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Earth testers have undergone a fundamental redesign
with users' needs given priority

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Title	Earth testers have undergone a fundamental redesign with users' needs given priority
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Abstract	The latest earth testers were designed after intensive research, observing the challenges that field engineers have had to put up with. The critical issues have been addressed, and you can now get earth testers with increased user safety and providing huge savings in time and aggravation.

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The oval design of the DET14C and DET24C is particularly suited to confined and awkward spaces.

For many years, stakeless or clamp-on testing has been accepted as an established method of testing earth system resistance, and is now included in the German standard VDE 0100-600:2008 (appendix B3). This method has a number of real user benefits, in particular not having to disconnect the electrode under test, increased user safety and huge savings in time and aggravation. However, many users are failing to enjoy the benefits of stake-less testing, and that's mainly down to two main issues. Firstly many potential users do not fully understand the testing technique, and avoid it; secondly many people have found some problems when testing, resulting in a number of concerns.

The first issue is easy to solve when you know where to go. You can find forums and micro-sites to help with many of these problems, or you could phone one of Megger's regional technical support offices. Easy, if you have time to stop your work and do the research!

The second issue is not so easily fixed. Problems experienced in actual testing are often caused by the abilities – or inadequacies - of the test equipment. Let's take a look at these concerns and see how we can eliminate or maybe get round them. For obvious reasons, most users have safety as their primary concern. In substation environments, the stakeless testing method may be the only method available to you. But what happens if you are holding the instrument when a massive fault produces a huge transient on the cable that you happen to be clamped around? This could also be a concern to users testing lightning protection; there can be a sudden lightning bolt that could kill you. The other and maybe less obvious hazard will present itself if, for whatever reason, the user has to disconnect one of the electrodes that is being tested. If there is too much current flowing down the electrode when it is disconnected, it will quickly turn into a hazardous voltage.



An example of Clamp-On testing using the DET14C and DET24C

What's the answer? Firstly, choose an instrument with the highest IEC safety category; it will have the best isolation between your hand and whatever you are clamped around. Secondly choose one that has a current measuring range, then you can measure whether there is a hazardous level of current flowing before you disconnect. If you work in a sub-station environment you may also have another concern which many users have no doubt experienced. Noise interference in the form of leakage currents flowing through the electrode under test can result in varying readings or in some cases actually prevent testing completely. In this case the solution is to select an instrument with the highest noise current immunity you can find. Many electrodes are in difficult to access locations; in boxes, pits or are just difficult to reach. What can you do in these situations? Your choice of instrument will directly influence your success in such situations.

Choosing a clamp with a large jaw capacity is not just about the size of cable it can clamp around, it will also provide a better angle of approach. Also, look at the instrument's body length. The longer it is, the more instrument there is to accommodate down an electrode pit. Another feature that will help with access is to have a jaw head that is slimmer in profile, and a backlit display will surely help too, especially in substation basements. Lets recap and talk about clamp capacity. The challenge isn't always to clamp around the large size of cables, as there may also be a requirement to clamp around flat earth tapes. In many cases these flat tapes have to be pried from walls, so a smaller section clamp will help. However these tapes are getting bigger, and in some locations such as on earth systems used on ~400 kV supplies they can be 50 mm x 10 mm. That really limits your choice of how to test. The other burning issue is reliability. Earth testing clamps get used in tough environments and are often used in remote locations such as on utility pole electrodes.

Many instruments have interlocking laminations (or interlocking teeth as they are often referred to). These 'teeth' are easily damaged and collect dirt which can either produce errors in measurement, or render the instrument useless and awaiting a trip to the repair shop. The answer is to use an instrument with smooth mating jaw surfaces. That sounds obvious but it is often overlooked. Also carefully check the instrument's battery life and check that there are readily available batteries in the location where you will be working. In a remote area, this could be a real concern to the user. Stakeless testing has real advantages and specifying the right instrument will really help get the best out of the method.

Megger's new range stakeless testers were specifically designed to overcome the problems outlined in this article. The new DET14C and DET24C have these new features:

- CATIV 600 V safety, with 8 kV of transient isolation
- Auto hazardous current warning even on the resistance range, giving you peace of mind, and no need to worry about remembering to measure it.
- Auto noise filter to provide the best of immunity to noise current
- Unique elliptical shape head with a 37 mm x 55 mm capacity and slim profile which provides excellent access and can clamp around a 50 mm x 10 mm earth tape
- Smooth mating jaw surfaces which are easy to clean and have no teeth to bend
- Huge battery life from readily available AA batteries, which last 24 hours with a 25 Ω load
- Pre-hold function which automatically initiates a test when clamped around an electrode, then holds the reading for reviewing when removed from the electrode.
- Backlit display

With all these ground test auto functions, you could find your worstproblems just go away!



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