| Falmouth Exeter Plus FSG 011 | |
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| **Guidance Document** | **Lithium-ION Batteries** |
| | Lithium-ion batteries are small and lightweight but can store a large amount of energy. As a result of these characteristics, they can cause a fire risk if damaged, incorrectly charged, inappropriately stored or used with the incorrect equipment When a battery fails it can release the stored energy giving off gases and heat, at this point the battery is likely to be in thermal runaway. Thermal runaway is the chemical process within the lithium-ion battery, it produces heat and flammable toxic chemical gases very quickly, often before any flame appears and can be very difficult to extinguish. |
| **Applies to:** | Students, Staff, Visitors & Contractors |
| **Organisation(s):** | FX Plus, Falmouth University, University of Exeter, Student Union |
| **Approved By:** | |
| **Document Owner:** | FX Plus Fire Safety Group |
| **Effective Date:** | 1st May 2024 |
| **Review Date** | 1st May 2027 |
| **Primary policy** | Fire Safety Policy |
| **Related Policies** | Health & Safety Policy |
| **Primary Legislation** | Regulatory Reform (Fire Safety) Order 2005<br>Fire Safety Act 2021<br>Fire Safety (England) Regulations 2022<br>Health and Safety at Work Act (HASWA) 1974 |
| **Reference Documents** | Control of Substances Hazardous to Health (COSHH) 2002 Regulations (as amended)<br>The Controlled Waste (England and Wales) Regulations 2012 Pollution Prevention and Control Act 1999<br>The Hazardous Waste (England and Wales) Regulations 2005<br>The Hazardous Waste (Miscellaneous) Regulations 2015<br>CFPA-E Guideline No 41:2023 F<br>**RC59: Recommendations for fire safety when charging electric vehicles**.<br>Waste Electrical and Electronic Equipment Recycling Regulations 2013 |

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| **Purpose** | This guidance note has been produced to set out FX Plus and the Universities organisational expectations and commitment to ensure compliance with Article 8 of the Fire Safety Order to take such general fire precautions as will ensure as reasonably practicable the safety of any of their employees or relevant persons. |
| **Scope** | This Guidance Document applies to all premises where FX Plus, Falmouth University, The University of Exeter and The Students' Union has any extent of control on the Cornwall Campuses, including any premises where the responsibility is shared with a third party.<br><br>This guidance document applies to all staff, providing information and guidance to empower everyone to play a part in ensuring fire safety becomes an integral part of what we do on our Cornwall Campuses. |
| **Introduction** | As we move to become more sustainable and to reduce our needs on fossil fuels, electric vehicles owned by FX Plus and the Universities is on the increase, also the use of Lithium-Ion battery powered equipment to replace petrol-based equipment and the general increase in the use of these batteries for all types of handheld devices.<br><br>The increase in the use of Lithium-Ion powered vehicles and equipment has led to an increase in the reports of fire related incidents. These fires are now well documented and guidance documents are being produced by different bodies to provide guidance on how to reduce the risk to life and property.<br><br>This document has been written to capture the best practices being advised in National documents to ensure that we are reducing our risks as low as reasonably practicable, while still embracing change to support the reduction of our carbon footprint.<br><br>This document provides General Guidance and information, with the following Appendices that provide more detail.<br><br>• **Appendix A – Fire Response**<br>• **Appendix B – Electric Vehicles & Charging Points**<br>• **Appendix C – E Bikes**<br>• **Appendix D – E Scooters**<br>• **Appendix E – Lithium-Ion Portable Equipment**<br>• **Appendix F – Vaping Devices & E-Cigarettes**<br>• **Appendix G - Disposal of Lithium-Ion Batteries and products**<br>• **Appendix H – Large Lithium – Ion Storage Arrays**<br>• **Appendix I – Research involving Lithium – Ion Batteries**<br>• **Appendix J – RC59 Recommendations and for fire safety when charging electric vehicles.** |

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| **General Guidance and Information**<br><br>**HAZARDS** | Lithium-ion battery cells combine a flammable electrolyte with significant stored energy, and if a lithium-ion battery cell creates more heat than it can effectively disperse, it can lead to a rapid uncontrolled release of heat energy, known as 'thermal runaway', that can result in a fire or explosion.<br><br>Thermal runaway can be caused by a number of reasons, including an internal short circuit due to manufacturing defects, mechanical damage (e.g. piercing, dropping).<br>Other possible causes of thermal runaway are exposure to heat from an external source such as sunlight or overcharging/over-discharging.<br><br>Thermal runaway can lead to the ejection of a range of gases from battery casings, such as hydrogen (extremely flammable), carbon monoxide (toxic and asphyxiant), and hydrogen fluoride gas (acutely toxic and corrosive).<br><br>When a battery cell vents or ruptures due to thermal runaway, immediate ignition of the emitted gases can occur, especially for batteries with a high level of charge. Alternatively, the gases may spread-out unignited, with the potential for a deflagration (very rapid combustion) or explosion if an external ignition source is encountered.<br><br>In normal use, the highest risk of fire occurs when lithium batteries are being charged, particularly if a cell is defective and unable to correctly convert the supplied electrical energy into stored chemical energy.<br><br>During normal use a damaged battery can overheat, which can in turn lead to thermal runaway, so suitable protection measures should be implemented.<br><br>When lithium-ion batteries are damaged, they can still contain energy, and this stranded energy should be dissipated prior to interaction or the removal of impacted cells. If not handled properly, the damaged batteries could cause injury, including electrical shock.<br><br>Lithium-ion battery fires generate their own oxygen and can be very difficult to extinguish. Specialist Aqueous Vermiculite Dispersion (AVD) fire extinguishers may be an option for small incipient fires, where extinguishing media can be applied directly to the cells of a battery, providing a combination of cooling and oxygen depletion, but these fires are very often only controlled and extinguished when the Fire & Rescue Service deliver copious amounts of water to the burning materials. |
| **General Guidance and Information**<br><br>**HOW TO MINIMISE RISK** | It can be very hard to identify how and when a lithium-ion battery may catch fire, but there are some preventative measures to minimise the risk of lithium-ion battery fires that can be taken:<br><br>• Only use batteries that are purchased with the device, and when replacing batteries ensure they have a CE or UKCAS mark and they are compatible for the device and from a reputable manufacturer or supplier. |

