

## TEST REPORT

No. : 44188

Client **Electrical Safety Council**  
Unit 331-3  
Great Guildford Business Sq  
30 Great Guildford Street  
London  
SE1 0HS

Client Contact Mr Steve Curtler

Item/s tested A selection of Universal Socket-outlets  
See the following pages of this report for details

Tested to Investigation looking at the safety implications of the  
installation of universal socket-outlets in the UK for  
domestic and commercial use, using reference  
standards **BS 1363-2: 1995 +A4: 2012 &  
BS 5733: 2010**

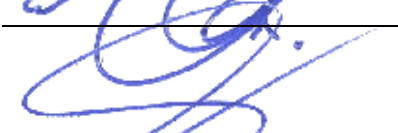
Date sample received 13<sup>th</sup> September 2012

Test Period 1<sup>st</sup> October to 9<sup>th</sup> November 2012

Date of Issue 12<sup>th</sup> November 2012

Tests carried out at 20 ± 5 °C

Testing Officer   
Giuseppe Capanna

Verified by   
Bunmi Phillips

Form No: QF102-5  
Issue No: 2  
Issue Date: 12.01.09



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THIS REPORT APPLIES ONLY TO THE PARTICULAR SAMPLE UNIT(S) TESTED AND TO THE SPECIFIC TESTS CARRIED OUT AS DETAILED IN THIS REPORT.

### **Objective**

Investigation looking at the safety implications in foreseeable conditions of use where universal socket-outlets are installed in the UK for domestic and commercial use, using reference standards BS 1363-2: 1995 +A4: 2012 & BS 5733: 2010.

This report will also assess the legal implications of installing these sockets against requirements of the UK Plugs and Sockets etc. (Safety) Regulations 1994 (SI 1768) and the Requirements for Electrical Installations BS 7671: 2008 (Amendment No 1: 2011).

It should be noted that full testing to BS 1363-2: 1995 +A4: 2012 & BS 5733: 2010 BS 5733 and other relevant standard(s) mentioned has not been carried out as part of this investigation.

### **Compliance with The Plugs and Sockets etc. (Safety) Regulations 1994 (SI 1768)**

The Plugs and Sockets etc. (Safety) Regulations 1994 states:

#### **Electrical devices other than standard plugs**

10.—(1) Subject to the following provisions of this regulation, any electrical device (other than a standard plug) specified in column 2 of Schedule 2 to these Regulations shall conform to the particular British Standard specified for such devices in column 3 of that Schedule.

Schedule 2 specifies that standard plugs i.e. BS 1363 plugs and socket-outlets with which standard plugs may be engaged shall comply with BS 1363.

From a legal point of view it is clear from the above extracts that it is illegal to install any socket (with which standard BS 1363 plugs may be engaged) that do not comply with the requirements of BS1363.

This point is further reinforced with guidance from the Requirements for Electrical Installations BS 7671: 2008 incl Amendment No 1: 2011 (Wiring Regulations 17<sup>th</sup> Edition), which states in clauses 510 & 511 that: Every item of equipment shall be selected so as to allow compliance with the regulations and that every item of equipment shall comply with the relevant requirements of the applicable British or Harmonized standard, appropriate to the intended use of the equipment. Appendix 1 lists the applicable standard as BS1363 and further references to the use of BS 1363 shuttered socket-outlets can be found in regulation 553 in particular 553.1.100 and table 55.1.

Compliance with BS 1363 is particularly important for safety in UK installations complying with BS7671 (Wiring regulations) in that sockets are traditionally installed in the UK in a final ring circuit configuration. A final ring circuit is generally protected by a 32A MCB or RCBO which adequately protects the 2.5mm<sup>2</sup> installation wiring and but relies on the fact that each individual appliance connected to the ring circuit is protected by its own fuse in the BS 1363 plug or fused connection unit. Without this protection, as would be the case if these universal socket-outlets were installed on a UK final ring circuit and used with any plugs other than BS1363 type, the only protection would be the 32A MCB, leading to the situation where the cord of an appliance such as a table lamp (typically 0.5mm<sup>2</sup>) would have the 32A MCB as its only means of protection in an overload situation. This results in a significant risk of fire.

