6620	7400	7880	8510	8980	9450
MODULES	1200	3780	4860	5760	6840	7560	8460	9000	9720	10260	10800
	1350	4250	5470	6480	7700	8510	9520	10130	10940	11540	12150
	1500	4730	6080	7200	8550	9450	10580	11250	12150	12830	13500
	1650	5200	6680	7920	9410	10400	11630	12380	13370	14110	14850
	1800	5670	7290	8640	10260	11340	12690	13500	14580	15390	16200
1800	900	3400	4370	5180	6160	6800	7610	8100	8750	9230	9720
	1050	3970	5100	6050	7180	7940	8880	9450	10210	10770	11340
SIX	1200	4540	5830	6910	8210	9070	10150	10800	11660	12310	12960
MODULES	1350	5100	6560	7780	9230	10210	11420	12150	13120	13850	14580
	1500	5670	7290	8640	10260	11340	12690	13500	14580	15390	16200
	1650	6240	8020	9500	11290	12470	13960	14850	16040	16930	17820
	1800	6800	8750	10370	12310	13610	15230	16200	17500	18740	19440
	1950	7370	9480	11230	13340	14740	16500	17550	18950	20010	21060
2100	1050	4630	5950	7060	8380	9260	10360	11030	11910	12570	13230
	1200	5290	6800	8060	9580	10580	11840	12600	13610	14360	15120
SEVEN	1350	5950	7650	9070	10770	11910	12320	14180	15310	16160	17010
MODULES	1500	6620	8510	10080	11970	13230	14810	15750	17010	17960	18900
	1650	7280	9360	11090	13170	14550	16290	17330	18710	19750	20790
	1800	7940	10210	12100	14360	15880	17770	18900	20410	21550	22680
	1950	8600	11060	13100	15560	17200	19250	20480	22110	23340	24570
	2100	9260	11910	14110	16760	18520	20730	22050	23810	25140	26460
	2250	9920	12760	15120	17960	19850	22210	23630	25520	26930	28350
2400	1200	6050	7780	9220	10940	12100	13540	1440	15550	16440	17280
	1350	6800	8750	10370	12310	13610	15230	16200	17500	18470	19440
EIGHT	1500	7560	9720	11520	13680	15120	16920	18000	19440	20520	21600
MODULES	1650	8320	10690	12670	15050	16630	18610	19800	21380	22570	23760
	1800	9070	11670	13820	16420	18140	20300	21600	23330	24620	25920
	1950	9830	12640	14980	17780	19660	22000	23400	25270	26680	28080
	2100	10580	13610	16130	19150	21170	23690	25200	27220	28730	30240
	2250	11340	14580	17280	20520	22680	25380	27000	29160	30780	32400
	2400	12100	15560	18430	21890	24190	27070	28800	31100	32830	34560

The pressure loss data above relates to a straight attenuator 1200mm long. The following factors are applicable to other lengths:

Length 'L' (mm)	600	900	1200	1500	1800	2100	2400
Δ p Factor	x 0.90	x0.95	0	x1.05	x1.10	x1.15	x1.20

For splitter bend attenuators add 40% to the pressure loss for the straight attenuator.