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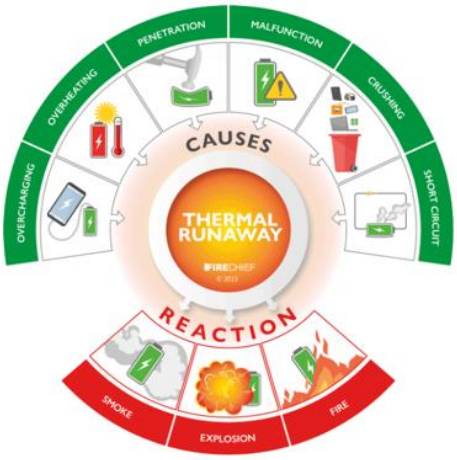
| | • Protect batteries against being damaged and do not attempt to recharge lithium-ion batteries with any signs of damage. These should be safely disposed of.<br>• Only charge batteries with the original charger supplied.<br>• Do not leave batteries charging in unoccupied locations especially at night, disconnect/remove batteries from chargers after charging is complete.<br>• Avoid storing, using, or charging batteries at very high or very low temperatures and never cover chargers or charging devices as this may lead to overheating.<br>• Don't leave any equipment that may contain lithium-ion batteries such as mobile phones and laptops in high temperature environments, such as in direct sunlight, or a hot vehicle.<br>• Don't overcharge your batteries as this is a potential cause of thermal runaway.<br>• Avoid keeping lithium-ion battery products in close proximity of each other. While keeping these products close together does not increase the risk of a fire occurring, keeping these products away from each other can reduce the risk of fire spread from one battery/battery-powered-device to another.<br>• Remember to store batteries or products using lithium-ion batteries in a cool dry place away from flammable and combustible materials.<br>  <br><br>• If the battery becomes abnormally warm during use or charging, or the battery bulges, or starts to smell, stop the process immediately and take the battery out of service and follow the correct disposal procedures.<br>• Do not disassemble the batteries and do not separate the cells that form it. |
| **General Guidance and Information**<br><br>**HAZARDOUS WASTE** | Lithium batteries are considered as dangerous waste, which requires the correct collection and disposal methods to be in place.<br>There are dedicated battery waste bins around campus to allow for the safe disposal of lithium batteries.<br>There are also separate recycling bins for Vapes and E cigarettes.<br>Used batteries and vapes should not be discarded into the general waste, as these may cause a fire. |

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| **Incident and Near Miss Reporting** | **Incident/near miss reporting**<br><br>Any incidents or near misses must be reported to the Health and Safety Team using My Compliance.<br><br>A Lithium Battery Incident would be one where there has been an electrical fault, short circuit or other abnormality, or where someone has been caused harm.<br><br>A Lithium Battery Fire Incident will be where a battery has given off gas or has caught fire, this will include just damage to a single battery or has spread to cause a more significant fire.<br><br>A Lithium Battery Near Miss is where batteries have been left on charge overnight, left or charged in a means of escape, not stored in their designated location, fitted to the wrong charger/equipment ETC.<br><br>All incidents and near misses will be investigated, to ensure any learning points and possible shortfalls in current arrangements are identified to ensure an improved safety standard is achieved. |

| **Appendix A - Fire Response** | |
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| | As fires involving lithium-ion batteries are on the increase and as we understand more about the risks that are posed during the fire development process, we can see clearly, they are not a small fire as described for the use of portable fire extinguishers.<br><br>The risk to life while tackling these fires is evident, due to the sudden release of flammable gas, therefore we need to take a risk assessed approach to dealing fires involving lithium-Ion batteries. The normal instructions for portable fire extinguishers are to only use in the early stages of fire development, but as we now know when a Lithium-Ion battery goes into **Thermal Runaway** the first visible sign of an impending fire is the sudden release of highly flammable gas, which ignites causing a rapid ignition and explosion, followed by a smaller but intense fire.<br><br>Not only are the gasses that are given off highly flammable they are highly toxic and can include Hydrogen Fluoride, Hydrogen Chloride and Hydrogen Cyanide which can provide significant respiratory illness.<br><br>**Therefore, it is deemed that a fire involving a Lithium Battery is not a small fire and falls outside of the scope for the use of a fire extinguisher by a member of staff therefore,** |

