

Adfreeze Stress Laboratory Test

Solar developers are increasingly building projects in regions where seasonal freezing and shallow groundwater can create frost heave conditions that affect foundation performance. To account for potential uplift forces, foundation designs often rely on a conservative industry-default adfreeze stress value. Often, site-specific laboratory testing can support lower design values, helping reduce pile lengths, lower material costs, and improve construction efficiency.

Frost heave is the upward movement of soil that occurs when freezing temperatures and shallow groundwater cause water in the soil to freeze and expand, forming layers of ice known as ice lenses. Adfreeze stress is the capacity of frozen soil to adhere to the surface of foundation piles. As the soil heaves, the ice moves the foundation upward, which can cause structural misalignment.

The current solar industry default adfreeze stress value is 1,500 pounds per square foot (PSF). This default value is often two to three times higher than actual laboratory-tested values. Based on over 30 projects, Terracon's adfreeze stress laboratory tests have resulted in recommended design values of 750 PSF or less, which can yield significant cost savings.



From the time the soil sample from the project site arrives at the Terracon lab, testing is completed and the results are sent back in a report within about 30 days. Testing can include three different surfaces: bare steel, galvanized steel, and steel coated with Sherwin-Williams Poly-Cote™ 110 corrosion barrier protection.

If Terracon serves as the Geotechnical Engineer of Record and performs the design-level exploration, then our geotechnical professionals can also incorporate laboratory test results into the foundation evaluation and recommend a project-specific adfreeze stress value.

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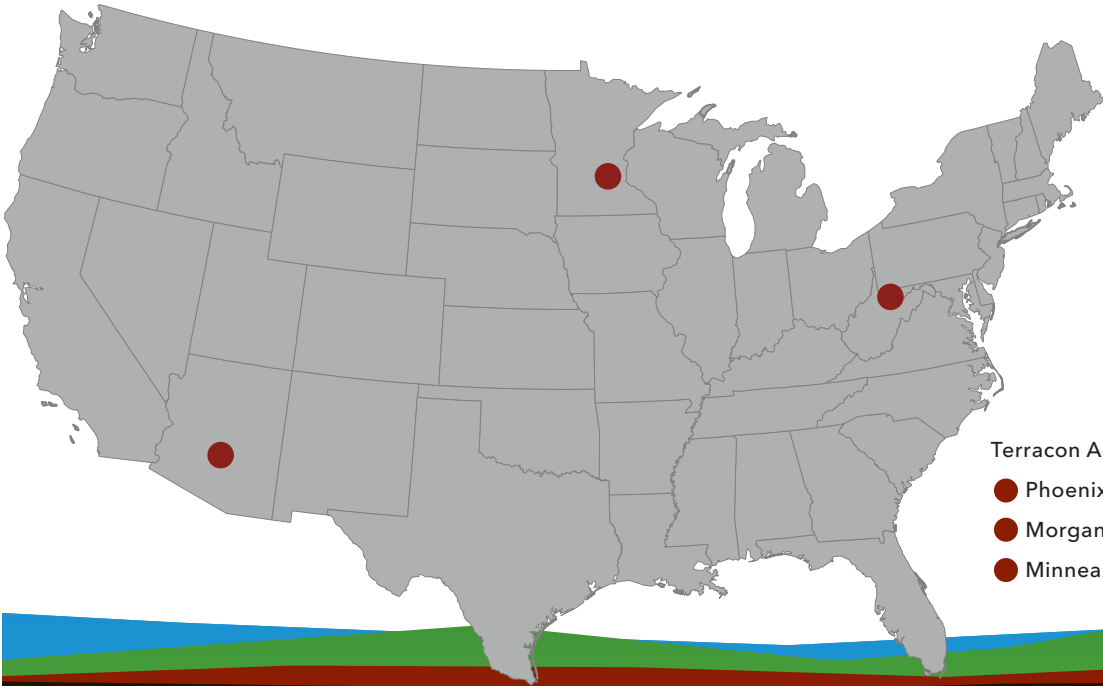
A Million Reasons to Test

Replacing conservative assumptions with site-specific data can unlock significant project savings and efficiencies. Reducing the adfreeze stress value from 1,500 to 750 PSF could produce **\$1 million or more in savings** for a 100 MW solar site.

- **Cost savings**
Reduced pile lengths and pile handling costs
- **Schedule improvement**
Less driving depth leads to faster installs
- **Reduced risk**
Site-specific, data-backed design
- **Sustainability**
Fewer materials, reduced over-design

Adfreeze Stress Testing Locations

Terracon has three laboratories strategically located across the country that can perform adfreeze stress testing. Our professionals combine expertise, sophisticated testing equipment, and a rigorous quality management system to deliver accurate, precise, and prompt results.



Terracon Adfreeze Lab Locations

- Phoenix, AZ
- Morgantown, WV
- Minneapolis, MN



When to Test for Adfreeze Stress

Understanding how frost conditions interact with soils can help optimize foundation design and avoid unnecessary pile embedment. Adfreeze effects become more significant as frost penetrates deeper into the ground, especially where soils provide lower skin-friction resistance.

Frost Penetration Depth	Strong Soils	Weak Soils
Less than 1 ft	Low Need	Consider
1-1.5 ft	Consider	Recommended
Greater than 1.5 ft	Recommended	Strongly Recommended
Greater than 2 ft	Strongly Recommended	Strongly Recommended

