

BUYER BEWARE



Many plugs and chargers – often obtained online – pose a serious risk to users.

By David Peacock

REBECCA POOL'S article in *Wiring Matters* issue 46 described the problems associated with fake electrical goods, concentrating mainly on products that are used for professional installation. If counterfeiters are able to profit from misleading skilled users, they clearly pose an even greater threat to consumers without specialist knowledge. One particular area of concern is the online trade in replacement cord sets, mobile device chargers, and travel adaptors. Sometimes the last two categories are combined with USB chargers to form so-called 'universal travel adaptors'.

Plugs

The Plugs and Sockets etc. (Safety) Regulations 1994 require that UK standard plugs must conform to BS 1363, be tested and approved by a notified body, and bear the approval marks and licence numbers for that

approval. They also stipulate that domestic electrical appliances must be fitted with standard plugs. The main approval bodies are BSI (Kitemark), ASTA (Diamond Mark) and Nemko (N Mark). As BS 1363 is a national standard and the regulations are national in origin, CE marking should not be used on the products covered by the regulations. The use of a CE mark on a plug claiming to be made to BS 1363 is in itself a reliable indication of a counterfeit. The Plugs and Sockets Regulations, by requiring conformance to a specific standard with detailed specifications, make it very straightforward for trading standards officers to take action. They are relieved of the task of making a case as to why a product is dangerous – if it does not conform to the standard, it is illegal.

The key characteristics of an approved UK plug are that it must be fitted with a fuse to BS 1362, the pins

are the correct size, the line and neutral pins (but never the earth pin) should have insulated sleeves, it must be impossible to touch live parts when in use, and be sufficiently robust to not come apart in normal use. In addition there are many tests to ensure that insulation, creepage, temperature rise under load and mechanical strength etc. conform to the standard.

Common problems with counterfeit UK power plugs and cord sets include:

- being fitted with counterfeit fuse – danger of explosion;
- a partially sleeved earth pin – will not provide reliable contact;
- incorrectly sized pins – poor contact and may damage socket;
- sub-standard flexible cords – danger of overheating and fire;
- plugs without any fuse, or with a fuse which is not connected.

Online dangers

Whilst sales of counterfeit plugs in traditional shops do occur, the main problem is with online stores such as eBay and Amazon Marketplace, both of which offer cord sets and appliances fitted with fake plugs. Sometimes these offers include photos of plugs which, to the trained eye, are obvious counterfeits. In other instances, there are photos of the genuine item, but the supplied product is fake. Another issue with Amazon Marketplace is the way that Amazon allows vendors to offer a product against an established listing, while supplying a product from a manufacturer different from the one given in the listing.

Customer product reviews are a good indicator of potentially suspect products. The following reviews for a cord set originally sold on Amazon Marketplace as a 'Cloverleaf Computer Power Lead by Volex', but now



Plugging in an appliance is an everyday task that can pose unexpected risks

withdrawn, gives a flavour of what to look out for:

"After only a couple of weeks' use, the cable started to burn and melted through."

"The cable started sparking then caught fire and burned a hole in the carpet."

"After two weeks it started to spark and strong burning smell came from it... exploded with a large bang and now has a small hole in the connector."

Similar reviews continued for over a year before the product was discontinued.

In 2011 PlugSafe – The Campaign for Plug Safety (www.PlugSafe.org.uk) – purchased a number of cables from this listing, from different suppliers, and only one of these was a genuine Volex. One supplier sent a 'King Coro' (a counterfeit of 'King Cord') which had all of the plug faults listed earlier. Other suppliers sent plugs with the fake 'guida' brand. It was simply a lottery.

One current (as of April

2013) example is the 'UK Longwell 1.5m Cloverleaf C5 Power Cable. Asta Approved and verified. By Volex' (Amazon ASIN B005JENBNK). The product illustrated (Fig 1) is from Longwell, and whilst the technical details list a 2m cable, the description states 1.5m. Of the eight reviewers, one confirms that he received a Volex cable, another says his was a Longwell, and a third had a Kitemark, indicating that it was neither Longwell or Volex as both carry ASTA, not BSI approvals. Two others are clear that their cable was neither Longwell or Volex, while the remaining three give no clue as to what they got. Clearly these reviews cannot be relied on as there is no way to tell which review relates to which supplier.

