

Setting the new standard in solar power.

Get more loading capacity from your transformers and keep your solar farms operating at their full capacity with FR3® fluid's ability to easily handle difficult harmonics, highly variable load conditions, and extreme heat fluctuations.



More loading capacity

- Keep skids the same size while increasing loading capacity by up to 20%



More reliability to maximize revenue potential

- No maintenance needed under normal operating conditions
- Easily handles high heat with 140°C¹ top fluid temperature limit



Reduce costs

- Reduce transformer size and get the same loading capacity or get up to 20% more loading capacity with the same sized transformer*



More sustainable

- Global Warming Potential (GWP) of zero and carbon neutral
- 100% biodegradable in as little as 10 days



Superior fire safety

- Over 2X higher flash and fire points*
- Zero reported fires in 25+ years

*Compared to a mineral oil filled transformer.

¹According to IEC 60076-14 and IEEE C57-154.



Solar Power FAQs

How can Dual Rated / Sustainable Peak Load transformers help improve my solar application?

FR3® fluid's unique formulation allows for transformers to gain up to 20% loading capacity compared to the same sized mineral oil filled transformers, allowing for more power in the same sized transformer and skid. More and more OEMs and operators are taking advantage of this benefit and specifying FR3 fluid filled transformers to better handle high peak loading conditions without needing to modify or change the design of the skid.

Are there diagnostic tools available for FR3® fluid?

Yes. There is a complete set of standards from both the IEC and IEEE with guidelines for maintenance based on physical-chemical analysis. All the traditional DGA tools such as basic ratios, simplified ratios, and CO₂/CO can be used. Specific Duval Triangles and Pentagons for FR3 fluid are also available to perform a more accurate analysis of generated gases.

Is FR3 fluid miscible with mineral oil?

Yes, FR3® fluid is fully miscible with mineral oil. In a typical retrofit, Cargill would expect to see 3-5% residual mineral oil remaining, which does not significantly impact FR3 fluid's performance.

Cargill recommends that 7% or less of the total fluid be residual mineral oil or FR3 fluid's benefits begin to decline.

Can I retrofit existing transformers with FR3 fluid?

Yes, FR3® fluid can be used to retrofit mineral oil filled transformers. In fact, many solar power installations have been retrofitting mineral oil filled transformers with FR3 fluid in order to improve reliability and reduce unplanned interventions.

Mineral oil has difficulty handling the harmonics and widely varying loading conditions that come with solar power generation, which causes accelerated aging of the insulating fluid.

FR3 fluid is specially formulated to handle high heat and challenging harmonics without accelerated aging of the fluid or insulation system.

How can FR3 fluid help mitigate gassing problems?

Gassing issues in solar farms are generally related with harmonics. High-frequency voltage harmonics lead to partial discharges and generate gasses, mainly hydrogen and methane. FR3 fluid has shown an outstanding performance to withstand these harmonics due to its higher Partial Discharge Inception Voltage (PDIV) that avoids the inception of discharges and its "self-extinguish" behavior that minimizes gassing.

Additionally, its unique formulation was developed to handle high load fluctuations and high heat, with a top fluid temperature that can safely operate at up to 140°C,^{*} which also make the transformer less prone to form sludge due to overheating from current harmonics.

^{*}According to IEC 60076-14, IEEE C57-154.

Learn more about how FR3® fluid can make your transformers more reliable, sustainable and higher performing at [FR3fluid.com](https://www.FR3fluid.com).

