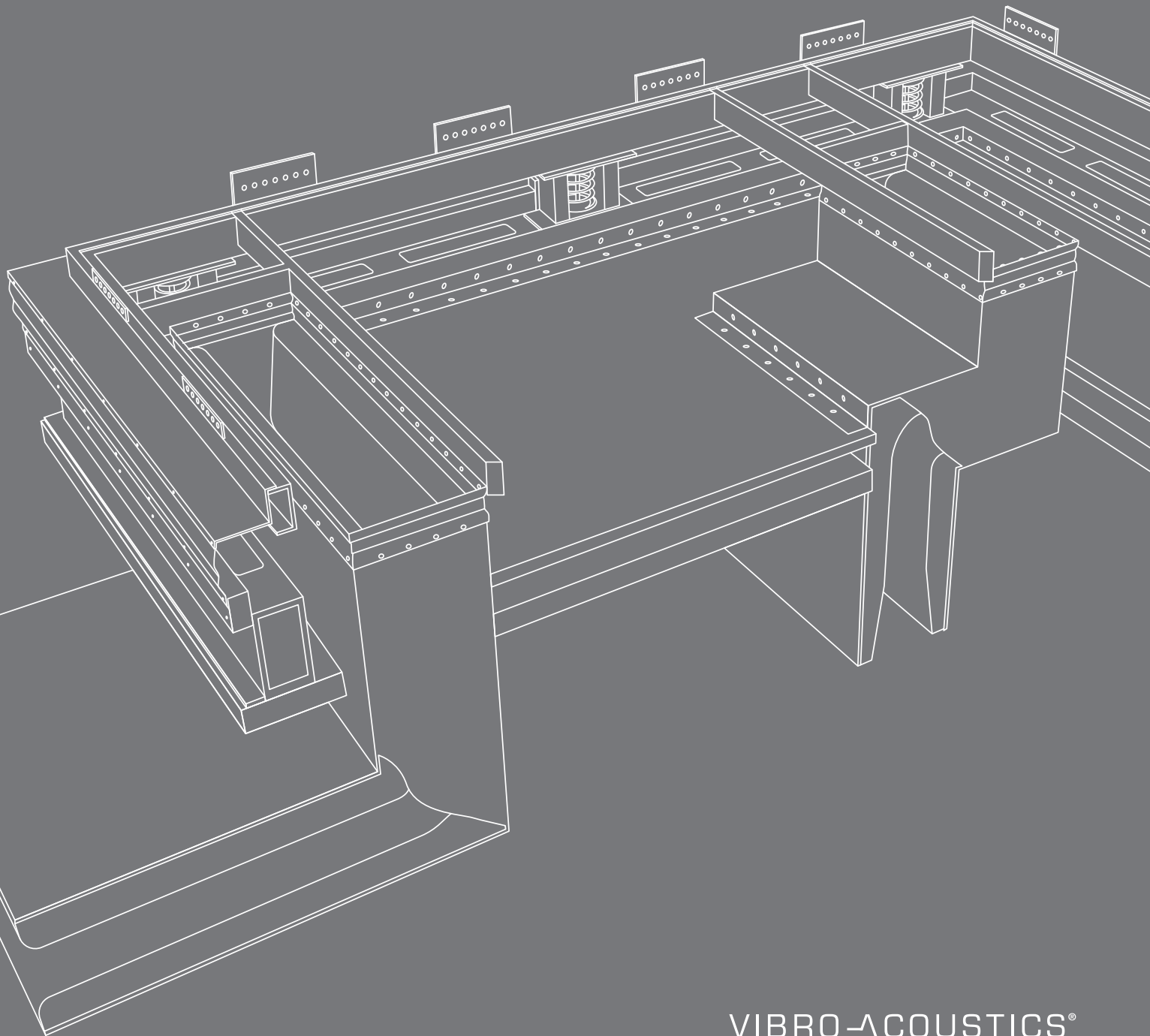


# ROOFTOP UNIT NOISE CONTROL SOLUTIONS



VIBRO-ACOUSTICS®  
A Swegon Group company



## ROOFTOP UNITS

The most commonly used heating, ventilating, and air conditioning (HVAC) system is the rooftop unit (RTU).

**TYPICAL DESIGN PRACTICE** is to place RTU's over the occupied space. The benefits of this practice is to simplify design for an energy-efficient (both thermal and pressure drop) and economical application.

