



# Test Report



Report No	2390/7438735	This Report consists of 18 pages
Client	Electrical Safety Council 18 Buckingham Gate London SW1E 6LB	
Authority & date	Quotation Acceptance dated 12 August 2009	
Items tested	Ten Direct plug-in mains power supply units Equipment Reference Number 10109544	
Specification	Testing to limited clauses of:- EN 61558-1:1997 EN 61558-2-17:1997 see within for details	
Results	Did not comply See comments	
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Issue Date	29 September 2009	
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## INTRODUCTION

Ten direct plug-in mains power supply units were tested to limited clauses of EN 61558-2-17:1997 (Safety of transformers, power supply units and similar – particular requirements for switch mode power supplies).

The units supplied have been tested against the following clauses only:-

Clause 8 – Marking and other information

Clause 14 - Heating

Clause 15 – Short-circuit and overload protection

Clause 18 – Insulation resistance and electric strength (excluding humidity treatment)

Clause 21 – Internal wiring

Clause 26 – Creepage distances, clearances and distances through insulation

Each of the power supply units is identified within this Report by a two digit identification number, assigned by the client, these were 02, 03, 04, 05, 07, 08, 09, 11, 12 and 14.

A photograph showing an external view of each power supply unit is included from page 13 of this Report.

## COMMENTS

1. All ten units supplied to BSI were subject to test by the BSI Accessories Laboratory prior to the testing conducted for this Report. Before testing for this Report, any physical damage to each unit was noted and is detailed within this Report against each power supply.
2. Formal type test to EN 61558-2-17:1997, requires submission of a number of power supply units, some specially prepared for the relevant tests. Since only one of each model was submitted for test, should a test result in a non-functioning unit (or the unit not functioning as received), there was no opportunity to conduct the remaining tests on a functioning unit. Where this occurred, it is noted within this Report.
3. Creepage and clearance requirements together with dielectric strength test voltages are determined from the working voltage, stressing the barrier under investigation. No working voltage measurements were conducted in this submission and the working voltage was taken as the rated mains input voltage.
4. Measurement of each power supply transformer temperature requires a specially prepared unit having a thermocouple embedded with the transformer windings. Since this had not been supplied on the submitted units, the temperature measurements were made by placing a thermocouple on each transformer. This necessitated each power supply unit being opened to allow entry of the thermocouple wire. Some of the power supply units were opened by removal of securing screws, others required the power supply casing to be split open, breaking the plastic case moulding.
5. Compliance against Clause 14 and Clause 15 is determined by confirming that the transformer temperature does not exceed the permissible maximum temperature for the thermal class of insulation which makes up the transformer. Since no information on the transformer thermal classes was supplied, compliance could not be determined for these clauses.

## Sample ID:02

As received observations: None.

## Results

### Clause 8 – Marking and other information – Pass

The unit met the requirements of this clause.

### Clause 14 – Heating – see comment 5 on page 2

Under normal operation the measured enclosure temperature was 51 °C.

Under normal operation the measured transformer temperature was 83 °C.

### Clause 15 – Short-circuit and overload protection – see comment 5 on page 2

Under maximum overload and output short circuit, the maximum transformer temperature was 83 °C.

### Clause 18 – Insulation resistance and electric strength – Pass

(excluding humidity treatment)

The measured insulation resistance between hazardous live parts and the power supply body was >100GΩ.

The measured insulation resistance between input circuits and output circuits was >100GΩ.

The unit met the dielectric strength test requirements of this clause with 3,640V~ applied between hazardous live parts and the power supply body, and between input and output circuits, with no breakdown.

### Clause 21 – Internal wiring – Pass

The unit met the requirements of this clause.

### Clause 26 – Creepage distances, clearances and distances through insulation – Fail

The required separation from live parts to accessible parts, and to the secondary circuit is a minimum clearance distance of 4.5mm and a minimum creepage distance of 4.8mm (based on 240V operation).

The measured creepage/clearance distance from live parts to accessible parts (the body of the power supply) was >7mm.

The measured creepage/clearance distance from live parts to the secondary circuit on the PCB was 6.3mm.

The measured creepage/clearance within the mains transformer (live parts to secondary circuit) was 3.5mm.

### Other:

The measured creepage distance between Live and Neutral before any fusing was 2.1mm and the measured clearance distance was 1.8mm, the minimum requirement is 2.4mm.

## Conclusion

The submitted power supply unit ID02 failed to meet the requirements of the clauses tested, as detailed above.

### Sample ID:03

As received observations: None.

### Results

#### **Clause 8 – Marking and other information – Pass**

The unit met the requirements of this clause.

#### **Clause 14 – Heating – see comment 5 on page 2**

Under normal operation the measured enclosure temperature was 48°C.

Under normal operation the measured transformer temperature was 72°C.

