Ester fluids in power transformers
ABB’s commitment to a greener future

Introducing ester fluids at increasingly higher voltage levels provides customers with a high performance, safe and green transformer solution. ABB’s world first 420kV single-phase transformers are environmentally friendly, energy efficient and a reliable high-voltage alternative for a sustainable future.

For more than 100 years, transformers have been filled with conventional mineral oils derived from petroleum as insulating fluid, but this is changing. Now, environmentally friendly esters are providing a new insulating fluid for transformers. ABB has been active in this technological R&D area, since the 1990’s, and has already manufactured tens of thousands of distribution transformers that use ester fluids.

While mineral oils are good insulators, they are non-biodegradable and not especially fire resistant. Both synthetic and natural esters are biodegradable, non-toxic and offer much greater fire resistance, and as a result are now preferred by an increasing number of transformer customers.

Breakthrough innovation
ABB is a pioneer using ester as an insulating medium and has extensive knowledge and research data on its performance characteristics in different transformer types and voltages.

ABB’s recent collaboration with a utility in Spain, means a retrofit solution is now available for all their existing ABB power transformers up to 420 kV in current operation and sets a new level for the development of HV environmental friendly transformers. ABB can also supply new power transformers with ester insulating fluid at voltages above 420 kV.

This is a breakthrough innovation to develop a retrofit solution that avoided changing the costliest and most complex parts of a transformer, the tank, core and windings, so units already in service could be drained of mineral oil and refilled with ester fluid, at minimal cost and service disruption. Environment savings, safety increase and sustainability improvements are key advantages of ester filled transformers.

Minimal pollution risk
Esters are both non-toxic and non-water hazardous (according to Umwelt Bundes Amt) limiting pollution risk during installation, operation, maintenance and end of life.

Biodegradable and renewable
Esters are readily biodegradable (tested and proven following industry standard methods). Natural Esters come from renewable resources, made out of seed crops, such as soybeans.

Less flammable
Esters are K Class fluids with flash points and fire points of over 300C, almost two times more than mineral oil. Esters are less flammable, which leads to increased fire safety of people, the environment, and reduced risk of collateral damage.
Increased lifetime
Ester fluids have better thermal conductivity and much greater ability to hold moisture than mineral oil which leads to increased insulation system life and transformer overload capacity.

Pioneers of green & sustainable ester fluids
ABB is the world’s biggest user of ester fluids, based on market research, and ABB has supplied tens of thousands of transformers filled with esters over the past 20 years.

Best-in-class testing
ABB’s quality management system addresses quality in every process and function of the value chain. The quality system is based on continuously measuring and comparing performance criteria such as test failures, customer complaints and cost of poor quality. With over 60,000 measurements conducted each year, ABB probably tests more operational parameters in all of our plants than any other supplier worldwide. Checklists, control points, design reviews and documentation ensure quality assurance in all business processes.

The world goes green with ABB technology
Sustainability is fundamental to ABB, and all transformer factories are focused on supporting our customers drive for ecological solutions to the challenges we face, for increased energy consumption and reduced environmental impact. Transformers with ester fluids are ABB’s commitment to a greener future.