Topic 9 Explosive Fuel Gas bottles & cylinders

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Justin Leonard

The storage and location of gas bottles is always an ever-present issue. Gas bottles, when heated, will flare, and they'll flare in the direction opposite to the hose inlet into the gas cylinder. So, when installing a gas cylinder, the direction it flares: be very reticent of what that direction is, and absolutely imperative is to prevent that gas bottle from falling over under any circumstances. If a gas bottle is on its side and continues to be heated, the vent will not flare and it will build up an intense pressure and possibly explode, like the one in the middle of this diagram which is opened. When that goes off, that is an earth-shattering explosion that will take out windows for a perimeter of upwards of 50m. So, it itself can compromise many houses simply by going off on itself.

And there's many examples of well-intentioned designed houses. This was a BAL-40 house in Wye River, and we're looking down the driveway. And just on the left of the driveway there we can see a number of gas bottles. Now, these gas bottles were very well installed on a concrete slab against the steel support system and chained in place. So, fantastic that they were unable to fall over.

Unfortunately, the treated pine retaining walls that supported the earth behind it provided enough heat for these gas bottles to flare, and they flared directly across the driveway, straight into the front door of the structure, and compromised even a specifically built bushfire house.

Justin Leonard

Now, in terms of house design, the radiant heat and the consequential fire implications are endless, really. And what I'd like to highlight here is there's just so many aspects of vulnerable places on the house, when you start to think about how consequential fires, which are materials, be it an adjacent house, be it gas bottles, be it stored materials can play out on a structure.

This picture here basically provides so many different combinations of issues that it's hard to do it justice, in that we've got gas bottles that are poorly secured against extreme fuel loads that the structure provides, and also even gas bottles that may be awaiting either removal or installation that are laid over in a worst-case scenario, where the fuel loads here are enough if that gas bottle on the ground had any liquid gas left in it, that could basically go off like a bomb in this event. Because gas bottles on their side cannot vent adequately, and can build up pressure to the point that they detonate and take out roughly a 50-80m radius; it will shatter windows.

Chair

I think your slides showed us pretty graphically what can happen if gas bottles are stored the wrong way. Could you just go through again: what are the key elements in storing gas bottles safely?

Justin

So, most importantly, wherever they're stored they need to be on a stable surface and chained, with a metal chain, to a metal upright system that is concreted into the ground essentially. So, if whatever structure they're placed near or against fell on that gas bottle, it would not be pushed over. So, that's the primary thing.

Then the other consideration is what have you put immediately around that gas bottle that could represent a significant heat load, because as that gas bottle heats up it will flare, and those flares are many metres long, and are typically horizontal, particularly from the 9-60kg range bottles that will flare outwards, and that might be onto a road, it might be onto a neighbour's house, if it was pointed the wrong way it might be directly at your house. You really need to consider the appropriate location.

The other thing to consider is the larger the gas bottle and the more full it is, the longer it needs to be heated before it could possibly flare. So, if you move to a much larger single-point gas bottle, and pipe that to all the locations that you might have barbecues and house usage, and you can turn that gas bottle off in its location before an imminent fire, that means you've got one potential flare point rather than many. And because it's a large gas bottle, it'll be far less likely to be able to be pushed over.