ATTENUATOR PERFORMANCE I TYPE ST- 150

Table 7: Pressure Loss - Cross Section Sizing

Pressure Loss (Δ p, Pa)		15	25	35	50	60	75	85	100	110	125
Face Velocity (v_t m/s)		3.0	3.9	4.6	5.5	6.0	6.7	7.1	7.7	8.1	8.6
Attenuator Self Noise guide Against Face Velocity (v_t)			NC 25		NC 30		NC 35		NC 40		NC45
Width (mm)	**Height (mm)**	Volume Flow Rate (V l/s)									
350	150	160	205	240	290	315	350	375	405	425	450
	300	320	410	480	580	630	700	750	810	850	900
ONE	450	470	610	720	870	950	1060	1120	1210	1280	1350
MODULE	600	630	820	970	1160	1260	1410	1490	1620	1700	1810
	750	790	1020	1210	1440	1580	1760	1860	2020	2130	2260
	900	950	1230	1450	1730	1890	2110	2240	2430	2550	2710
700	450	950	1230	1450	1730	1890	2110	2240	2430	2550	2710
	600	1260	1640	1930	2310	2520	2810	2980	3230	3400	3610
TWO	750	1580	2050	2420	2890	3150	3520	3720	4040	4250	4520
MODULES	900	1890	2460	2900	3470	3780	4220	4470	4850	5100	5420
	1050	2210	2870	3380	4040	4410	4920	5220	5660	5950	6320
	1200	2520	3280	3860	4620	5040	5630	5960	6470	6800	7220
1050	600	1890	2460	2900	3470	3780	4220	4470	4850	5100	5420
	750	2360	3070	3620	4330	4730	5280	5590	6060	6380	6770
THREE	900	2840	3690	4350	5200	5670	6330	6710	7280	7650	8130
MODULES	1050	3310	4300	5070	6060	6620	7390	7830	8490	8930	9480
	1200	3780	4910	5800	6930	7560	8440	8950	9700	10210	10840
	1350	4250	5530	6520	7800	8510	9500	10060	10910	11480	12190
	1500	4730	6140	7240	8660	9450	10550	11180	12130	12760	13550
1400	750	3150	4090	4830	5780	6300	7040	7460	8090	8510	9030
	900	3780	4910	5800	6930	7560	8440	8950	9700	10210	10840
FOUR	1050	4410	5730	6760	8090	8820	9850	10440	11320	11110	12640
MODULES	1200	5040	6550	7730	9240	10080	11260	11930	12940	13610	14450
	1350	5670	7370	8690	10400	11340	12660	13420	14550	15310	16250
	1500	6300	8190	9660	11550	12600	14070	14910	16170	17010	18060
	1650	6930	9010	10630	12710	13860	15480	16400	17790	18710	19870
	1800	7560	9830	11590	13860	15120	16880	17890	19400	20410	21670
1750	900	4730	6140	7250	8660	9450	10550	11180	12130	12760	13550
	1050	5510	7170	8450	10110	11030	12310	13050	14150	14880	15800
FIVE	1200	6300	8190	9660	11550	12600	14070	14910	16170	17010	18060
MODULES	1350	7090	9290	10870	12990	14180	15830	16770	18190	19140	20320
	1500	7880	10240	12080	14440	15750	17590	18640	20210	21260	22580
	1650	8660	11260	13280	15880	17330	19350	20500	22230	23390	24830
	1800	9450	12290	14490	17330	18900	21110	22370	24260	25520	27090
	1950	10240	13310	15700	18770	20480	22860	24230	26280	27640	29350
	2100	11030	14330	16910	20210	22050	24620	26090	28300	29770	31610
2100	1050	6620	8600	10140	12130	13230	14770	15660	16980	17860	18960
	1200	7560	9830	11590	13860	15120	16880	17890	19400	20410	21670
SIX	1350	8510	11060	13040	15590	17010	19000	20130	21830	22960	24380
MODULES	1500	9450	12290	14490	17330	18900	21110	22370	24260	25520	27090
	1650	10400	13510	15940	19060	20790	23220	24600	26680	28070	29800
	1800	11340	14740	17390	20790	22680	25330	26840	29110	30620	32510
	1950	12290	15970	18840	22520	24510	27440	29070	31530	33170	35200
	2100	13230	17200	20290	24260	26460	29550	31310	33960	35700	37900
	2250	14180	18430	21740	25990	28350	31660	33550	36380	38270	40640
2450	1200	8820	11470	13520	16170	17640	19700	20870	22640	23810	25280
	1350	9920	12800	15210	18190	19850	22160	23480	25470	26790	28440
SEVEN	1500	11030	14330	16910	20210	22050	24620	26090	28300	29770	31610
MODULES	1650	12130	15770	18600	22230	24260	27080	28700	31130	32740	34770
	1800	13230	17200	20290	24260	26460	29550	31310	33960	35700	37900
	1950	14330	18630	21980	26280	28670	32000	33940	36800	38700	41100
	2100	15440	20070	23670	28300	30870	34470	36500	39600	41700	44300
	2250	16540	21500	25360	30320	33080	36900	39100	42500	44600	47400
	2400	17640	22930	27050	32340	35300	39400	41700	45300	47600	50500

The pressure loss data above relates to a straight attenuator 1200mm long. The following factors are applicable to other lengths:

Length 'L' (mm)	600	900	1200	1500	1800	2100	2400
Δ p Factor	x 0.90	x0.95	0	x1.05	x1.10	x1.15	x1.20

For splitter bend attenuators add 50% to the pressure loss for the straight attenuator.

