Silent death

Smoke is toxic – and breathing it can kill. So you need an alarm that gives you early warning and more time to escape.

TEST: BILL WHITLEY

It could be a deadly mistake thinking you're protected by the most common type of smoke alarm. If there's smouldering fire – one that starts in furniture, bedding or an electrical appliance – many "working" ionisation smoke alarms stay silent. Our test reveals the best alarms to buy.

Back in June 2006 and March 2010 (*Consumer 459 and 500*) we tested how well photoelectric and ionisation alarms reacted to smoke from a flaming wood fire or a smouldering fire. The two alarms operate differently in detecting the presence of smoke (see "Smoke is not just smoke").

We found that photoelectric smoke alarms gave you significantly more protection than the more common ionisation models – particularly for smoke from non-flaming smouldering fires.

What we found

This new test reinforces our earlier findings. This time we tested nine photoelectric, three dual- sensor and eight ionisation models – 20 in total. We tested them against a flaming wood fire and smouldering upholstery foam, both with steadily increasing smoke levels.

The **dual-sensor** models and *all* the **photoelectric** models gave the best protection from both types of fire.

The **ionisation** models were slightly better overall at detecting flaming fires – but they were hopeless for smouldering fires. None of them sounded at all during our smouldering fire test-runs. That failing is potentially fatal.

Using dual-sensor alarms is the deluxe solution. But they're not that much of an advantage over our recommended photoelectric models.

The key to your protection is to have several good photoelectric alarms in working order. The NZ Fire Service has advice on where to place the alarms (see "Other stuff").

Smoke is not just smoke

Smoke from flaming wood or cooking-oil fires is different from that produced by the cooler smouldering of upholstery foam, bedding or the plastic components in electrical equipment.

Ionisation alarms sense the volatile combustion products from hot flaming fires. But they don't do as good a job sensing the smoke from smouldering fires because fewer combustion products are present.

Photoelectric alarms shine a light beam across a chamber and detect if the air in the chamber becomes partially obscured. So they can detect smoke from both types of fires.

tip

If your house has ionisation alarms, supplement (or replace) them with our recommended photoelectric models.

Batteries

Most alarms come supplied with a battery: some are a basic carbon-zinc type; others are alkaline. Several models in our test came with a long-life lithium battery that lasts around 10 years – the life of the alarm.

We think alarms equipped with a long-life battery are a good idea. They take away the hassle of changing batteries and mean the alarm is always in working order. They're also useful if the alarm is located in a difficult-to-reach area.

The next-best solution is to use alkaline batteries – some are not too expensive and they're likely to last about three years.

IMAGE: NZ FIRE SERVICE

See our April smoke-alarm battery test in *Consumer 545* and also at consumer.org.nz.

Night chirps

Alarms sense the voltage of the battery and produce a series of chirps to warn you the battery is getting low. Annoyingly, that usually happens in the dead of the night … because that's when the room temperature (and therefore the battery voltage) is lowest.

Burnt toast

False alarms can be a problem in kitchens and other places where steam or cooking smoke can get near the smoke alarm. Some manufacturers don't recommend putting an alarm in these areas. We think you can – so long as you take some precautions. So here's a few tips:

- Install photoelectric alarms. They're less likely to give out a false alarm when you're cooking.
- *For the kitchen only*, look at installing a less-sensitive model that's towards the bottom of the photoelectric models in our Table.
- Use extractor fans or range hoods to remove kitchen fumes and bathroom steam.
- Be careful where you install alarms on the ceiling. Place them as far away as possible from billowing steam or cooking fumes.

Which type have you got?

Ionisation models require a tiny amount of radioactive material to make them work. So all of them will have the radiation symbol somewhere on the plastic body .

MODELS	$	%	OUT OF 10		TECH BITS	
✔ WE RECOMMEND	Price	Overall	Flaming fire	Smouldering fire	Alarm type	10-year battery life
✔ **Quell** QP19010	34.95	**80**	8.8	8.9	Photoelectric & ionisation	
✔ **Warrior** MT588H-LB	29.15	**77**	7.7	9.4	Photoelectric	●
✔ **First Alert** SA320CN	60.00	**71**	7.3	8.5	Photoelectric & ionisation	
✔ **Aura** Photoelectric Long Life A588H-LL	29.99	**69**	7.2	8.2	Photoelectric	●
✔ **First Alert** SA710CN	28.37	**67**	6.5	8.4	Photoelectric	
✔ **Fire Smart** FS 301	11.99	**67**	6.8	8.2	Photoelectric	
✔ **Fire Angel** ST-620	49.90	**66**	6.5	8.0	Photoelectric & thermal	●
Orca Safety Ace OM506H-L	29.95	**64**	6.4	7.8	Photoelectric	●
Cavius 2002-006	59.95	**63**	6.2	7.8	Photoelectric	●
Quell Q1400	31.99	**63**	5.4	8.5	Photoelectric	●
Family Shield SD-588H	13.98	**61**	5.1	8.4	Photoelectric	
Elto ESD-196H	14.99	**59**	5.7	7.4	Photoelectric	
First Alert SA303CN	19.98	**38**	8.5	0.0	Ionisation	
Quell Q910	27.94	**38**	9.2	0.0	Ionisation	●
Fire Smart FS 946	6.49	**37**	8.2	0.0	Ionisation	
Universal Security Instruments MDS300L	52.98	**37**	8.2	0.0	Modified ionisation	●
Orca Safety Ace OM175-TP	14.99	**32**	7.1	0.0	Ionisation	
Elto ESD-475H	12.99	**31**	7.0	0.0	Ionisation	
Fire Angel SI-601	19.98	**30**	6.6	0.0	Ionisation	
Family Shield SD-IS588H	11.98	**25**	5.6	0.0	Ionisation	

GUIDE TO THE TABLE **OUR TEST** was conducted at an independent fire laboratory in New Zealand. **MODELS** were all battery-powered and had a test button and a hush button. **PRICE** is the price we paid in December 2013. **SCORES OUT OF 10 Flaming fire** (50% of overall score). **Smouldering fire** (50%). **TECH BITS Alarm type** includes photoelectric, ionisation, and dual (photoelectric+ionisation and photoelectric+ thermal).

HOW WE TESTED

Our test was conducted in the fire laboratory of the Building Research Association (BRANZ). We bought three examples of each model. Our results are the average of the performances of the three examples.

The alarms were fixed to a ceiling panel in a mocked-up hallway adjacent to the door opening of a fireproof room (which was about the size of a single-car garage).

The *flaming* fire test: Three pieces of 40mm-square 300mm-long sticks were set alight using a small quantity of methylated spirits. The resulting smoke built up in the room and flowed into the mock hallway.

The *smouldering* fire test: A 60W electric soldering iron was pre-heated and laid horizontally on to a 1.2 kg piece of 70mm-thick polyurethane upholstery foam. An electric fan was used to evenly distribute the resulting smoke out into the mock hallway.

In both tests, the smoke density was measured at the location of the alarms using a laser light-source and detector.

IMAGE: CHRIS COAD