



An Installers Guide to **AIR CONDITIONER NOISE**

Installing an Air Conditioner?

Noise from air conditioners can disturb neighbours. The noise can disrupt sleep, interfere with normal daily activities and can have significant impacts on people's health.

Installation of an air conditioner that emits unreasonable noise is illegal. Installers can face penalties of up to \$5000 if they do not meet their legal obligations.

In Western Australia, the noise from an air conditioner installed on a property must comply with the *Environmental Protection (Noise) Regulations 1997*.

Under the Regulations, the noise from an air conditioner must meet assigned allowable noise levels at all times. The *Environmental Protection Act 1986* sets penalties for non-compliance with the Regulations and as the installer of a noisy air conditioner you can face legal action under Section 80 of the Act.

What is Section 80 of the Environmental Protection Act 1986?

Section 80 places responsibility on installers of equipment to ensure that an air conditioner does not emit unreasonable noise. A summary of the Section is stated below, however, for a copy of the legislation or more information on Section 80, refer to the back page of this brochure.

Section 80 (1) generally states that a person who installs any equipment which, when operated, emits unreasonable noise commits an offence under the Act.

Section 80 (2) generally states that if an occupier is convicted of committing an offence under the Act because of unreasonable noise being emitted by any equipment which was installed by an installer, that occupier may recover the cost of the installation, together with the amount of any penalty imposed on him from the installer by action in court.

The penalty for an offence under Section 80 (1) is \$5,000 for an individual or body corporate

What is Unreasonable Noise?

For the purposes of the *Environmental Protection Act 1986*, noise is taken to be unreasonable if –

- (a) noise is emitted, or equipment emitting noise, does not comply with the Act and/or the *Environmental Protection (Noise) Regulations 1997*; or
- (b) having regard to the nature and duration of the noise emissions, the frequency of similar noise emissions from the same source and the time of day at which the noise is emitted, the noise unreasonably interferes with the health, welfare, convenience, comfort, amenity of any person.

What Level of Noise is Permitted by the Environmental Protection (Noise) Regulations 1997?



The Regulations use a calculation procedure to determine the assigned allowable noise levels applicable to a particular premises **receiving noise**. This calculation takes into account the areas of land zoned for commercial and industrial use and the nature of roads within 450 metres of the premises. For air conditioner noise the most stringent criteria applies at night, when, from 10.00 pm, the allowable noise level is 35 dB(A) in most suburban areas. However, higher allowable noise levels could be expected during the day.

What Can I do to Prevent Unreasonable Noise Being Emitted from an Air Conditioner Installation?

The location of the air conditioner is the most important factor in ensuring noise is not going to be intrusive. All types of air conditioners should be located as far away as possible from neighbours and away from noise sensitive areas such as bedrooms and alfresco dining/outdoor entertainment areas. Getting the initial installation position right can save a costly relocation and/or prosecution if noise complaints are lodged and justified.

Refrigerated Air Conditioners

The best location is generally facing the rear yard. Placing the unit at the side of the house close to the neighbour's house is likely to create excessive noise, as the noise is trapped and reflected between the walls and the eaves of the houses.

Evaporative Coolers

Many roof mounted evaporative coolers may cause a noise problem on neighbouring properties. Whilst the noise estimation techniques outlined in this brochure are intended for use with refrigerated air conditioners, the "distance factor" is applicable. If the calculation determines that some attenuation is required, an acoustic barrier designed by an acoustic consultant may be necessary.

Allow for a Noise Increase

Over time, air conditioners, like any machines, deteriorate in their performance. This is accompanied by an increase in noise from worn bearings, cabinet rattles, dirty or rusty fan blades, worn rubber mountings and compressor wear. Some of this increased noise can be reduced by regular maintenance. However, consideration should be made at installation for a slight increase in noise over time.

Estimating the Noise Impact on Neighbouring Properties

The following pages give simple methods to estimate the likely noise impact of an air conditioner installation on neighbouring properties. If you want to determine the suitable “Sound Power Level” for a given installation position then use procedure one. If you have a unit (and know the “Sound Power Level”) and want to know how close you can place it to a neighbouring fence line then use procedure two.