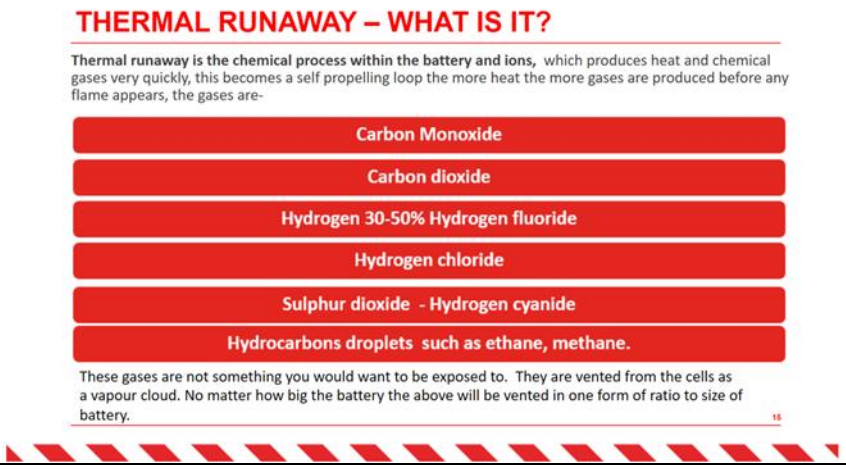
**The staff response to a release of gas from or fire a involving a lithium-ion battery is to:**

1. **DO NOT ATTEMPT TO FIGHT THE FIRE**
2. **Do not attempt to pick up the gassing battery as it will be very hot and could explode at any time.**
3. **Immediately Evacuate the area and close all doors to the space.**
4. **Activate the nearest Fire Alarm Call Point.**
5. **Inform the responding Safety and Support Team of the Lithium-Ion battery gas release and or ignition if this has occurred.**
6. **The Fire Service must be called to deal with any incident involving Lithium-Ion batteries.**
7. **The fire service must be informed at the time of call and on arrival that lithium-ion batteries are involved.**

When the Safety and Support/ Halls team receive a message at the welcome building or Lodge confirming a fire involving Lithium-Ion batteries, must immediately inform all responders on channel 900. They must also initiate a 999 call to the fire service confirm there is a fire at Woodlane or Penryn Campuses and that the fire involves Lithium-Ion batteries.

The Safety and Support/ Halls team responding to a Lithium Battery fire must be aware that smoke and gases given off in a lithium battery fire are highly toxic and must be avoided at all times. They should follow the following safety rules

1. **DO NOT ATTEMPT TO FIGHT THE FIRE**
2. **Do not open any doors to the room involved in fire**
3. **Ensure all rooms nearest the fire have been fully evacuated**
4. **Complete Full Evacuation of building as per usual**
5. **Pass on location of the fire to the attending fire officer and confirm Lithium-Ion batteries involved.**



| Appendix B Electric Cars | |
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| **Introduction** | Electric cars and vans are becomingly popular and are likely to be the vehicle of choice for most in the next 10 years. The use of these vehicles is encouraged by the University and an increased number of electric charging points are being provided around the Campuses.<br><br>Advances in technology and concern for the environment have created an increasing demand for electric vehicles (EVs) for both private and commercial use. The Universities have seen an increasing number of Electric Vehicles being used by staff and visitors, in general when EV's are park on site and they are not on charge, they pose no additional risk.<br>Though general safety rules should be applied where possible such as ensuring that EV's are not parked to close to buildings.<br>However, when EV's are on charge they are more likely to have an issue that can lead to a fire, therefore best practice guidance has been produced and published.<br>Therefore, to ensure that the Universities reduce the risk of fire to buildings and other vehicles from electric vehicles, the general precautions outlined in the RICS Authority document RC59 Recommendations for fire safety when charging electric vehicles, has been adopted as best practice for the Penryn and Falmouth Campuses.<br>This Guidance applies to all staff, students and visitors, and the Universities and partners when designing EV infrastructure.<br>The document ZRS EV should also be referred to. |
| **Private EV's** | For the purpose of this guidance, a private EV's is a vehicle fully powered by lithium-Ion batteries, and used and owned by members of staff, students, visitors or contractors.<br><br>The Universities and FX Plus encourages the use and charging of private electric cars and vans on its Campuses at designated charging areas only.<br><br>The following safety rules apply and must be adhered to for all private EV's.<br><br>• No Electric Vehicle is to be parked within 5M of any building or temporary structure unless they are parked in a designated EV disabled parking space that has been risk assessed by the Fire Safety Advisor.<br>• All Electric Vehicles not requiring a disabled parking space must be parked in the Universities standard designated parking spaces within our main carparks.<br>• Contractors may park outside of a designated parking space but must be more that 5M from any buildings or temporary structures.<br>• Contractors may park within 5M of a building or temporary building for a short period to allow for loading or unloading of heavy equipment |

