

Use of Electrical Adapters

Introduction






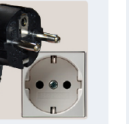


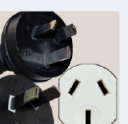


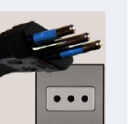



There has been a massive increase in the use of electrical equipment within the University and as a consequence there is extensive use of electrical adaptors within Schools/Units and also in residences by the students.

There has also been an increase in the use of adapters for non-UK electrical plugs to fit UK electrical sockets.

There is concern about the use of adapters in terms of fire safety and thus document is designed to provide detailed guidance on what adapters are acceptable and which ones are not with an explanation of why certain adapters are not acceptable.

Types of Electrical Sockets and Plugs

There are many different types of electrical plugs and sockets used worldwide. As an example these are

<p>Type A</p>  <ul style="list-style-type: none">mainly used in the USA, Canada, Mexico & Japan (for a full list, click here)2 pinsnot grounded15 Aalmost always 100 – 127 Vsocket compatible with plug type A <p>Learn more</p>	<p>Type B</p>  <ul style="list-style-type: none">mainly used in the USA, Canada, Mexico & Japan (for a full list, click here)3 pinsgrounded15 Aalmost always 100 – 127 Vsocket compatible with plug types A & B <p>Learn more</p>	<p>Type C</p>  <ul style="list-style-type: none">commonly used in Europe, South America & Asia (for a full list, click here)2 pinsnot grounded2.5 Aalmost always 220 – 240 Vsocket compatible with plug type C <p>Learn more</p>	<p>Type D</p>  <ul style="list-style-type: none">mainly used in India (for a full list, click here)3 pinsgrounded5 A220 – 240 Vsocket compatible with plug type D (partial and unsafe compatibility with C, E & F) <p>Learn more</p>	<p>Type E</p>  <ul style="list-style-type: none">primarily used in France, Belgium, Poland, Slovakia & Czechia (for a full list, click here)2 pinsgrounded16 A220 – 240 Vsocket compatible with plug types C, E & F <p>Learn more</p>	<p>Type F</p>  <ul style="list-style-type: none">used almost everywhere in Europe & Russia, except for the UK & Ireland (for a full list, click here)2 pinsgrounded16 A220 – 240 Vsocket compatible with plug types C, E & F <p>Learn more</p>	<p>Type G</p>  <ul style="list-style-type: none">mainly used in the United Kingdom, Ireland, Malta, Malaysia & Singapore (for a full list, click here)3 pinsgrounded13 A220 – 240 Vsocket compatible with plug type G <p>Learn more</p>	<p>Type H</p>  <ul style="list-style-type: none">used exclusively in Israel, the West Bank & the Gaza Strip (for a full list, click here)3 pinsgrounded16 A220 – 240 Vsocket compatible with plug types C & H (unsafe compatibility with E & F) <p>Learn more</p>
<p>Type I</p>  <ul style="list-style-type: none">mainly used in Australia, New Zealand, China & Argentina (for a full list, click here)2 or 3 pins2 pins: not grounded / 3 pins: grounded10 A220 – 240 Vsocket compatible with plug type I <p>Learn more</p>	<p>Type J</p>  <ul style="list-style-type: none">used almost exclusively in Switzerland & Liechtenstein (for a full list, click here)3 pinsgrounded10 A220 – 240 Vsocket compatible with plug types C & J <p>Learn more</p>	<p>Type K</p>  <ul style="list-style-type: none">used almost exclusively in Denmark & Greenland (for a full list, click here)3 pinsgrounded16 A220 – 240 Vsocket compatible with plug types C & K (unsafe compatibility with E & F) <p>Learn more</p>	<p>Type L</p>  <ul style="list-style-type: none">used almost exclusively in Italy & Chile (for a full list, click here)3 pinsgrounded10 A & 16 A220 – 240 V10 A socket compatible with plug types C & L (10 A version) / 16 A socket compatible with plug type L (16 A version) <p>Learn more</p>	<p>Type M</p>  <ul style="list-style-type: none">mainly used in South Africa (for a full list, click here)3 pinsgrounded15 A220 – 240 Vsocket compatible with plug type M <p>Learn more</p>	<p>Type N</p>  <ul style="list-style-type: none">used in Brazil and South Africa (for a full list, click here)3 pinsgrounded10 A & 20 A100 – 240 Vsocket compatible with plug types C & N <p>Learn more</p>	<p>Type O</p>  <ul style="list-style-type: none">used exclusively in Thailand3 pinsgrounded16 A220 – 240 Vsocket compatible with plug types C & O (unsafe compatibility with E & F) <p>Learn more</p>	

