

# Dielectric

## *Important element of electro erosion machining*

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Using the opportunity that this edition of the periodical „Toolmaking Forum Oberon” contains a report on electro erosion machines, I'd like to recall how important their proper use is to ensure a stable process of electro erosion. Liquid dielectrics have significant impact on the effect of electro erosion. Its type, properties, way of feeding the spark gap and grade of contamination with erosion products will determine the machining output, wear level of the working electrode, accuracy of machining and surface roughness.

### Basic functions of dielectric

- It is a medium for controlling the process of electric discharges;
- It is responsible for removal of processing side-products from the inter-electrode gap;
- It absorbs heat produced during the electric discharge process, both from the processed electrode (machined material) and working electrode;
- Deionization.

The properties of dielectrics to which we should pay attention when purchasing them for our electro erosion machine are: viscosity, flash point, dielectric strength, volatility, flow temperature, resistance to oxidization, acidity, colour, smell and impact on human skin. The most important dielectric property which should be crucial for its selection is the flash point, because it influences the safety of the operator's work and persons nearby. The higher the flash point, the better. The use of pure naphtha for electro erosion machining can have serious consequences. At first, such agents can cause the danger of explosion, and on top of that, because they do not contain any functional additives, they will degrade faster, increase their viscosity and acidity, which will cause a drastic reduction in quality of the machined material and, in some cases, cause corrosion on the material and elements of the machine. So we should look for dielectrics resistant to oxidizing, which will be a guarantee of longer life span. It is also worth highlighting the importance of acidity. The high acidity of dielectrics may lead to corrosion of machine parts. Too high content of aromatic hydrocarbons can affect cooling times at higher range of temperatures and, following this, the final hardness of material. A very important operational parameter is the low electrostatic charge tendency of the liquid (ECT – Electrostatic Charge Tendency), which is also connected with the use of a dielectric liquid. The selection of correct product quality means comfort and safety of operation – said Mr. Arkadiusz Leżoń, Director of Research and Development in the company PDP Naftochem.

### When the dielectric should be replaced

Proper maintenance of the electro erosion machine requires correct filtration and replacement of the dielectric in appropriate time intervals because of the fact that the temperature produced during electrical discharges can cause the degradation of dielectric oil.

The frequency of replacement is also dependent on:

- Number of electro erosion hours;
- Type of dielectric;
- Type of working electrode (metal or graphite).



We recommend replacement of mineral oils every year and synthetic oil once every two years. However, it is good to control the condition of the dielectric. The symptoms that will signal deterioration of electro erosion process stability are the following: oil is turbid when cold and after heating up it becomes transparent; changes of colour from transparent into yellowish; increased viscosity; emanation of stronger smell than usual; electro erosion machining time is longer; stability of electro erosion process is reduced; surface quality of machined workpieces is deteriorated.

### How to correctly replace the dielectric

First, drain the dielectric from the erosion tank. Thoroughly clean the erosion tank, paying special attention to the cleanliness of the oil tank. After cleaning, it is good to pour in a little old oil and switch on the pump in order to clean the system from contamination. In this way, you can avoid having the contaminants penetrate into the fresh oil. Then drain the used oil. Install new filters and pour in the fresh oil. Good luck!

Source:

1. Wikipedia.
2. "EDM Today", January/February 2009.
3. Opinion of Mr. Pana Arkadiusz Leżoń from the company Naftochem.
4. "Obróbka Skrawanie ścierna i erozyjna" Praca zbiorowa pod redakcją (Abrasive and erosion machining – group editing) L. Dąbrowski, M. Marciniak, B. Lewicki.

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