phoenix-E

Applications and Product Selection Guide

SILENCERS FOR BLOWERS AND FANS

Silencers are installed in the gas stream to reduce both blower generated noise as well as noise which is being created upstream or downstream of the blowers. Silencers can be installed at the blower inlet, at the blower discharge, within the ductwork or at the duct termination point such as exhaust stacks or inlet plenums. Round or rectangular, silencers can be fabricated in most any configuration as needed to meet space, attenuation and allowable pressure drop constraints. In general, increasing silencer size will increase attenuation and decrease its added resistance to airflow. Further, locating the silencers at some distance from the blower equipment and away from elbows or turns, and locating the silencers where flow of air is fairly laminar will minimize added resistance to airflow.

The following outlines the information needed to effectively match silencers and acoustical louvers to a particular application. Sketches and photographs showing installation requirements and illustrating site conditions are often useful in integrating solutions into existing sites.

APPLICATION INFORMATION

Customer: _____ **Date:**_____

Project Identification:_____

Location: _____

Many manufacturers acoustically test and rate their equipment. This sound data, in *decibels*, may be published as (1) ***Sound Power Levels*** or, (2) as ***Sound Pressure Levels*** at a given distance. Usually, this information is provided in full-octave or third-octave bands. Occasionally, fan manufacturers will provide acoustical data in terms of loudness and publish this data in *sones*. This data, in addition to allowable pressure drop at the specified flow rates, is needed in the selection of silencers and acoustical enclosures.

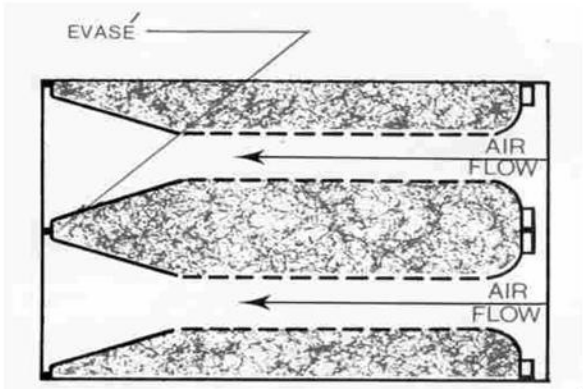
MANUFACTURER'S SOUND DATA – FULL OCTAVE BANDS

Center Frequency - Hz	63	125	250	500	1000	2000	4000	8000
Intake Noise								
Discharge Noise								
Casing Noise								

This data is: ____ **Sound Power Level re: 10^{-12} watts.**
____ **Sound Pressure Level measured at _____feet.**

SILENCERS FOR BLOWERS AND FANS

Typical Silencer Cross Section



BLOWER DATA

Physical geometry of the blower inlet and discharge and operating conditions establish the initial silencer sizing parameters. This information is published by the fan manufacturer:

Manufacturer: _____

Type & Model: _____

Speed: _____RPM Number of blades: _____

Inlet size: Rectangular _____" X _____" high or, _____" diameter

Discharge size: Rectangular_____" X _____" high or, _____" diameter

Gas flow: Air Steam Other Specify:_____

Temperature: _____°F Flow: _____ _____CFM

Allowable pressure drop: _____H_20 Operating pressure: _____PSIA

Motor horsepower:_____

RESIDUAL SOUND PRESSURE LEVELS

Residual sound pressure levels in decibels may be specified as **dBA** or **Noise Criterion (NC) curves**. Outdoor ambient noise levels are more often specified as dBA levels while interior acoustical environments are specified as NC levels. In addition, other specific standards have been developed and are utilized when appropriate. Whether these requirements are specified as a function of frequency or as a one-number criterion, it is necessary that the existing noise levels be measured as a function of frequency. Generally, mid or high frequency energy is easier and less expensive to contain than is that in the lower audible frequencies. Measurements should be taken at uniform distances from the equipment; distances may be at one meter (1) for smaller sources and at three (3) meters for larger equipment, for example.

Reducing the inlet and discharge noise levels by 6 to 7 dB below the casing radiated noise is considered practical without needing to enclose or acoustical lag the fan casing. Casing radiated noise levels are often presumed to be 20 to 25 dBA less than the fan sound power level.

SOUND LEVEL MEASUREMENTS

Sound level measurements are representative of the as-built conditions and account for topography, reflecting surfaces, connections and housings which commonly are not included as part of the laboratory test procedures. Field conditions can mitigate or alter the type or extent of noise reduction materials and equipment. Potentially objectionable pure tones resulting at the blade passage frequency should be investigated. Often, it is the discrete tone itself, not its intensity, that is unacceptable.