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| | and tools, for a limited time only, once items have been unloaded the vehicle must be moved to a designated parking space.<br>• Electric Vehicles are only permitted to be charged at the designated EV charging points that are provided.<br>• **Under no circumstances are Electric Vehicles to be charged at a non-designated area, and especially by running personal leads from the general building infrastructure.**<br>• Owners are responsible for checking all cables for signs of damage before connecting into the designated charging points, located on campus. |
| **University or FXPlus owned vehicles** | Where the Universities or FX Plus provide Electric Vehicles for use by staff the following safety rules must be adhered to.<br><br>• No Electric Vehicle is to be parked within 5M of any building or temporary structure unless they are parked in a designated disabled parking space.<br>• Staff may park within 5M of a building or temporary building for a short period to allow for loading or unloading of heavy equipment and tools, for a limited time only, once items have been unloaded the vehicle must be moved to a designated parking space.<br>• All Electric Vehicles must be parked in designated parking spaces when not being used for their designated purpose.<br>• Electric Vehicles are only permitted to be charged at the designated FX Plus EV charging points that are provided.<br>• **Under no circumstances are Electric Vehicles to be charged at a non-designated area, and especially by running personal leads from the general building infrastructure.**<br>• Staff are responsible for checking all cables for signs of damage before connecting into the designated charging points, located on campus. |
| **Commercial/ Construction Vehicles** | Commercial / Construction Vehicles that are powered by Lithium batteries (the same precautions should be adopted for traditional lead acid powered equipment) such as Scissor Lifts, MEWP's and Forklifts that are stored inside the buildings.<br><br>This type of equipment can pose an additional fire risk when being used inside a building, and especially while be charged.<br><br>• FX Plus and University partner equipment must be inspected and maintained as per the manufacturer's guidance.<br>• FX Plus and University partner equipment must have a pre use check carried out to ensure there are no obvious signs of damage to the equipment.<br>• Before charging, the charging leads and connections must be inspected to ensure there are no signs of damage. Once connected and switched on a safety check should be carried out to ensure that there are no connection issues. |

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| | • No vehicles are allowed to be charged in a circulation space or means of escape.<br>• No vehicles are to be left on charge overnight.<br>• **Under no circumstances are these Vehicles to be charged in a non-designated area.**<br>• Vehicles brought on site by FX Plus and University partners, must come with the appropriate safety information, and be inspected before use.<br>• For vehicles brought on to site by external contractors the expectation is they will have all the required safety certificates for the equipment they are using. These vehicles are prohibited from being charged inside any buildings on the Falmouth and Penryn Campuses. |
| **Design and Installation of EV charging points** | When selecting sites for charging points, sufficient space must be allowed for vehicles to be parked safely in the designated charging area, and for connection to be made to the charging equipment. Charging equipment and cables should not interfere with any access or emergency egress routes.<br><br>Mark vehicle parking bays clearly on the ground. This should include sufficient space to gain access to the vehicle, with a minimum 1,200mm wide transition zone between parking bays for disabled users. It is good practice to design all EV charging bays for disabled users.<br><br>The attached guidance **RC59: Recommendations for fire safety when charging electric vehicles**. Has been adopted as the standard to be applied to all new and existing EV Charging points.<br><br>**Compliance with fire safety legislation**<br>Where appropriate, an assessment in compliance with the Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR) (ref. 8) should be undertaken, to ensure that charging areas are sufficiently remote from any hazard zones and locations used for the storage of hazardous or flammable liquids and gases.<br>In premises to which the Regulatory Reform (Fire Safety) Order 2005 (or equivalent legislation in Scotland and Northern Ireland) (ref. 17) applies, the fire safety management strategy should consider practical passive, active, and managerial control measures as part of the fire risk assessment for the premises when selecting and designing areas for use as EV charging points.<br><br>Like any fixed electrical installation, Duty Holders are required under the Electricity at Work Regulations 1989 (EAWR) (ref. 19) to ensure the safety of EV charging points. This includes maintaining electric vehicle systems to prevent, so far as is reasonably practicable, any danger to employees, visitors, or other persons.<br><br>**General Considerations for positioning of charging points**<br><br>• No external charging points should be fixed against flammable style cladding. |

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| | • Permanently installed EV charging units should be located at least 10 m from any combustible walls.<br>• No electric vehicle on charge should be parked within 7.5M of unprotected openings / extensive glazing in non-combustible walls.<br>• Where this is not achievable the distance may be reduced to 5M providing the external wall has no windows and provides a minimum 60 minutes of fire resistance. This will need to be risk assessed on a case-by-case basis by the fire safety advisor and estates operations.<br>• No electric vehicles or their charging points should be within 10M of a Hazardous Storage Area or ATEX Zone (This includes Flammable Gases and Liquids)<br>• No electric vehicles are to be charged within any building on the Cornwall Campuses.<br>• All electric vehicle charging spaces should have a minimum 2-meter separation from adjacent vehicles / fences / hedges ETC. |