In support of the activities of the PlugSafe campaign I have made test purchases of many cord sets, adaptors and chargers, but I have also inadvertently bought fakes when making straightforward purchases. Last October I bought a replacement charger for my daughter's HP laptop. I chose one from Amazon Marketplace which was fulfilled from Amazon itself, believing that this would minimise the chances of buying a counterfeit. When it arrived the charger appeared genuine, but the cord set was an obvious fake. The plug supplied (Fig 2) was of the non-approved guida brand which bears a fictitious approval from the non-existent STGS, as well as a fake Kitemark. Unlike many guida plugs this one did not have a partially sleeved earth pin, but the fuse was a fake. When I informed HP about its product being sold with a fake cord set they asked to see the charger, kindly exchanging it for another. It turned out that the charger itself was also counterfeit.

With eBay the situation is a little different. There are no multi-supplier listings, but also no product reviews, so there is only the description



Fig 1 Illegal 'guida' brand plug with sleeved earth, purchased from Amazon.co.uk

to go on. Working with a local trading standards department, PlugSafe has initiated the removal of more than 1,200 eBay listings, which include illegal plugs. It would appear that eBay puts no effort into monitoring the legality of products offered on its site; it seems to act only on instructions from trading standards departments. The company does provide a means for consumers to report fakes, but there is no evidence that these reports

are acted upon. An indication of the problem can be seen by comparing two pictures, from January 2012 and April 2013, taken from the same eBay listing of a disc docking station (Fig 3). The product has been reported to PlugSafe as being supplied with an illegal fuseless mains plug. The earlier image clearly shows the illegal plug. The current picture is the same except that a meaningless flash has been added to obscure the plug. Fig 4 shows another example of an illegal fuseless plug, similar to the plug in Fig 3.

Travel adaptors

Travel adaptors for use in the UK (for connecting to a BS1363 socket outlet) are within the scope of the Plugs and Sockets Regulations. BS 1363-3 is the standard applicable to adaptors intended to use with BS 1363 sockets and the dimensional requirements for the plug part of an adaptor are basically the same as for a normal plug. All adaptors must have shutters, and those that have more >

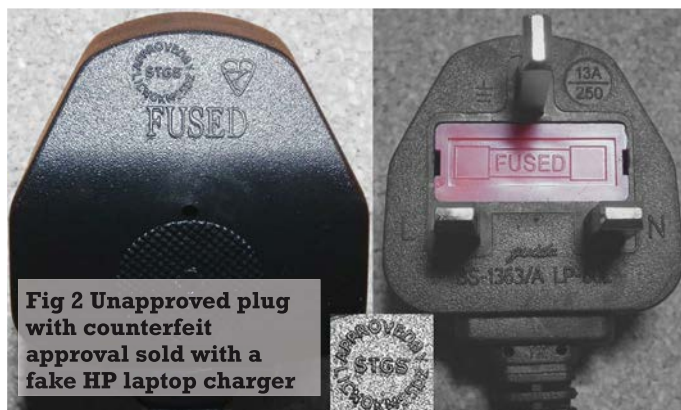


Fig 2 Unapproved plug with counterfeit approval sold with a fake HP laptop charger



Fig 3 How to hide an illegal plug. January 2012 picture (left) clearly shows an illegal fuseless plug – hidden by the meaningless 'HOT' flash in April 2013 (right)

Less than two BS 1363 sockets, or have non-BS 1363 sockets, must be provided with a fuse. Despite these clear regulatory requirements, there is a widely available group of so-called universal adaptors, made in China, but usually marked 'for export only' which are intended for use with BS 1363 sockets and accept UK, US, European and Australian plugs using a set of unshuttered contacts with no fuse (Fig 5). Often the plug part does not conform to the correct pin size, and invariably the pins are too close to the periphery. Sometimes there is no sleeving on the pins and sometimes the earth pin is only partially sleeved – both clear breaches of the regulations.

