

## Bushfire Ember Protection Screens for Evaporative Air Conditioning Units

### Key Points

- ⇒ **Unscreened evaporative air conditioning units are a potential bushfire hazard**
- ⇒ **DFES recommends that residents in bushfire prone areas install ember protection screens to their evaporative air conditioning units**
- ⇒ **DFES recommends that the screens are constructed of corrosion-resistant steel, bronze or aluminum and with a mesh of maximum aperture of 2mm**
- ⇒ **A bushfire prone area is any area that may be subject to a bushfire attack, which can be via embers, direct flame contact or radiant heat**

If you live near bushland and have a roof mounted evaporative air conditioning unit, your home may be at risk from bushfire ember attack.

Burning embers from bushfires can travel relatively long distances from the actual fire through the air. If the embers land on or near your home and there is fuel available to burn, they can start a fire. They can get into your house through gaps (greater than 2mm) in the roof, walls, windows, doors and evaporative air conditioning units.

The filter pads in evaporative air conditioners are made from cellulose material and are therefore a potential source of fuel for travelling embers. If air conditioners draw in embers and the filter pads ignite, the unit may collapse into the roof and the fire may spread throughout the house (Figure 1).

To prevent embers entering your evaporative air conditioning unit and to protect your home from the effect of bushfires, The Department of Fire and Emergency Services (DFES) recommends that you install ember protection screens.



Figure 1. An evaporative air conditioning unit burnt during a bushfire.

### Evaporative Air Conditioners

Evaporative air conditioners consist of a fan or blower that draws in outside air and passes it through a filter pad, which may or may not be entirely wet. As hot, dry air moves through the filter, water evaporates, cooling and humidifying the air. The cool air is then blown through the house.

The filter pads in the majority of evaporative air conditioners are made of cellulose material, so they are potentially flammable (Figure 3).



Figure 2. A roof mounted evaporative air conditioning unit. Figure 3. A cellulose filter pad exposed to ember attack (during testing)

### Ember protection Screens

An ember protection screen is designed to prevent embers entering the unit and igniting the filter pads. DFES commissioned the University of Western Australia to test the effect of a screen on the functionality of a unit and the effectiveness of a screen in preventing filter pad ignition. The study concluded that an ember screen did not significantly affect the performance of the cooler or cause any stalling within the normal operating range. The screens did protect the air conditioner from igniting.

There are a number of possible screen designs and a range of evaporative air conditioning units on the market and therefore DFES is unable to provide a screen design to fit all units. However, DFES have provided three examples of ember protection screen designs which will provide varying degrees of ember protection; a unit cover, an external screen and an internal screen. The external screen is the most effective option. A sheet metal contractor can design and fit screens for your unit. Alternatively, you can build and fit the screens yourself.

Regardless of which design you chose, it is important to note that the screen must not have any gaps greater than 2mm in which embers may enter the air conditioning unit and ignite the potentially flammable filter pads.

#### ⇒ Design 1. Unit cover

A unit cover is a screen built to fit over the entire air conditioner. The unit cover should seal around the bottom of the unit to ensure adequate protection from ember attack. The unit cover must eliminate all possible ember entry points. The advantage of the unit cover is that it may be easily removed when necessary.



Figure 4. The unit cover pictured does not enclose the bottom of the air conditioner and therefore does not adequately protect it from ember attack.

⇒ **Design 2. External Ember Screen – most effective option**

External screens can be securely fitted over each of the air intake panels (Figure 7). Handles can be attached to the external screens to allow easy removal of the air intake panels (Figure 5). Screens should fit snugly to the unit. A fire resistant foam or sealer can be used to fill in any small openings, ensuring that gaps are not greater than 2mm (Figure 6).



Figure 5. External Ember Screen with handles

The gap sealer should be in-line with products endorsed by AS 3959-2009 *Construction of buildings in bushfire prone areas.*



