Production Line Ground Bond Testing with the OMNIA II

Introduction

Most electrical product manufacturers are familiar with basic Ground Continuity test requirements. This is due to the fact that safety agency specifications generally require a **Ground Continuity test** to be performed as a 100% production line test (a test that must be performed on all manufactured units before shipment). This low voltage, low current test usually consists of a small DC voltage source, a simple measuring circuit, and a PASS/FAIL indicator (See Figure 1 below).

Figure 1: A Simple Continuity Tester

While the Ground Continuity test is a great way to verify the *existence* of a path to ground, it does nothing to verify the *integrity* of an electrical product's earth ground conductor. Due to the dangerous fault currents that can be present in an electrical product as a result of an insulation breakdown, the integrity of the ground conductor is arguably just as important as the existence of it

With advances in automation technology, a growing trend is taking place amongst electrical product manufacturers: adoption of the **Ground Bond test** in a production line environment. While generally specified by safety agency standards as a design or type test, the Ground Bond test verifies both the existence and integrity of an electrical product's ground conductor. Thus a Ground Bond test that elicits a PASS condition helps to assure operators that the DUT has not only

a low impedance path to ground, but also a ground conductor that will be able to handle the fault current that is likely to be sent though it.

Ground Continuity Limitations

As mentioned above, an important shortcoming of the **Ground Continuity test** is that it fails to verify the *integrity* of the earth ground conductor. Since the earth ground conductor is tied directly to the chassis of a Class I product (a product with a metallic enclosure, usually terminated in a three-prong plug) it should be robust enough to direct any fault current back to ground in case of an insulation failure. While the Ground Continuity test indicates that this connection exists, a Ground Continuity PASS condition alone doesn't justify whether or not the wire is capable of handling the current it is meant to conduct. For example, a single strand of copper wire with one end terminating on a product's metal chassis and the other end connected to earth will PASS a Ground Continuity test, but will likely melt when subjected to substantial fault current.

What kind of fault currents could potentially pass through this wire? Many household time-delay fuses and circuit breakers can handle up to a 200% current overload condition for as long as two minutes. So it is follows that the earth ground conductor on any electrical product operating under utility power should be capable of handling the same condition. Failure to handle this type of fault current can cause multiple concerns for end-users, including potential fire hazards or electrical shock hazards. The Ground Continuity test alone does not provide the information necessary to determine if an electrical product is safe for day-to-day use.

Why Perform a Ground Bond Test?

The Ground Bond test provides the current level needed to ensure a product's earth ground conductor can handle any fault current likely to be imposed on it. In fact, most Ground Bond tests are specified to be performed at two times the rating of a product's fuse or branch circuit for up to two minutes (generally between 25A-40A). Testing under these conditions not only verifies the *existence* of a continuous earth ground conductor, but also verifies the *integrity* of that conductor.

Electrical product manufacturers are beginning to realize the benefits that a Ground Bond test offers and thus incorporate this test on their production line test routines as well as in the laboratory. While a potential shortcoming of the Ground Bond test is the increased test time, advances in automation technology in the electrical safety testing industry are making production line Ground Bond testing quicker and easier than ever.

OMNIA II and the Ground Bond Test

Associated Research, Inc.'s OMNIA II family of electrical safety compliance analyzers (see Figure 2 below) offers several features that can increase throughput on the production line

despite the longer test times often required by Ground Bond test safety standards. When combined with the peace of mind that the Ground Bond test provides to electrical
product manufacturers, the OMNIA II's productivity-increasing features make the decision to incorporate a Ground Bond test on the production line an easy one.

Figure 2: OMNIA II Model 8204 Electrical Safety Compliance Analyzer

A True One Box Solution

The OMNIA II is a true one-box testing solution. This means that operators can setup and perform tests without the need for multiple pieces of test equipment. Whether programming the instrument from the front panel or remotely via a PC interface, setting up a Ground Bond test to perform along with other relevant tests

applicable to a specific application is quick and easy. There is no need to stop the test routine in order to make time-consuming additional connections from the instrument to the DUT. This makes it easy to add a Ground Bond test to any pre-existing test routine or create an entirely new test routine that incorporates all required electrical safety tests.

DualCHEK®

The OMNIA II family includes Associated Research's exclusive DualCHEK® feature, which allows the operator to perform a Ground Bond test and a Hipot test simultaneously. DualCHEK® combines an AC Ground Bond test with an AC Hipot test and executes the tests at the same time in order to satisfy the most common test requirements as called out by electrical product safety standards. Utilizing the DualCHEK® feature will drastically reduce overall test time for customers with time-sensitive production line requirements by combining the two most common electrical safety tests into a single, more efficient test.

Summary

Performing a Ground Bond test on the production line will help electrical product manufacturers ensure that all products shipped from the factory meet the highest safety standards. This provides manufacturers with the peace of mind that they are utilizing the safest method of testing an electrical product's earth ground conductor. Further, implementation of the Ground Bond test on the production line will help to prevent customer injury and warranty repair claims. While test operators using traditional test equipment had to sacrifice productivity (longer test times) for safety (assurance of the integrity of the DUT's earth ground conductor), modern day test equipment such as the OMNIA II can actually improve throughput while enabling test operators to use the Ground Bond test on the production line.