**One disadvantage to placing an RTU over occupied spaces is the risk of noise and reduced Indoor Environmental Quality (IEQ).**

## NOISE PROBLEMS

RTUs are one of the most common causes of HVAC noise problems and a major reason for tenant complaints.

**THERE ARE MANY** RTU noise paths, such as airborne noise, duct breakout noise, and structure-borne noise (see fig 1.0 for complete list). Any of these paths, if not treated correctly, can create a noise problem. Unfortunately, solving the problem is not as simple as attenuating each of these paths. System complexity, such as fan orientation within an RTU and ductwork design, also needs to be considered.

Environmental noise that comes from the RTU's condenser fans, fresh air intakes, exhaust fans and compressors is another concern. Because this noise can be heard from nearby properties, owners and engineers may encounter complaints and lawsuits from disgruntled neighbors.

Consultants often try to avoid these problems at the design stage by placing RTUs over non-critical areas. Doing so, however, removes the benefit that comes with setting the units close to or directly over occupied spaces. Neglecting noise control during the design stage can lead to costly problems that must be fixed later on.

Other factors that design engineers need to consider are wind and seismic forces. Depending on the region, RTUs may be exposed to winds of 90 mph (145 kph) to 150 mph (241 kph) and/or extreme seismic forces. It is also important to design an RTU curb that can withstand wind and seismic conditions even at connection points. Even though the RTU may be rated to meet IBC (US) or NBC (Canada) requirements, the connection method from RTU to curb and curb to roof need to be verified through engineering calculations and stamped by a professional engineer.

