Wood-burning heaters–how to use them effectively

Updated September 2011[1]

EPA 230/11: This information sheet offers advice to householders on the best way to operate their wood-burning heaters.

Introduction

Although wood-burning heaters are a popular means of home heating, they can cause unnecessary air pollution, create an environmental nuisance for your neighbours, and waste your money through unburnt fuel if they are used inefficiently.

This information sheet tells you how to use your wood-burning heater correctly so that you can reduce air pollution while gaining maximum heating value from the wood you purchase. It includes a checklist to help make sure you're getting the best out of your heater and provides advice to help resolve complaints between neighbours with wood smoke problems.

If you are considering installing a wood-burning heater, the Environment Protection Authority (EPA) recommends heaters made to Australian Standard AS4013, which are designed to provide efficient heating with little pollution when used correctly. Heaters made to this standard will carry a label showing their certification. Your heater should also be correctly installed, according to AS2918.

What pollution can be caused

Domestic wood-burning heaters are one of the main sources of pollution affecting air quality in the Adelaide metropolitan area in winter—second only to motor vehicle emissions.

When wood is burnt completely, its waste products are carbon dioxide and water vapour, which are emitted to the air, and an ash residue. However, wood fires can emit smoke, soot, smells and a range of toxic compounds that affect air quality; this may cause discomfort for people with respiratory problems such as asthma.

Smoke is no joke! Take responsibility for your wood heater. Use it correctly to minimise the harmful effects of smoke pollution in your neighbourhood and save money on running costs.

Operation

The secrets of successful burning

When they are used incorrectly, wood-burning heaters emit more pollutants and use up expensive fuel inefficiently. There are some simple rules to get the most efficient results from your heater:

[1] Last updated March 2007

- use dry fuel and seasoned timber which maximises heat release during combustion
- adjust the air damper to allow enough air flow to provide oxygen for combustion
- make sure the fire is burning brightly so that there is enough heat for complete combustion
- balance the mix of air and hot combustion gases to promote complete burning
- allow enough time for complete burning of all the fuel.
- If there is a lack of any or all of the above factors, your fuel will not burn completely, more pollutants will be released and you will waste some of your fuel.

How to choose your fuel

The wood you burn should always be dry and well seasoned because this burns more cleanly and more efficiently than unseasoned wood. Unseasoned wood contains a great deal of moisture, which reduces the burning temperature of the fire and causes smoke and pollutants.

The EPA recommends that you buy wood from a reputable firewood merchant, and do not collect wood from roadsides or illegally from national parks and reserves. Reputable merchants can be found by contacting the Firewood Association of Australia (see Page 7 for more information).

Hardwoods, such as mallee and redgum, are preferable to softwoods, such as pine, because softwoods tend to contain more resins, which create smoky odours, deposits in the chimney, and exhaust gases.

When the flue on your heater is not hot enough—and especially when you have been using unseasoned wood—a dark, sticky substance known as creosote attaches to the walls of the flue. Creosote lodges in flues and chimneys, and can cause a chimney fire. It can be minimised by burning at higher temperatures.

Remember:

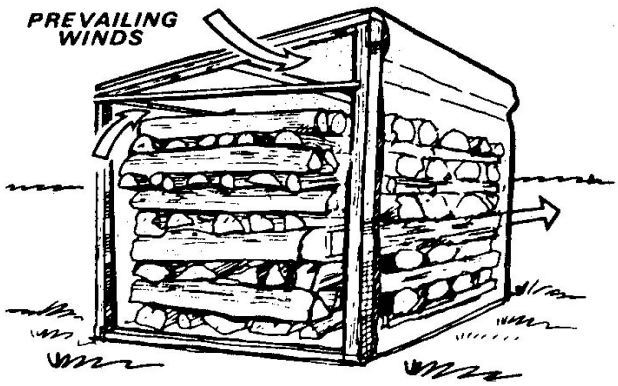
- buy wood from a reputable firewood merchant
- check that the wood you are buying is dry and well seasoned by striking two pieces together. Dry wood gives a resonant ‘clack’, while unseasoned wood sounds more like a dull ‘clunk’
- never use wood treated with copper chrome-arsenate[2] (such as permapine)—it releases poisonous fumes when burnt
- wood collected from the seashore is not suitable because it contains corrosive salts
- don’t burn garbage, painted timber or particle board[1]—these release pollutants.

How to store wood correctly

Stack your wood loosely off the ground in a criss-cross fashion to allow the air to circulate freely (Figure 1). Store it under a roof to keep it dry. It is better to keep wood at least eight months before use so that it is properly seasoned.

[2] Burning these materials is also illegal.

