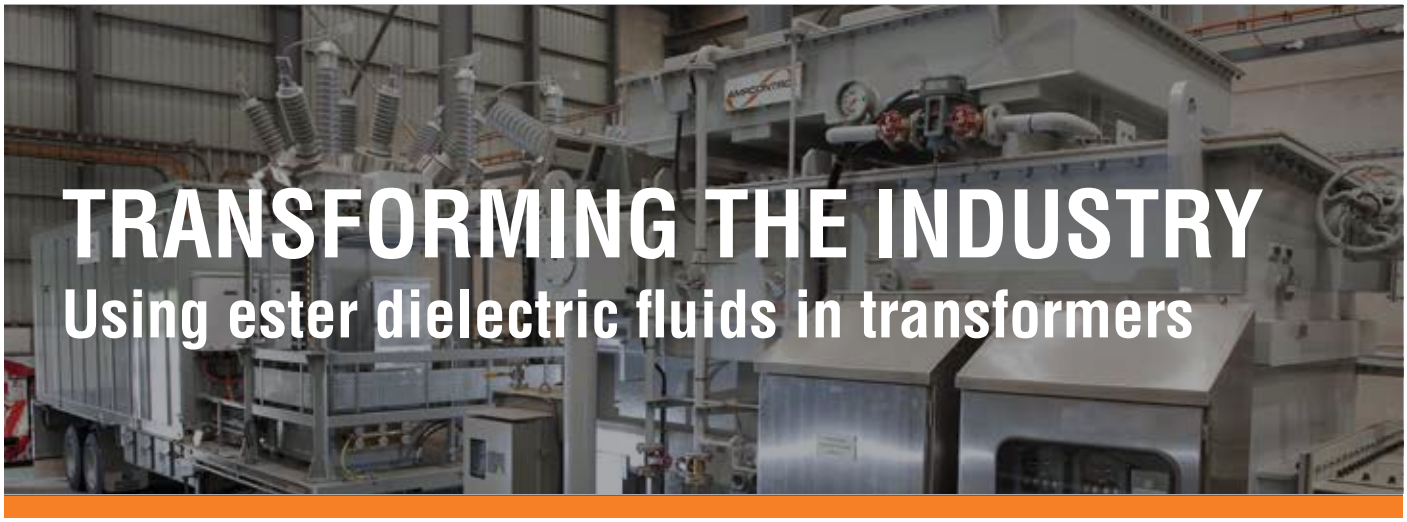

TRANSFORMING THE INDUSTRY

Using ester dielectric fluids in transformers

As Ampcontrol continues to tailor our approach to transformer design and manufacture, our transformer design engineers are increasingly incorporating ester dielectric fluids, a key technical and environmental advancement occurring in the Australian transformer market.

Transforming the industry

End users have been looking for techniques to manage and improve the life of their transformers and ester fluids being specified more frequently.

Advanced dielectric oils such as natural ester fluids (vegetable oil) are gaining popularity with utility, mining and industrial customers due to their environmental benefits as well as their superior performance and improved fire resistance when compared to traditional mineral oils.

Ampcontrol have produced transformers using a variety of dielectric fluids and recently extended the use of ester fluid to 132kV transformers. Including being used on Australia's first 132/11kV 25MVA emergency response mobile substation.

Getting to know ester fluids

When it comes to selecting a dielectric fluid that best meets the needs of a particular installation there are several factors that need to be considered, including environmental and installation requirements.

Ideal for use in a broad range of distribution transformers, ester dielectric fluids are a viable natural alternative providing environmental, safety and performance benefits over and above traditional mineral oils.

Formulated from edible seed oils and food grade additives, ester dielectric fluid is biobased, sustainable, renewable and recyclable providing sustainable environmental protections.

Ester dielectric fluids offer strong benefits for transformers in environmentally sensitive locations such as highly urbanised, rural or constricted internal spaces. In the event of an oil release, natural dielectric fluids quickly and thoroughly biodegrade in the environment and contain no harmful petroleum, halogens, silicones or other questionable materials.

With a high flash point of 330˚C they also provide a high level of fire safety compared to a flash point of 145˚C for petroleum-based mineral oil. This provides increased safety for oil and gas and other hazardous industries. In asset life terms, the chemical properties of ester dielectric fluids enhance transformer insulation performance and life expectancy, minimising the impact of moisture. As a result, the insulation system can last up to three times longer than one in a mineral oil filled transformer.

The fluids are entirely compatible with standard transformer insulating materials, components and with fluid processing equipment and procedures. It has been seen that insulating paper within ester dielectric fluids age at a much slower rate than in conventional transformer oil due to its ability to draw out and absorb retained water.

Ampcontrol's use of ester dielectric fluids

The use of ester fluid at voltages of 66 to 132kV requires the engineer to take account of the dielectric properties of ester fluids which differ from traditional insulating oils. Ampcontrol have the experience and capabilities required to offer ester dielectric fluids as an option in transformers up to 132kV.

Consulting closely with clients to understand their exact requirements is a central part of Ampcontrol's engineering design process and with each project presenting unique challenges and restraints, receiving precise intelligence on insulating fluid is critical.

Ester fluids have a strong case for use in mobile substations due to reduced environmental risks and opportunity to enhance emergency ratings however traditional transformer oils are also very well understood and are expected to have a strong future in transformer design and operation.

Australia's first 132/11kV 25 MVA Emergency response mobile substation

Armed with a set of particularly challenging specifications, the Ampcontrol team developed a dielectric ester fluid distribution transformer as part of Australia's first 132/11kV 25MVA emergency response mobile substation.

The mobile substation was developed for an energy supply company to provide temporary load support to zone substations.

The substation included two trailers, one housing a 132kV transformer that operated with all the necessary high voltage and power ratings of a typical fixed substation transformer, but specially designed and manufactured to be quick to set up and mechanically stable to handle constant movement.

To reduce the risks associated with oil spillage during both transport and use, the customer requested that environmentally friendly ester oil be used in the design. The higher level of density and viscosity of the oil impacted the size and weight of the transformer which was of particular importance due to restrictions of the trailers to enable RTA approval for transport on NSW roads.

Ampcontrol's engineering team worked to find a multitude of electrical and mechanical weight and space saving solutions that enabled the mobile substation to take to the road.