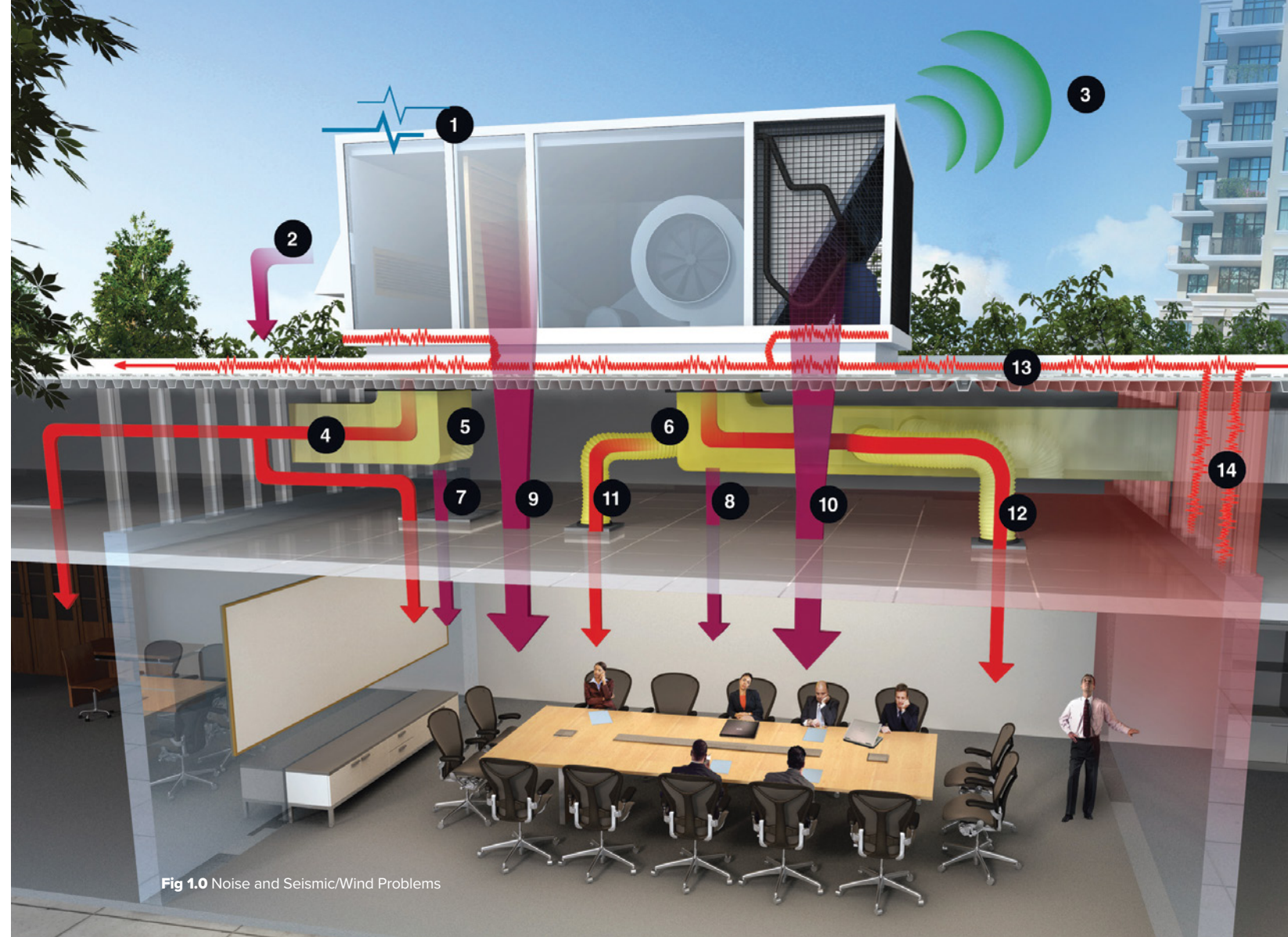


Fig 1.0 Noise and Seismic/Wind Problems

### RTU NOISE AND SEISMIC/WIND PROBLEMS

- |   |  |
|---|--|
| <b>1</b> Seismic & wind loading                             | <b>7&amp;8</b> Breakout duct-borne noise (supply and return air) |
| <b>2</b> Flanking radiated external noise                   | <b>9&amp;10</b> Radiated noise                                   |
| <b>3</b> Environmental noise                                | <b>11&amp;12</b> Duct-borne noise (supply air)                   |
| <b>4</b> Duct-borne noise (return air)                      | <b>13</b> Vibration path   |
| <b>5&amp;6</b> Aerodynamic system effects & generated noise | <b>14</b> Structure-borne noise                                  |



**Relocating RTUs removes the benefit that comes with setting the units close to or directly over occupied spaces.**

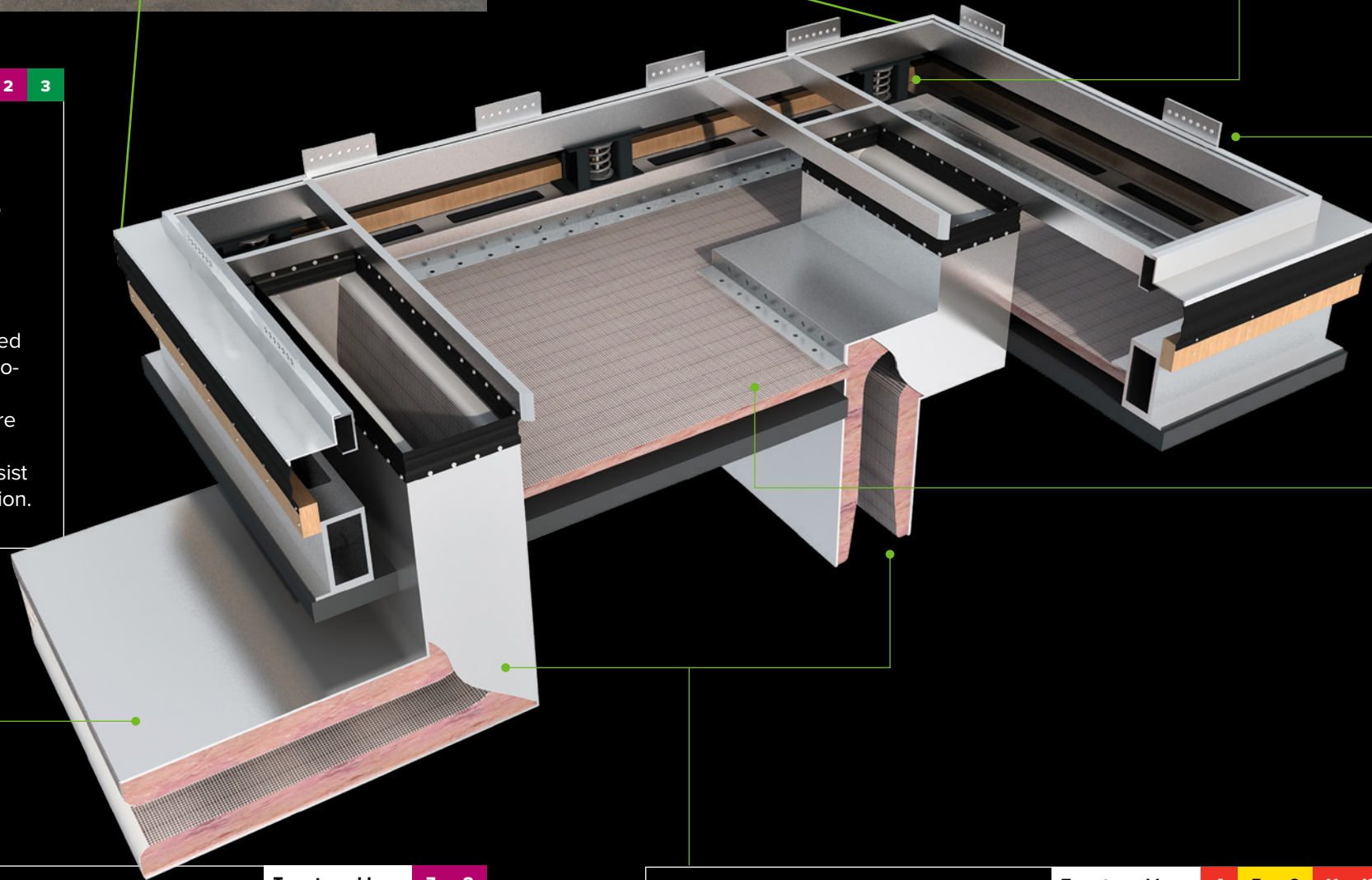
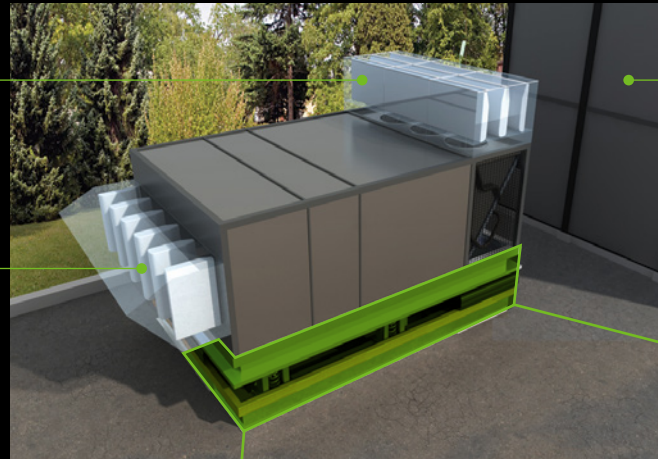