#### **Clause 15 – Short-circuit and overload protection – see comment 5 on page 2**

Under maximum overload and output short circuit, the maximum transformer temperature was 80°C.

#### **Clause 18 – Insulation resistance and electric strength – Pass**

(excluding humidity treatment)

The measured insulation resistance between hazardous live parts and the power supply body was >100GΩ.

The measured insulation resistance between input circuits and output circuits was >100GΩ.

The unit met the dielectric strength test requirements of this clause with 3,640V~ applied between hazardous live parts and the power supply body, and between input and output circuits, with no breakdown.

#### **Clause 21 – Internal wiring – Pass**

The unit met the requirements of this clause.

#### **Clause 26 – Creepage distances, clearances and distances through insulation – Fail**

The required separation from live parts to accessible parts and to the secondary circuit is a minimum clearance distance of 4.5mm and a minimum creepage distance of 4.8mm (based on 240V operation).

The measured creepage/clearance distance from live parts to accessible parts (the body of the PSU) was >7.5mm.

From live parts to the secondary circuit on the PCB, the measured creepage distance was 4.9mm and the measured clearance distance 4.5mm.

The measured creepage/clearance within the mains transformer (live parts to secondary circuit) was 4.0mm.

#### **Other:**

No other observations.

### **Conclusion**

The submitted power supply unit ID03 failed to meet the requirements of the clauses tested, as detailed above.

## Sample ID:04

As received observations: Plastic Earth Pin had broken off.

## Results

### Clause 8 – Marking and other information – Pass

The unit met the requirements of this clause.

### Clause 14 – Heating – see comment 5 on page 2

Under normal operation the measured enclosure temperature was 65°C.

Under normal operation the measured transformer temperature was 107°C.

### Clause 15 – Short-circuit and overload protection – see comment 5 on page 2

Under maximum overload and output short circuit, the maximum transformer temperature was 110°C.

### Clause 18 – Insulation resistance and electric strength – Pass

(excluding humidity treatment)

The measured insulation resistance between hazardous live parts and the power supply body was >100GΩ.

The measured insulation resistance between input circuits and output circuits was >100GΩ.

The unit met the dielectric strength test requirements of this clause with 3,640V~ applied between hazardous live parts and the power supply body, and between input and output circuits, with no breakdown.

### Clause 21 – Internal wiring – Pass

The unit met the requirements of this clause.

### Clause 26 – Creepage distances, clearances and distances through insulation – Fail

The required separation from live parts to accessible parts and to the secondary circuit is a minimum clearance distance of 4.5mm and a minimum creepage distance of 4.8mm (based on 240V operation).

The measured creepage/clearance distance from live parts to accessible parts (the body of the PSU) was 3.8mm.

The measured creepage/clearance distance from live parts to the secondary circuit on the PCB was 6.3mm.

The measured creepage/clearance within the mains transformer (live parts to secondary circuit) was 4.7mm.

### Other:

The measured creepage distance between Live and Neutral before any fusing was 2.2mm and the measured clearance distance was 1.5mm, the minimum requirement is 2.4mm.

## Conclusion

The submitted power supply unit ID04 failed to meet the requirements of the clauses tested, as detailed above.

## Sample ID:05

As received observations: None.

## Results

### Clause 8 – Marking and other information – Fail

The unit was not marked with a manufacturer name or trade mark as required by sub-clause 8.1i).

### Clause 14 – Heating – see comment 5 on page 2

Under normal operation the measured enclosure temperature was 38°C.

Under normal operation the measured transformer temperature was 60°C.

### Clause 15 – Short-circuit and overload protection – see comment 5 on page 2

Under maximum overload and output short circuit, the maximum transformer temperature was 68°C.

### Clause 18 – Insulation resistance and electric strength – Fail

(excluding humidity treatment)

The measured insulation resistance between hazardous live parts and the power supply body was >40GΩ.

The measured insulation resistance between input circuits and output circuits was >100GΩ.

The unit met the dielectric strength test requirements of this clause with 3,640V~ applied between hazardous live parts and the power supply body with no breakdown. However with the dielectric strength test applied between input and output circuits, the insulation broke down at 2,000V~.

### Clause 21 – Internal wiring – Fail

The Live and Neutral wires connecting the PCB to the plug pins were attached to the plug pins by solder only, with no secondary securement. Should a wire break free, its movement could result in a hazardous mains voltage being applied to the low voltage secondary circuit.

### Clause 26 – Creepage distances, clearances and distances through insulation – Fail

The required separation from live parts to accessible parts and to the secondary circuit is a minimum clearance distance of 4.5mm and a minimum creepage distance of 4.8mm (based on 240V operation).

The measured creepage/clearance distance from live parts to accessible parts (the body of the PSU) was >7mm.

The measured creepage/clearance distance from live parts to the secondary circuit on the PCB was 3.9mm.

