

## Topic 5    Roofs    Wind, roof types, fascia

Chair: Malcolm Hackett OAM

Presenter: Dr Justin Leonard



### Justin Leonard

Wind damage itself. The fires happen to occur on very windy days. That's just one of the important aspects of a severe fire weather day. Those winds themselves can act on the houses and damage them. The fires can also contribute to increasing the local winds that the houses experience during the event.

### Justin Leonard

The fire events that we know all too well, like Black Saturday and Ash Wednesday, both involved wind speeds and wind gusts that were sufficient for exposed houses to be damaged directly themselves. So, wind gusts that exceed 75km/hr are enough to potentially lift tin, or dislodge roof tiles, or project branches through the air that could break a window.

So, that degree of weakening obviously then allows the other bushfire actions to play on the house and cause issues. And, I guess, the things that can help support or manage that risk are to retain vegetation in the landscape to reduce the loads on your house itself, but also think very carefully about how adequately your roofing is fixed. An extra pack of screws on every other ridge on a roof is an excellent consideration, as is means to protect windows by putting shutters, or fly screens, or protective things over the window glass themselves, all help to contribute to hardening those processes.

There's also good building guidance around building in cyclone areas, and I'd encourage you to look to some of those Queensland resources for ideas on how to harden up your house for those rare but particularly critical wind actions on your structure.

### Justin Leonard

I would say that roofs, and the weaknesses around roofs and roof access, is probably really the one to emphasize in that there is quite a high degree of loss implication around those roofs, and as a priority getting your roof sorted out is a really good approach, so good to see that one second.

And, I guess, yeah, the broader issue, I guess, addressing gaps in structures is also a key approach. In a sense, the roofs are a real one I would keep coming back to in that if you happen to be in a house and trying to use it for survival, the last thing you want is it to fail via a roof failure.

Because one of the main challenges is that the first thing you know about your roof actually failing is when the ceiling lining starts to fall in. And at that point, you have fractions of minutes to safely get out of that house.

Conversely, if you do have a vulnerable roof, you really need to think about ways of managing it actively during a fire, like having a really good water source near the manhole and a safe way of accessing and constantly scanning that roof cavity.

## Chair

I know from my experience with my neighbours that many who had corrugated iron roofs and sarking still found embers had managed to get in. Perhaps the tin distorts or they were never particularly well sealed in the first place. But I presume tin roofs have their own challenges.

## Justin Leonard

So tin obviously doesn't have any issues within the roof sheet itself, or even with the roof sheets that overlap over multiple ribs the way they lay across. So that tends to stay quite settled and a well put together roof. That's too fine a gap and too much of a torturous path to get between the roof sheets. But every roof sheet has an end, either at the ridge line of a house or at the gutter line of the edge of the roof, and that's where you have significant potential ember entry. And now fortunately for a steel roof, those areas can be readily addressed by putting ember screening systems either along the ridge capping and along the gutter line. That addresses that ember ingress process and it's more of a "leave your roof sheets in place but retrofit things to that roof" rather than have a really more significant dilemma of a tiled roof, where not only at the edges are a problem but between each tile is also an ember entry problem.

## Chair

This person has sealed the gap above the fascia and below the roof with a custom cut flashing with a corrugated profile which seats underneath the corrugated roofing and sealed with fire resistant caulking. But now they're worried about the roof space not having adequate ventilation. Do roof spaces need to be ventilated? And if so, how do you balance that roof space ventilation requirement with the need to seal for ember proofing?

## Justin Leonard

Yes, very much a significant issue and an issue that seems to be coming up as we move to tighter and tighter and more sealed and energy efficient houses. How does the moisture play out and where does it go? So, I'd say with any a good caveat in any aspect of making a building cavity more tight or screening over vents, you are actually masking or limiting airflow to some extent. And that's where getting building advice around either adding additional vents that are also screened, or putting alternative means to make sure that those cavities are aspirated, but in an ember proof way, is an important consideration. But, unfortunately, I'm a bushfire expert and not a comprehensive building expert so I would certainly defer to builders and local building expertise to try to anticipate those moisture build up questions and issues, if they're appropriate.

## Chair

You highlighted last week the risk of roof tiles allowing embers to enter the roof structure, and we've got a question are there any options to modify an existing tiled roof, or do you need to replace it to give greater protection? In particular what about a fire-resistant lining under the tiles, like Firefly or something similar to that?