| **Appendix C E-Bikes** | |
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| **Introduction** | Electric Bikes are classed as 'powered transporters' this is a term used to cover a variety of personal transporter devices which are powered by a motor. In addition to e-bikes these should also be include E-scooters, Segways, hoverboards, Go-peds, powered Unicycles and U-wheels.<br><br>As part of the move towards environmental travel, the number of E-Bikes that are now on campus is on the increase which includes privately owned and commercial (Beryl Bikes).<br><br>As evidence of reported fires increase, FX Plus and its University Partners have taken the following preventative measures to reduce the risk of a fire involving any of their buildings. |
| **Privately owned E-Bikes** | FX Plus and its partner Universities fully support and actively encourage the use of E-Bikes by staff, students, and visitors anywhere on campus, but the following must be observed.<br><br>• All electric bikes must be parked within the designated areas.<br>• Designated electric bike shelters should not be positioned within 5M of the footprint of the building, including overhangs and walkways. Where this is not achievable the distance may be reduced to 3M providing the external wall has |

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| | no windows and provides a minimum 60 minutes of fire resistance and the shelter is non flammable. This will need to be risk assessed on a case-by-case basis by the fire safety advisor and estates operations.<br>• Designated electric bike charging shelters should not be positioned within 5M of the footprint of the building, including overhangs and walkways. Where this is not achievable the distance may be reduced to 3M providing the external wall has no windows and provides a minimum 60 minutes of fire resistance and the shelter is non flammable. This will need to be risk assessed on a case-by-case basis by the fire safety advisor and estates operations.<br>• Electric bikes must not be taken into any campus buildings, especially accommodation blocks.<br>• Under no circumstances are detachable batteries to be taken into any campus buildings and charged.<br>• Under no circumstances may an electric bike be parked where they are liable to cause obstruction or danger, be attached to fences, railings, at entrances or by external escape routes of buildings.<br>• The owners of E-Bikes are responsible for ensuring that they maintain their bikes in a safe and road worthy manor.<br>• The owners of E-Bikes should ensure that they have insurance to cover against any damage caused by a Lithium-Ion battery fire.<br>• Fixed location will be provided by FX Plus and the Universities to charge these E-Bikes This will be managed by Estates following assessment of predetermined principles to ensure they are in a safe location.<br>• Bikes must be managed appropriately - Any bikes that are left in such a way as to cause or lead to an obstruction on any emergency exit, escape route or access point will be removed by Safety and Support Staff or any member of staff acting in their authority. |
| **Commercial E-Bikes (Beryl Bikes)** | **E- Bike Operators Beryl Bikes – Cornwall Campuses**<br><br>Falmouth University has entered an agreement with SMIDSY Ltd, trading as Beryl. To provide safe locations for Beryl bikes to be located on Penryn and Falmouth campuses, both Falmouth University and SMIDSY Ltd must ensure the conditions of the licence are upheld.<br><br>Staff, Students and Visitors are encouraged to use the Beryl Bike network as an affordable, fun, and sustainable way to get around Falmouth and Penryn but requires all users to adhere to the following:<br><br>• Beryl electric bikes must always be returned to the docking stations and should never be left in any other Campus location.<br>• Beryl electric bikes have a range of tariffs and will always be your responsibility to ensure these are paid and you comply with the company's usage policy.<br>• Beryl electric bikes must not be taken into any campus buildings, especially accommodation blocks.<br>• Beryl electric bikes must only be charged and serviced by an approved contractor.<br>• Under no circumstances may a Beryl electric bike be parked where they are liable to cause obstruction or danger, be attached to fences, railings, at entrances or by external escape routes of buildings. |

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| | • Beryl electric bikes must be managed appropriately - Any bikes that are left outside of their designated zones will be removed by Safety and Support Staff or any member of staff acting in their authority and returned to a designated zone.<br>• The head of sustainability will manage the contract for Beryl Electric Bikes on the Cornwall Campuses and will ensure that evidence of maintenance regimes and insurance can be provided in the event of an incident involving a Beryl Bike. |

| **Appendix D E-Scooters** | |
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| **Introduction** | E-Scooters are classed as 'powered transporters' this is a term used to cover a variety of personal transporter devices which are powered by a motor.<br><br>It is illegal to use an E-Scooter in any public space unless rented as part of a government-approved trial. They can be ridden on private land with the permission of the landowner.<br><br>As evidence of reported fires increase, FX Plus and its University Partners have taken the following preventative measure to reduce the risk of a fire to any of their buildings caused by a defective E-Scooter.<br><br>**FX Plus and its University Partners as the landowners PROHIBIT the use of E-Scooters on any land forming part of the grounds of the Cornwall Campuses.** |
| | **E-Scooters**<br><br>• FXPlus and its University Partners **DO NOT** permit the use, storage or charging of e-scooters anywhere on the Cornwall campuses by staff, students, contractors or visitors.<br>Any such item found on the Cornwall Campuses will be removed by the Safety & Support Team, Health & Safety Team, Residencies Support Team or any member of staff acting on their authority. |

| **Appendix E - Lithium Ion Powered Portable Equipment** | |
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| **Introduction** | Laptops, phones, and many ancillary items, including battery powered tools use lithium-ion batteries as their power source, these will be used across all campuses. The size and power of these batteries is increasing especially with backpack devices similar to those used for grounds equipment which bring increased inherent risk with them. |