The measured creepage/clearance within the mains transformer (live parts to secondary circuit) was 1.0mm.

## Other

The measured creepage/clearance distance between Live and Neutral before any fusing was 0.6mm, the minimum requirement is 2.4mm.

The Y capacitor across primary to secondary barrier was marked '472 2kV' – no marking was present to indicate that it is a Y1 capacitor.

## Conclusion

The submitted power supply unit ID05 failed to meet the requirements of the clauses tested, as detailed above.

## Sample ID:07

As received observations: None.

## Results

### Clause 8 – Marking and other information – Fail

The unit was not marked with a manufacturer name or trade mark as required by sub-clause 8.1i).  
The unit was not marked with a model or type reference as required by sub-clause 8.1j).

### Clause 14 – Heating – see comment 5 on page 2

Under normal operation the measured enclosure temperature was 39°C.  
Under normal operation the measured transformer temperature was 68°C.

### Clause 15 – Short-circuit and overload protection – see comment 5 on page 2

Under maximum overload and output short circuit, the maximum transformer temperature was 72°C.

### Clause 18 – Insulation resistance and electric strength – Fail

(excluding humidity treatment)

The measured insulation resistance between hazardous live parts and the power supply body was >100GΩ.

The measured insulation resistance between input circuits and output circuits was >100GΩ.

The unit met the dielectric strength test requirements of this clause with 3,640V~ applied between hazardous live parts and the power supply body with no breakdown. However with the dielectric strength test applied between input and output circuits, the insulation broke down at 3,000V~.

### Clause 21 – Internal wiring – Fail

The Live and Neutral wires connecting the PCB to the plug pins were attached to the plug pins by solder only, with no secondary securement. Should a wire break free, its movement could result in a hazardous mains voltage being applied to the low voltage secondary circuit.

### Clause 26 – Creepage distances, clearances and distances through insulation – Fail

The required separation from live parts to accessible parts and to the secondary circuit is a minimum clearance distance of 4.5mm and a minimum creepage distance of 4.8mm (based on 240V operation).

The measured creepage/clearance distance from live parts to accessible parts (the body of the PSU) was >6.7mm.

From live parts to the secondary circuit on the PCB, the measured creepage distance was 5.5mm and the measured clearance distance was 3.2mm.

The measured creepage/clearance within the mains transformer (live parts to secondary circuit) was 1.4mm.

### Other:

Under output short circuit test – external bench over current trip operated due to excessive current flow. Internal component damage observed.

## Conclusion

The submitted power supply unit ID07 failed to meet the requirements of the clauses tested, as detailed above.

## Sample ID:08

As received observations: One of the enclosure securing screws was missing with the thread for this screw damaged.  
The Plastic Earth Pin was broken off.

## Results

### Clause 8 – Marking and other information – Fail

The unit was marked 'class 2' with no class II symbol as required by sub-clause 8.11).

### Clause 14 – Heating – see comment 5 on page 2

Under normal operation the measured enclosure temperature was 44 °C.

Under normal operation the measured transformer temperature was 62 °C.

### Clause 15 – Short-circuit and overload protection – see comment 5 on page 2

Under maximum overload and output short circuit, the maximum transformer temperature was 62 °C.

### Clause 18 – Insulation resistance and electric strength – Fail

(excluding humidity treatment)

The measured insulation resistance between hazardous live parts and the power supply body was >100GΩ.

The measured insulation resistance between input circuits and output circuits was >1.3GΩ.

The unit met the dielectric strength test requirements of this clause with 3,640V~ applied between hazardous live parts and the power supply body with no breakdown. However with the dielectric strength test applied between input and output circuits, the insulation broke down at 2,500V~.

### Clause 21 – Internal wiring – Fail

The Live and Neutral wires connecting the PCB to the plug pins were attached to the plug pins by solder only, with no secondary securement. Should a wire break free, its movement could result in a hazardous mains voltage being applied to the low voltage secondary circuit.

### Clause 26 – Creepage distances, clearances and distances through insulation – Fail

The required separation from live parts to accessible parts and to the secondary circuit is a minimum clearance distance of 4.5mm and a minimum creepage distance of 4.8mm (based on 240V operation).

The measured creepage/clearance distance from live parts to accessible parts (the body of the PSU) was >7mm.

The measured creepage/clearance distance from live parts to the secondary circuit on the PCB was 3.3mm.

The measured creepage/clearance within the mains transformer (live parts to secondary circuit) was 0.7mm.

### Other:

Under output short circuit test – external bench over current trip operated due to excessive current flow. Internal component damage observed.

## Conclusion

The submitted power supply unit ID08 failed to meet the requirements of the clauses tested, as detailed above.



## Sample ID:09

As received observations: None.

## Results

### Clause 8 – Marking and other information – Pass

The unit met the requirements of this clause.

### Clause 14 – Heating – see comment 5 on page 2

Under normal operation the measured enclosure temperature was 61 °C.

