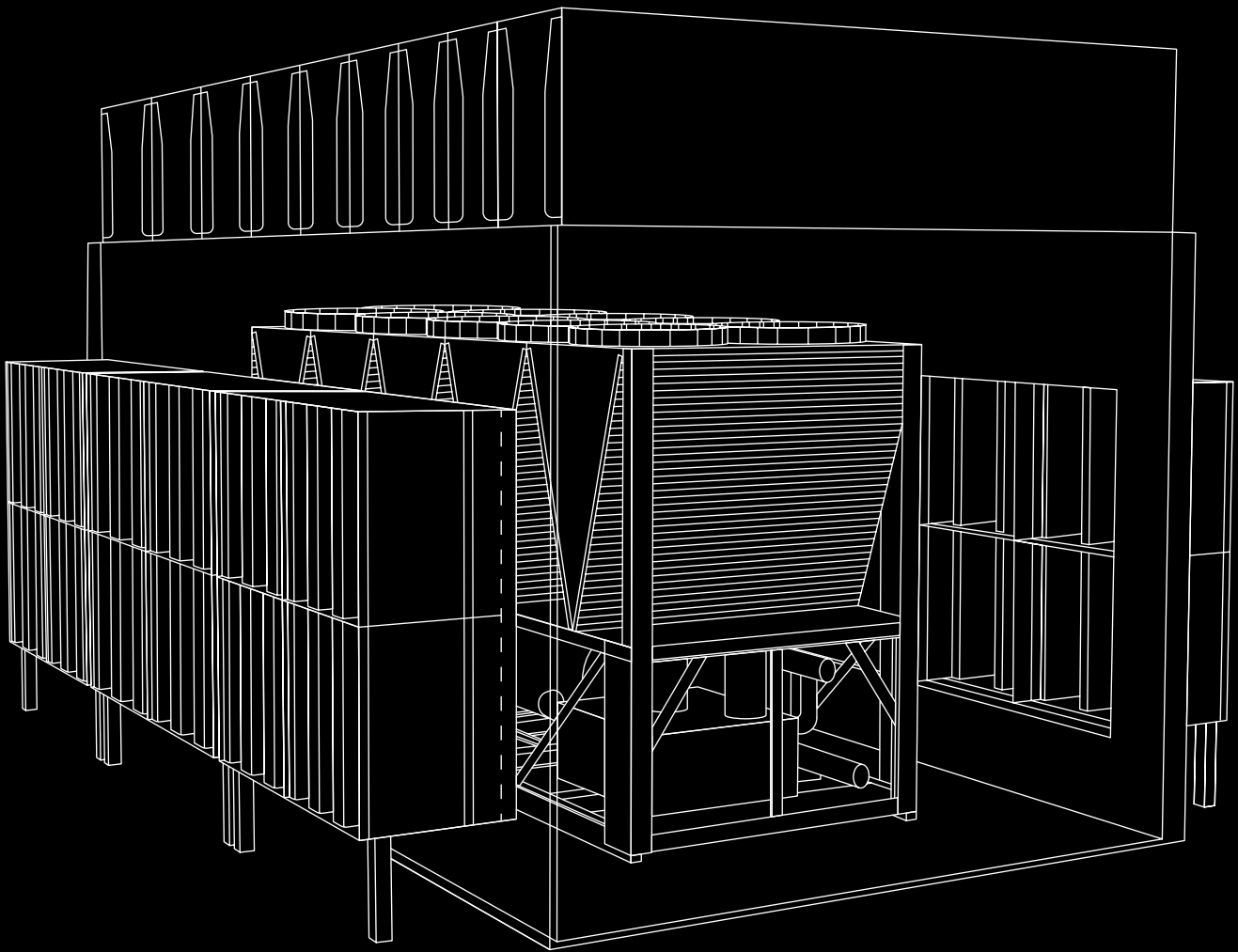


AIR COOLED CHILLER NOISE CONTROL SOLUTIONS





AIR COOLED CHILLERS

Air-cooled chillers are refrigeration machines that remove heat from cooling loads using chilled water and reject this heat into the atmosphere using refrigerant.