The UK use type G plugs and sockets.

Each country also uses a variety of electrical voltages and frequencies for their national systems which are shown in URL: https://en.wikipedia.org/wiki/Mains_electricity_by_country and also in URL: <https://www.worldstandards.eu/electricity/plug-voltage-by-country/>

Type G plugs have a fuse system and should be fitted with an appropriate fuse for the equipment being used.

The UK uses a 230V at 50Hz system while other countries use different systems eg USA 120 V at 60 Hz.

Electrical equipment sold in these countries will be designed to work with the relevant electrical power supply systems and thus may become a risk within the UK because the transformers over heat and become a fire risk

Potential Fire Risk

Fires require three factors,

- Ignition source,
- Fuel (Combustible materials etc)
- Oxygen.

Electrical systems are can provide an ignition source if they are faulty or incorrectly used. Electrical fires can be started by many means eg damage to the insulation on the wires or arcing between the socket and the plug. It is therefore vital that all systems are managed and inspected on a regular basis.

The following are examples of electrical equipment igniting and thus potentially the cause of fires.



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NEWS

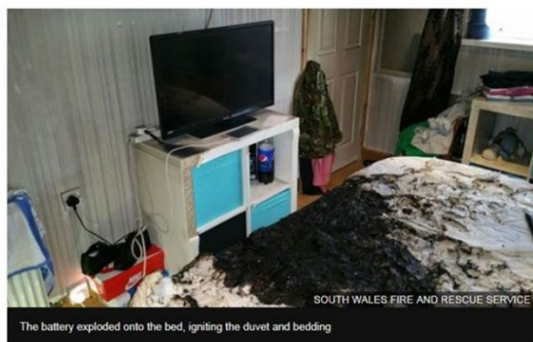
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Electrical charger warning after Newport e-cig house fire

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A family from Newport had "a lucky escape" after a charger caused an e-cigarette to explode and spark a fire.

South Wales Fire and Rescue Service was called to the blaze at a house on Humber Road, Bettws, on Monday evening.



All electrical plugs should have a suitable rated fuse for the type of equipment for example:

Typical Fuse Ratings

- Clock radio – 3 amp.
- Coffee maker – 5 amp.
- Dishwasher – 13 amp.
- DVD player – 3 amp.
- Electric blanket – 3 amp.
- Fan – 3 amp.
- Food mixer – 3 amp.
- Fridge – 3 amp.
- Hair dryer – 13 amp.
- Hi-fi – 5 amp.
- Iron – 13 amp.
- Kettle – 13 amp.

If the fuse rating is inappropriate (eg a 13amp fuse for a clock radio), it can allow significant more current to flow through it than was designed thus the equipment could over heat and potentially catch fire.

Also many non-UK two pin plugs do not have an earth system thus any equipment which is not double insulated has the potential for the equipment to become live if the electrical circuit is compromised.

All electrical equipment used within the University must also comply with the University local rules for electrical safety (see URL: <https://www.st-andrews.ac.uk/policy/health-and-safety-hazard-identification-and-risk-assessment/electrical-safety.pdf>)

Acceptable Adapters

The following are deemed acceptable adapters and connections to the University electrical systems:



The electrical extension board is the preferred adapter to be used within the University. This adapter must have the correct fuse for the equipment it is proposed to supply.