Under normal operation the measured transformer temperature was 100 °C.

### Clause 15 – Short-circuit and overload protection – see comment 5 on page 2

Under maximum overload and output short circuit, the maximum transformer temperature was 100 °C.

### Clause 18 – Insulation resistance and electric strength – Fail

(excluding humidity treatment)

The measured insulation resistance between hazardous live parts and the power supply body was >100GΩ.

The measured insulation resistance between input circuits and output circuits was >100GΩ.

The unit met the dielectric strength test requirements of this clause with 3,640V~ applied between hazardous live parts and the power supply body with no breakdown. However with the dielectric strength test applied between input and output circuits, the insulation broke down at 3,640V~, the sample under test did not withstand the applied voltage for 1 minute. The unit passed this test at 3,000V~ for 1 minute.

### Clause 21 – Internal wiring – Fail

The Live and Neutral wires connecting the PCB to the plug pins were attached to the plug pins by solder only, with no secondary securement. Should a wire break free, its movement could result in a hazardous mains voltage being applied to the low voltage secondary circuit.

### Clause 26 – Creepage distances, clearances and distances through insulation – Fail

The required separation from live parts to accessible parts and to the secondary circuit is a minimum clearance distance of 4.5mm and a minimum creepage distance of 4.8mm (based on 240V operation).

The measured creepage/clearance distance from live parts to accessible parts (the body of the PSU) was >7mm.

The measured creepage/clearance distance from live parts to the secondary circuit on the PCB was 5.3mm.

The measured creepage/clearance within the mains transformer (live parts to secondary circuit) was 1.1mm.

### Other:

No markings on the capacitor across primary to secondary barrier – this is required to be a Y1 capacitor.

## Conclusion

The submitted power supply unit ID09 failed to meet the requirements of the clauses tested, as detailed above.

## Sample ID:11

As received observations: Unit not functioning – no output voltage.

## Results

### Clause 8 – Marking and other information – Pass

The unit met the requirements of this clause.

### Clause 14 – Heating – Test not conducted, unit not functioning

### Clause 15 – Short-circuit and overload protection – Test not conducted, unit not functioning

### Clause 18 – Insulation resistance and electric strength – Fail

(excluding humidity treatment)

The measured insulation resistance between hazardous live parts and the power supply body was  $>100\text{G}\Omega$ .

The measured insulation resistance between input circuits and output circuits was  $>100\text{G}\Omega$ .

The unit met the dielectric strength test requirements of this clause with  $3,640\text{V}\sim$  applied between hazardous live parts and the power supply body with no breakdown. However with the dielectric strength test applied between input and output circuits, the insulation broke down at  $2,000\text{V}\sim$ .

### Clause 21 – Internal wiring – Pass

The unit met the requirements of this clause.

### Clause 26 – Creepage distances, clearances and distances through insulation – Fail

The required separation from live parts to accessible parts and to the secondary circuit is a minimum clearance distance of 4.5mm and a minimum creepage distance of 4.8mm (based on 240V operation).

The measured creepage/clearance distance from live parts to accessible parts (the body of the PSU) was  $>7\text{mm}$ .

The measured creepage/clearance distance from live parts to the secondary circuit on the PCB was 5.8mm.

The measured creepage/clearance within the mains transformer (live parts to secondary circuit) was 1.6mm.

### Other:

The capacitor across the barrier primary to secondary is a Y2 capacitor, this is required to be a Y1 capacitor.

## Conclusion

The submitted power supply unit ID11 failed to meet the requirements of the clauses tested, as detailed above.

## Sample ID:12

As received observations: None.

## Results

### Clause 8 – Marking and other information – Pass

The unit met the requirements of this clause.

### Clause 14 – Heating – see comment 5 on page 2

Under normal operation the measured enclosure temperature was 56°C.

Under normal operation the measured transformer temperature was 105°C.

### Clause 15 – Short-circuit and overload protection – see comment 5 on page 2

Under maximum overload and output short circuit, the maximum transformer temperature was 105°C.

### Clause 18 – Insulation resistance and electric strength – Fail

(excluding humidity treatment)

The measured insulation resistance between hazardous live parts and the power supply body was >100GΩ.

The measured insulation resistance between input circuits and output circuits was >100GΩ.

The unit met the dielectric strength test requirements of this clause with 3,640V~ applied between hazardous live parts and the power supply body with no breakdown. However with the dielectric strength test applied between input and output circuits, the insulation broke down at 2,000V~.

### Clause 21 – Internal wiring – Pass

The unit met the requirements of this clause.

### Clause 26 – Creepage distances, clearances and distances through insulation – Fail

The required separation from live parts to accessible parts and to the secondary circuit is a minimum clearance distance of 4.5mm and a minimum creepage distance of 4.8mm (based on 240V operation).