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| | Therefore, it is important that we follow basic safety rules and risk reduction measures for the use, storage and charging of these batteries.<br>It is important that they are only charged as per using the manufacturer's instructions and with charging equipment provided with the device.<br><br>**Under no circumstances should devices be charged with equipment that has not been provided with the device or is a replacement direct from an approved manufacturer.** |
| | **Lithium Ion Powered Portable devices fall into two main categories.**<br><br>1. **Personal devices used by all relevant persons such as Laptops, Mobile Phones, Radios, and ancillary equipment.**<br>2. **Commercial portable devices used by Employees or Contractors to carry out work tasks such as leaf blowers, hoovers, power tools ETC.** |
| **Personal Devices** | Personal devices are classified as small devices such as mobile phones, tablets, laptops, cameras ETC where the battery size is typically below 100 Watt/Hours, that are used on a daily basis by an employee or contractor for work or recreation purposes. These are perfectly acceptable devices to be used and charged on our Falmouth and Penryn campuses.<br><br>Though the following safety rules should always be observed<br><br>• Always use the approved manufacturers charging units and ensure you follow their charging advice.<br>• Never leave items charging overnight unless they are in a designated charging area with suitable fire protection.<br>• Always check batteries are not overheating.<br>• Never leave chargers or items in direct sunlight or within high temperature locations.<br>• Ensure cables remain in good order and undamaged, dispose and replace if required.<br>• Never charge your devices on soft surfaces such as sofas, beds or pillows, as this can block the ventilation grills and allow the device to overheat.<br>• Never charge items in fire escape routes.<br>• Any equipment issued by FX Plus, or the Universities must be returned to the loanee if faulty or damage is suspected.<br>• Where any equipment has a fault that has resulted in injury or had the potential to cause injury, this must be reported through My Compliance.<br>• **No stand alone with batteries above 100 Watt/Hours are allowed to be taken into any University Buildings, unless they are required by a person to assist them in their everyday activities such as an electric wheelchair**<br>• **University/FXPlus issued or installed devices with batteries above 100 Watt/Hours, are allowed within University Buildings.** |

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| **Commercial Portable Devices** | These are larger devices that have been provided with Lithium Batteries to replace mains powered and petrol/ diesel powered equipment that are used by employees and contractors to complete everyday work tasks.<br><br>The following safety rules must always be observed.<br><br>• Always use the approved manufacturers charging units and ensure you follow their charging advice.<br>• The charging of commercial batteries must always be within a suitably fire protected cupboard or storeroom providing a minimum 30 minute standard of fire resistance.<br>• Where this is not possible a fire risk assessment should be carried out with the fire safety advisor to identify a suitable alternative location.<br>• **These items must never be charged in fire escape routes.**<br>• Never leave items charging unattended especially overnight.<br>• Always check batteries are not overheating.<br>• Never leave chargers or items in direct sunlight or within high temperature locations.<br>• Ensure cables remain in good order and undamaged, dispose and replace if required.<br>• Where any equipment has a fault that has resulted in injury or had the potential to cause injury, it must be reported through My Compliance. |
| **Departmental Battery Charging Stations** | As the use of equipment with lithium batteries increases within university departments and loaned to students like cameras, there are likely to be charging stations provided for the recharging of these batteries. Where they are provided the following safety advice should be followed<br><br>• On return the battery must be inspected to ensure there is no obvious damage to the battery<br>• Always use the approved manufacturers charging units provided and ensure charging advice is followed.<br>• Charging stations must always be within a suitably fire protected cupboard or storeroom providing a minimum 30 minute standard of fire resistance.<br>• Where this is not possible a fire risk assessment should be carried out with the fire safety advisor to identify a suitable alternative location.<br>• **These items must never be charged in fire escape routes.**<br>• Never leave items charging unattended especially overnight.<br>• Always check batteries are not overheating.<br>• Never leave chargers or items in direct sunlight or within high temperature locations.<br>• Ensure cables remain in good order and undamaged, dispose and replace if required.<br>• Where any battery has a fault that has resulted in injury or had the potential to cause injury, it must be reported through My Compliance. |

