



FIRE SAFETY:

E-CIGARETTES &

CONSIDERATIONS

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INTRODUCTION

About E-cigarettes

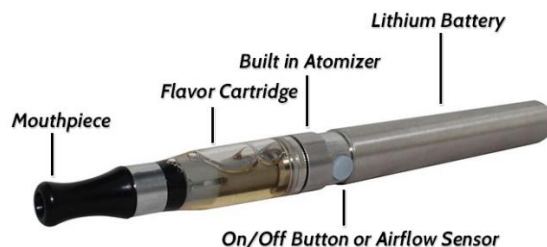
A recent and sudden increase of e-cigarette users in the UK has been noted.

Common names for e-cigarettes include:

- An electronic cigarette (e-cig or e-cigarette)
- Personal vapouriser (PV)
- Electronic nicotine delivery system (ENDS)

They are a battery-powered vaporiser which simulates tobacco smoking by producing an aerosol, commonly called vapour that resembles smoke.

It uses a heating element known as an atomiser (clearomiser). This vaporises a liquid solution known as e-liquid. E-liquids usually contain a mixture of propylene glycol, vegetable glycerine, nicotine, and flavourings, while others release a flavoured vapour without nicotine.



Power Packs

There are different types with two main power packs, ones with single use batteries and ones with lithium-ion batteries which are rechargeable.



Single use batteries will work for a given period of time and once the charge is exhausted then the unit is disposed of. They are non-rechargeable units.



Rechargeable Lithium-Ion batteries can be recharged using a USB connector that is usually supplied with the kit when purchased



Battery Failure Issues

A number of incidents have been reported across the UK involving e-cigarettes that have exploded or ignited to cause a fire while recharging or in use. A number of different brands of e-cigarette have been implicated within these incidents.

Incidents have occurred in premises and vehicles. Recharging modes included connection to a computer USB port, car cigarette lighter/accessory socket, and connection to a mains recharger.

E-cigarettes are known to contain lithium ion batteries; these types of batteries are known to have caused fires in the past due to thermal run away which can be caused by overcharging, physical damage or a defect within the battery during manufacture.



Several causes have been identified and it is becoming apparent that it is possible the devices do not have adequate over-charge safeguards. Some E-cigarettes may incorporate a high level of over-charge protection using fuses or intrinsically safe batteries for example. However, it is difficult to readily identify or distinguish these products from those with less protection or possibly no over-charge protection. Batteries made from lithium-ion can be recharged but can fail whilst on charge with explosive force. Several factors can lead to battery failure including:

- Use of incorrect charger.
- Battery which has been damaged by dropping or impact.
- USB lead plugged into non approved mains power transformer.
- Poor manufacturing of battery.
- Some E-Cigarette batteries do not have over charge / over heat protection.

For awareness, one style of vaping is known as 'sub-ohm' or 'cloud chasing'. This involves building an atomising coil with a very low resistance (hence, 'sub-ohm') in order to create huge clouds of vapour (hence 'cloud chasing'). However, by reducing the resistance of the coil in the atomiser of the vaping device, this increases the load on the battery, and therefore increases the risk of exceeding the amp rating for the battery.

Discharging a battery through a low resistance wire at a discharge rate that exceeds the maximum amp limit can result in a short circuit of the battery. If this short circuit takes place in a sealed tube, then the battery can fail with catastrophic effects, these are now being reported by Fire and Rescue Services throughout the country.

Can the Electronic Cigarette be recharged?

If the cigarette is recharged from a plug socket, the plug must comply with the Electrical (Safety) Equipment Regulations 1994 and The Electromagnetic Compatibility Regulations 2006, which stipulates that the plug must display a CE Mark, have a unique identifier such as model and serial number and have the power/current and frequency; the plug must also display the name or trademark of the manufacturer or responsible supplier.