SILENCERS FOR BLOWERS AND FANS

Provide a sketch of the existing blower equipment identifying the measurement positions. Where possible, the sound measurements should reflect the noise levels at the locations where the sound attenuation is to be achieved. For instance, where the air and noise is ducted from the equipment; casing noise can be measured at the blower while discharge and intake noise can be measured at the duct terminations. The residual noise requirement should then be specified noting, if necessary, minimum noise reduction values in each of the audible octave bands.

SOUND LEVEL READINGS & REQUIRED RESIDUAL NOISE LEVELS--dB

Frequency - Hz	63	125	250	500	1000	2000	4000	8000	dBA
Intake Noise									
Discharge Noise									
Casing Noise									
Required Residual Noise Levels *									

*** An NC Level of _____is specified for this application.**

AERODYNAMIC PERFOMANCE

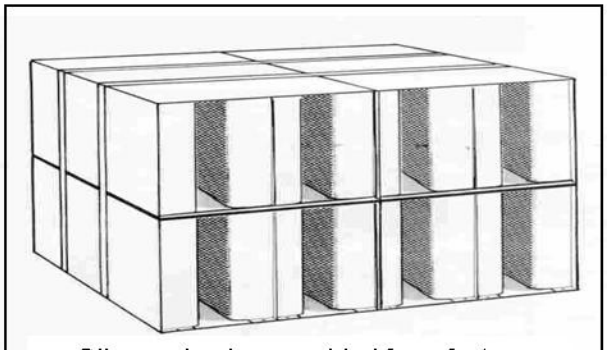
Pressure drop (added resistance to airflow), attenuation performance and overall size are interrelated in the selection of an inlet or discharge silencer. Note the maximum increase in pressure drop which is acceptable: Reducing the cross section of the silencer increases the air velocity through the silencer, increases pressure drop and increases the silencer's ***self-generated noise***. (Self-generated noise is often relatively low and therefore may not be considered a factor in some industrial applications.)

INSTALLATION & CONSTRUCTIONS

Length, size and construction of existing ducts and stacks may suggest appropriate silencer configurations, their placement and connection details. Large silencing systems may be shipped as factory fabricated components or modules to be assembled in place. Such cost effective methods not only reduce shipping and handling costs but can also provide for major equipment removal using the silencing system as access.

Vibration isolation may be needed depending upon the equipment foundation and any tendency for structural energy to reradiate as airborne noise. Isolators and acoustical gaskets cam be installed to minimize potential problems.

Environmental conditions or corrosive gases can require the use of special materials or coatings. Compatibility of the exterior environment and in-process materials with standard construction carbon steel should be verified.



Silencer bank assembled from factory fabricated modular units.

STRUCTURAL CONSIDERATIONS & BUILDING CODES

Silencing systems will induce additional loads into the equipment support structure at which they are attached. Usually, this additional load is modest and does not impact life-safety regulations. Larger systems which may be free-standing, stack supported, or become part of the building infrastructure may induce significant loads. Not only is the weight of the equipment, its location and connections critical, but seismic and wind loads may need to be safely accommodated. This work is addressed by model building codes such as the Uniform Building Code, ASTM and, in addition, regulations of local city and state building departments.

Location and support of the silencing systems may reflect specific requirements from the manufacturer for connecting the silencer to the blower equipment, site conditions can result in the need for additional duct, and stack constructions will determine necessary bracing and acoustical seals needed to accommodate the silencer package. Support legs, lugs, saddles, and special skirts are supplied when requested.

Self-contained silencer systems should be provided with the necessary structural support and connections necessary to provide a safe work environment.

SONO-CON SILENCING SYSTEMS

VERIFY ENGINEERING STANDARDS

SAFETY AND SERVICE LIMITATIONS

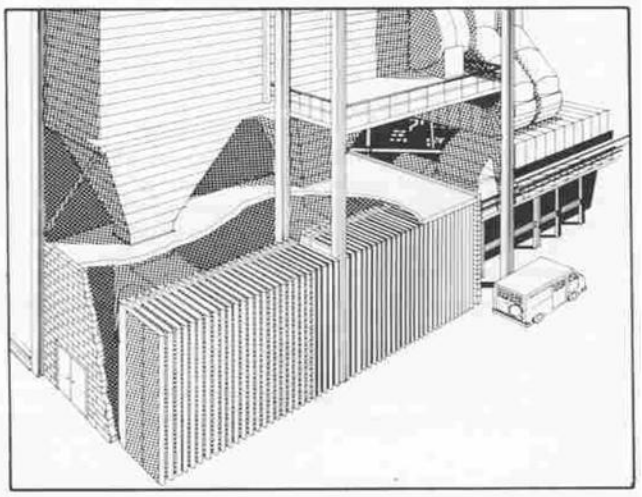
Size or envelope restrictions?

Special materials & coatings?

Other applicable building codes?

Seismic & wind loads?

Mounting arrangements?



Silencer Baffles For On-site Assembly