

Portable Appliance Testing

By G8MNY

(Updated Jun 09)

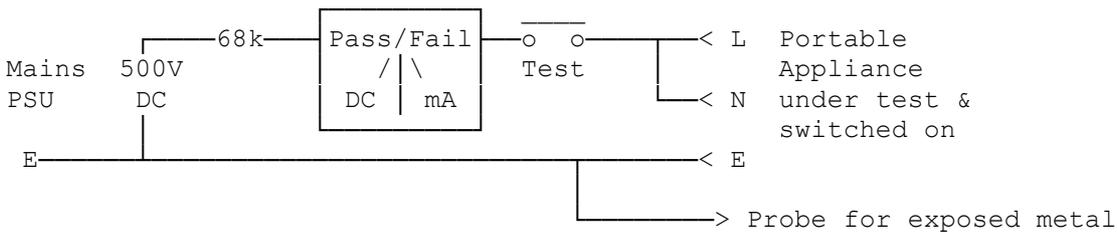
(8 Bit ASCII Graphics use code page 473 or 850)

In the UK all commercially used portable mains equipment has to be tested to ensure it meets basic electrical safety tests.

The 2 basic tests on a 13 Amp plug & test probe are:-

1/ VOLTAGE

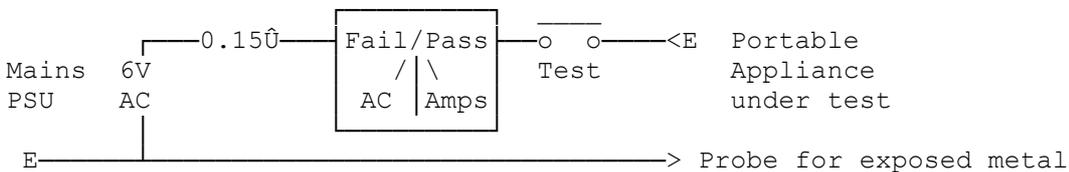
Resistance of Live & Neutral to Earth > 500kΩ @ 500V (DC voltage > 2x RMS). This test ensures the mains insulation is not too damp or about to break down. A basic test arrangement might look something like this..



2/ EARTH CURRENT

Earth case Bond current test up to 25 Amps (>1.5x fuse rating) with a low voltage (e.g. 6V) this equates to a 0.1Ω lead R. This test ensures the earth wiring can withstand the full fault condition fuse rupturing current. (e.g. not earthing with a few strands of wire, that would pass simple CONTINUITY TEST)

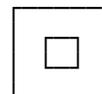
A basic test arrangement might look something like this..



More complex testers will measure the values & have different ratings for more delicate & lower fuse rated items. See DANGERS below.

Some testers do a high voltage flash test (e.g. 3kV) to ensure the mains circuit insulation is adequate (e.g. unearthed TV). Also a standard "SMALL FINGER" type probe may be used to simulate what could be accessed by a child.

(From Harry M1BYT) These test would normally be used on equipment described as "DOUBLE INSULATED", marked by a square box within a square box symbol.



The flash test is done between any exposed metal on the appliance & the mains lead. For instance - testing a double insulated electric drill, you would place the flash test probe on the drills chuck, with the drill plugged into the instrument. That would confirm that the chuck is adequately insulated from the mains & that it could not become live.

The term "double insulated" refers to there being two effective insulating barriers between any mains wiring or live parts & exposed metal work. Insulation between the windings of the motor & the shaft plus a second barrier in the form of nylon gearing + case before the steel chuck.

DANGERS

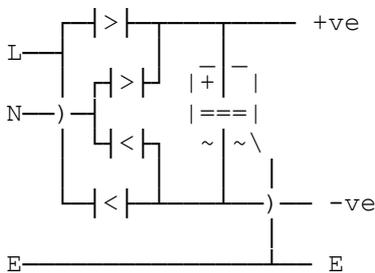
As you can appreciate these tests can be dangerous for some types of equipment. For instance many electronic items (PC, Audio & Video Mixers, etc.) do not have 25A current carrying capacity PCB earth tracks to all of their exposed metal parts, then PCB earth tracks & fine wires & connectors can BE DAMAGED or even VAPORISED!

FALSE READINGS

Items that run hot like irons & kettles must have there insulation tested when cold & when hot, for the test to have any meaning.

Some items can fail a test due to false testing concepts. e.g. A long 13A mains lead wound on a steel winding drum, can fail the earth bond test (as above) when the wire is coiled, but pass when unwound, due to the increase in inductance of the cable on the steel drum.

Smoothing Capacitor faults like framing on an electrolytic that caused high earth capacitive leakage currents (>100mA) that can be difficult to locate...



An insulation fault causes the metal case to earth. It is normally at -ve, but only via an electrolytic effect inside the case. A DC megger test to earth showed all was OK !

See my bul on "Earths", "Constant Voltage Transformers", "Edgcume Peebles Earth Loop Z", "Maplin Mains Meter 2000MU-UK", & also "Mains Power Protection".

Why Don't U send an interesting bul?

73 de John G8MNY @ GB7CIP