Procedure 1 – Determining a Suitable Sound Power Level

Follow Steps 1 - 4 carefully and it will help you decide which air conditioner is suitable by considering the distance between the intended site and the property boundary, as well as noise barriers, such as fences.

Step 1: The closer the air conditioner is to the neighbour the quieter it will need to be. Follow the procedure in “**Instructions for Box 1**” (page 4) and put your answer in Box 1.

Step 2: If there is a fence or wall between the neighbouring properties the noise may be reduced. Check this using “**Instructions for Box 2**” (page 5) and put your answer in Box 2.

Step 3: Noise can reflect off walls and make the air conditioner appear louder. Follow the steps in “**Instructions for Box 3**” and put your answer in Box 3.

Step 4: Add the numbers in Box 1 and Box 2, then subtract the number in Box 3.

BOX 1		BOX 2		BOX 3		ANSWER
Distance Factor	+	Barrier Factor	–	Reflection Factor	=	Sound Power Level dB(A)

The answer is the maximum *Sound Power Level* that can be installed in the position that you are considering.

Sound Power Level - Refrigerated air conditioners with a cooling capacity of less than 12kW sold within Western Australia are required under law to be labelled with their outside sound power level.

Whilst evaporative coolers do not come with sound power level labels, manufacturers should be able to provide sound power levels for each model. As with refrigerated air conditioners noise levels vary between units and purchasers should be encouraged to select a quieter unit.

AS AN INSTALLER YOU WILL NEED TO KNOW THE SOUND POWER LEVEL OF ANY AIR CONDITIONING UNIT YOU INTEND TO INSTALL

Instructions for Box 1- Distance Factor

Measure the shortest distance, in metres, between where you want to put the air conditioner and the nearest noise sensitive area on the neighbouring property. The nearest noise sensitive area may be the façade of the neighbours house or an outdoor entertaining area or patio. If unsure, the safest method is to take the shortest distance between the unit and the boundary fence with an additional allowance for the minimum setback on the neighbours side (typically one metre). Mark the distance with an X in column 1, below.

Bear in mind that to reduce noise, air conditioners are best placed in a location that provides the greatest distance between the air conditioner and neighbours. This could, for example, mean mounting the air conditioner facing the back fence or front street (check Town Planning constraints first).

For the majority of residential properties the assigned level will be the base value of 35dB(A) for the overnight period from 10 pm until the following morning. Assigned noise levels are always calculated at the property receiving noise rather than the property emitting the noise. Before relying on an assigned level for this calculation you will need to consider “tonality”.

Tonality can be simply described as a characteristic whine or drone. Experience has shown that many air conditioners are tonal when assessed under the Regulations. If the tone cannot be reasonably and practicably removed from the noise, the installer will need to compensate for this in the calculation. This can be achieved by subtracting 5dB from the assigned level, prior to doing any calculations.

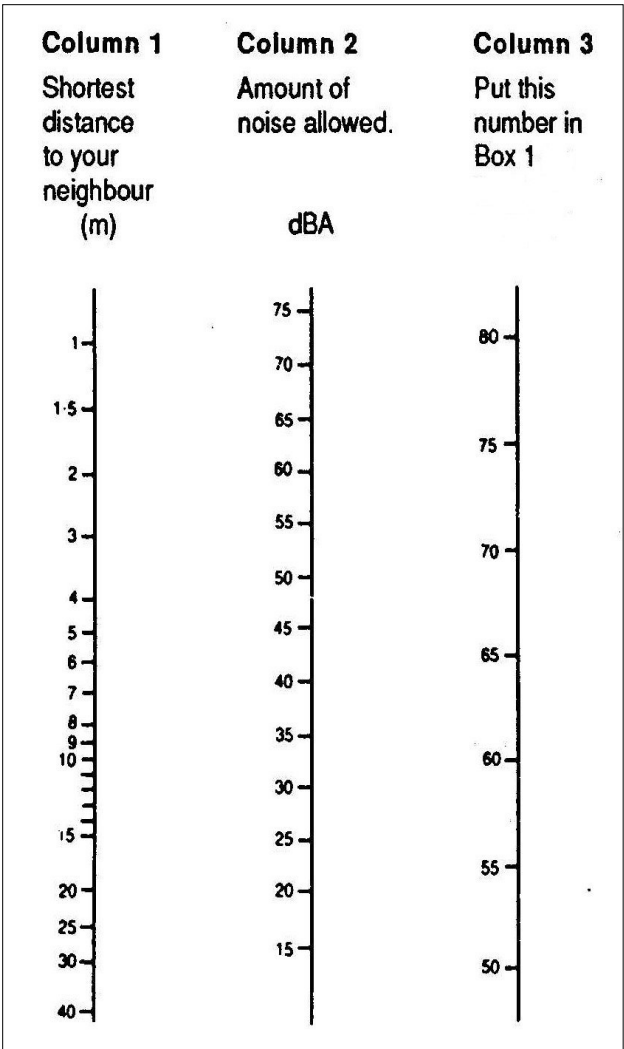
The lowest allowable level is 35dB(A), therefore if you believe a unit is tonal and you cannot reasonably or practicably remove the tones, you will need to consider the assigned allowable level to be 30dB(A).

