

Noise Control for Building Exterior Heating, Ventilation and Air Conditioning Equipment Guidance Sheet

9/24/13

Distributed by:
New York City Department of Environmental Protection

The following is intended to provide guidance and example resources for noise control of building exterior heating, ventilation and air conditioning (HVAC) equipment. HVAC equipment involves rotating machinery and air moving devices which generate noise that can propagate through the open air to nearby noise sensitive locations. This is particularly true if the HVAC equipment is located on the roof of one building in close proximity or with a direct line of sight to an adjacent building.

While the general approach to noise control is the same for many situations, the specific measures and solutions need to be carefully selected and implemented correctly. In general, noise control measures can be applied at the source, along the pathway, or at the receptor directly. For these reasons, it is highly recommended that building owners discuss their situation with a qualified acoustical consultant as early as possible. It is always more cost-effective to design for appropriate noise control from the beginning rather than to rely on retrofit solutions when noise becomes a problem later. To aid in the selection of an acoustical consultant, links to several national professional societies are provided. The NYC DEP can also provide a list of consultants.

This information is not an exhaustive list of noise control products and vendors. It is ***intended for guidance and informative purposes only***, and should not be construed as an official endorsement of any product, vendor, or consultant by the City of New York. Furthermore, any noise control work or repair done on exterior HVAC systems will need to comply with NYC Construction Codes.

HVAC Exterior Noise Criteria

The NYC Noise Control Code Section 24-227 specifies the following HVAC equipment noise limits:

- 42 dBA L_{max} (slow) for a single air circulating device
- 45 dBA L_{max} (slow) for the cumulative noise level of multiple air circulating devices

Both limits apply to noise levels measured *within the receiving property* at a distance of 3 feet from the open portion of a window.

HVAC Noise Control Methods

Many options are available to reduce or avoid excessive noise from HVAC systems. Source controls tend to be the most effective because they prevent the noise from being generated in the first place. However, unlike interior HVAC noise that can be due to mechanical noise, duct airflow noise and vibration, exterior HVAC noise is essentially comprised solely of mechanical noise propagating through the air to nearby receptor locations. The following good housekeeping practices should be considered when installing or retrofitting exterior HVAC systems:

- Do not place HVAC equipment near noise-sensitive receptors
- Place HVAC equipment in a separate mechanical room with massive walls/ceiling
- Select HVAC equipment with lower noise ratings
- Select fans to operate at peak efficiency
- Select fan sizes to allow lowest possible motor RPM
- Attach rooftop HVAC equipment to stiff/massive structural elements
- Avoid duct break-out noise with lagging cover or chaseway (>2 lbs/SF)
- Use flexible collars between all major elements
- Use acoustical louvers for air intake from outdoors
- Mount HVAC equipment on inertial blocks/rails/curbs
- Use vibration isolation springs/pads under rotating equipment
- Use silencers - dissipative/absorptive, reactive/muffler, active electronic
- Use silencers for air intake and discharge pathways with straight/smooth approach
- Place silencers as close to noise source as possible
- Beware silencer pressure drop (do not exceed 0.3 inchH₂O) and self-generated noise
- Enclose rooftop HVAC equipment in a noise enclosure (provide for adequate airflow)
- Install a noise barrier or parapet wall between the HVAC equipment and the receptor(s)
- A barrier must break the line-of-sight, have no gaps, and be sufficiently massive (>4 lbs/SF)
- Use acoustical absorptive materials on the source side of a barrier or enclosure (NRC > 0.7)

Example Products and Vendors

The following provides contact information for finding HVAC noise and vibration control products and vendors. Oftentimes vendors can provide knowledgeable recommendations for suitable products for a given situation; however an independent acoustical consultant should be able to provide more comprehensive noise control assessments and case-specific solutions.

Acoustical Consultants

- Acoustical Society of America <http://acousticalsociety.org>
- Institute of Noise Control Engineering <http://inceusa.org>
- National Council of Acoustical Consultants <http://ncac.com>

Noise Barriers and Enclosures

Products designed to attenuate sound levels by blocking the path of sound from the source to the receiver.

- Acoustax Noise Barriers Noise Barriers and Noise Enclosures www.acoustax.com
- Acoustical Surfaces Acoustical Enclosures www.acousticalsurfaces.com
- George Koch Sons Acoustical Enclosures www.kochllc.com
- IAC Acoustics Type FS, SFS, Acoustic Enclosure www.iac-acoustics.com
- Industrial Noise Control Outdoor Noise Barrier, Acoustic Enclosure www.industrialnoisecontrol.com
- Kinetics NoiseBlock HTL/STL www.kineticsnoise.com

Acoustical Louvers

Acoustical louvers can be integrated into the partition of the intake/exhaust system of an outdoor air handling unit, and are lined with acoustical material to absorb sound.

- Construction Specialties Model A12x, A8x, A6x www.c-sgroup.com
- Greenheck Model AFA, AFJ, AFS www.greenheck.com
- IAC Acoustics Model Noishield, Slimshield www.iac-acoustics.com
- Industrial Louvers, Inc. Model 680x, 880x, 1280x www.industriallouvers.com
- Kinetics Model VAL www.kineticsnoise.com
- Ruskin Model LAS www.ruskin.com

Duct Silencers

Duct silencers are used inside air handling ducts and should be positioned as close to the noise source as possible. Airflow noise is absorbed/reduced within the silencers.

- Kinetics Rectangular Silencers, Circular Silencers www.kineticsnoise.com
- Industrial Noise Control Panel-Flow Silencers www.industrialnoisecontrol.com
- Vibro-Acoustics Dissipative Silencers, Reactive Silencers www.vibro-acoustics.com
- McGill Airflow Soundpak Silencers www.mcgillairflow.com

Acoustical Absorption

Acoustical absorption materials are intended to reduce reverberant (reflected) noise from inside an enclosure or from a barrier surface. It is not intended to act as a barrier by itself.

- Acoustiblok QuietFiber www.acoustiblok.com
- Acoustical Surfaces Wall Panel www.acousticalsurfaces.com
- Eckel Industries Model EFP, FFP, ALP, DAP www.eckelusa.com
- Industrial Acoustics Absorption Panels www.industrialacoustics.com
- Pyrok, Inc. Acoustement Plaster www.pyrokinc.com