USB1.1 and USB 2.0 sockets use 5Volts and allows up to 500mA current (see URL: <https://itstillworks.com/usb-chargers-same-voltage-12226215.html>) and USB 3.0 allows 20 V and up to 5 Amps (see URL: <https://en.wikipedia.org/wiki/USB>). As a consequence of this, electrical equipment like phones and computers can be charged directly through a USB port at much lower voltage and also at lower current levels. Thus the alternative to a non-UK Type G plug would be a connection through a USB connector to the electrical equipment.

Thus an alternative is the USB connection adapter to a Type G three pin plug eg:



or a USB connection directly into a Type G socket arrangement eg:



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Non-Acceptable Adapters

Effectively all types of adapters other than those above present a significant fire risk and are thus banned from use within the University.

Overloading Adapters No adapter systems should be plugged into other adapters as this could increase the current through the adapters causing them to over heat and potentially become ignition sources.



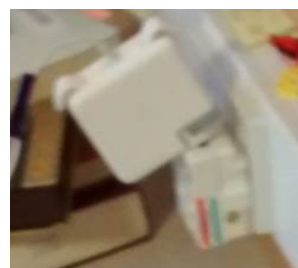
There must only ever be one adapter inserted into a mains socket and there must never be an adapter linked to another adapter.

Cube Adapters -



Cube adapters have a significant problem in that the adapter becomes very heavy causing the pins of the adapter to come away from the socket causing potential arcing between the pin and socket thus becoming an ignition source. No cube adapters should be used within University properties.

Adapters to Fit No UK Plugs



Where a Non-UK Type G plug is fitted to electrical equipment, it will mean the equipment was designed for non-UK electrical services (voltage, frequency and current). As a consequence all such adapters are banned from the University. In the examples above the original plug is connected to a USB connector. Thus the original plug must not be used. All such equipment must use a Type G plug/socket as shown above with a direct connection to a USB. Multiple adapters as shown above become side heavy causing the pins in the socket to partially come out of the socket potentially causing arcing between the socket and plug thus possibly causing an ignition source.

Travel Adapters

Travel adapters are really only intended for very short-term use in a very controlled environment. Many such adapters do not have a fuse and many such adapters are for electrical plugs which do not have an earth system thus potentially could cause the equipment to become live if the circuit is compromised. Also, the adapters if left in a live socket will have internal parts which are then live and potentially a fire risk but also potentially an electrical risk eg:



Use of Non-Type G plugs into Type G sockets

Non-Type G plugs **must never** be forced into Type G UK sockets. This causes damage to the sockets such that they then present a fire risk. They also present a potential electrical risk especially forcing a two pin plug into the Type G socket and thus there is no earth system

Electrical Equipment Within Residences

The contract between students and residences/University states:

Fire & Electrical Safety

17.1 The University takes no responsibility for damages or injuries caused by personal electrical equipment within the Residence. You are wholly responsible for the use and consequences of misuse of any electrical equipment You bring into the Residence. Where informed by You, the University will certificate all items of electrical equipment brought into the Residence by You at the start of semester. Any items brought into the Residence after this period will need to be tested and certified at Your own expense. You can get advice on electrical safety from your Residential Services Manager.

17.2 Do not bring into the Residence any electrical kitchen or cooking equipment from outside the United Kingdom as it may not be compatible with the voltage system and will fail the electricity safety certification; this includes adaptors and power leads. You can bring computers or mobile devices (i.e. laptops, phones, tablets, iPads) but they must meet the Universities' electrical equipment certification- and used with a United Kingdom power cable that is purchased in the United Kingdom.

Requirements

It is a requirement of the University that all electrical systems are safe to use. Thus all plugs must be of the Type G variety or a Type G plug with one direct USB connector, the plug must be suitably fused, must be suitably earthed and the electrical systems (including the transformer) must be designed to work on UK electrical power grid (ie 230V at 50Hz).