For further information on assigned levels contact the Environmental Health Officer at the relevant local authority.

Once you have considered whether an adjustment for tonality is required, mark the amount of noise allowed in the area with an X in Column 2.

Draw a straight line from the X in column 1 through the X in column 2 to cut through column 3.

Read the number from column 3 where the line you have just drawn crosses, and write this in Box 1.



Barrier Factor

A fence/barrier can reduce the level of air conditioner noise heard in neighbouring premises. To do this a fence/barrier will need to be continuous and solid. It should contain very few gaps, particularly where the fence meets the ground. The fence/barrier must also prevent the air conditioner being seen from noise sensitive locations on neighbouring premises. Noise sensitive locations include windows of bedrooms and living rooms (including those of multi storey dwellings) and outdoor entertaining/relaxing areas.

What to do

Carefully read through the fence/barrier descriptions below. Select a value that corresponds to the fence/ barrier description applicable to your situation. Put this value in Box 2 on the front page.

	Description	Value for Box 2
1	The fence/barrier does not prevent the air conditioner being seen from between the air conditioner and noise sensitive locations on the neighbouring premises.	0
2	The fence/barrier blocks the “line of sight” but it is made of material having large gaps, such as a standard picket fence or a brick fence with fancy iron inserts. e.g. Hedges/bushes/trees Tea tree/brush Picket Fence Fence in disrepair with holes or missing planks Cyclone fence Masonry fence with decorative open inserts.	0
3	The fence/barrier blocks “line of sight” of the air conditioner from noise sensitive locations. • Typical paling fence Gaps between palings due to warping etc. • Solid fence with no gaps and flush to the ground e.g. “Colorbond” fencing Fibre cement sheeting (“Hardifence”, asbestos) Timber planking with overlap Concrete block/masonry/brick	5 10

Note:

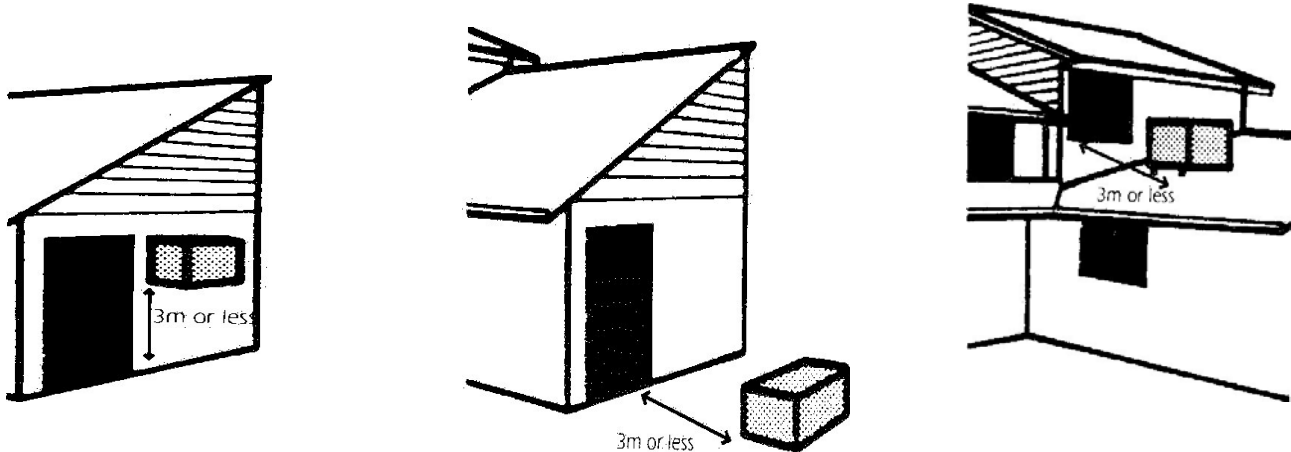
- If in doubt about your fence type, select a low value.
- For roof mounted refrigerated or evaporative units place "0" in Box 2 – barrier factor