ATTENUATOR PERFORMANCE I TYPE ST- 200

Pressure Loss (Δp, Pa)		15	25	35	50	60	75	85	100	110	125
Face Velocity (v_t m/s)		4.0	5.0	6.2	7.4	8.0	8.9	9.6	10.4	11.0	11.6
Attenuator Self Noise guide Against Face Velocity (v_t)			NC 25	NC 30	NC 35		NC 40		NC45		NC50
Width (mm)	**Height (mm)**	**Volume Flow Rate (V l/s)**									
400	150	240	300	370	445	480	535	575	625	660	695
	300	480	600	740	890	960	1070	1150	1250	1320	1390
ONE	450	720	900	1120	1330	1440	1600	1730	1870	1980	2090
MODULE	600	960	1200	1490	1780	1920	2140	2300	2500	2640	2780
	750	1200	1500	1860	2220	2400	2670	2880	3120	3300	3480
	900	1440	1800	2230	2660	2880	3200	3460	3740	3960	4180
	1050	1680	2100	2600	3110	3360	3740	4030	4370	4620	4870
	1200	1920	2400	2980	3550	3840	4270	4610	4990	5280	5570
800	450	1440	1800	2230	2660	2880	3200	3460	3740	3960	4180
	600	1920	2400	2980	3550	3840	4270	4610	4990	5280	5570
TWO	750	2400	3000	3720	4440	4800	5340	5760	6240	6600	6960
MODULES	900	2880	3600	4460	5330	5760	6410	6910	7490	7920	8350
	1050	3660	4200	5210	6220	6720	7480	8060	8740	9240	9740
	1200	3840	4800	5950	7100	7680	8540	9220	9980	10560	11140
	1350	4320	5400	6700	7990	8640	9610	10370	11230	11880	12530
	1500	4800	6000	7440	8880	9600	10680	11520	12480	13200	13920
1200	600	2880	3600	4460	5330	5760	6410	6910	7490	7920	8350
	750	3600	4500	5580	6660	7200	8010	8640	9360	9900	10440
THREE	900	4320	5400	6700	7990	8640	9610	10370	11230	11880	12530
MODULES	1050	5040	6300	7810	9320	10080	11210	12096	13100	13860	14620
	1200	5760	7200	8930	10660	11520	12820	13820	14980	15840	16700
	1350	6480	8100	10040	11990	12960	14420	15550	16850	17820	18790
	1500	7200	9000	11160	13320	14400	16020	17280	18720	19800	20880
	1650	7920	9900	12280	14650	15840	17620	19010	20590	21780	22970
	1800	8640	10800	13390	15980	17280	19220	20740	22460	23760	25060
1600	900	5760	7200	8930	10660	11520	12820	13820	14980	15840	16700
	1050	6720	8400	10420	12430	13440	14950	16130	17470	18480	19490
FOUR	1200	7680	9600	11900	14210	15360	17090	18430	19970	21120	22270
MODULES	1350	8640	10800	13390	15980	17280	19220	20740	22460	23760	25060
	1500	9600	12000	14880	17760	19200	21360	23040	24960	26400	27840
	1650	10560	13200	16370	19540	21120	24500	25340	27460	29040	30630
	1800	11520	14400	17860	21310	23040	25630	27650	29950	31680	33410
	1950	12480	15600	19340	23090	24960	27770	29950	32450	34320	36190
	2100	13440	16800	20830	24860	26880	29900	32260	34940	36960	38980
2000	1050	8400	10500	13020	15540	16800	18690	20160	21840	23100	24360
	1200	9600	12000	14880	17760	19200	21360	23040	24960	26400	27840
FIVE	1350	10800	13500	16740	19980	21600	24030	25920	28080	29700	31320
MODULES	1500	12000	15000	18600	22200	24000	26700	28800	31200	33000	34800
	1650	13200	16500	20460	24420	26400	29370	31680	34320	36300	38280
	1800	14400	18000	22320	26640	28800	32040	34560	37440	39600	41760
	1950	15600	19500	24180	28860	31200	34710	37440	40560	42900	45240
	2100	16800	21000	26040	31080	33600	37380	40320	43680	46200	48720
	2250	18000	22500	27900	33300	36000	40050	43200	46800	49500	52200
	2400	19200	24000	29760	35520	38400	42720	46080	49920	52800	55680
2400	1200	11520	14400	17860	21310	23040	25630	27650	29950	31680	33400
	1350	12960	16200	20090	23980	25920	28840	31100	33670	35640	37580
SIX	1500	14400	18000	22320	26640	28800	32040	34560	37440	39600	41760
MODULES	1650	15840	19800	24550	29300	31680	35240	38020	41180	43560	45940
	1800	17280	21600	26780	31970	34560	38450	41470	44930	47520	50110
	1950	18720	23400	29020	34630	37440	41650	44930	48670	51480	54290
	2100	20160	25200	31250	37300	40320	44860	48380	52420	55440	58460
	2400	23040	28800	35710	42620	46080	51260	55300	59900	63360	66820

