

Ground Bond, Ground Continuity and Earth Continuity

What are these tests and what are the differences between them? Ground tests on electrical devices are mandated by product safety standards to protect anyone coming in contact with the product from electrical shock. Common sense would dictate that if a person walks up to an electrical product and touches it, they should not be shocked. The product should be properly grounded so that it retains no residual charge.

Ground Continuity

A Ground Continuity (GC) test checks that there is a connection between exposed conductive parts and the ground of the power cord on the product being tested. GC testing is required on all corded products in accordance with UL standards and recommendations. This test can be performed with either an AC or DC test signal and is generally performed at low current levels. If an AC signal is used the test is identical to a ground bond or earth continuity test with the exception that the testing is at a low current level typically less than 1 Amp. The DC test can be performed with a simple ohmmeter, battery and light/buzzer or milliohmmeter and just checks to insure there is a connection between ground and any exposed metal. This does **not** verify the integrity of the ground under an actual fault condition where the ground connections may have to handle 20 or 30 amps until a fuse blows or circuit breaker trips.

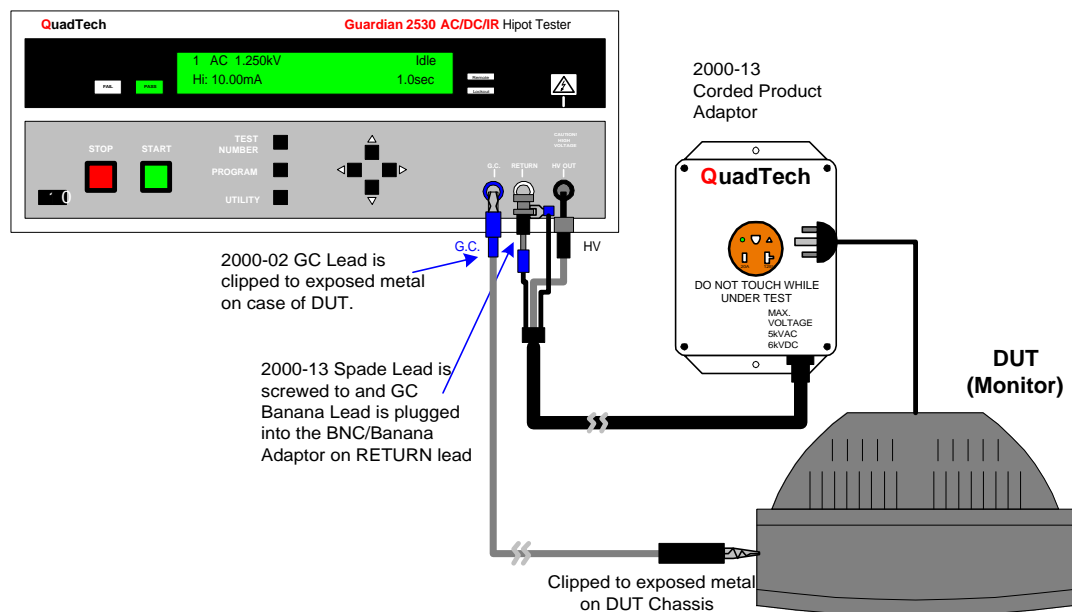


Figure 1: Ground Continuity Test Connection to DUT

Ground Bond and Earth Continuity

Ground Bond and Earth Continuity tests verify the integrity of the ground connection between exposed metal and the ground of the power cord under **high** current conditions. The resistance between all accessible metal parts and the ground blade of the power cord is measured under high currents. The test is performed using an AC test signal at line frequency 50 or 60Hz, less than 12V and current levels of 10A, 25A or 30A. The measured resistance on a good product is typically less than 1Ω so it is important to account for resistance in fixtures and test leads being used for testing. To determine the amount of lead resistance present, short the test leads together and measure the resistance. The lead resistance is then subtracted from subsequent measurements. An offset feature is available on most ground bond testers that automatically subtracts lead resistance from the measurements. The use of high current provides a better simulation of how the ground on the device would perform under **actual** conditions if the motor or wiring were to short to ground. This verifies that the grounds in the device can handle 25 or 30 amps until a circuit breaker trips or fuse blows. Most European standards such as TÜV, IEC, VDE, BABT and CSA require this type of testing.