The measured creepage/clearance distance from live parts to accessible parts (the body of the PSU) was 5.6mm.

The measured creepage/clearance distance from live parts to the secondary circuit on the PCB was 1.4mm.

The measured creepage/clearance within the mains transformer (live parts to secondary circuit) was 0mm.

### Other:

The power supply unit has the facility to fit alternate mains plug pins. These alternate plug pins are removable by hand (without the use of a tool). With only the plug pins inserted into a main socket outlet, both the live and neutral terminals are accessible.

The capacitor across the barrier primary to secondary is a Y2 capacitor, this is required to be a Y1 capacitor.

## Conclusion

The submitted power supply unit ID12 failed to meet the requirements of the clauses tested, as detailed above.

## Sample ID:14

As received observations: None.

## Results

### Clause 8 – Marking and other information – Fail

The unit was not marked with a manufacturer name or trade mark as required by sub-clause 8.1i).  
The unit was not marked with the class II symbol as required by sub-clause 8.1l).

### Clause 14 – Heating – see comment 5 on page 2

Under normal operation the measured enclosure temperature was 47°C.  
Under normal operation the measured transformer temperature was 75°C.

### Clause 15 – Short-circuit and overload protection – see comment 5 on page 2

Under maximum overload and output short circuit, the maximum transformer temperature was 93°C.

### Clause 18 – Insulation resistance and electric strength – Fail

(excluding humidity treatment)

The measured insulation resistance between hazardous live parts and the power supply body was >100GΩ.

The measured insulation resistance between input circuits and output circuits was >100GΩ.

The unit met the dielectric strength test requirements of this clause with 3,640V~ applied between hazardous live parts and the power supply body with no breakdown. However with the dielectric strength test applied between input and output circuits, the insulation broke down at 2,000V~.

### Clause 21 – Internal wiring – Fail

The Live and Neutral wires connecting the PCB to the plug pins were attached to the plug pins by solder only, with no secondary securement. Should a wire break free, its movement could result in a hazardous mains voltage being applied to the low voltage secondary circuit.

### Clause 26 – Creepage distances, clearances and distances through insulation – Fail

The required separation from live parts to accessible parts and to the secondary circuit is a minimum clearance distance of 4.5mm and a minimum creepage distance of 4.8mm (based on 240V operation).

The measured creepage/clearance distance from live parts to accessible parts (the body of the PSU) was >7mm.

The measured creepage/clearance distance from live parts to the secondary circuit on the PCB was 1.5mm.

The measured creepage/clearance within the mains transformer (live parts to secondary circuit) was 1.0mm.

### Other:

Following short circuit of the output, component damage within the power supply was observed. The capacitor across the barrier primary to secondary is marked '102 1kV' – no other marking was present, this is required to be a Y1 capacitor.

## Conclusion

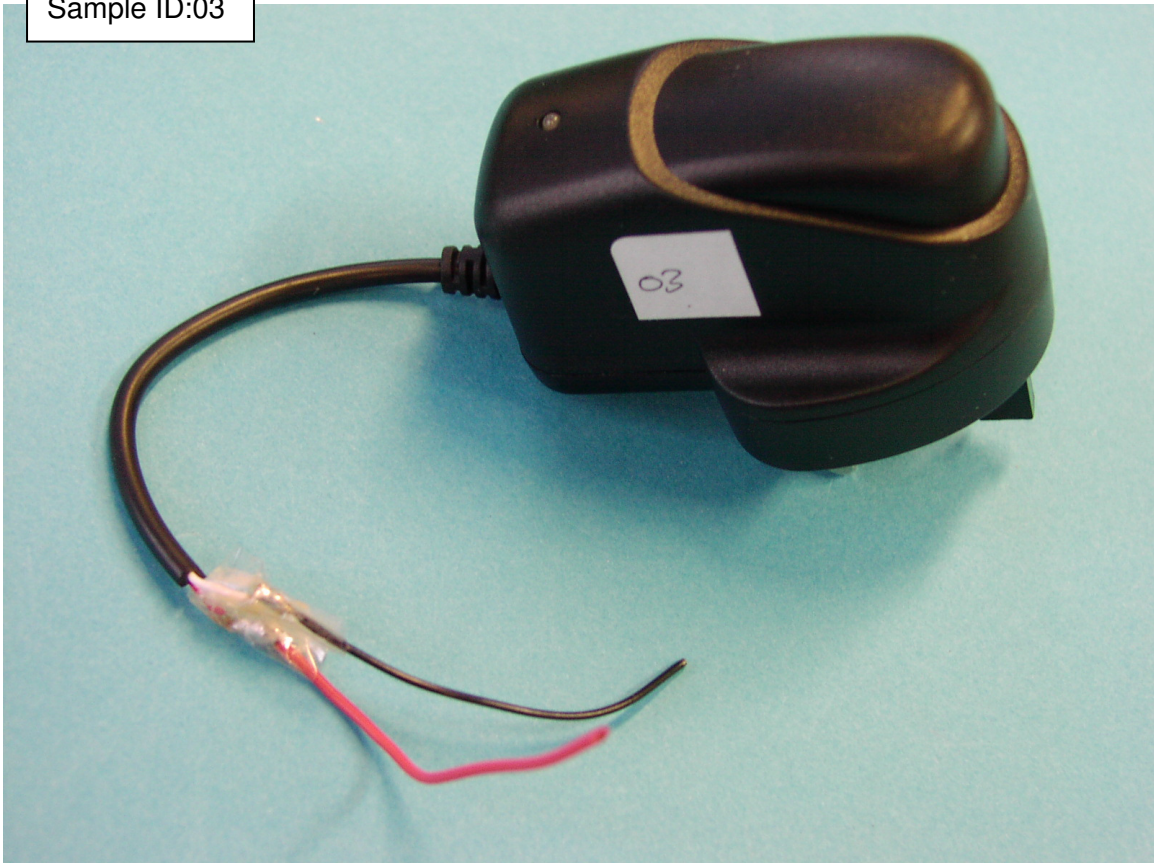
The submitted power supply unit ID14 failed to meet the requirements of the clauses tested, as detailed above.