# RTU NOISE CONTROL SOLUTION

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

**WE PROVIDE** an integrated NCC-VCR noise control curb system that addresses all noise sources and paths so that the project's sound criteria are achieved.

The noise control curb system enables the consulting engineer to reap the full benefits of locating RTUs over occupied spaces without the disadvantage of a noise problem. According to the project's needs, a number of customizable features are integrated into the curb. What the engineer receives is a single, amalgamated solution to address multiple areas of concern with single-source responsibility.



Targets problems 2 3

### Intake and discharge silencers To minimize environmental noise

Typical condenser fans have little static pressure to spare for silencing noise radiated to property lines. Vibro-Acoustics' intake and discharge silencers are designed to minimize pressure drop and resist environmental corrosion.

Targets problems 3

### Noise Control Vertical Barrier To minimize environmental noise

Vibro-Acoustics' noise barriers help prevent property line noise problems. They can act as architectural screening as well as effective noise control that does not reduce equipment performance.

Targets problems 13 14

### Vibration Isolation To dampen vibrations that cause structure-borne noise

Vibro-Acoustics isolates the entire RTU system externally. We take into consideration the location of the equipment in relation to neighboring occupied spaces, roof deflection, and sound criteria. This is the only sure way to address all vibration sources effectively.

Targets problems 1

### Anchorage calculations with PE/P.Eng stamp For seismic and wind loading

For code compliance, we perform all required anchorage calculations and provide connection details for the curb. Furthermore, the design and calculations are stamped by a professional engineer.

Targets problems 9 10

### Noise Control Curb Barrier To block radiated noise

Noise radiating from the bottom of the RTU is often overlooked. Located inside the Vibro-Acoustics noise control curb, the engineered barrier attenuates low frequency noise before it passes through the ceiling and into the occupied space.

Targets problems 7 8

### HTL (High Transmission Loss) Casing To address breakout noise

After performing a breakout analysis, HTL casing is provided to attenuate breakout noise. This is a better alternative to field-applied duct lagging because single-source responsibility is provided by Vibro-Acoustics.