The pressure loss data above relates to a straight attenuator 1200mm long. The following factors are applicable to other lengths:

Length 'L' (mm)	600	900	1200	1500	1800	2100	2400
Δp factor	x 0.90	x0.95	0	x1.05	x1.10	x1.15	x1.20

For splitter bend attenuators add 50% to the pressure loss for the straight attenuator.

ROUND SOUND ATTENUATORS

Description:

The Round attenuators are prefabricated sections of double-wall ductwork with a solid outer shell and perforated inner shell. The space between the two shells is usually filled with acoustic infill. They are designed to reduce fan noise and meet specified noise levels such as NC or NR.

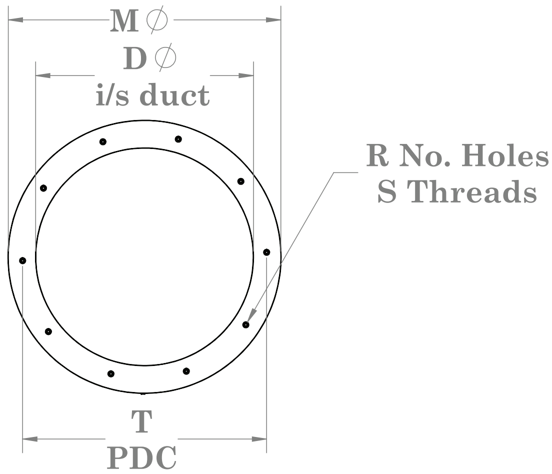
Construction:

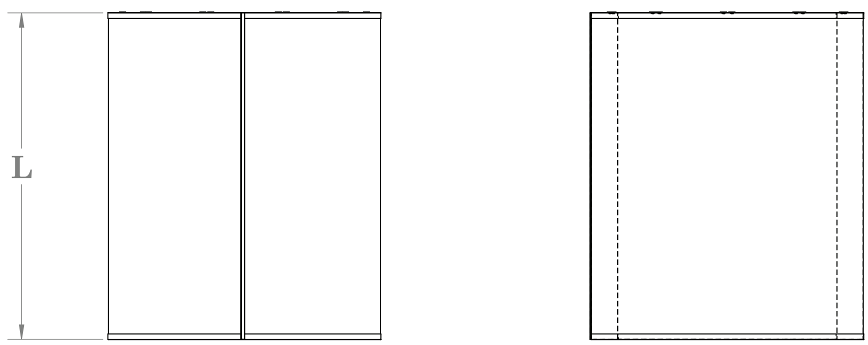
• Type RSA attenuators are available in a size range based on ISO standards. Two lengths are catalogued, nominally equivalent to one time the inside duct diameter, with increased lengths available where higher acoustic performance is required. Alternative sizes and end connection types can be provided.
• Standard attenuator casings are manufactured from galvanized sheet metal Ga.20 minimum. Casings are constructed with grooved seams with a mastic sealant; casing thickness complies with SMACNA standards and DW 144 Class B ductwork code.
• End plates contain threaded inserts M6-M10 as standard, depending on the attenuator size.
• The attenuators contain acoustic infill with a glass cloth facing and are contained behind galvanized perforated sheet metal; this dual protection prevents damage and fibre erosion up to 30 m/s airway velocity.

Sectionalized Construction:

• Attenuators are typically supplied split in length when the 'L' dimension exceeds 2000mm for site assembly by others.
• Coupling angles are supplied for assembly.
• The assembly of sectionalized attenuators is done on-site by others. CASTLE will provide full details of attenuator configuration and assembly

Dimensions:


M ∅
D ∅
i/s duct
R No. Holes
S Threads
T
PDC


L


CASTLE
ENGINEERING
INDUSTRIES

ROUND SOUND ATTENUATORS

Description:

The podded round attenuators are prefabricated sections of double-wall ductwork with a solid outer shell, perforated inner shell, and incorporate an aerodynamically efficient concentric pod. The space between the two shells and pod is usually filled with acoustic infill. They are designed to reduce fan noise and meet specified noise levels such as NC or NR.