THEY ALL HAVE fans, condenser coils, and compressors. Air-cooled chillers are used to provide cooling for human comfort and electronic equipment as well as industrial process applications around the world.

Nearly all air-cooled chillers are located outdoors to allow adequate airflow through the condenser heat exchanger coils. Air-cooled chillers are often placed adjacent to or on top of buildings to minimize the amount of space they take up and to reduce the amount of piping required to connect to associated equipment.

NOISE PROBLEMS

Addressing each noise path from an air-cooled chiller is not as simple as merely adding attenuation or isolation.

There are many noise paths from air-cooled chillers (see **Fig. 1** for examples) that, if not treated correctly, can lead to noise problems. When addressing each noise path, ventilation requirements, pressure drop considerations, space constraints, aesthetics, location, supporting structure, and materials of construction need to be considered.

Compressors are a primary noise source in chillers. Large air-cooled chillers can have multiple compressors to help provide good turn-down ratios to meet part-load conditions. The combination of multiple compressors changing speeds and turning on and off makes the noise more irritating as the sound level goes up and down and tones continuously vary in intensity.

Condenser fans often account for more than half of the overall sound level. Most chillers cycle the fans on and off to match cooling load, varying the noise levels. Reducing or eliminating noise requires consideration of complicating factors including the relatively low capacity of condenser fans to accommodate additional pressure drop as they move large amounts of air. Any silencers placed in the air path must ensure airflows are maintained.

Air-cooled chillers can also create noise and vibration problems for building occupants. Harsh tonal noise associated with chillers can pass through standard windows and vibration can transmit through the building structure. When a chiller is placed next to a building its noise will be reflected from adjacent surfaces, combining with noise directly from the machine and creating higher levels of noise—which can travel farther and be heard by more people—causing more discomfort and annoyance. The result in occupant annoyance could lead to code violations and subsequent financial penalties.

Since most air-cooled chillers are outside, any noise reduction solution needs to be designed to withstand wind loads as required by local building codes. Proper design of both the silencers and their attachments will need to be performed by a licensed professional engineer in that jurisdiction.