### **Sample selection:**

Five types of universal socket-outlets were supplied for the investigation. 3 types of switched socket-outlets and 2 types of unswitched socket-outlets (see photos below). The samples will be identified in this report as samples 1-5 as below

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Photographs of samples tested

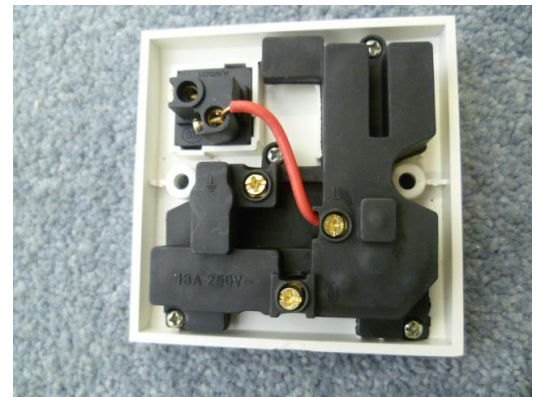
1



2



3



4



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5



### Results of tests and inspections

#### **Classification**

None of the samples complied with BS 1363-2. However the classification according to BS 1363-2 would be as follows:

Single (samples 1, 2 & 5)	<input checked="" type="checkbox"/>		
Multiple (samples 3 & 4)	<input checked="" type="checkbox"/>		
Switched (samples 1,2 & 3)	<input checked="" type="checkbox"/>	Single pole	<input checked="" type="checkbox"/>
		Double pole	<input type="checkbox"/>
Unswitched (samples 4 & 5)	<input checked="" type="checkbox"/>		
Fused	<input type="checkbox"/>		
Unfused (all)	<input checked="" type="checkbox"/>		
Portable (sample 5 is a panel mounted socket-outlet for use in non-rewirable portable socket-outlets)	<input checked="" type="checkbox"/>	Rewirable	<input checked="" type="checkbox"/> (samples 1,2,3 & 4)
		Non-rewirable	<input checked="" type="checkbox"/> (sample 5)
Fixed (samples 1,2,3 & 4)	<input checked="" type="checkbox"/>	Flush-mounted	<input checked="" type="checkbox"/> (samples 1,2,3 & 4)
		Surface mounted	<input type="checkbox"/>
		Panel mounted	<input checked="" type="checkbox"/> (sample 5)
With indicator lamp (sample 3)	<input checked="" type="checkbox"/>		
Without indicator lamp (samples 1,2,4 & 5)	<input checked="" type="checkbox"/>		

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### Marking, labeling and instructions

Socket-outlets installed in the UK for domestic and commercial use with which standard (BS1363) plugs may be engaged shall comply with the requirements of BS 1363-2: 1995. All of the samples had marking failures to BS1363 to a greater or lesser extent (see table below).

<b>Required Marking / Sample Designation</b>		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
a)	Name, trademark or identification mark	x	✓	✓	✓*	✓
b)	BS 1363	x	x	x	x	x
c)	/A for portable socket-outlets	N/A	N/A	N/A	N/A	N/A
d)	L, N & ⊕ for terminals	✓	✓	x	✓	✓
e)	FUSE or FUSED for fused socket-outlets	N/A	N/A	N/A	N/A	N/A
f)	MAX 13A for multiple fused socket-outlets	N/A	N/A	N/A	N/A	N/A
g)	1) Rated current	✓	✓	x	x	✓
	2) Rated volts	✓	✓	✓	✓	✓
	3) Nature of supply	✓	x	✓	✓	✓

✓ = Marking complies                      x = Marking does not comply                      N/A = Marking not applicable

Note: the marking also failed to comply with the requirements of BS 5733

### Instructions

Only sample 2 was supplied with user instructions. The instructions did not warn users of the hazards associated with installing or using these sockets in the UK.