Figure 1 **Storing wood in a criss-cross pattern allows free air flow**



How to start a fire correctly

Use kindling wood, firelighters or paper to start the fire. Then add larger pieces of wood when a bed of fire has been established.

The air intake on your heater should be left fully open for at least 30 minutes to encourage the fire to reach maximum temperature—a hot fire will burn the wood more completely and therefore more efficiently and cleanly.

How to keep it going efficiently

It is better to build small fires regularly, and provide them with plenty of air, than to build one large fire and partly close the air intake—it will smoulder through lack of oxygen, give you less heat and burn inefficiently. It will also cause pollution, upset the neighbours, and allow partly burnt cinders to build up in the chimney, which could cause a chimney fire.

Every time you add fuel, open the air intake first and then add the wood. After 10–20 minutes when all the wood is burning properly, you may then reduce the air intake to give a comfortable fire. If your room is too hot, reduce the heat by adding less wood when refuelling the fire.

For the best results, keep your fire burning at a moderate rate.

Where there is smoke

Smoke means air pollution—and the best way to check for smoke is to look outside. If you can see smoke rising from your chimney, your heater is not burning efficiently and the air supply to the fire should be increased. If you still can’t find the source of your wood smoke problem, the Australian Home Heating Association offers a free home inspection service in conjunction with participating councils. Please contact your council to enquire about the availability of this service.

You can expect some light smoke when you start your fire and when you refuel it, but this should last no longer than 20 minutes. The less smoke you can see, the hotter and cleaner your fire is burning.

If you prevent your fire from smoking, you can reduce your contribution to air pollution and the haze caused by fires, get more value from your firewood, and avoid unpleasantness with your neighbours.

Installation

Height and position of chimneys and flues

When installing a wood-burning heater, your chimney must be high enough to allow the combustion gases to disperse.

If another building, or a solid mass such as the side of a hill, is closer than 15 metres, the chimney needs to be at least one metre higher than the building or hillside (Figure 2). In some areas, it may not be practical to install and use a wood fire because the chimney would need to be very high to achieve this minimum clearance (Figure 3).

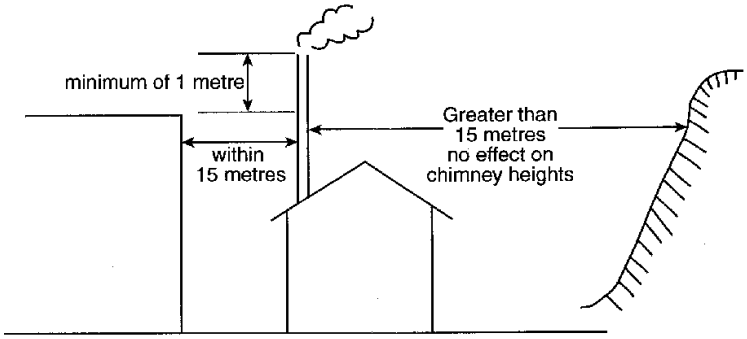


Figure 2 **Recommended minimum chimney height rule**

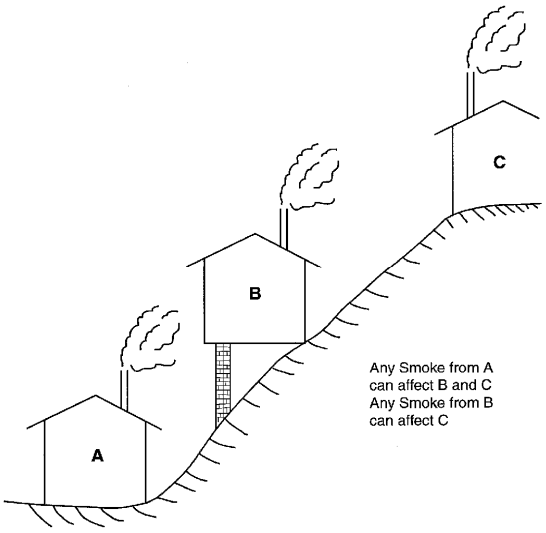


Figure 3 **Houses at different elevations—installation is not recommended for houses A and B unless only smokeless fuel or a catalytic reactor stove complying with AS4013 is used**

A flue or chimney that is correctly installed will:

- avoid smoke and odours entering your neighbours' homes
- disperse the smoke and gases
- reduce the concentration of pollutants.

Saving money

You can also reduce your heating costs by insulating your home, closing doors and drawing your curtains to conserve the heat from your fire.

However, you should always have some fresh air flowing into the room in which your heater is located to provide air for combustion.

Buying the right size

Buying the right sized heater is important. A model that is too large for your room will have to be turned down, and this immediately reduces efficiency, creates smoke and fouls the flue with creosote.