NOISE PATHS

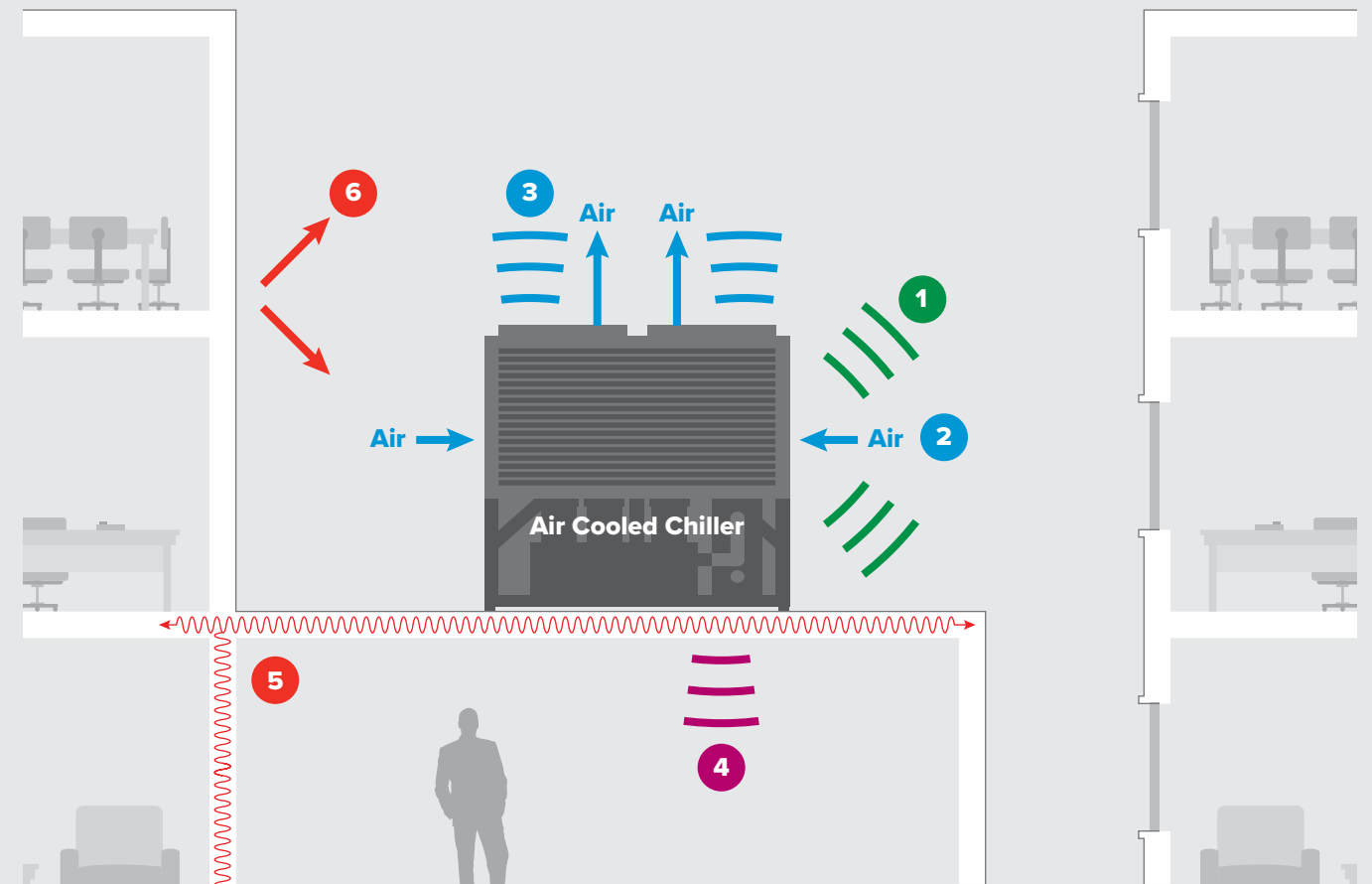


Fig. 1 Air Cooled Chiller Noise Paths

AIR COOLED CHILLER NOISE PATHS

- 1 Noise from compressors
- 2 Noise from inlet side of condenser coils
- 3 Noise from discharge side of condenser fans
- 4 Noise radiated into the building
- 5 Vibration path radiated noise
- 6 Noise reflected off the ground and adjacent surfaces



Typically, air cooled chiller fans can handle no more than 0.25" static pressure

AIR COOLED CHILLER NOISE CONTROL SOLUTION

Vibro-Acoustics provides a no-obligation application engineering Lay-In service to analyze project-specific chiller system design and provide an optimal solution.

WE PROVIDE a noise control solution that integrates with the system and addresses all noise sources and paths so that the project's sound criteria are achieved.

The chiller noise control solution enables the consulting engineer to place a solution that will work with the selected chiller and consider energy efficiency. Solutions will be designed keeping the air flow and static pressure limitations in mind with designs that do not nullify chiller manufacturer's warranties, or greatly reduced chiller performance. Building owners can run their chillers without disrupting neighbors, occupants or violating noise by-laws and regulations. What the engineer and contractor receive is an integrated solution to address multiple areas of concern with a single source responsibility.

Targets problem 3

Discharge Silencers To reduce noise transmission

Vibro-Acoustics' discharge silencers reduce noise transmission through air exhaust openings of the chiller.

Targets problems 1 2

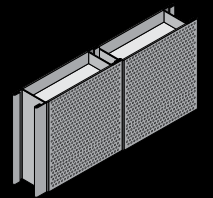
Intake Silencers/Louvers To reduce noise transmission

Vibro-Acoustics' intake silencers reduce noise transmission from compressors and air flow at the intake of the chiller.



Vibro-Acoustics provides aerodynamic calculations stamped by a Professional Engineer. The maximum recommended combined pressure drop including system effects for both intake and discharge silencers is 0.25" wg or less.