Targets problems 4 5 6 11 12

### Fit-the-System Silencers To address airborne noise

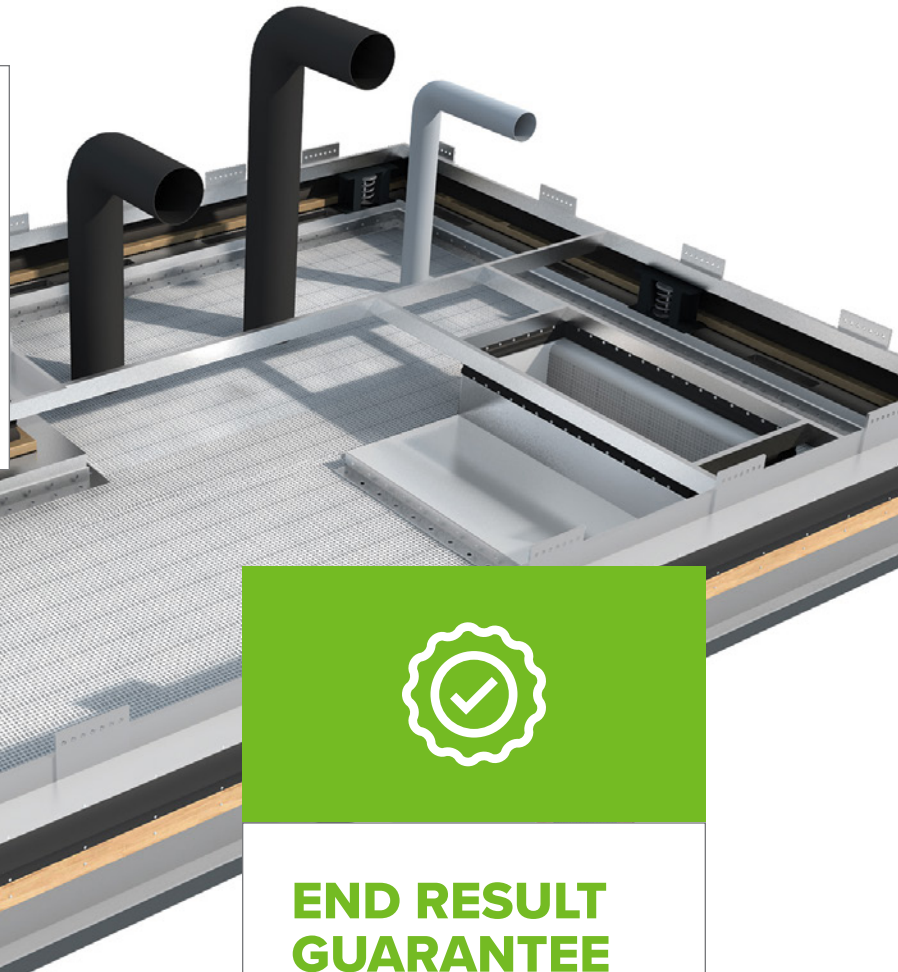
Vibro-Acoustics silencers are built to the required shape and size to provide sufficient insertion loss while meeting space restrictions. Fit-the-system silencers also include flow-shaping internals which help keep pressure drop to a minimum.

**Fit-the-system silencers also include flow-shaping internals to keep pressure drop at a minimum.**



## SUBCOMPONENTS

**IN ADDITION** to the main components, Vibro-Acoustics' NCC-VCR noise control curb can provide you with the flexibility to include subcomponents of the HVAC system, such as pipe chases, filter banks and coils within the roof curb itself—valuable benefits when ceiling space is limited.



## END RESULT GUARANTEE

**INCLUDED** with our RTU system solution is our guarantee: in the working environment, all sound criteria in the occupied space and at the property line will be met as designed.

**Note:** End-result guarantee and pressure drop guarantee are based on information provided.

## PRESSURE DROP GUARANTEE

**AT VIBRO-ACOUSTICS**, we pride ourselves in being highly experienced in HVAC noise control and HVAC aerodynamics. With every noise control solution we work on at the design stage, we provide a pressure drop guarantee. This guarantee, which includes aerodynamic system effects, provides design engineers confidence that the noise control solution will not create pressure drop problems.

# ENSURE ASHRAE & BY-LAW COMPLIANT SOLUTIONS BY TAKING ADVANTAGE OF OUR RTU SYSTEM SOLUTION



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

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