Operating a heater with a smaller load of firewood than it is designed for to reduce the heat output will reduce its efficiency, although it also decreases air pollution.

Installing your heater

Check with your local council before the heater is installed, because installation of wood-burning heaters normally requires approval under building codes.

You should use a qualified tradesperson to install the heater properly, according to the manufacturer's instructions and complying with Australian Standard AS2918.

Do not fit a rain protector, such as a 'Chinaman's cap', that restricts the upward flow of the hot gases. Instead, use a cowl that does not impede the upward flow of smoke, eg concentric rain excluders (vertical discharge flue in Figure 4), or a rotating wind directional cowl (Figure 5) if you live in a heavy rainfall area.

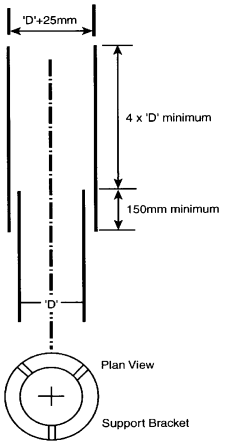


Figure 4 Extended concentric shroud rain excluder

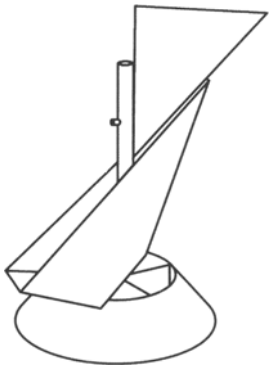


Figure 5 Rotating wind directional cowl

Choosing an efficient design

Look for the following design features when choosing a heater that will burn the fuel completely and with minimal pollution effects:

- compliance with Australian Standards AS4012 and AS4013 relating to energy and efficiency, and smoke emission
- properly designed internal baffle plates
- provision for preheating the incoming primary air to be directed through the active fire or the secondary air after the fire
- promotion of secondary combustion to reduce air pollution
- insulation of the flue as high as possible to minimise condensation fouling, and assist both dispersion and natural draught air flow to the fire.

Combustion system

Good design and operation will ensure enough air is supplied to burn off smoke and volatile wood components in the secondary combustion zone (Figure 6). This will generate more heat in the room and reduce air pollution.

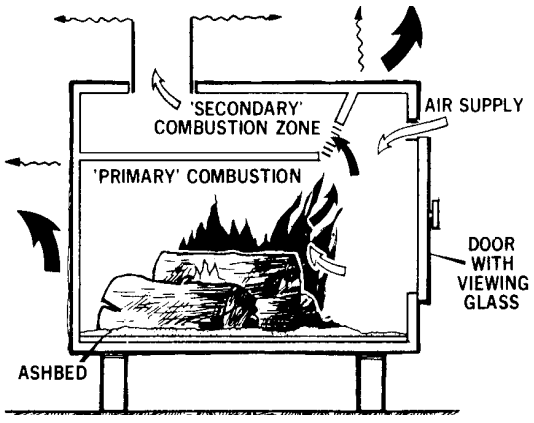


Figure 6 Combustion system of a wood burner

Advice for neighbours with wood smoke problems

The EPA encourages neighbours to resolve problems between themselves or through mediation. We all need to give greater consideration to the impacts we might be having on our neighbours.

If your neighbour's wood heater is producing smoke or odour that is affecting the enjoyment of your property, you can do something about it:

- **Tell your neighbour what the problem is**

  You may find that your neighbour is unaware that their wood heater is affecting your property.

- **Don't get angry**

  Anger, frustration and fear can impact upon how we react to annoyance.

  By confronting the issue immediately you can avoid the risk of ill health caused by compounding stress. Less stress places you in a better frame of mind to constructively discuss your concerns with your neighbour. Most people are responsible and willing to help if asked.

- **Approaching your neighbour**

  Be calm, not angry. Focus your discussion on the issue, not the person. Help your neighbour to resolve the issue.

- **If approached by a neighbour**

  Don't be defensive or offended. Remember—they are not there for a personal attack, it is 'the issue' that they are concerned about. Be friendly and work with your neighbour to find a solution.

- **Mediation processes**

  Sometimes both parties choose to seek assistance through free mediation that includes an interpreter service. These services can be found in the White Pages under 'Mediation'.

- **Taking civil action**

  If the parties have been unable to resolve the issue informally through negotiation or mediation, either party can take civil action (under Section 104 of the *Environment Protection Act 1993*) through the Environment, Resources and Development Court. Please call the EPA on (08) 8204 2004 (Freecall 1800 623 445 for country callers) for further information.

When seeking ways for neighbours to live in harmony, we advise that legal action should only be considered as a last option.