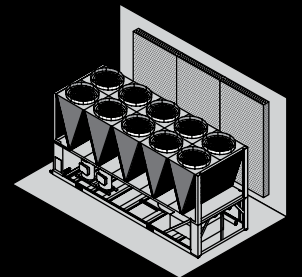
Targets problem 4



Acoustic Panels To reduce noise transmission

Vibro-Acoustics acoustic panels reduce noise transmission while forming an enclosure around the chiller to ensure maintenance access and maintain manufacturer recommended clearances

Targets problem 6



Absorption Panels

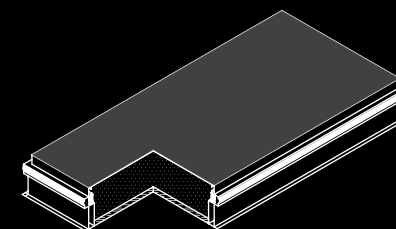
Vibro-acoustics Absorption panels reduce sound reflection from hard surfaces. They can be installed on existing walls with relative ease.

Targets problems 4 5



Seismic and wind rated support structure

Vibro-Acoustics enclosure comes complete with structural elements to ensure that it is rated as per project specific wind and seismic ratings. Seismic and wind calculations stamped by a state licensed Professional engineer are available upon request.



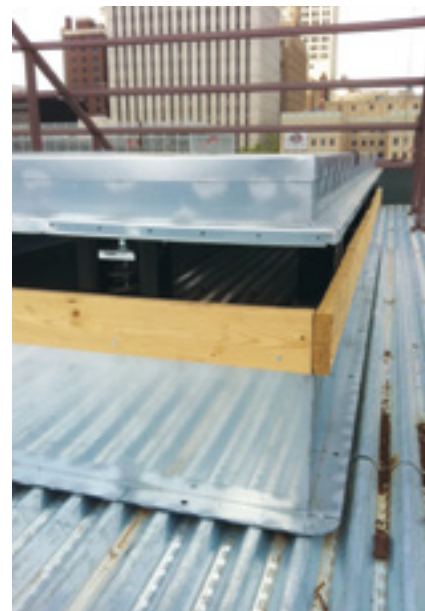
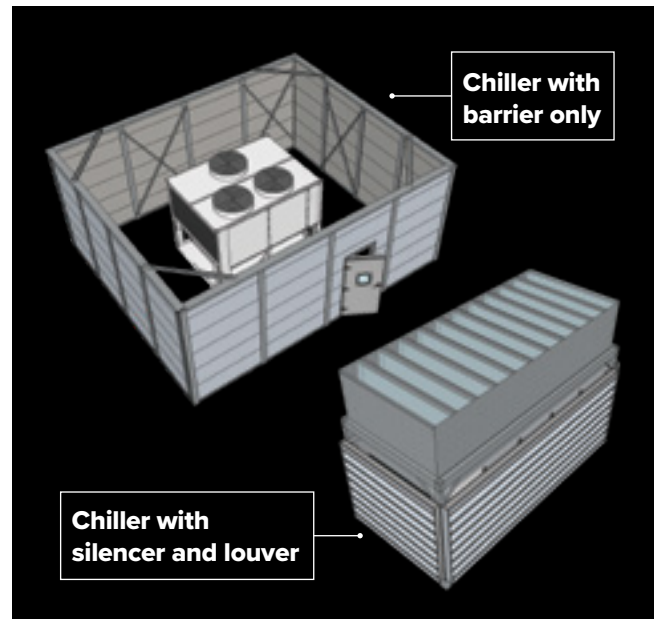
Acoustic Isolation Platform To reduce radiated noise and vibration

Vibro-Acoustics Acoustic Isolation Platforms can be used with air cooled chillers to reduce the vibration transmitted through the structure and the radiated noise through the roof.



Vibro-acoustics application engineers offer creative and pragmatic solutions to overcome challenges, such as:

- > Stringent noise criteria
- > Proximity to property lines
- > Low available pressure drops
- > Required clearances around chillers for air flow and maintenance access



ENSURE NOISE & BY-LAW COMPLIANT SOLUTIONS BY TAKING ADVANTAGE OF OUR APPLICATION ENGINEERING SERVICES



Contact your local Vibro-Acoustics sales representative or get in touch with us to find out more about our generator noise control solutions and Lay-In Service. Call **1-800-565-8401**, or email info@vibro-acoustics.com.

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NOISE CONTROL