Figure 6. A sealant is used to fill any gaps

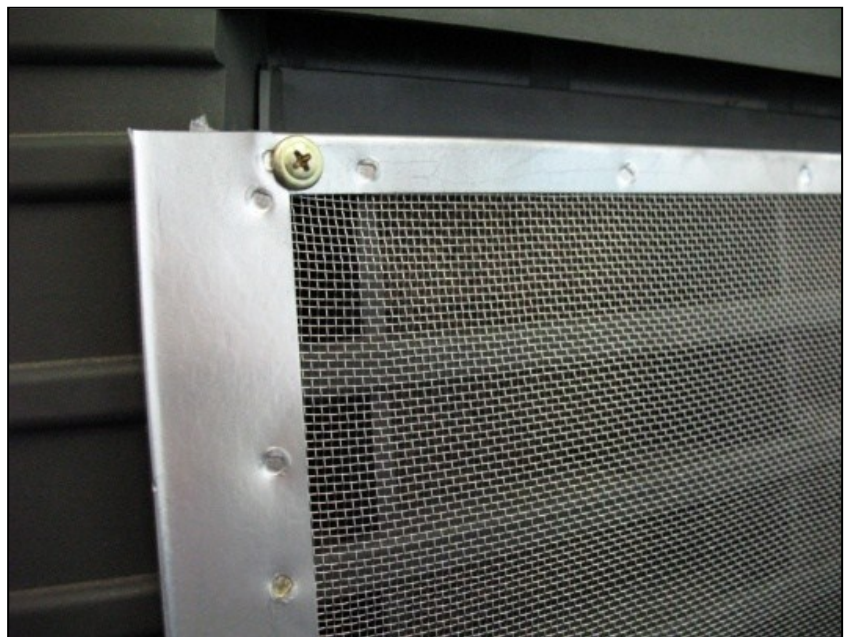
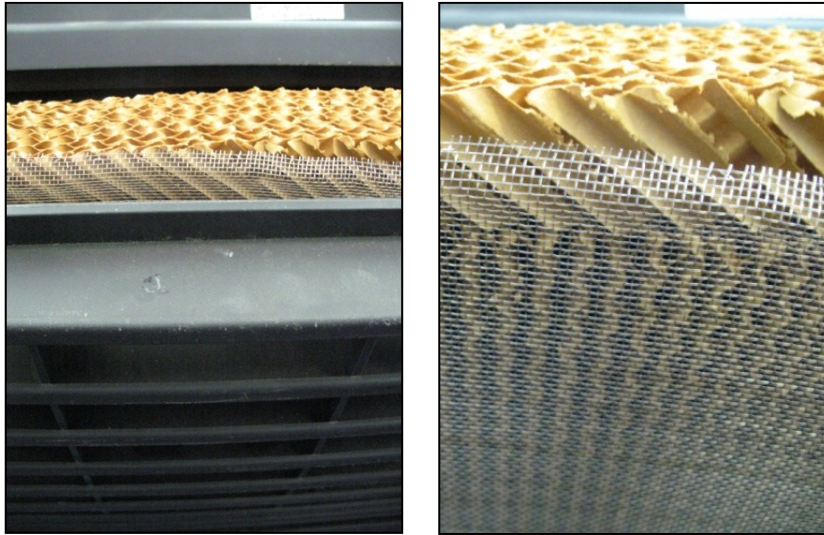


Figure 7. An external screen is securely attached with screws

⇒ **Design 3. Internal Ember Screens**

Screens can be fitted in between the air intake panels and the filter pads. Internal ember screens are often more aesthetically pleasing than a unit cover or external screen (Figures 8 & 9). However, internal screens do not offer the same level of ember protection. If embers land on a ledge of the air intake panel, they may generate enough heat to ignite the filter pads through the screen or ignite the external PVC cover of the air conditioner (Figure 10).



Figures 8 & 9. A screen is fitted between the filter pad and air intake panel.

In some unit designs, filter pads are secured to the panels with a pin or clip inserted from the outside. DFES discourages the use of the internal ember screen design for these units as the hole in the screen generated by the clip may create a gap larger than 2mm and allow embers to reach the filter pads (Figure 11).

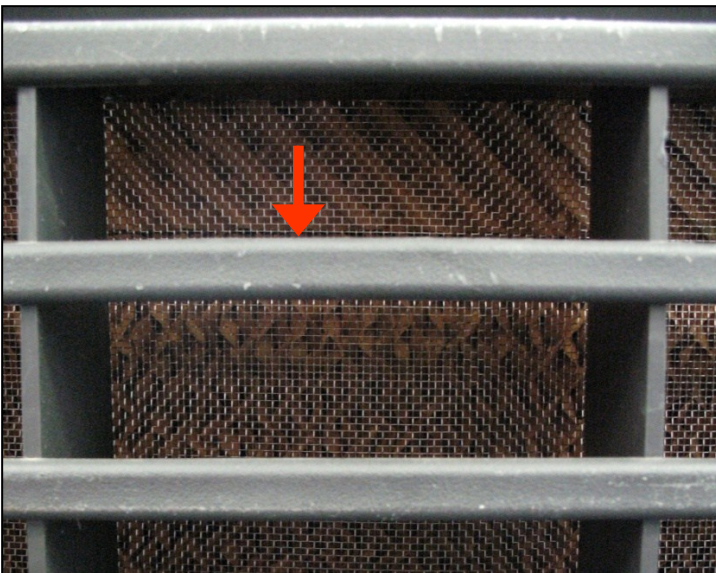


Figure 10. Embers may land on the ledge of the panel.

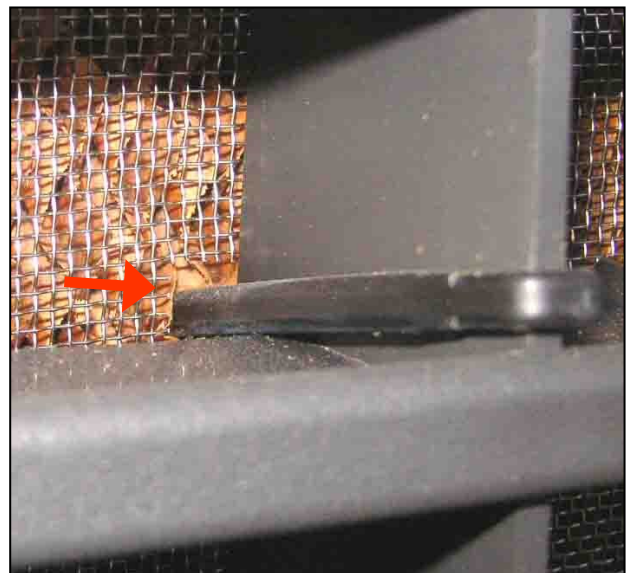


Figure 11. The hole in the screen generated by the clip is unacceptable as it leaves a gap larger than 2mm, exposing the filter pads to embers.