PHOTOGRAPHS

Sample ID:02



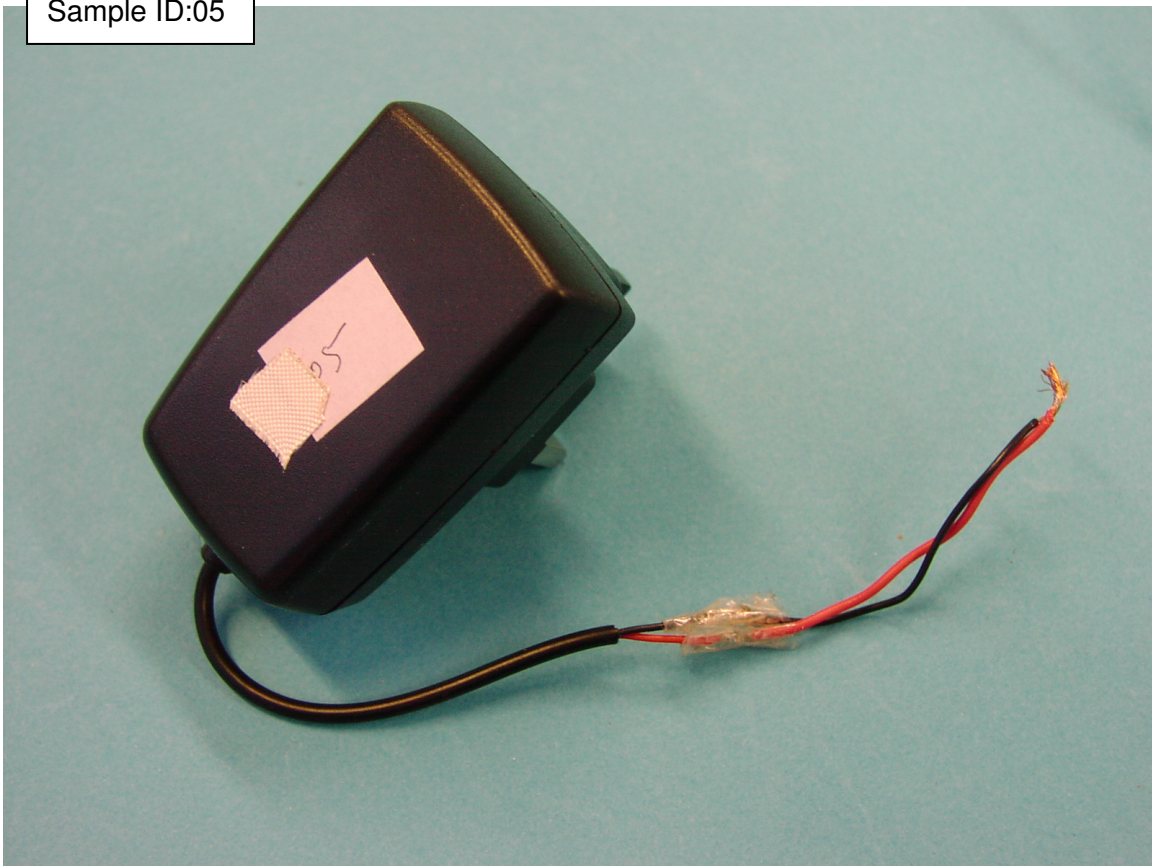
Sample ID:03



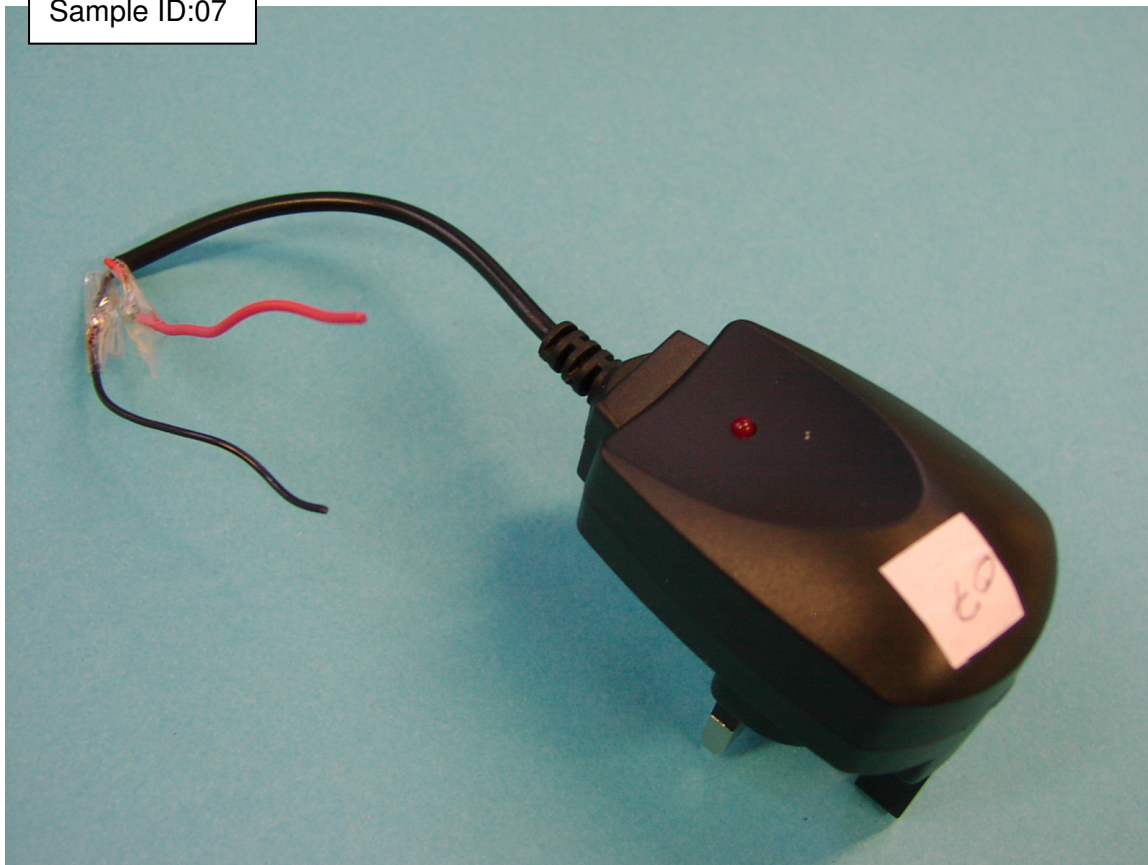
