

## Testing generator winding insulation—by way of the “megging” process—is a wise addition to your maintenance schedule.

**INSULATION TESTING OF YOUR** generator windings is a data acquisition method that—if completed during regular maintenance cycles—can help you understand the health of your equipment.

A good part of a wind turbine technician’s time is spent checking, lubricating, and inspecting mechanical components. The repetition of these actions helps them notice when something is not in line with the normal status of these services.

Electrical components within the turbine require the same type of attention. A potential silent failure may be waiting within your turbine that could be anticipated with the use of some simple data collection. That data is obtained by performing insulation testing of your generator and motor windings.

Electrical insulation on your inductors performs a very important task of keeping the current within the proper circuit. When electrical insulation fails, a short circuit may occur, leading to a violent explosion and destruction of components. Inspecting the insulation quality of your generator and other motors is now easier than ever, and the data collected may help you decide where to spend your money in a controlled and planned manner. This inspection process is easily achieved with the use of a mega ohm meter—commonly referred to as a “megger.” This meter is able to measure high resistance values, and does so by using a high voltage to look for stressed and weakened areas of insulation on the windings of the conductors that comprise a generator or motor or other inductor.

The process of “megging” a generator or motor is the same. Remember, these test are performed with no power, other than that provided by the mega ohm tester.

To perform the test, first disconnect all electrical power and isolate the inductor. Make the system safe to work on with no power present per your company’s safety policies for electrical systems. Next, disconnect the generator power conductors and isolate the generator stator windings and perform the test per your test meter. If the disconnection point is done in the terminal box of the generator, then a visual and smell test can be made of the generator connections also. This allows the technician to get familiar with the normal sights and smells within this component’s

electrical connection box (This action alone may save you a surprise event should something abnormal be found). This same test should be performed on wound rotors to get information on the health of the insulation of the inductors comprising the generator rotor. For this part (after ensuring you follow proper electrical safety), you could disconnect the supply cables before or after the slip ring on the rotor. If you have strange readings you may want to isolate the rotor from the slip rings.

The insulation testing tools today are much more sensitive than in the past. Meggers and the process of megging used to be a no-value event, as a good winding would send the indicator needle straight into the “infinity zone.” Any reading less than this would raise an eyebrow as a slightly abnormal event. The mega ohm meters of today now have the capacity to read the actual resistance reading of the winding in terra ohms and may not end up in the infinity zone. This is beneficial because you can have a real starting value to record and track as the test is repeated on an annual schedule.

There are two parts to the simple megger testing. One part of the test is to place the megger into the testing process for one minute and the record that value. This value is called the Insulation Resistance value (also known as the IR). You are looking for a high value resistance reading. The second part of the test is the same, except that the test duration is 10 minutes. This part of the test is called the Polarization Index (also referred to as PI). The PI is formulated as the resistance after 10 minutes divided by the resistance after one minute.

This test helps to determine if there is moisture or other contaminants that may be a reason of concern.

In the past, most meggers were hand-cranked. Ten minutes of hand cranking proved to be difficult and discouraged many from performing the test.

You may be asking yourself: “Do I really need to perform these tests?” The answer really depends on your needs for useful data in your decision making process. Without this data, the quality of the insulation on your inductor windings is unknown. Having this data allows you recognize trends or abnormalities, and can aid in preventing a surprise event. ✍