If the plug socket is recharged using non mains devices such as 12V or USB, the product does not require a CE marking; however, the product must conform to the General Product Safety Regulations 2005. (<https://www.legislation.gov.uk/ukxi/2005/1803/contents/made>)

An electronic cigarette battery must also conform with The Waste Electrical and Electronic Equipment (WEEE) Regulations (<https://www.gov.uk/guidance/regulations-waste-electrical-and-electronic-equipment>)



Battery failures resulting in fires

Merseyside Fire and Rescue Service (MF&RS) responded to or were aware of 10 incidents from October 2012 -2014 where failure of the battery pack resulted in a fire. It is believed many more occurred that have not been reported.

Each incident which is classed as a house fire requires two fire appliances and an investigation officer to attend.

Safety Advice Suppliers of e-cigarette equipment give varying levels of advice with regard to the charging of batteries. One company gives advice as follows:

- ✓ Do use correct charger.
- ✓ Do remove from charge when complete.
- ✓ Do dispose of batteries correctly.
- ✓ Do use fire retardant bags.

- ✗ Never leave a battery on charge unattended.
- ✗ Do not drop, strike or subject battery to impact.
- ✗ Do not use if battery has signs of damage.
- ✗ Do not over charge battery.
- ✗ Do not use if wet or exposed to water.
- ✗ Do not over tighten atomiser or when connecting to charger.

Protective Bags



Specialist fire retardant bags are available for a cost of approximately £5.00 which can be used when batteries are being charged. The bags are designed to contain the battery and charger whilst on charge.

Take charge of battery safety when using e-cigarettes – GOV.UK

The OPSS (Office for Product Safety and Standards) launched a campaign in February 2020 highlighting the importance of e-cigarette battery safety. Safety posters and information is available here:

<https://www.gov.uk/government/news/take-charge-of-battery-safety-when-using-e-cigarettes>



Considerations

E-cigarettes are being diversified for other uses such as used to simulate illegal substances such as marijuana and e-spliff and e-joints are being sold on the internet. Alternative uses of e-cigarettes are now emerging online.



Case Study (London Fire Brigade 17.02.2020)

A man was badly burnt and left with scars on his leg after a vape exploded in his pocket when it came into contact with his keys.

Fortunately for contractor, he was at Whittington Hospital in Upper Holloway working when the accident happened and was immediately rushed to A&E for treatment.

Now the 37-year-old has joined London Fire Brigade in supporting an Office for Product and Safety Standards campaign which launches today (Monday) to highlight the potential dangers of using vapes.

"I was trying to get my vape out of my pocket but it was burning my hand so I couldn't get it out. Everyone was helping me as I was trying to get my boots undone so I could get my trousers off but it was too late – I was already badly burnt. Hospital staff were coming out and pouring water over my leg.



"It all happened so quickly but I have never felt pain like it. I can laugh about it now but I've never been so scared – it was like a bomb going off in my pocket."

Richard suffered third degree burns on his left leg and also had blistering to his hand where he'd tried to retrieve the vape. Luckily, he didn't need to have skin grafts but he has been left with bad scarring and says it could have been even worse if he hadn't happened to be working in a hospital at the time of the incident last summer.



Cause of the vape fire

Our fire investigators believe the keys in Richard's pocket may have caused the vape's battery to short-circuit.

Ironically, Richard's girlfriend works in a vape shop but he wasn't aware that coming into contact with metal items could lead to them exploding.

Richard added: "I've been vaping for about four years and seen videos of them exploding but you just don't expect it to go off like that. I must have been lucky as I've always had change or keys in my pocket – I just don't think people are aware of the dangers.

"I did try to give up and haven't been able to, but I'm so careful now. I've got one of the cases to keep everything in and I never carry my vape around with me and if I see other people vaping I walk away."

Although the Brigade has thankfully only attended a handful of incidents involving vape batteries, firefighters do have concerns about the near misses which haven't been reported to us.

The Brigade's Deputy Assistant Commissioner for Fire Safety, Charlie Pugsley, said: "Compared to the number of fires we see caused by cigarettes, vaping could be seen as a much safer option.

"However, we are concerned that there are often cases such as Richard's where the batteries have short-circuited and gone out but there is a very real potential of them starting a serious fire.

"If you are using vaping products it's vital you only use the charger it was supplied with and never overcharge it."



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