## Appendix F - Vapes & E-Cigarettes

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| **Introduction** | The use of vapes and e-cigarettes has increased significantly over recent years as they are seen as a safe replacement to smoking. Vapes and E-cigarettes come in two main categories Rechargeable or Disposable, the latter being readily available on the internet, with little or no regulation.<br><br>The rechargeable devices if used correctly are reasonably safe with low numbers of recorded incidents, whereas the throwaway style vape devices especially those bought from the internet can be a fire risk. The fire incidents caused by disposable incidents range from fires in rubbish caused by irresponsible disposal and exploding in people's pockets causing burn injuries.<br><br>Vaping and e-cigarettes are treated the same as smoking and as per smoking policy - not permitted inside building or vehicle or within 2m of any building |
| | Rechargeable E-Cigarettes and Vapes will come with their own charging leads and the vaping oil can be refilled, the following safety advice should be followed.<br><br>• Only use the charger that was supplied with the vape for charging.<br>• Don't charge the vape overnight and regularly check your device when it is charging.<br>• Unplug the vape when it is fully charged.<br>• Don't refill the device with oil when the being charged.<br>• Charge the vape on a clean, flat surface and away from anything that can easily catch fire.<br>• Ensure you can clearly see the vape when it is charging.<br>• Consider using vape devices with safety features and don't remove or disable safety features.<br>• Only use genuine and recommended batteries for your vaping device. Don't let your battery encounter metal items.<br>• Store removable and spare batteries in a plastic case to prevent accidental contact.<br>• Regularly inspect your vape batteries and replace your battery immediately if it is damaged, leaking or not functioning properly.<br>• Dispose of batteries at recycle or disposal points provided around campus.<br>• **Never dispose of your old batteries or device in the general rubbish**<br>• **Old batteries can be placed in the vape recycling as long as both contacts are taped over.** |
| | Disposable vaping devices are usually single use and are thrown away when the vaping fluid is used up, in most cases the lithium battery will still hold a charge which if the device is damaged can cause a fire incident.<br><br>It is important that when these disposable vaping devices have been used and there is no liquid left, they are disposed of correctly. To help in the disposal of these devices on campus dedicated vape recycling bins are provided.<br><br>**These bins must be used at all times for the disposal of these devices, under no circumstances should they be discarded into the general rubbish bins on site.** |

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| | Devices should be purchased from reputable suppliers to ensure they are as safe as possible, cheap devices bought online may not be safe and may be liable to fault leading to a fire and causing harm to the person holding them.<br>They should not be exposed to direct sunlight or other sources of heat like leaving on a heater or next to an oven or cooker. |

## Appendix G - Disposal of Lithium-Ion Batteries, Vapes and E-Cigarettes

**Introduction**

Lithium-Ion batteries, Vapes and E-Cigarettes are considered as a dangerous and hazardous waste, which require the correct collection and disposal methods to be in place.

With the increased use of Lithium-Ion Batteries, Vapes and E-Cigarettes there has been an increase in waste related fires caused by poor disposal of these products. These fires are avoidable with the correct and safe disposal of these Lithium based products.

FX Plus and University Partners work to ensure that they recycle all recyclables, in a safe manor and have put procedures in place to achieve this.


There are dedicated battery waste bins around campus to allow for the safe disposal of single cell alkaline type batteries (your standard single use AAA, AA, C and D type batteries)

There are separate dedicated recycling bins for Vapes and E cigarettes.

These are located in both of the shops on the Woodlane and Penryn Campuses – AMATA and Games Academy.

These bins are monitored and emptied by facilities and the space owner, the batteries being collected and disposed of by a competent contractor appointed by Facilities.

Single cell rechargeable lithium batteries must not be mixed with other single cell batteries, as they can retain a charge and could short out when in contact with other batteries leading to a fire.

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| | For larger Lithium-Ion batteries and single cell rechargeable lithium batteries facilities provide a collection service. To have any of these batteries collected for disposal please complete a job on PLANON providing details of where they need to be collected from and what type of batteries.<br><br>If a Lithium-Ion battery is being disposed of because it is in any way damaged this must be clearly highlighted in the **PLANON Job** comments and a request that it be prioritised as a Health & Safety Priority One for immediate collection.<br><br>**Used batteries, vapes and E-Cigarettes must not be discarded into the general waste, as these pose a significant risk of fire as there is an increased risk of the batteries becoming cracked or overheated in bins or in bin lorries due to mechanical damage. This could result in explosion of the battery and fire.** |
| | For larger Lithium-Ion batteries and single cell rechargeable lithium batteries facilities provide a collection service. To have any of these batteries collected for disposal please complete a job on PLANON providing details of where they need to be collected from and what type of batteries.<br><br>Facilities will collect these batteries and store them in unit 5C where they will await collection from our designated approved waste collection company. All batteries will be stored in designated storage containers while being held ready for collection.<br><br>• All batteries will have any visible contacts covered by electrical tape to avoid an accidental short that may lead to a short circuit.<br>• Batteries must not be stored next a water source or in an area prone to damp.<br>• Batteries must be kept away from any other combustibles.<br>• Batteries must not be stored in metal containers.<br>• Damaged batteries are to be stored inside the building and must be put in the external compound and stored separately from all other items. |
| | Vapes and E-Cigarettes look like plastic and people may think, or want to think, that they are recyclable. However, this is not the case. They are a mixed material and contain a lithium battery. This means they are classed as WEEE waste when they are ready to be thrown away. WEEE stands for waste electrical and electronic equipment, therefore need to be collected by a specialist company.<br><br>FX Plus have provided Disposable Vape and E-Cigarette collection bins throughout the campus to allow for the safe disposal of these devices.<br><br>They are checked fortnightly by the facilities team and emptied on a regular basis, though the person responsible for the space can request them to be emptied if there is a sudden influx of item put in the bins. |