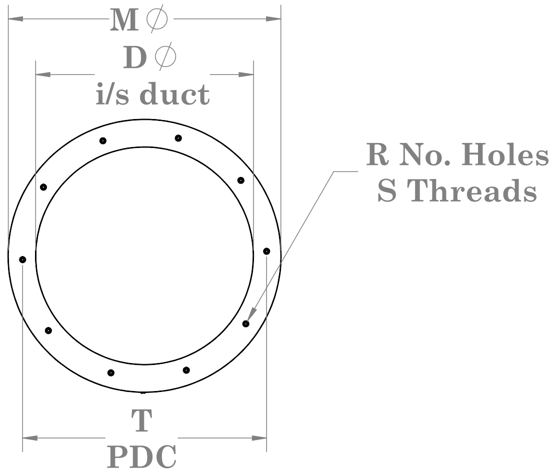
Construction:

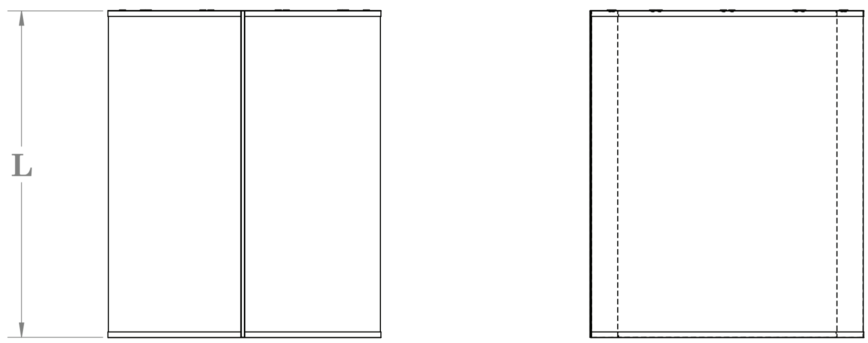
• Type RSAP attenuators are available in a size range based on ISO standards. Two lengths are catalogued, nominally equivalent to one time the inside duct diameter, with increased lengths available where higher acoustic performance is required. Alternative sizes and end connection types can be provided.
• Standard attenuator casings are manufactured from galvanized sheet metal Ga.20 minimum. Casings are constructed with grooved seams with a mastic sealant; casing thickness complies with SMACNA standards and DW 144 Class B ductwork code.
• End plates contain threaded inserts M6-M10 as standard, depending on the attenuator size.
• The attenuators contain acoustic infill with a glass cloth facing and are contained behind galvanized perforated sheet metal; this dual protection prevents damage and fibre erosion up to 30 m/s airway velocity.

Sectionalized Construction:

• Attenuators are typically supplied split in length when the 'L' dimension exceeds 2000mm for site assembly by others.
• Coupling angles are supplied for assembly.
• The assembly of sectionalized attenuators is done on-site by others. CASTLE will provide full details of attenuator configuration and assembly.

Dimensions:


M ∅
D ∅
i/s duct
R No. Holes
S Threads
T
PDC


L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ATTENUATOR SELECTION

Acoustic Performance:
Attenuator performance is derived from tests meeting the requirements of BS 4718: 1971. Round attenuators follow a similar principle, however, in this case, the splitter consists of a pod in the middle of a lined round duct.

Attenuator selection is based on the static insertion loss performance, the aerodynamic resistance or pressure drop, and the regenerated sound power levels. Static insertion loss figures are given in the table.

Full regenerated noise data is available for CASTLE Round attenuators, enabling the calculation of installed Insertion Loss.

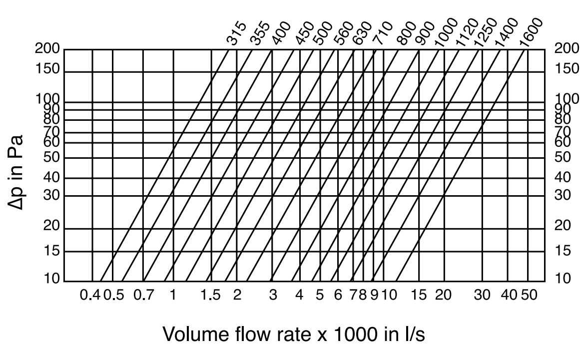
Pressure loss data relates to pod-type attenuators and assumes uniform airflow to the attenuator face in a duct-to-duct layout. Units installed in situations leading to poor inlet or discharge conditions could incur pressure drops higher than catalogued. Podless attenuators have a pressure loss similar to an equivalent length of ductwork.

