



In depth: how common are e-cig fires, and why do they start?



As the use of e-cigarettes has spread, so has the number of fires started by them. But while this has raised some concerns and generated some headlines, these incidents form a small proportion of fires overall, and the risk comes mostly from poor-quality and counterfeit batteries – hazards that could be eliminated with improved regulation and consumer education.

Taking the UK as an example, the following figures illuminate the relatively small scale of the e-cigarette fire “problem”, which should also be seen against a background of decreasing numbers of residential fires overall, in both Britain and the U.S.

- There were 113 call-outs for fire departments to fires caused by e-cigarettes in the UK between 2012 and late 2014.
- These comprise eight call-outs to e-cig fires in 2012, 43 in 2013 and 62 in the first 11 months of 2014.
- Including all causes, there were 39,600 fires reported in individual dwellings in the UK in the single year 2013-14.
- 52% of fires in dwellings were ignited by cooking appliances (around 20,000 cases, against 62 for e-cigs).
- 12% were ignited by electrical appliances and electrical distribution.
- 6% were ignited by smokers’ materials.

Nevertheless, serious incidents have raised the profile of the fire risks posed by e-cigarettes in the UK. For example, a 62-year-old man died in Merseyside after an e-cigarette he was charging exploded and set fire to a pipe leading to an oxygen tank.

Although the man already had problems with his lungs and heart, the coroner concluded that his exertions following the fire contributed to his death. In another case, a young mother in Birmingham had to flee her flat with her two young sons when her e-cig charger exploded and set her bedroom alight.

However, events such as these form a minute proportion of fire-related incidents overall. UK fire and rescue services attended 39,600 fires in individual dwellings in 2013-14 and e-cigs accounted for under 0.2% of these, as we note above using figures from the Local Government Association (LGA). This is far below cooking appliances at 52% and smokers’ materials at 6%.

U.S. figures were similar – at 43% for cooking appliances and 5% for smokers’ materials.

Explosive charge

There are several potential problems with charging e-cigarettes, according to Martyn Allen, head of the electrotechnical division at Britain’s Electrical Safety Council, a charity which campaigns under the name Electrical Safety First. Among these are that

the lithium-ion batteries used are not always of the highest quality, and that counterfeit batteries are being sold on some Websites.

“Some claim to have been tested in a laboratory when they haven’t been,” says Allen.

Batteries bought this way may not be compatible with the charger provided by the e-cig manufacturer and may use different voltages, which can cause the battery to overload and explode. “Even small differences in voltage could be enough to send it over the edge,” says Allen.

The best e-cigarette batteries contain safety circuitry to remove the risk and prevent overcharging. The charger either will not work with an incompatible battery or will cut out before any danger arises.

Flame thrower

There are similar risks in using mobile phones with the wrong charger. This can lead to the phone being heated up until it is ruined, causing electric shocks and sometimes fire. However, with e-cigarette fires, the e-liquid often spurts out several metres and sets light to other materials.

When the lithium-ion battery overheats, it can ignite flammable liquids inside the battery, which, because it is in a cylindrical device, has its weakest point at its ends. “As a result of the battery and container failure, one or the other, or both, can be propelled across the room like a small rocket,” as a report by the U.S. Fire Administration (USFA) describes it.

The report studied 25 U.S. media reports of e-cigarette fires between 2009 and 2014. It found that 20 of the incidents occurred when the battery was being charged, two were when the e-cig was being used and one when it was in storage or transport. The status of the e-cig was unknown in a further two. In all, ten injuries and no deaths were reported, with the two most serious injuries occurring when the e-cig was being used.

In only one case was a room and its contents destroyed, with 13 fires extinguished quickly by the occupants and a further eight put out before the fire department’s arrival.

Much of the danger arises from the fact that many e-cigarettes use a USB port, which means they can be connected to a wide range of adaptors and other devices such as laptops, according to the USFA.

“Few, if any, consumers understand that not all USB ports are ‘created equal’. The voltage and current provided by USB ports can vary significantly,” states the report.

Risk reduction through regulation?

Improved regulation could reduce the fire risk in future. For example, Electrical Safety First and the e-cig trade body ECITA are among those supporting the [creation of a standard for the manufacture, testing and labelling of e-cigarettes](#) within the UK. This has been developed by the British Standards Institution and a draft publicly available specification (PAS) has been published. If adopted, it could become a British Standard within two years and subsequently a European or international standard.

In the meantime, the LGA has called for graphic safety messages to be displayed on all e-cigarette chargers, while in November fire the British safety minister Penny Mordaunt announced the publication of safety tips for vapers.

Out of the home

E-cigarette fires are not an issue only in domestic settings. The Federal Aviation Administration (FAA) in the U.S. wants all e-cigs to be carried in the cabin of the aircraft and not in checked in luggage, and in January of this year issued a [Safety Alert For Operators \(SAFO\)](#) recommending that this should [become common practice among airlines](#).

Its action followed the evacuation of an aircraft in Boston last August when an e-cigarette in a passenger’s bag caught fire in the

cargo hold. Then, in January, a checked bag that had missed its flight in Los Angeles was found to be on fire in a baggage area; emergency services blamed an overheated e-cigarette. The FAA believes the danger is created when the heating element is accidentally activated or left on.

“This danger may be exacerbated by the growing trend of users modifying and rebuilding their reusable e-cigarette devices and interchanging original and aftermarket batteries, heating elements and vaporizing components,” the SAFO says.

What This Means: Increased knowledge about the dangers of e-cigarette fires, the creation of new standards and greater public awareness should reduce what is in reality a limited risk. But the explosive nature of the fires when they do occur is likely to put them in the spotlight for some time to come.

– Simon Jack *ECigIntelligence contributing writer*

Photo: Montecruz Foto