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| | Bins will be emptied before they become half full or fortnightly depending on use.<br><br>Once collected they are then stored in a safety bin and collected by a designated approved waste collection company.<br><br>There is no specific fire legislation regarding the location of vape collection bins but the following guidance should be followed for the location of collection bins.<br><br>• Outside is better than inside, provided they are protected from the temperature effects of weather, direct sunlight and moisture.<br>• They must not be on a dedicated means of escape.<br>• Do not place them where there is only one means of escape from the room.<br>• When placed in a circulation space you must be able to turn your back on the bin and exit the building without passing the bin.<br>• Any space used for collection bins must be provided with smoke detection for early warning of a fire.<br>• They must not be placed in any stairwell or area where a stair discharges into the location. |
| | Single cell alkaline battery collection bins are provided throughout the campus to allow for the safe disposal of these batteries. They are checked and emptied on a regular basis by the facilities team.<br><br>When the batteries are collected, they are sifted by the facility team to ensure there are no single cell or other lithium batteries mixed in with the alkaline type batteries. Where these are found they are removed and stored as per above.<br><br>Once collected they are then stored in a safety bin and collected by a designated approved waste collection company. |

| **Appendix H - Large Lithium-Ion battery storages** | |
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| **Introduction** | Battery Energy Storage Systems (BESS) contain significant capacity for stored energy normally 48V - 30kWh, these devices or groups of devices enable energy from intermittent renewable energy sources (such as solar and wind power) to be stored and then released when customers need power most or provide vital electrical back up to computer servers, and other critical systems. |

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| | They are constructed of successive battery packs wired together to create modules that are connected within racks to create an energy storage array.<br><br>  <br><br>The most common type of commercial batteries used are lithium-ion batteries, and there are two types on today's market, but they operate in similar ways:<br><br>• Lithium nickel manganese cobalt batteries (NMC)<br>• Lithium iron phosphate batteries (LFP) |
| | The following fire construction recommendations are provided in RISC Authority Need to know Guide RE2 – Lithium-ion Battery Use and Storage.<br><br>• Lithium-ion batteries storage in rooms forming part of buildings should be separated from other areas by minimum 2-hour fire rated construction.<br>• Smoke detection systems (ideally combined smoke and carbon monoxide (CO) detection) should be provided for all lithium-ion batteries storage rooms and compartments.<br>• Fire doors must not have ventilation grills.<br>• This may be combined with deployment of an extinguishing agent flooding system (based on the fire control strategy).<br>• Before introducing a new storage array into a university building advice must be requested from the Fire Safety Advisor to ensure that the space is suitable and sufficient.<br>• **No storage arrays are to be installed without fire safety authorisation through the FX Plus Fire Safety Group (FSG)**. |

| **Appendix I - Research/ Recycling involving Lithium-Ion Batteries or Devices** | |
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| **Introduction** | There may be occasions where research or repurposing of lithium batteries is carried out within university buildings at Penryn or Falmouth. Where this is done this must be done in a very controlled environment with suitable and sufficient risk assessments in place. |

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| | The Health & Safety Team and Fire Safety Advisor must have site of these risk assessments prior to any activity taking place within any building on the Cornwall Campus's. |
| | **Large/complex Equipment used within Lab and Research**<br><br>**Some activities required for research can pose a higher level of risk and therefore, in all cases individual projects should be risk assessed and consider the below:**<br><br>Where prototype batteries or larger industrial pack tests are being carried out or used for the purpose of research, industry safety standard must be considered that may include:<br><br>• Batteries should always have two methods of disconnection from the charger.<br>• Never be left charging unsupervised unless they meet all three of the following points.<br>1. They have digital communication with the charger to stop charging if the battery management system (BMS) detects a problem,<br>2. They have thermal monitoring and,<br>3. Every cell voltage is being monitored.<br>• Or the batteries are being remotely monitored by people taking shifts via a relay box which requires the watcher to regularly send a command to let the box know someone is still observing the battery progress.<br>• If this signal is not received for any reason the charger will shut off and stop charging the battery via a Deadman's switch.<br>• Nonstandard charging equipment being used must have two methods of disconnection.<br>• **Due to the increased risk of fire all research on lithium batteries must be carried out only in spaces that provide a minimum 30-minute standard of fire resistance and adequate smoke detection for early warning.**<br>• **No fire doors should open into a protected lobby unless lobbied to provide a 60-minute level of fire resistance.**<br>• **Adequate signage must be displayed on all doors that open into the space and the risk recorded in Sypol or LabCup depending on the University responsible.** |
| | **Repurposing of Lithium-Ion batteries**<br><br>Where Lithium-Ion batteries are being repurposed for use in other devices the removal of batteries must be done in a controlled manner and in a way that does not damage the batteries.<br><br>Once a battery has been removed from the original device like a vape it must be stored in a way to ensure they do not come into contact with other |

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| | batteries or metal surfaces to avoid the chance of a short circuit or fault being caused. It is likely that these batteries will hold an electrical charge.<br><br>Spaces or Rooms where batteries are being dismantled or recharged, suitable and sufficient fire protection measures should be in place to include a minimum 30-minute standard of fire resistance from any means of escape and adequate some detection for early warning. |