For insertion loss data for Melinex-faced attenuators - refer to Castle.

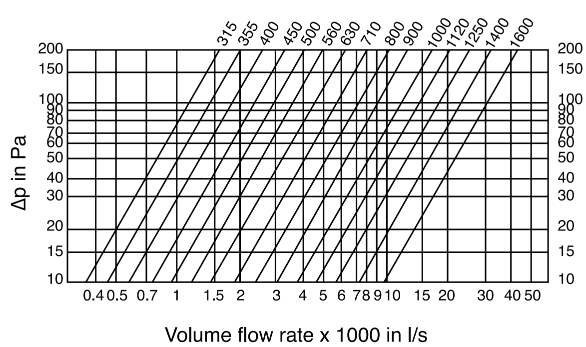
Nomenclature
L in mm: Length
D in mm: Inside diameter
V in l/s: Volume flow rate
p in Pa: Pressure loss
fm in Hz: Octave centre frequency
De in dB: Insertion loss

Pressure Loss

Pressure loss for type RSAP-1D



Pressure loss for type RSAP-2D



Pressure loss for type RSAP-2D

Insertion Loss (dB)									
Attenuator		Octave Centre Frequency (Hz)							
Size	Type	63	125	250	500	1000	2000	4000	8000
250	SAC-1D	2	3	6	11	12	7	6	4
	SAC-2D	4	5	10	21	22	13	10	8
315	SAC1-D	2	3	6	12	11	7	6	4
355									
400	SAC2-D	4	5	10	21	22	13	10	8
450									
	SACP-1D	5	6	10	16	22	24	20	15
	SACP-2D	9	12	18	30	44	48	38	29
500	SAC-1D	2	3	6	11	12	7	6	4
560									
630	SAC-2D	4	5	10	21	20	10	9	6
710									
800	SACP-1D	5	6	10	16	22	23	17	12
900									
	SACP-2D	9	12	18	30	44	45	33	24
1000	SAC-1D	2	3	6	11	8	5	4	3
1120									
1250	SAC-2D	4	5	10	21	16	9	8	5
1400									
1600	SACP-1D	5	6	10	16	22	22	15	11
	SACP-2D	9	12	18	30	44	42	29	21

Dimensions (End Plate for Flange Connection)								Weights (kg)			
Unit Size	D f	M f	L 1D	L 2D	T pcd	R No. of Holes	S Thread Size	SAC 1D	SAC 2D	SACP 1D	SACP 2D
250	256	456	250	500	286	6	M6	9	13	-	-
315	322	522	300	600	356	8	M8	11	15	14	20
355	361	561	350	700	395	8	M8	15	21	20	28
400	404	604	400	800	438	12	M8	18	27	26	36
450	453	653	450	900	487	12	M8	24	35	34	42
500	507	707	500	1000	541	12	M8	29	41	41	57
560	564	764	550	1100	605	16	M10	35	50	50	70
630	638	838	600	1200	674	16	M10	42	58	58	82
710	715	915	700	1400	751	16	M10	51	72	72	100
800	801	1001	800	1600	837	24	M10	58	82	79	111
900	898	1098	900	1800	934	24	M10	70	100	97	135
100	1007	1207	1000	2000	1043	24	M10	95	135	120	185
1120	1130	1330	1100	2200	1174	24	M10	115	160	145	215
1250	1267	1467	1250	2500	1311	24	M10	130	180	165	240
1400	1421	1622	1400	2800	1465	24	M10	210	420	270	520
1600	1593	1793	1600	3200	1637	32	M10	250	490	320	620

CROSSTALK ATTENUATORS

Introduction:

The fan is not the sole source of airborne sound power transmitted through ductworks. Just as sound power can emanate from ducts through air devices into rooms, it can also enter through these openings. When two rooms are served by branches on a shared duct system or if walls or partitions have air transfer openings, there is a higher likelihood of sound transmission from one room to an adjoining one. Sounds in one room that transmit to an adjoining room may come from various sources such as raised voices, office equipment, or machinery. This transmission path is referred to as crosstalk. A suitable method of preventing or reducing crosstalk to attain the required room noise level is by installing crosstalk attenuators.

Application:

Crosstalk attenuators are commonly utilized to prevent noise transmission via shared ceilings, duct systems, or air transfer openings in walls or partitions between adjoining rooms. These units are designed and built for optimal noise control in situations where the noise in the first room is clearly heard in the second room.

