SENSEMASTER LTD
Sensing, Heating & Anti-static Solutions

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Insulation resistance is a vital safety parameter in every electric heater used for process heating applications.
Ensuring your electric heating systems operate efficiently and safely starts with understanding how to perform and interpret megohm testing.

Why Insulation Resistance Matters in Electric Heaters

All Watlow® electric heaters undergo rigorous insulation resistance testing before leaving the manufacturing plant.
However, during storage and shipping—especially in humid or coastal regions—mineral-insulated heaters (using magnesium oxide or *MgO*) may absorb moisture, which compromises heater performance.
This is especially critical in environments where process heating equipment is stored for long periods or exposed to high ambient humidity.
In such cases, performing a megohm check becomes a critical first step before installing any electric heating element.

The Effects of Moisture on Insulation Resistance

Mineral insulation like magnesium oxide (MgO) is highly effective at insulating wires from the outer sheath at high temperatures, but it's also *hygroscopic* - meaning it attracts and absorbs moisture from the atmosphere.
Once moisture enters the heater:

- The insulation resistance decreases
- The risk of a short-to-ground increases
- Equipment failure, fire, or even explosions can occur in extreme cases

That's why conducting a megohm test is crucial before powering any electric heater, especially in high-humidity regions such as the Gulf Coast, Pacific Northwest, or tropical climates.

What Is a Megohm Test and How to Perform One?

A megohm test, also known as a megohm check, is used to measure the insulation resistance for electric heaters. This simple diagnostic step identifies whether the heater has absorbed moisture and is safe to operate.

Best Practices for Megohm Testing:

- Always use a megohm tester (not just a standard multimeter)
- Perform the test at 500VDC
- A reading of 500 megohms or higher is generally acceptable
- Lower values indicate a "wet heater" and require moisture removal

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This quick test helps prevent costly damage and ensures the electric heater meets safety standards before installation.

How to Fix a Wet Heater: The Heater Bake Out Method

If your megohm test shows low insulation resistance, don't discard the heater. Instead, perform a heater bake out to restore it.

Heater Bake Out Process:

1/ Place the heater in a bakeout oven at 120°C (248°F) for at least six hours
2/ If an oven isn't available, use a Watlow controller with a heater bake out setting
3/ Retest using the megohm tester
4/ Repeat the process as needed (sometimes up to 40 hours) until the insulation resistance returns to acceptable levels

During this process, moisture trapped in the MgO insulation is removed, converting magnesium hydroxide (which forms in wet conditions) back to MgO.

What if the Megohm Value Is Too High?

Great news—there is no such thing as insulation resistance being too high. A high reading in your megohm check simply confirms the heater is dry, safe, and ready for operation.

Final Safety Tips for Electric Heating Installations

- Always test insulation resistance for electric heaters before installation
- Repeat megohm testing for heaters that have been in storage or used in humid environments
- Perform a heater bake out whenever necessary to restore proper function
- Don't risk using a wet heater—safety always comes first in any process heating application