### Clearances, creepage distances and solid insulation

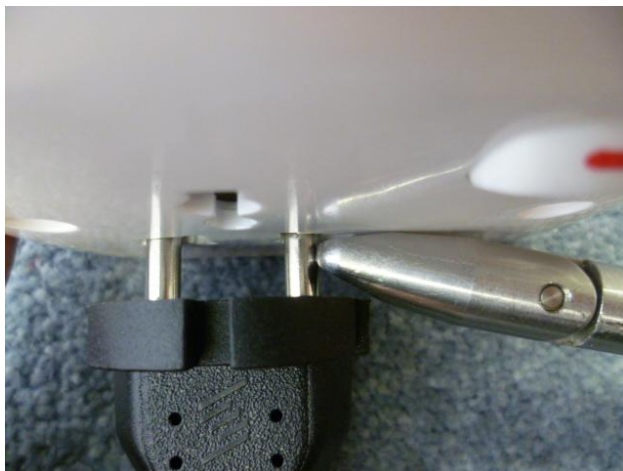
The clearances, creepage distances and distances through solid insulation were found to be adequate on all 5 samples inspected

### Accessibility of live parts

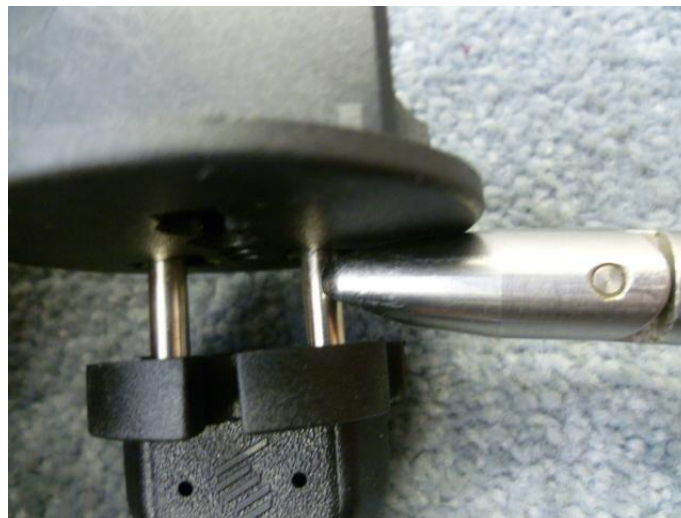
Samples 1, 2, 3 & 4 were all fitted with shutters. Although only sample 2 passed the test of clause 9.1 with the 1mm test pin of fig 1 of BS1363-2. Samples 1, 3, 4 & 5 all allowed access to live parts when the test pin was applied with a force of 5N.

It was possible with all the samples tested to touch the live plug pins of a Schucko or US plug whilst inserting and removing these plugs from any of the socket-outlets. This represents a significant risk of electric shock to the user. (see photos below).

On sample 3 & 5 it was also possible for a plug pin to be inserted whilst the other plug pin was accessible. Although for sample 5 this may be prevented if used in a suitable enclosure



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### **Provision for earthing**

When used with UK, AS/NZS or US plugs the resistance between the earth terminal and the inserted plug pins was adequate.

When used with plugs with side earthing contacts such as a Schucko plug or plugs with an earthing socket such as the French plug, the earth connection is lost resulting in a risk of electric shock in the event of a failure of basic insulation with class 1 appliances.

### **Terminals and terminations**

A limited check was carried out on the terminals of the samples and each of the samples was able to accept 3 x 2.5mm<sup>2</sup> solid conductors.

### **Construction**

All of the samples except for sample 5 were fitted with shutters. However only the shutters on sample 2 complied with the requirements for access to live parts (see accessibility of live parts above). The size and of the apertures on these universal socket-outlets are designed to accept as many different types of plugs as possible. As a result of this the apertures tend to be overly large and can lead to the incorrect insertion of certain plugs. In particular: (i) the Europlug can be inserted between the line and earth contacts on 4 out of 5 of the samples checked and (ii) these socket-outlet are designed to accept both the US 3 pin plug and the AS/NZS 3 pin plug. This results in the polarity of the US plug being reversed, which can result in a hazard in the case of class 1 appliances.

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There is a further potential hazard with regard to the US plug and similar flat blades plugs in that the rated voltage of most appliances fitted with these plugs is 120V (USA and Canada), 127V (Mexico) and 100V (Japan). There is a risk that 100-120V appliances could be connected to a 240V supply resulting in a risk of fire. (see below for the results of tests carried out)

The shape of sample 4 and the proximity of the two socket-outlets was such that simultaneous use of both sockets with BS 1363 plugs was not possible or a single BS 1363 plug and any other type of plug. The size of the cover plate on this sample was also such that it would not fit a standard BS4662 type box. Sample 3 was rated 13A. However this sample was fitted with a switch rated at only 10A.