Helpful tools

A number of tools are available to help you use your wood heater correctly, minimise harmful wood smoke pollution and save money. The EPA and the Australian Home Heating Association (AHHA) have some useful tools available on their websites and you can order a FREE copy of the DVD, *Clear Skies—getting the most out of your wood heater* from the EPA or AHHA.

Contact the association at:
Tel: (08) 8351 9288 Fax: (08) 8351 9099
Email: <homeheat@homeheat.com.au>
Website: <www.homeheat.com.au>

For further assistance with solid fuel heating

EPA	Email: <epainfo@epa.sa.gov.au> Website: <www.epa.sa.gov.au/woodsmoke>
Firewood Association of Australia (FAA) Inc	Telephone: 1300 131 481 Website: <www.firewood.asn.au>
Mediation services	White Pages
Chimney sweeps	Yellow Pages

Disclaimer

This publication is a guide only and does not necessarily provide adequate information in relation to every situation. This publication seeks to explain your possible obligations in a helpful and accessible way. In doing so, however, some detail may not be captured. It is important, therefore, that you seek information from the EPA itself regarding your possible obligations and, where appropriate, that you seek your own legal advice.

Further information

Legislation

Legislation may be viewed on the Internet at: <www.legislation.sa.gov.au>

Copies of legislation are available for purchase from:

Service SA Government Legislation Outlet Adelaide Service SA Centre 108 North Terrace Adelaide SA 5000	Telephone: Facsimile: Website:	13 23 24 (08) 8204 1909 <shop.service.sa.gov.au>

For general information please contact:

Environment Protection Authority GPO Box 2607 Adelaide SA 5001	Telephone: Facsimile: Freecall (country): Website: Email:	(08) 8204 2004 (08) 8124 4670 1800 623 445 <www.epa.sa.gov.au> <epainfo@epa.sa.gov.au>

Wood heating checklist

Are you using your wood heater correctly? Tick the boxes that mostly describe your situation.

	Do you:	A	B	C
1	Burn well-seasoned dry wood	☐ ALWAYS	☐ MOSTLY	☐ NEVER
2	Burn treated and/or painted wood	☐ NEVER	☐ SOMETIMES	☐ OFTEN
3	Burn household rubbish (eg plastic or nappies)	☐ NEVER	☐ SOMETIMES	☐ OFTEN
4	Use only dry kindling, paper and/or firelighters for starting fires	☐ ALWAYS	☐ SOMETIMES	☐ RARELY
5	Burn hardwoods (eg redgum, mallee)	☐ ALWAYS	☐ MOSTLY	☐ RARELY
6	Obtain next year's wood well in advance	☐ ALWAYS	☐ SOMETIMES	☐ RARELY
7	Keep wood supply covered	☐ ALL	☐ SOME	☐ NONE
8	Understand burning values of different types of wood	☐ GOOD KNOWLEDGE	☐ SOME KNOWLEDGE	☐ LITTLE KNOWLEDGE
9	Have flue inspected and cleaned regularly	☐ EVERY YEAR	☐ EVERY 2–3 YEARS	☐ 4-YEARLY OR GREATER
10	Have heater inspected and cleaned regularly	☐ EVERY YEAR	☐ EVERY 2–3 YEARS	☐ 4-YEARLY OR GREATER
11	When starting fire, leave air controls fully open for 20–30 minutes	☐ MOSTLY	☐ SOMETIMES	☐ NEVER
12	Leave fire-box door closed during burning, except when starting	☐ ALWAYS	☐ SOMETIMES	☐ NEVER
13	Keep fire burning brightly, not smouldering	☐ ALWAYS	☐ SOMETIMES	☐ NEVER
14	Occasionally check externally for smoke from your heater 20 minutes after starting up	☐ SOMETIMES	☐ RARELY	☐ NEVER
15	Check the condition of your heater's door seal	☐ EVERY YEAR	☐ EVERY 2–3 YEARS	☐ 4-YEARLY OR GREATER

Total number of ticks: A ( ) B ( ) C ( )

This checklist is provided with scoring instructions (overleaf) as a guide to assist and encourage householders to improve their use of wood heaters.

Checklist scoring:

		No. of ticks		
Answers:	**Column A**	**( )**	**x 2 =**	
	Column B	**( )**	**x 1 =**	
	Column C	**( )**	**x 0 =**	**0**

Total: ☐

Score			
30	☺	**GREAT**	**Keep up the good work!!**
21–29		**GOOD**	**Improvement possible**
16–20		**ACT NOW!**	**Changes needed to save you money and improve the environment**
0–15	☹	**SERIOUS**	**Improvement urgently needed!**

If you still need assistance, the Australian Home Heating Association (AHHA) offers a free wood heater inspection service to councils. An AHHA representative will only conduct an inspection in conjunction with a council officer.