## Justin Leonard

That's an excellent suggestion for a way forward and does really go straight to the point that a tiled roof needs quite a dramatic intervention to resolve the problem. And the problem is fundamentally because the tiles don't seal against each other, and the entire roof itself has almost a universal ember access problem. The second part of that problem is that the battens that the tiles are sitting on, and secured to, are timber. And, in most cases, the trusses that those tile battens are screwed to, or nailed to, are timber also. And the sarking, if it's ever fitted, is usually fitted over the framing, the A Framing under the tile battens, only because that is actually the only practical way a tile roofing contractor can navigate and walk over the roof without damaging the sarking.

So, given that that is the combination of problems, using a Firefly sarking would be an excellent way forward, but it must be used in combination with metal tile battens. So, you put the Firefly sarking over the A Frame, screw that down and secure it down with metal tile battens, and then put your tiles back on, and you can have a fairly bushfire tolerant tile roof.

## **Chair**

Can you describe that Firefly sarking?

## **Justin Leonard**

It's a combination of foil coatings, and ceramic and glass fiber, but it's essentially a non combustible fire resistant sarking type material, but the important aspect of it is that it's fire resisting. So, if you ever want to determine whether your sarking is adequate or not, string it out, clamp it to a couple of saw horses, put a big pile of leaves in the middle of it, and burn that pile of leaves on the sarking. And if it doesn't burn through the sarking, then you've got the right stuff.

## **Chair**

This person has a terracotta roof with sarking underneath, and they see lots of light and possible ember entry points when they're up in the roof area, and they're interested in suggestions to minimize the risk of ember entry.

## **Justin Leonard**

So their intuition about recognizing that as a major ember egress problem is right, and that's seeing light streaming through into your roof space is one really clear and obvious thing. Roofs that are sarked or even quite completely sarked with conventional sarking that you can't see right through is also just as big a problem if they're under traditional terracotta tiles or traditional tiled roofs. The problem with tiles are they're not tight fitting enough to prevent the embers from getting into your roof space. And what you'll notice with those tiled roofs is when you get up inside them, there'll be a certain amount of leaf debris or fine debris already building up over the years. And that's another indicator that the embers will come in through those same paths and ignite those things.

The debris sits on top of sarking as well, so it can be a problem that's hidden from view even if you get up into your roof space, and you only really find out how bad your problem is when you start to lift or repair your roof tiles and see how much debris is actually sitting on top of your sarking. And what you'll also notice is that the tile battens that your tiles are tied down to, or are sitting on, is actually over the top of your sarking, so you've actually got combustible timber battens on top of sarking. The sarking isn't a flame barrier. So, it's actually a really major problem that to move from that to an ember proof scenario or a roof that isn't going to burn due to embers in a fire is a major retrofitting process involving a lot of roofing components.

## **Chair**

With terracotta tile roofs, what preventative measures are recommended, firstly in the lead up to the Summer Bushfire Season, and secondly in the scenario of an approaching bushfire?

## **Justin Leonard**

A terracotta roof presents a particular problem in that they just inherently aren't ember tight. The ridgelines certainly are, if they're well pointed and covered, but the tiles simply don't sit tightly enough over each other to prevent long term leaf, debris and build up under the tiles, and also allow embers through those same gaps. So, you pretty much don't have an easy fix. Watering the roof down doesn't fix it. There isn't much you can do short of removal of the tiles and significant remediation of what's under those tiles, like putting up a special fire resisting sarking over your

existing frame and then putting your tiles back on, or moving to a different roofing system, is really the only reliable and viable way to eliminate that as a risk.

Simply, the timber framing elements immediately under it even if there's conventional sarking over them, which is typically only even under the timber tile battens that are holding the battens in place don't offer any significant protection from a roof fire that could develop to a massive house fire where the first you realize is that your roof plaster is collapsing in multiple rooms at once.

### **Justin Leonard**

When we were approaching our post bushfire surveys, particularly in New South Wales, we actually found quite a high number of gutters on houses that were in this state where the debris and the gutters had actually burned, but the house had not been lost. Which is something we virtually never saw in Victorian based post bushfire surveys. And the reason why that was the case was because in New South Wales there was a prevalence to use metal fascias on their roofs. So, the material or fascia the gutter is screwed to is actually a metal finish fascia, and a lot of the houses up there also benefited from having metal framed roofs under the tiles or steel sheets as well.

Not always the case but the eave and the way things play up onto combustible eave fascias is a really prolific way houses are ignited and lost. And, obviously, quite a challenging prospect to address or even recognize that a roof fire has occurred or begun, particularly when you're looking at two storey properties or you're sheltering within the property itself during the fire event.