### Insulation resistance and electric strength

The insulation resistance and electric strength insulation were found to be adequate on all 5 samples tested

### Temperature rise

The temperature rise on all 5 samples tested was found to be below the maximum limits required by the standard.

### Normal operation of socket-outlets

IEC 60884-1 the international standard for plugs and socket-outlets and most international socket standards require 5000 insertions for socket-outlets. However, UK BS 1363 requires 15,000 insertions.

The samples were first subjected to 5000 insertions. At the end of 5000 insertions the samples were inspected and all 5 of the samples were satisfactory. The samples were then subjected to a further 10,000 insertions in line with the requirements of BS1363. The results were as follows:

- Sample 1           Shutters broke after 10,000 insertions, test stopped. (See photo)
- Sample 2           Coverplate cracked after 10,000 insertions, test stopped. (See photo)
- Sample 3           Completed 15,000 insertions, shutters working, temperature rise within limits
- Sample 4           Completed 15,000 insertions, shutters working, temperature rise within limits
- Sample 5           Completed 15,000 insertions, no shutters, line contact was found to be broken.

Sample 1 after 10,000 insertions



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Sample 2 after 10,000 insertions



### **Mechanical strength**

10 blows were applied to the 5 samples as described in the standard, the height of fall being 150<sup>0</sup><sub>.5</sub> mm. 0.53 Nm was applied to the fixing screws where appropriate. The results were as follows:

- Sample 1      No damage
- Sample 2      Cover plate cracked after 5 blows (see photo)
- Sample 3      Indicator lens displaced and minor displacement of the actuating member (see photo)
- Sample 4      No damage
- Sample 5      No damage

Sample 2 after 5 blows



Sample 3 after 10 blows



### **Screws, current-carrying parts and connections**

The contacts of these sock-outlets relied to some extent on the enclosure for contact pressure. Further testing would be required to determine whether there is sufficient resilience in the metal parts to compensate for any yielding of the insulating materials.



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**Resistance to abnormal heat and fire**

**Table of Glow-Wire test results**

Sample	Part tested	Colour	Test Temp (°C)	Pass	Fail
Sample 1	Front plate & shutter	White/Black	650	✓	
	Base moulding	Black	850		✓
	Switch actuating member	White	850		✓
Sample 2	Front plate & shutter	White	650	✓	
	Base moulding	Grey	850	✓	
	Switch actuating member	White	850	✓	
Sample 3	Front plate	White/Black	650	✓	
	Base moulding	Black	850	✓	
	Switch	White/Black	850		✓
Sample 4	Front plate	White	650	✓	
	Cover plates (2)	White	850		✓
	Base moulding	Black	850		✓
Sample 5	Front plate	Black	850	✓	
	Base moulding	Black	650	✓	

Sample 1 base @ 850°C



Sample 1 switch actuating member @ 850°C



Sample 3 switch actuating member @ 850°C



Sample 4 Front plate @ 850°C



Sample 4 Base @ 850°C



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### Connection of 100-120vac appliances to 240vac supply

A selection of 100-120v appliances including an energy saving light bulb, a hair dryer, a fan heater, a kettle and a toaster were connected to the 240v supply and switched on to ascertain any potential hazards. Most of the appliances survived the test and either shut down safely or failed in a safe manner. However, the toaster elements became much hotter than they would in normal use and part of the plastic casing melted. The toaster did not catch fire but there is obviously an increased risk of fire when used at 240v and also an increased risk of burns.

Photograph of 110v toaster after connection to 240v supply



### Conclusions and observations

From the test results above it is clear that as well as the legal implications of installing these universal socket-outlets in the UK for domestic and commercial use, there are also serious potential hazards including risk of electrocution and risk of fire.

### Recommendations

It is recommended that electricians are alerted to the potential hazards detailed in this report, in case they are requested to fit such socket-outlets in domestic or commercial installations (for example in hotels).

\*\*\*\*\* **END OF TEST REPORT** \*\*\*\*\*

