

## Noise Tips for Siting Equipment

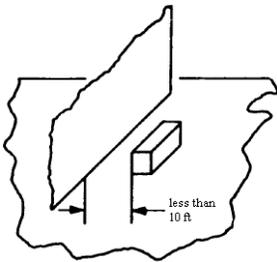
Evaluating and mitigating potential noise impacts in the design stage can save significant time and money. If the installation fails the noise review during final inspection the contractor is responsible to bring the equipment into compliance with the Seattle Noise Code.

This document is designed to help the installer evaluate the potential noise effects of their installation.

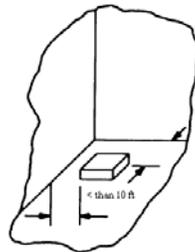
The majority of noise problems resulting from currently installed residential air conditioners or heat pumps would not exist if the installer or home owner had analyzed the property to determine the location which produced the least noise impact at adjacent properties. The following outlines some simple "do's" and "don'ts" when it comes to installing air conditioners or heat pumps.

As the condenser units produce a continuous, steady sound while operating, the owner will most likely locate the unit as far as possible from his or her bedroom or outdoor living area. This often means that the unit is placed near the adjacent residential property which may result in noise complaints or noise citations.

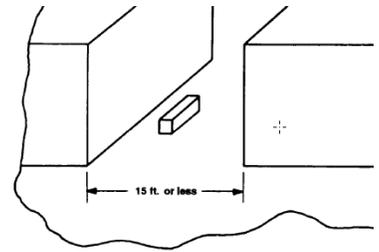
Before permanently installing the unit, a location should be selected that will minimize the noise impact at nearby property lines. There are several installation locations that should be avoided due to their ability to actually increase the noise level. Described briefly, they are



1. in the side yard or within 10 feet of a wall



2. within 10 feet of two adjacent walls (such as a corner)



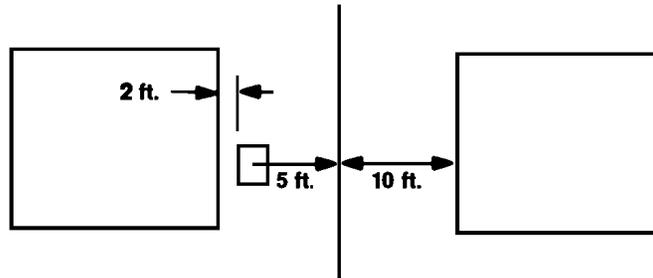
3. Between two houses or within 15 feet of two opposite walls

| No mechanical equipment is allowed within 3' of any lot line<br>SMC 23.44.014.12 | a)   | b)   | c)   |
|--|--|--|--|
|  | Equipment on ground, roof or deck with no reflective surfaces within 10' | Same as a) but with a single reflective surface within 10' (located on side of house.) | Same as a) but with two walls forming an inside corner, or between two houses less than 15' part |
| Distance from the unit to the property line (ft)                                 | Sound Rating required to ensure Leq = 45 dBA Limit (Heat Pumps)          |  |  |
| 3  | 59   | 56   | 53   |
| 6  | 61   | 58   | 55   |
| 10   | 64   | 61   | 58   |
| 20   | 69   | 66   | 63   |
| Distance from the unit to the property line (ft)                                 | Sound Rating required to ensure Leq = 55 dBA Limit (Air Conditioners)    |  |  |
| 3  | 69   | 66   | 63   |
| 6  | 71   | 68   | 65   |
| 10   | 74   | 71   | 68   |
| 20   | 79   | 76   | 63   |

To assist in determining the potential noise levels at nearby property lines, the installer is referred to AHRI standard 275, "Application of Sound Rating Levels of Outdoor Unitary Equipment)" developed by the Air-Conditioning Heating and Refrigeration Institute (AHRI). If the results of the calculation (following their procedure below) indicate that operation of the unit is in violation of Seattle Noise Code, the owner will need to provide noise abatement measures to reduce sound levels and ensure compliance with Noise Code, or install a quieter unit.