These potentially lethal devices are available from Amazon and eBay, often priced at less than £1, and typically posted direct from China. They have often featured on the EU RAPEX list of products withdrawn as dangerous. RAPEX is the EU rapid alert system that facilitates the rapid exchange of information between Member States on measures taken to prevent or restrict the marketing or use of products posing a serious risk to the health and safety of consumers. A weekly overview is published giving information on the product, the possible danger and the measures that were taken by the reporting country.

Another group of universal travel adaptors not only takes plugs of many different types, but also has a series of retractable pins intended to fit many different sockets (including UK sockets). The Plugs and Sockets Regulations exclude "any travel adaptor (that is to say an adaptor which enables a plug designed for use in the United Kingdom) to be connected to a socket used outside the United Kingdom."

It is unlikely that those who drafted those regulations conceived of adaptors with

multiple sets of pins, so these devices fall somewhat between the cracks of the regulations, making it a little more complicated to deal with dangerous products. These products often incorporate a USB charger, which also puts them outside the Plugs and Sockets Regulations.

Some universal plug/universal socket adaptors are simply badly made, and show up on the RAPEX list for allowing, for example, a single plug pin to be inserted with the other live pin being exposed to touch, and/or inadequate isolation between the input and output circuits of the charger. Another common design fault is to have all the different plug pins connected in parallel, such that pins which are not inserted into the socket are accessible and have mains voltage on them. Such is the case with the models illustrated in Fig 6 and 7, which, despite featuring on the RAPEX list many times (not only the UK and Ireland but also Germany, Netherlands, Spain, Denmark and Malta) are still available through both Amazon and eBay.

The pins on universal plug adaptors normally consist of one set of UK pins with an ISOD (plastic earth pin) for shutter opening, a set of non-earthed Euro-plug pins, and a semi-rotating set of US/Australian/Chinese non-earthed flat pins. The socket usually accepts most two-pin and three-pin plugs. However, because there is no provision for connecting to earth they are in fact an effective (and illegal) earth isolation device.

This lack of earthing has been cited in RAPEX withdrawal notices in the UK, Germany, Netherlands, Hungary and the Czech Republic. There are many such unearthed universal adaptors still offered on both Amazon and eBay. The most common brand names are 'SKROSS', 'Design Go' and



Fig 4



Fig 5



Fig 8

'FUJIFILM'; their products are offered widely on the Internet, and also in traditional stores such as B&Q, John Lewis, PC World, Currys and Boots. In addition to their unearthed adaptors, SKROSS also offer a universal adaptor with a full set of earthing pins. Why they also make an unsafe version is simply a mystery.

Chargers

In 2007, a seven-year-old boy was electrocuted by a fake Nintendo Game Boy charger, resulting in a major investigation by Buckinghamshire Trading Standards who found many unsafe game and phone plug-top chargers on the market, some costing as little as 99p. Typical problems include inadequate insulation between the input and output circuits, low-quality internal connections allowing wires to break loose, incorrectly sized pins, and inadequate marking. The last two faults can be identified by a visual inspection, but the others



Fig 6

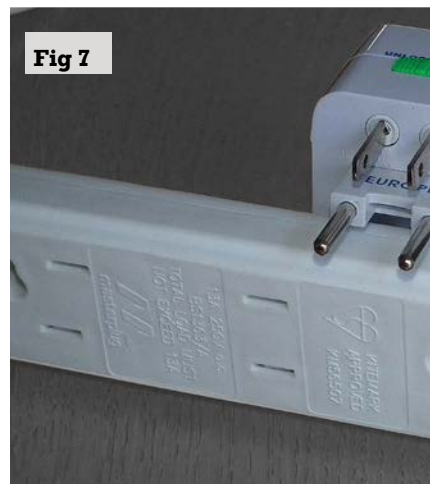


Fig 7

can only be uncovered by opening up the device.

Plug-top chargers are excluded from the Plugs and Sockets regulations, but subject to The Electrical Equipment (Safety) Regulations 1994, the relevant standards being BS EN 61558-1 and BS EN 60950-1. Although those standards are of a general nature, it would be normal for any safety evaluation to take into consideration BS 1363-1 as the reference for the plug pin dimensions, and this is what the Buckinghamshire tests did. The regulations also require that electrical products (excluding those covered by the Plugs and Sockets Regulations) should bear the CE mark and also "The manufacturer's brand name or trade mark should be clearly printed on the electrical equipment". Further details on the Buckinghamshire investigations can be obtained via a Google search on "What's in your socket?".

