



Ceramic filters for distribution transformers

Ecological-friendly reusable filters for distribution transformer oils

Institution



CEITEC, Brno University of Technology

Development Status

Corresponds with TRL5 and TRL 6.

IP Protection Status

Know-how and procedures protected as proprietary expertise.

Partnering Strategy

Available for licensing, spin-off and co-development.

The Problem

In today's highly turbulent period in the energy sector and under the pan-European pressure for decarbonization, there is a strong demand for environmentally friendly solutions in the production and maintenance of distribution transformers. These devices serve to convert voltage from the distribution network for standard use. Transformers are key system components for powering electric vehicle charging stations as well as for transmitting the output of renewable energy sources (such as photovoltaic power plants – PV). Due to the justified expectation of a rapid increase in their numbers, there is both potential and effort to minimize the environmental impact of these devices, as they contain electro-insulating fluids (transformer oils). By striving for low-cost maintenance, environmentally friendly servicing, and improved operational quality, one promising approach is replacing paper insulation filters with special porous ceramics. Paper filters have a limited lifespan, are not inert substances, and when disposing of end-of-life products, they represent highly hazardous waste that is difficult to eliminate and creates a significant ecological burden on the environment.

Technology Description

The technology involves a ceramic filter with controlled porosity designed to capture impurities in transformer oils. The filter is placed inside a detachable filter housing. It can be removed from the housing and regenerated to restore its filtering capability using high temperatures.

Commercial Opportunity

The economic benefit is based on the potential of ceramic filters in power transformers, most of which are beyond half of their service life, oversized, or prone to failure, and there are approximately 150,000–200,000 units in the Czech Republic alone. Considering the estimated lifespan of new transformers at 50 years, even with a mere replacement of 3,000 units annually, there is a significant opportunity to implement the developed ceramic filters in both older and newly installed equipment. This potential is linked to COMMISSION REGULATION (EU) No. 548/2014 in its current state (EcoDesign Level II as of July 1, 2021) and further in the upcoming stage from July 2027, when the goal is to install power transformers with maximum energy efficiency—devices with higher utility value and lower environmental impact.