L Type: CTSL

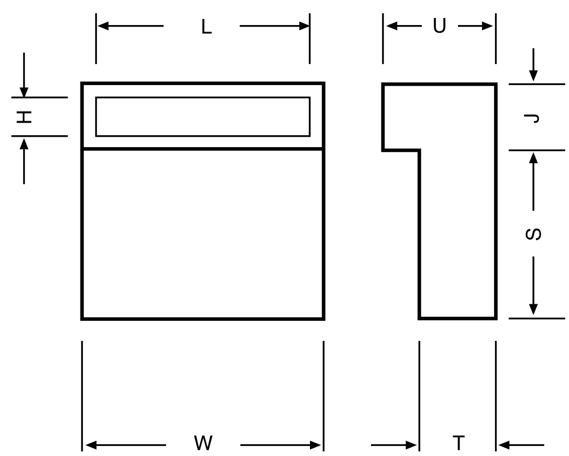
Description:

Crosstalk attenuators are engineered to prevent noise emitted from a room or duct termination connected via a main duct to a branch duct leading to another room. These attenuators enable airflow while restricting the transfer of noise.

Construction:

Type CTSL attenuators are specifically designed to prevent noise interference between interconnected rooms. They function as air transfer attenuators between adjacent areas where maintaining the acoustic integrity of a shared partition or ceiling is crucial.
These units are constructed with casings made from galvanized sheet metal Ga.20 with spot-welded seams. The acoustic lining meets Class O Building Regulations and features a glass tissue facing for erosion protection. Additionally, these attenuators may come equipped with one or two Linear grilles in natural anodized aluminium. Custom colour paint finishes are also available upon request.

Dimensions:



Standard Sizes:

Unit Size	H	L	J	W	T	U	S
1	100	550	140	590	100	120	760
2	100	700	140	740	100	120	760
3	100	900	140	940	100	120	760
4	100	1000	140	1040	100	120	760
5	100	1200	140	1240	100	120	760

U Type: CTSU

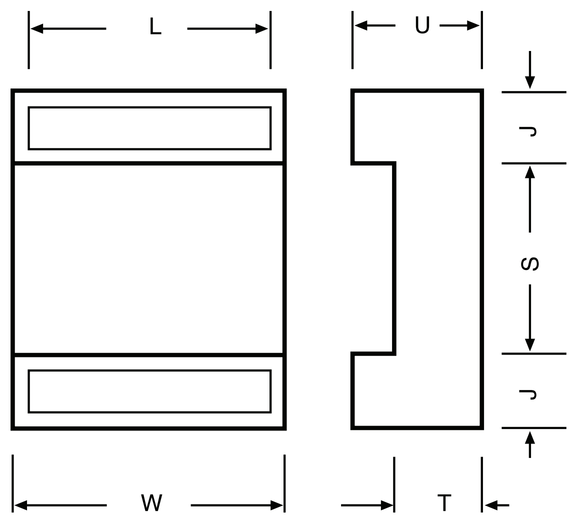
Description:

Crosstalk attenuators are crafted to prevent noise that emanates from a room or duct termination connected through a main duct to a branch duct leading to another room. These attenuators facilitate airflow while minimizing noise transfer.

Construction:

Type CTSU attenuators are specifically engineered to prevent noise interference between interconnected rooms. They serve as air transfer attenuators between adjoining areas where maintaining the acoustic integrity of a common partition or ceiling is essential.
The casings are manufactured from galvanized sheet metal Ga.20 with spot-welded seams.
The acoustic lining meets Class O Building Regulations and features a glass tissue facing for erosion protection. These units may be supplied with one or two Linear grilles in natural anodized aluminium. Custom colour paint finishes are also available upon request.

Dimensions:



Standard Sizes:

Unit Size	H	L	J	W	T	U	S
1	100	550	140	590	100	120	760
2	100	700	140	740	100	120	760
3	100	900	140	940	100	120	760
4	100	1000	140	1040	100	120	760
5	100	1200	140	1240	100	120	760

Z Type: CTSZ

Description:

