

# Biodegradable insulating fluid based on vegetable oils



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The placing of distribution transformers in ecologically sensitive areas is an ongoing concern of electric utilities, and invariably meets with strong local resistance. Special, and expensive, measures have to be taken to address this concern, eg by eliminating the risk of transformer fluids being accidentally released into the environment. BIOTEMP® is a totally biodegradable vegetable oil that solves the problem. Prototype transformers are in operation in the USA, where they are being reviewed favorably by the utilities. The new fluid also has the potential for application in larger power transformers, capacitors, switchgear and cables.

To solve the ecological problems posed by conventional transformer insulating fluids, ABB launched a program to find a more environmentally favorable fluid that would allow distribution transformers to be placed in ecologically sensitive areas. The payback for such a fluid was seen to be a significant saving in remediation and compliance costs for the electric utilities.

The new fluid that came out of this program – called BIOTEMP® – is the result of extensive screening of potential biodegradable fluids. Promising candidates were examined with regard to their suitability based on industry-accepted criteria. The final choices were subjected to processing refinements to attain the best possible electrical and physical properties. Final verification of the chosen fluid's favorable environmental and functional characteristics was achieved by accelerating the aging of distribution-size transformer at temperatures of up to 225 °C.

BIOTEMP® surpasses conventional insulating fluids, ie mineral oil, in several respects:

- It is a totally biodegradable vegetable oil.
- It is classified as a high-temperature fluid in the USA, based on a fire point above 300 °C.
- Its heat capacity and heat transfer properties are superior to those of conventional mineral oils.

Because of its exceptional thermal properties, the fluid allows electrical equipment to be operated at higher temperatures than is possible with mineral oils.

Prototype distribution BIOTEMP® transformers are being operated with major utility and industrial systems throughout the USA. Solicitation of European test sites is under way.

BIOTEMP® has also been successfully used as a retrofill fluid in a test application in which it replaced a petroleum based dielectric fluid. Its use as an insulating and

cooling fluid for high-temperature bushings with new solid insulating systems is also being investigated.

Potential also exists for the application of BIOTEMP® in other types of electrical equipment, such as larger power transformers, capacitors, switchgear and cables.

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