Instructions for Box 3 – Reflection Factor

Just as light reflects from mirrored surfaces, sound will reflect from walls, carports, roofs and the like. Find a diagram below which best corresponds to the placement of the air conditioner. Put the corresponding value in Box 3 and go to STEP 4.

Note: For roof mounted refrigerated or evaporative units place “0” in Box 3 – Reflection Factor

One Reflective Surface - Value for Box 3 = 3



Two Reflective Surfaces – Value for Box 3 = 6



Example of Procedure One – Determining a Suitable Sound Power Level

Step 1

You plan to locate the air conditioner 5 metres from the neighbour's patio so you put a mark at 5 in column 1. The assigned level at the neighbour's property should not exceed 35dB(A) and you are satisfied that the unit is not tonal so you put a mark at 35 in column 2. Joining these two points with a straight line through column 3 gives a value of 57.

Step 2

The fence between the air conditioner and the neighbours would block the "line of sight" and is made of galvanised iron. Put 10 in Box 2.

Step 3

The air conditioner will be located on the ground against the house wall and more than 3 metres from any other wall surface. Put 3 in Box 3.

BOX 1		BOX 2		BOX 3		ANSWER
57	+	10	–	3	=	64 dB(A)

You have therefore determined that the Sound Power Level for an air conditioner to be installed at this particular location should not exceed 64dB(A). It may be possible to locate a unit with a higher Sound Power Level at this location **if** an appropriately designed acoustic enclosure is built around it. This should only be considered under the advice of a suitably qualified person otherwise damage to the unit or a fire hazard may result.

Procedure Two – Determining Distance to Boundary

Determining the distance to the boundary for a known air conditioner is also simple. This time the known values are Sound Power Level (from the unit), Barrier Factor, and reflection factor.

The value for Box 1 is determined as follows:

BOX 1				BOX 3		Box 2
Distance Factor	=	Sound Power	–	Barrier Factor	+	Reflection Factor

This value for Box 1 is marked in column 3 of the diagram on page 4. Draw a straight line through this mark and a similar mark in column 2 representing the noise level allowed in the area (typically 35dB(A) at night, or 30 dB(A) if the noise is tonal).

This straight line is extended through column 1 to give the minimum distance in metres that the unit should be set back from the nearest boundary.

It may be possible to locate the unit closer to the boundary **if** an appropriately designed acoustic enclosure is built around it. This should only be considered under the advice of a suitably qualified person otherwise damage to the unit or a fire hazard may result.

For commercial projects or if you have any doubts about the suitability of an installation you may need to get an acoustic consultants report. See "Acoustical Consultants" in the Yellow Pages.

Further Information

Legislation

Copies of the legislation are available for purchase from:

State Law Publisher
Ground Floor
10 William Street
PERTH WA 6000

Tel: (08) 9321 7688
Fax: (08) 9321 7536

And may be viewed on the internet at: www.slp.wa.gov.au

General Information

- Environmental Health Officer
At any Local Government Authority
- Department of Environmental Protection
Hartley Poynton Building
141 St Georges Terrace
PERTH WA 6000

Tel: (08) 9222 7000
Fax: (08) 9222 7099

Internet: www.environ.wa.gov.au

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