The situation uncovered by



Fig 4 Illegal fusesless plug - a Chinese plug with no provision for a fuse, and the pins set too close to the periphery

Fig 5 Fuseless, shutterless, travel adaptor

Fig 6 Two similar universal travel adaptors with multiple plugs, multi-socket and no earth, the design does not prevent deployment of all pins at the same time



Fig 7 Travel adaptor plugged into socket with live pins exposed to touch, the top (US) pins are spring loaded and can be deployed by releasing the green catch, even after plugging in the adaptor

Fig 8 A USB charger with pins illegally close to the periphery and no indication of the manufacturer

Buckinghamshire Trading Standards still pertains today.

The photograph of an illegal AC adaptor (Fig 8) clearly shows a product with no manufacturer's name or trademark, and with pins that are set far too close to the periphery (compare the width of the pins, 6.4mm, to the distance from the periphery, the minimum allowed is 9.5mm). The model shown was amongst those illustrated in the Buckinghamshire report, and currently [April 2013] can be found on eBay and Amazon. The Amazon offers are both described as being by Sumnique, a company that appears not to exist. The description of both versions claims that they are "Exclusively sold and distributed on Amazon by Sumnique" and yet that name appears nowhere in the list of 23 suppliers for one and 15 for the other. The product reviews for both Amazon versions include many references to "exploded", "blew up" and "burning".

They also include a number of complaints about the dummy earth pin (ISOD) breaking off and remaining stuck in the socket (when this happens sockets are left in a dangerous condition because the broken earth pin holds open the protective shutters, making the live parts accessible to children). During a one-month period in 2012, PlugSafe initiated the removal of more than 3,000 eBay illegal charger listings by providing information to trading standards, but the problem keeps coming back.

Action required

What can be done to combat counterfeit online sales of cord-sets (whether sold separately or with appliances), unsafe chargers and travel adaptors? Following their charger investigation, Buckinghamshire Trading Standards called for major changes in the law, including:

- establishing a National Product Safety Agency

– an independent single agency to protect the public's health and consumer interests, based on risk analysis, in relation to consumer goods;

- introducing a registration system – businesses manufacturing or supplying food for human consumption are required to register with their local authority so that due diligence processes can be assessed and compliance with food hygiene controls are in place. A similar system would enable local authorities and regulatory bodies to know where the businesses are selling electrical goods and advise/monitor if needed;
- introducing on-the-spot fines for non-compliant goods. A fine for obvious failures for certain breaches of product safety regulations would focus the mind of suppliers on their obligation to supply safe goods;
- improving consumer education – given the low levels of understanding about electrical safety there is a fundamental need to educate consumers of all ages.

My own proposals for augmenting the Buckinghamshire measures follow:

- as the law requires that all BS 1363 plugs are marked with the identity of the manufacturer or vendor, then that information should always be included in the description;
- Amazon should not permit offers for different products to be combined in the same listing;
- measures could be taken to require that there should always be a clear photograph of the plug showing the pins, the identification and the approval marks and licence numbers (with some designs this would require a photograph of both front and back);

- as an aid to consumer education, the major online suppliers should be required to make consumers aware of the importance of checking that plugs, adaptors and chargers received matched the pictures and descriptions of those offered. This should reduce the acceptance of counterfeit products, but it would be essential to insist that the suppliers picked up the cost of returns as the price is often less than the cost of normal postage to return them'
- online businesses should be prohibited from facilitating the direct shipping of mains-related electrical goods from outside the EU to UK consumers.

Electrical contractors and other professionals are well placed to assist in this area. In particular they can help educate consumers about the importance of safety, and alert all users to the dangers of counterfeit and substandard products, identifying them when found.

Finally, they can sign the government e-petition (started by electricians) calling for a strengthening of regulations <http://tinyurl.com/plugpet>. As professionals we need to do all we can to help eliminate these dangers. ☘

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