

Sound Advice

Helpful Information from *Stewart Acoustical Consultants*

A member firm of the National Council of Acoustical Consultants
7330 Chapel Hill Road, Suite 101, Raleigh, NC 27607

919-858-0899

copyright 2007

www.sacnc.com

The information in this document is not provided as a consulting service or as a solution to any specific problem.

AIR CONDITIONERS AND NOISE ORDINANCES

by Noral D. Stewart

The most common and prevalent noise source located on residential properties is the air conditioning condenser unit. Guidelines for noise at residential boundaries were developed before air conditioning became common. Recent analysis has shown the most residential condensing units located close to boundaries will exceed common noise ordinance limits. Some newer models are significantly quieter. Thus, communities need to evaluate their ordinances and consider changes especially as the ordinances apply to existing systems. Also, people buying new systems should carefully consider the system noise and location in relation to the community noise limits.

Communities will typically limit sound levels at residential boundaries at night to a level of 45, 50, or 55 dBA. Residential condensing units are available with A-weighted sound power ratings in the range of 67 to 83 dB. Traditional systems have usually been in the range of 78 to 83 dB. Common high efficiency models are usually in the range of 73-78 dBA. Some of the new ultra high efficiency premium models that are rarely used have sound power less than 70 dBA. Assume one of these units on soft ground with its center about 2 feet from the side of a house. The A-weighted sound levels at various distances from the center of the unit for various sound power ratings are as follows:

| √ Sound Pwr | 11.6 ft | 20 ft | 22 ft | 30 ft | 31.5 ft | 40 ft | 50 ft | 54 ft | 60 ft | 62 ft | 78 ft |
|-------------|-----------|-------|-----------|-------|-----------|-----------|-------|-----------|-------|-----------|-----------|
| 83 dB | 63 | 58.7 | | 55.4 | 55 | 53 | 51.1 | 50 | 48.4 | | 45 |
| 80 dB | 60 | 55.7 | 55 | 52.4 | | 50 | 48.1 | | 45.4 | 45 | |
| 78 dB | 58 | 53.7 | | 50.4 | 50 | 48 | 46.1 | 45 | 43.4 | | |
| 75 dB | 55 | 50.7 | 50 | 47.4 | | 45 | 43.1 | | 40.4 | | |
| 73 dB | 53 | 48.7 | | 45.4 | 45 | 43 | 41.1 | | 38.4 | | |
| 70 dB | 50 | 45.7 | 45 | 42.4 | | 40 | 38.1 | | 35.4 | | |

In many communities, the condensing units are only 15 to 25 feet from boundaries. It can be seen that high efficiency quieter systems are required to meet a 50 dBA limit and only the quietest rarely used systems can meet the quietest 45 dBA limits at these distances. Fortunately the noisiest units will be phased out as regulations require use of higher efficiency systems.

With the quieter output of the new systems, more stringent limits on A-weighted sound can be met for new construction. However, meeting 45 dBA at the boundary requires the quietest, most expensive systems and careful placement away from the boundary. Some existing systems will exceed 55 dBA at the boundary. Raising the limit above 55 dBA presents problems when sources are not near a boundary and levels are high over a large area. A better solution would be to require the source to be at least 15 feet from the boundary for new construction, and to set a minimum distance from the source for measurements.. Ordinances could then set limits at the boundary but no closer than 50 (or 30) feet from the source, with 50 (or 55) dBA limits in general ordinances for existing source and 45 (or 50) dBA limits in zoning performance standards for new construction. As older systems are phased out and newer ones become quieter, the distance could be reduced in the future.

Some communities have imposed octave-band or third-octave limits. These can be even more difficult to meet at the lowest frequencies as many systems have a strong sound in the 63 Hz octave. This low frequency sound reflects more strongly from the ground. Some of the newer systems do not have this strong 63 Hz octave sound.