Here is an example of a simple noise review using the AHRI standard 275

Simple Site plan

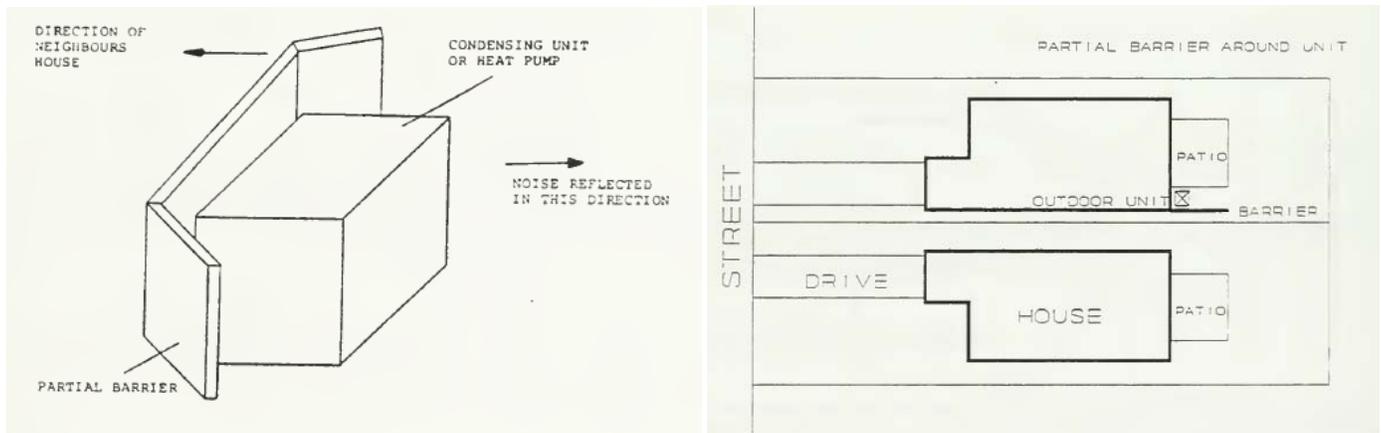


Procedure for estimating sound pressure levels at the property line

| Line | Distance from equipment to evaluation point on property line = 5'  | A/C         | HP          |
|------|--|-------------|-------------|
| 1    | Unit Sound Rating<br>(per AHRI Standard 270 from equipment manufacturer)                                   | 63          | 53          |
| 2    | Equipment Location Factor  | 3           | 3           |
| 3    | Add Lines 1 and 2  | 66          | 66          |
| 4    | Barrier Shielding Factor   | 0           | 0           |
| 5    | <del>Sound Path Factor</del> (is not used for property line evaluations)                                   | 0           | 0           |
| 6    | Distance Factor  | 11.5        | 11.5        |
| 7    | Add Lines 4, 5 and 6   | 11.5        | 11.5        |
| 8    | Estimated A-Weighted Sound Pressure Level predicted at the property line.<br>(Subtract Line 7 from line 3) | <b>54.5</b> | <b>44.5</b> |

If the results of the calculation indicate the installation is in compliance you can provide a copy of this calculation, the simple site plan and refrigeration permit number to [noise@seattle.gov](mailto:noise@seattle.gov) to be reviewed and approved. If a mechanical inspection is called in for an installation the noise review will be started then.

## Use of Barriers



Barriers, if properly installed, can be the most cost-effective means of noise reduction. Common barrier materials include earth, steel, plywood and concrete. General guidelines for barrier walls include the following:

- Place barriers as close to the source as possible without restricting airflow to/from the unit. This will ensure the deflection of most of the sound away from the evaluation point. Care must be taken not to restrict the airflow of the unit as this would lead to a decrease in unit efficiency. Consult the manufacturer for minimum distance requirements.
- Barriers must be solid (like  $\frac{3}{4}$ " plywood or greater) extend all the way to the ground or deck and be free of holes, gaps, cracks, etc. Noise will be transmitted through the wall if this condition is not met.
- Weatherproof absorptive treatment can be provided with the barrier to reduce the noise reflected from the house wall.
- A partial barrier can be provided for the unit in order to reduce the noise that would otherwise be radiated towards the neighbor's house. The sketch above shows the use of the barrier.
- Simple noise barriers generally do not require sound absorbing surfaces. Absorptive treatment on the source side of the barrier makes only a minor improvement in reducing noise and is generally not cost-effective.
- In situations where house walls will reflect sound back at the barrier, the effectiveness of the barrier shielding will be significantly reduced. To remedy this, wall surfaces facing the unit could be covered with sound absorbing material.

For more information regarding noise review or mitigation measures please contact a noise abatement staff.