

MAKING YOUR TRANSFORMER ENVIRONMENTALLY FRIENDLY

By Scott Weyker, Senior Product Specialist, Three-Phase Pad-Mounted Transformers

The Envirotran EF transformer program launched in May 2004 with single-phase transformers, stimulating the use of Envirotemp FR3 fluid in transformers becoming the first step in creating a strong movement toward biodegradable fluid.

Envirotemp FR3 fluid has gained visibility and acceptance from utilities, legislation, soybean boards, consultants and the public. A number of rural electric cooperatives have converted to Envirotemp FR3 fluid and have held media events promoting their environmental and safety consciousness.

GROWING ON SUCCESS

The success of single-phase Envirotran EF transformers has prompted the recent introduction of the three-phase pad-mounted Envirotran EF transformer.

This addition allows Cooper Power Systems to offer a full line of Envirotran EF distribution transformers. Envirotran EF transformers offer an environmentally responsible, high-efficiency, and safer choice for our customers. All units are optimized around the properties of Envirotemp FR3 fluid and NEMA TP1 minimum efficiency levels.

ENVIRONMENTALLY RESPONSIBLE

Envirotemp FR3 fluid is derived from 100% edible vegetable oils. Specially formulated with performance-enhancing food-grade additives, this non-toxic insulating fluid is the first truly green fluid. The fluid biodegrades quickly and completely in the environment. As a soybean-based fluid, it is eligible for current and future regulatory relief plus alternative spill response procedures may be possible. Schools, parks and ecologically sensitive locations are just some of the applications that are benefiting from the positive environmental characteristics of Envirotran transformers.

The Envirotran transformer has won several awards for environmental stewardship and product innovation.

IMPROVED FIRE SAFETY

Envirotran EF transformers are safer for people and the buildings they serve.

Envirotemp FR3 fluid's high fire point (360°C) and flash point (330°C) are more than twice that of mineral oil, virtually eliminating the risk of transformer fires and reducing liability concerns. Over 1,000 mineral-oil-filled transformers per year are destroyed by fire, with insurance claims estimated at over \$50 million per year. Cooper Power Systems high-firepoint, fluid-filled transformers have had a flawless safety record for over 30 years.

This includes over 35,000 Envirotemp FR3 fluid-filled transformers currently in service. Based on electrical fire code regulations and nationally recognized testing laboratory certifications, Envirotran EF transformers can be installed indoors and outdoors, adjacent to buildings and walkways, or on rooftops, typically without additional safety requirements.



LONGER LIFE

The Envirotran EF transformer coil design has been optimized to maximize Envirotemp FR3 fluid benefits and to minimize the first cost of this new technology. The fluid has superior water absorption characteristics, helping to draw out retained moisture and the moisture generated by insulation paper degradation. It chemically helps prevent the paper fibers from severing when exposed to heat. This attribute enables the fluid to

significantly reduce the aging rate of transformer paper and, consequently, helps extend transformer insulation life. Under standard loading, the Envirotran EF transformer insulating paper exhibits over seven times the normal life of mineral-oil paper. Due to Envirotemp FR3 fluid's unique properties, units can be overloaded up to 14% without causing loss of transformer insulation life (subject to temperature limitations of the IEEE Standard C57.91 loading guide). This means that Envirotran EF transformers are more durable than comparable mineral oil-filled transformers. "The soy-based oil provides benefits beyond improved protection for the environment," Stoughton Utilities Director Robert Kardasz said.

"The new oil will help extend the life of our transformers by improving their ability to safely handle high power demands experienced on hot summer days."

The Standard in Efficiency Utilities constantly face the challenge to reduce costs. In a competitive, de-regulated environment, there is constant pressure to cut capital, operating, and maintenance costs — often by purchasing distribution transformers with reduced efficiency. At the same time, most companies recognize that reducing immediate costs comes at a trade-off with efficiency, and reduced efficiency costs more long term.

In 1996, the National Electrical Manufacturers Association (NEMA) published an industry standard, NEMA TP 1, Guide for Developing Energy Efficiency for Distribution Transformers. The basis used to establish NEMA TP 1 standards was economic payback. Using typical electricity prices, transformer load factors, common transformer design technologies, and costs, the standards were set at levels that would typically result in a three- to five-year payback.

The standard, which was revised in 2002, lists the minimum efficiency levels

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Transformer fluid

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for single-phase and three-phase liquid-filled transformers. Efficiencies are referenced at 50% load and losses are referenced to temperatures of 55°C (Load Loss) and 20°C (No-Load Loss).

By meeting NEMA TP1 efficiency levels, Envirotran EF transformers approximate contemporary prices for a more highly evaluated (\$3.00/\$1.00 formula) mineral-oil unit. Cooper is also able to provide Envirotran EF transformers that meet higher efficiency levels.



INSTALLATION FLEXIBILITY

Three-Phase Pad-Mounted Envirotran EF transformers can be specified as Code-Listed FM Approved, which offers a practical and more dependable solution for installations near commercial or industrial complexes, office buildings, educational and health institutions and other fire safety sensitive areas. The high fire point of Envirotemp FR3 fluid enables it to meet the requirements for recognition as a fire safeguard by Section 15 of the National Electrical Safety Code and also meet the National Electrical Code Section 450-23 requirements for use as a listed less-flammable liquid. Typically, there is no need for a fire vault, automatic sprinklers, or special clearances.

The FM Approved transformer designs come with a special nameplate listing the transformer's protective devices and other compliance requirements, so the on-site inspector can easily and quickly verify code compliance for both indoor and outdoor installations.

EARLY ADOPTERS

Wisconsin Public Power Inc. (WPPI) is a regional power company serving 48 customer-owned electric utilities in Wisconsin, Michigan, and Iowa. By partnering with WPPI's Joint Purchasing Group, municipally owned utilities gain advantages of size, scope, and expertise in purchasing distribution transformers and other distribution goods. Since the Envirotran EF transformer was intro-

duced to the members of WPPI, many have adopted it for all their transformer needs. Others find it vital for particular applications.

Evansville Water & Light is one WPPI member utility that has fully adopted the product. Evansville is the fastest growing community in Rock County, located south of Madison, Wisconsin.

"The Evansville community is committed to helping the environment by using the new biodegradable oil in as many applications as possible," stated John Rasmussen, Evansville Water & Light Line Foreman. Evansville was the first WPPI member to purchase the three-phase pad-mounted Envirotran EF transformers.

The WPPI member community of River Falls, Wisconsin, recently passed a resolution implementing "Lead by Example," a community-wide initiative to promote energy efficiency, conservation, and renewable energy resource development efforts. According to River Falls Municipal Utilities Superintendent Chuck Beranek, "The community will purchase only EF transformers from this point forward."

Bruce Folbrecht, superintendent of Jefferson Utilities and chairman of the advisory group overseeing WPPI's Joint Purchasing program, stated, "WPPI members are committed to working towards a full catalog of EF transformers."

The transition and implementation of the three-phase pad-mounted Envirotran EF transformer program is exciting, and is welcomed."

As of this printing, six WPPI members have purchased the new three-phase EF transformers: Cuba City, Evansville, Oconomowoc, River Falls, Stoughton, and Waupun.

PRODUCT SCOPE AND AVAILABILITY

Any three-phase pad-mounted transformer in Cooper's product scope can be specified as an Envirotran EF transformer.

This includes KVA ratings from 45 to 10,000 kVA with primary voltages up to 46 kV and secondary voltages up to 15 kV. In order to fulfill immediate demand for this product, Cooper has also been stocking common ratings, which can be delivered in as little as two weeks.



Envirotran EF three-phase transformer.