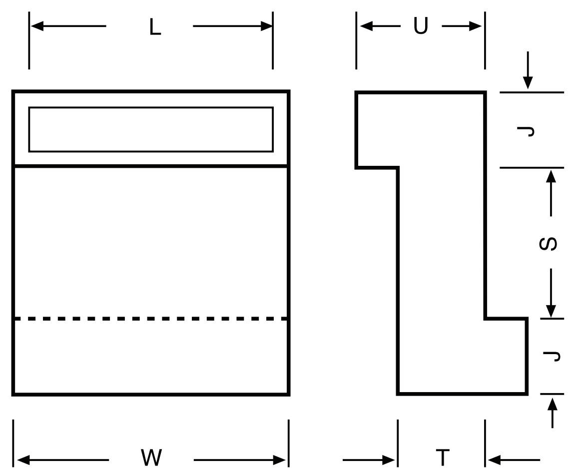
Crosstalk attenuators are specifically engineered to stop the transmission of noise emitted from a room or duct termination, which is connected via a main duct to a branch duct leading to another room. These attenuators facilitate airflow while restricting noise transfer

Construction:

Type CTSZ attenuators are specifically engineered to prevent noise interference between interconnected rooms. They serve as air transfer attenuators between adjoining areas where maintaining the acoustic integrity of a common partition or ceiling is essential.

The casings are manufactured from galvanized sheet metal Ga.20 with spot-welded seams. The acoustic lining complies with Class O Building Regulations and features a glass tissue facing for erosion protection. These units may be supplied with one or two Linear grilles in natural anodized aluminium. Custom colour paint finishes are also available upon request.

Dimensions:



Standard Sizes:

Unit Size	H	L	J	W	T	U	S
1	100	550	140	590	100	120	760
2	100	700	140	740	100	120	760
3	100	900	140	940	100	120	760
4	100	1000	140	1040	100	120	760
5	100	1200	140	1240	100	120	760

Performance Data

Air flow rate (l/s)	Cross Talk Attenuator Models													
	CTA-U1/CTA-Z1		CTA-U2/CTA-Z2 CTA-L1		CTA-U3/CTA-Z3 CTA-L2		CTA-U4/CTA-Z4		CTA-U5/CTA-Z5 CTA-L3		CTA-L4		CTA-L5	
	Pa	NC	Pa	NC	Pa	NC	Pa	NC	Pa	NC	Pa	NC	Pa	NC
20	3	<20	-	-	-	-	-	-	-	-	-	-	-	-
30	5	25	3	<20	-	-	-	-	-	-	-	-	-	-
40	8	27	5	25	3	<20	-	-	-	-	-	-	-	-
50	13	28	8	26	5	24	3	<20	-	-	-	-	-	-
60	18	29	10	27	6	25	5	24	33	<20	-	-	-	-
70	23	31	13	28	8	26	7	25	4	<20	4	<20	-	-
80	30	32	17	29	10	27	9	26	5	24	5	24	-	-
90	38	33	21	30	14	28	10	27	6	25	6	25	-	-
100	44	34	26	32	17	29	13	28	8	26	7	26	4	24
120	60	36	32	33	20	30	16	29	12	27	9	27	6	25
140	75	38	42	34	27	32	20	30	15	28	12	28	8	25
160	95	40	54	36	33	33	26	32	20	29	15	29	10	27
180	-	-	72	37	43	34	33	33	26	30	20	30	13	28
200	-	-	93	40	55	36	43	34	32	31	25	31	15	29
220	-	-	-	-	68	37	48	35	36	32	29	32	17	30
240	-	-	-	-	78	38	58	36	42	33	32	33	20	31
260	-	-	-	-	89	40	70	37	50	34	38	34	24	31
280	-	-	-	-	-	-	80	38	60	35	42	35	28	32
300	-	-	-	-	-	-	90	40	70	36	50	36	32	33
320	-	-	-	-	-	-	-	-	78	37	59	37	36	34
340	-	-	-	-	-	-	-	-	90	38	68	38	41	35
360	-	-	-	-	-	-	-	-	100	40	77	39	45	36
380	-	-	-	-	-	-	-	-	-	-	84	40	50	37
400	-	-	-	-	-	-	-	-	-	-	-	-	58	38
420	-	-	-	-	-	-	-	-	-	-	-	-	64	39
440	-	-	-	-	-	-	-	-	-	-	-	-	70	40
460	-	-	-	-	-	-	-	-	-	-	-	-	76	42
480	-	-	-	-	-	-	-	-	-	-	-	-	85	43
500	-	-	-	-	-	-	-	-	-	-	-	-	92	45

Insertion Loss Data, dB

Attenuator length L in mm	Octave Center Band Frequency in Hz							
	63	125	250	500	1000	2000	4000	8000
500	5	7	10	15	23	17	13	11
750	6	9	14	23	37	29	22	16
1000	8	11	19	31	48	37	28	21
1250	9	14	23	38	50	44	32	26
1500	10	16	27	45	50	50	39	31

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