AIR CONTROL INDUSTRY

SOUND ATTENUATORS

QUALITY ASSURANCE

An ISO 9001:2015 certified company
Product tested and approved by ETL testing laboratories USA

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SOUND ATTENUATORS

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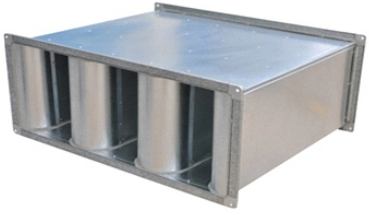
SILENCING HVAC FAN NOISE

► The fans that move air through modern HVAC systems are noise generators. The ductwork carrying conditioned air to occupied spaces throughout the building can often act similar to the old fashion "speaking tubes" that can conduct intrusive and annoying fan noise to occupied spaces. This can often result in annoying or intolerable noise levels in offices, conference rooms, classrooms and auditoriums, etc.
► One solution is place one or more rectangular or round air duct noise silencers between the fan and the occupied spaces. While reducing objectionable fan noise, duct sound attenuators can also reduce cross-talk transmitted from one space to another through the ducts to insure office privacy.
► ACI sound attenuators are available in a wide assortment of geometries, models, and lengths. This choice in duct mufflers is to accommodate shape, pressure drop vs. airflow and noise reduction.
► Fabricated from 22-18 gauge galvanized steel for superior strength and maximum sound transmission reduction through side walls. No flimsy 26 or 24 gauge vent noise silencer material that vibrates in the airstream.
► Let our engineering department help you with your air duct noise reduction needs.

TYPES OF SOUND ATTENUATORS

Depending on the type of ducts used, You can choose from:

► Rectangular Sound Attenuators
► Circular Sound Silencers
► Flexible Silencers



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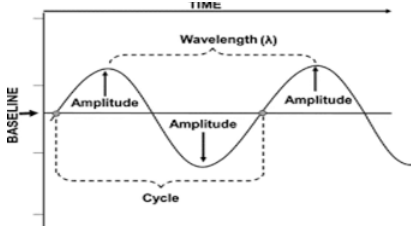
Sound Pressure is dependent on the acoustic environment. The factors involved include the effects of nearby reflecting surfaces, receiver distance, type of space, the amount of location in the space, the presence of barriers, and the intrusion of ambient sounds. Therefore, the sound pressure resulting from a given AHU – generated sound power depends on :

- Distance from the AHU to the room
- The size of the room
- The absorptive properties of interior furnishings
- Attenuating elements such as silencers, duct liner, duct branches, elbows , etc

Sound Power Output AHU equipment supplier provides sound power data as given in below table. The quietest sound we might measure is 10^{-12} Watts (0dB) and the loudest noise is that of space shuttle during take-off which is 10 Watts (200 dB)

Source	W Exponential	Decibel Ref 10^{-12} w
Power Generator	10^{-2}	100
Air Handling Unit	10^{-3}	90
Voice, Conversation level	10^{-5}	70
Exhaust Fan	10^{-6}	60
Air Diffuser	10^{-7}	50
Voice, Soft Whisper	10^{-9}	30
Threshold of Hearing	10^{-12}	0

SOUND WAVE



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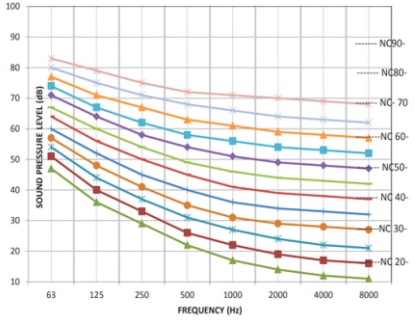
Insertion loss is the decrease in sound pressure levels that can be expected when a silencer is inserted into the path between the source and the receiver. Pressure Drop is the difference in static pressure from the inlet to the outlet. Regenerated Noise is the sound power created when airflows through a silencer at a given velocity and direction (forward or reverse).
Noise Criteria (NC) is a single number rating derived from sound pressure levels in all eight octave bands, and is intended to predict an occupant's response to the overall sound level. The critical octave bands for evaluating sound performance ranges from 63 to 8000 Hz. To determine NC rating value, sound pressure levels are plotted with a family of criterion curves shown in Figure. The level which intersects the highest curves determines the overall NC rating.

NC DIAGRAM



dB Level Increase for Equal Sound Sources

Source	W Exponential	Decibel Ref 10^{-12} w
Power Generator	10^{-2}	100
Air Handling Unit	10^{-3}	90
Voice, Conversation level	10^{-5}	70
Exhaust Fan	10^{-6}	60
Air Diffuser	10^{-7}	50
Voice, Soft Whisper	10^{-9}	30
Threshold of Hearing	10^{-12}	0

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CALCULATING AN NC VALUE

The NC rating can be obtained by plotting the octave band levels for a given noise spectrum against the NC curves. In this example , the following 1:1 octave bands have been measured:

Frequency Hz	63	125	250	500	1000	2000	4000	8000
Octave Band Level dB	74.1	75.3	68.9	59.6	49.3	42.9	41.0	35.8

These values can be compared to those in the NC data table and a value obtained for each octave band . The NC value is the lowest NC curve which is not exceeded by each individual frequency band.

Frequency Hz	63	125	250	500	1000	2000	4000	8000
Octave Band Level dB	74.1	75.3	68.9	59.6	49.3	42.9	41.0	35.8
NC Value	NC 55	NC65	NC65	NC60	NC50	NC45	NC45	NC40

The highest of these is the 125Hz band with an NC value of 65 and therefore the overall NC for this measurement is NC 65.

NC DATA TABLE

Noise Criterion	Octave Band Center Frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
	Sound Pressure Levels (dB)							
NC-15	47	36	29	22	17	14	12	11
NC-20	51	40	33	26	22	19	17	16
NC-25	54	44	37	31	27	24	22	21
NC-30	57	48	41	35	31	29	28	27
NC-35	60	52	45	40	36	34	33	32
NC-40	64	56	50	45	41	39	38	37
NC-45	67	60	54	49	46	44	43	42
NC-50	71	64	58	54	51	49	48	47
NC-55	74	67	62	58	56	54	53	52
NC-60	77	71	67	63	61	59	58	57
NC-65	80	75	71	68	66	64	63	62
NC-70	83	79	75	72	71	70	69	68

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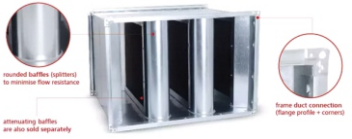
Indoor Design Goals for Air Conditioning Sound Control
(As Per ASHRAE 2001, Fundamentals, Chapter 7, Table 11.)

Type of Area	Recommended NC Criteria Range
Private Residences	25-30
Hotel Meeting Rooms	25-30
Office Conference Rooms	25-30
Office Computer Equipment Rooms	40-45
Hospital Wards	30-35
Hospital Operating Rooms	35-40
Mosque	25-30
School Lecture And Class Rooms	25-30
School Open – Plan Classrooms	30-35
Libraries	35-40
Concert Halls	30-35
Legitimate Theatres	30-35
Recording Studios	30-35
Movie Theatres	30-35
Laboratories With Fume Hoods	30-35

RECTANGULAR SOUND ATTENUATORS WITH BAFFLES



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