Sample ID:04



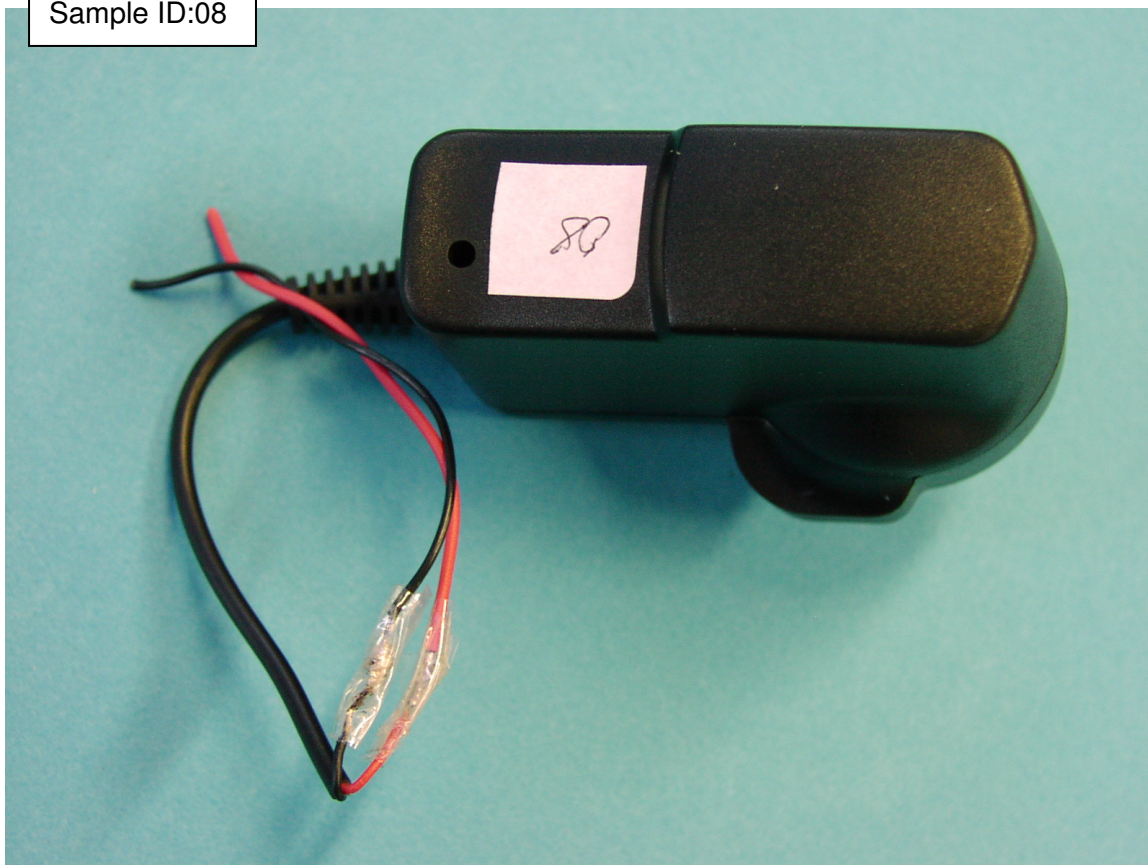
Sample ID:05



Sample ID:07