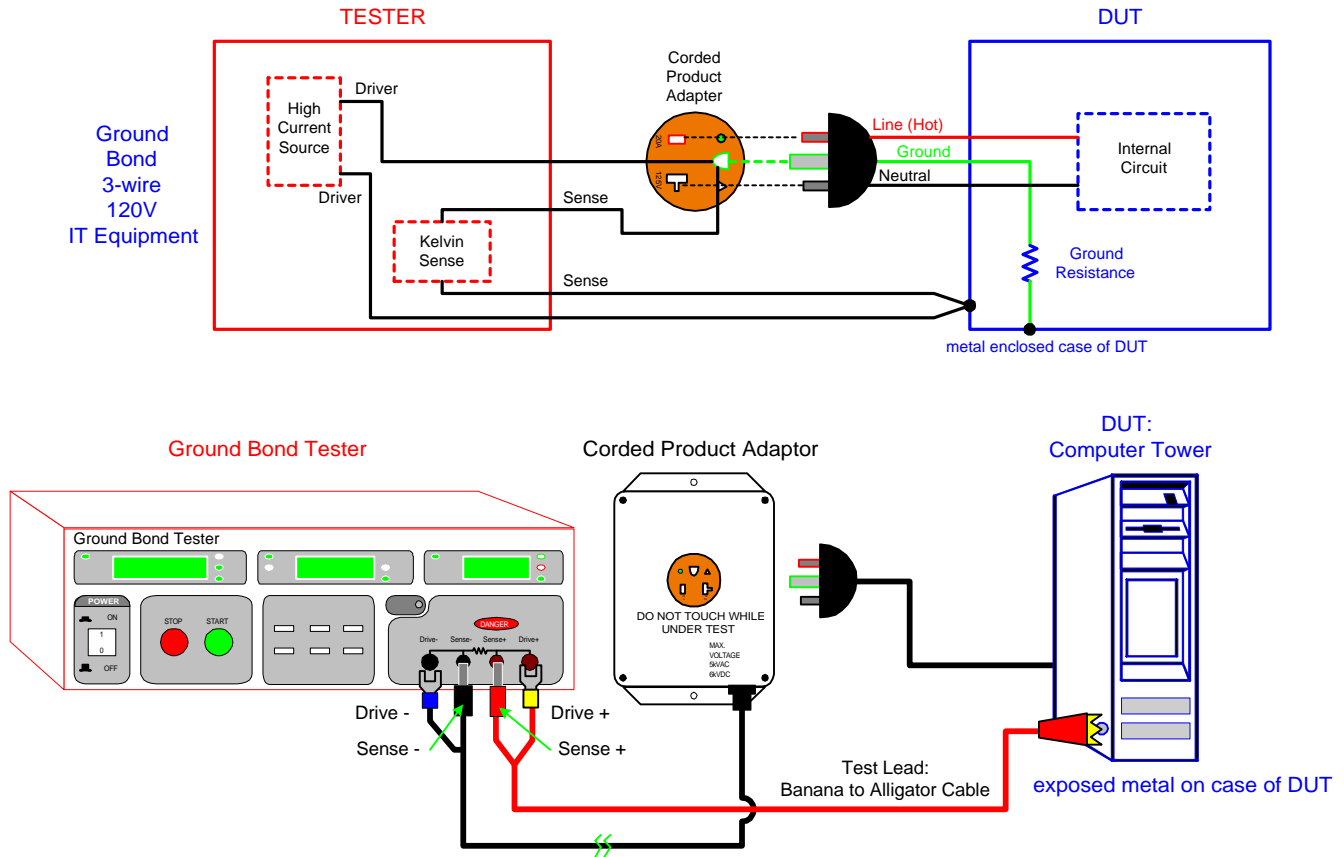



Figure 2: Ground Bond Test Connection to DUT

Summary

Ground Bond and Earth Continuity tests measure resistance using an AC signal at high current levels to verify the integrity of the ground connection. A Ground Continuity test measures resistance using either a DC or AC signal and is performed at low current levels typically under 1A to check that there is a connection. Table 1 lists QuadTech electrical safety testers that can perform ground continuity and/or ground bond measurements.

Table 1: QuadTech Electrical Safety Testers

<p>Sentry Plus AC/DC/IR Hipot Testers Ground Continuity Measurement: Programmable Ground Continuity: 0.1Ω-5Ω, ±0.2Ω Current: 0.1A or OFF Measure & Display Resistance Value</p>	
	<p>Guardian 1000 Series AC/DC/IR Hipot Testers Ground Continuity Check: Check Resistance between ground blade of power cord and exposed metal on DUT is <1Ω.</p>
<p>Guardian 2500 Series AC/DC/IR Hipot Testers Ground Continuity Check: Test Current: 100mA DC Range: 10mΩ – 10Ω in 1mΩ steps</p>	
<p>Guardian 6000 Series Electrical Safety Analyzer Ground Continuity Check & Ground Bond Measurement: Ground Continuity Check <1Ω Ground Bond Measurement: Output Current: 1A – 30A AC, Voltage: 6-15V AC Resistance: 0.1mΩ – 510.0mΩ</p>	
<p>Sentry 50 High Current Ground Bond Tester Ground Bond Measurement: Output Current: 1A – 30A AC Voltage: 6.0V – 15V, 0.01V/step Resistance: 0.1mΩ – 510.0mΩ, Set High & Low limits Display Current, Voltage & Resistance</p>	

For complete product specifications on the Guardian 6000 Series Electrical Safety Analyzers or any of QuadTech's products, visit us at <http://www.quadtech.com/products>. Call us at 1-800-253-1230 or email your questions to info@quadtech.com.

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