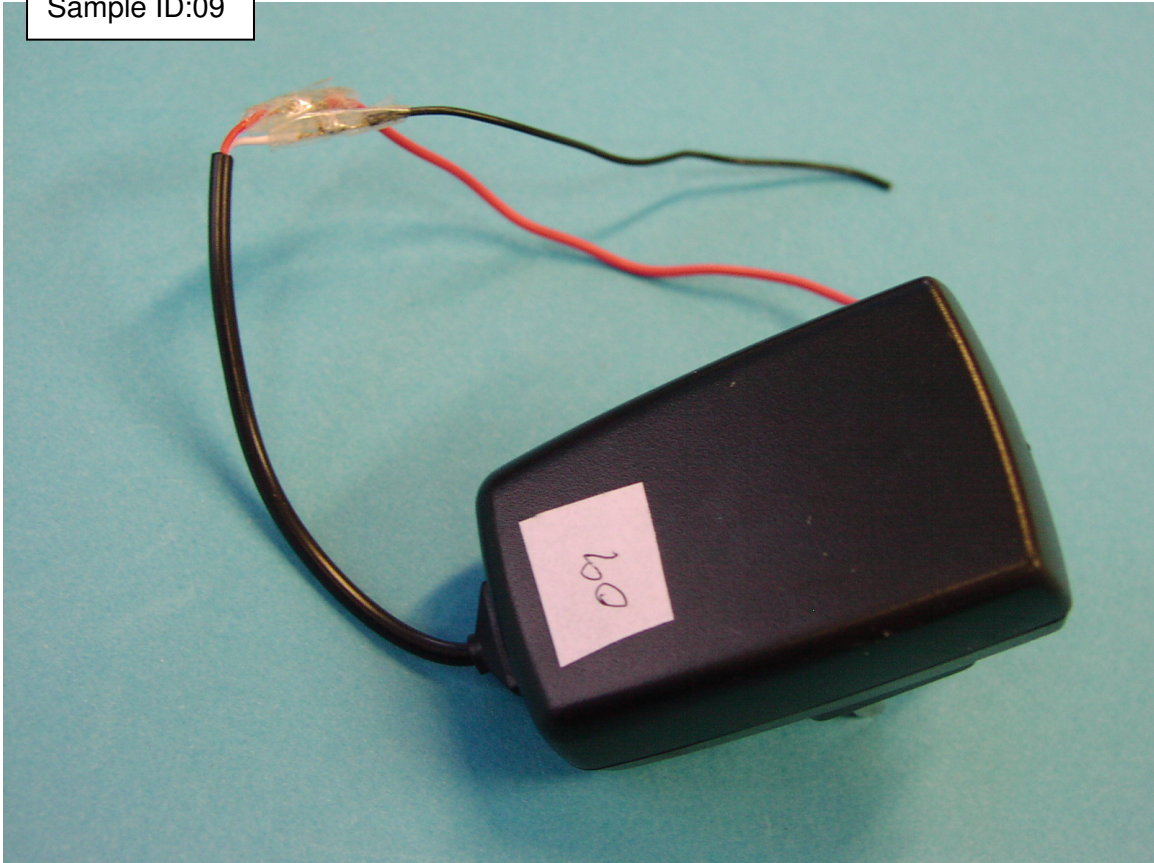


Sample ID:08





Sample ID:09



Sample ID:11



Sample ID:12



Sample ID:14

