

Controlling the Breakdown Voltage of Oil in a Transformer



Products Used



Maxi Water VAC

CUSTOMER

Joulz
The Netherlands

INDUSTRY

Energy

Company Profile

Joulz is a leading owner and provider of essential energy infrastructure equipment and services in the Netherlands. It leases essential energy infrastructure equipment and meters to a large and diversified customer base of industrial, commercial and public sector customers.

One of many activities is supplying medium voltage/distribution transformers. Joulz gives guidance throughout the entire process of advice, installation, assembly, maintenance, management, and breakdown service.

The Challenge

Transformer insulating oil is used in oil-filled electrical power distribution transformers. The oil insulates the transformer so there is no arcing and corona discharge and acts as a coolant of the transformer. Additionally, the transformer oil is used to preserve the transformer's core and windings of the cellulose-made paper insulation and prevents oxidation.

These electric properties are vital for the correct operation of the transformer and have to be controlled frequently during the operation of the transformer. To do so, dielectric strength, also known as the breakdown voltage (BDV) of transformer oil is analyzed. A low value of BDV indicates the presence of moisture

content and conducting substances in the oil (e.g. particle contamination). When the BDV level is below 30 kV an immediate action is required according to NEN-EN-IEC 60422.

Joulz started up a project to improve the maintenance of the transformer. The key requirements for the project are lower operational cost, improved maintenance efficiency, and lower carbon footprint.

PROJECT SPECIFICATION

Machine: IEO 630 kVA transformer
Oil reservoir: ± 400 liters
Type oil: Shell Diala S4
Breakdown Voltage(BDV): 26 kV



RMF Vacuum Dehydration Units are designated oil purification units that can be applied directly to various types of machine reservoirs. The units dehydrate and clean most types of oil such as lubricating, hydraulic, transformer, and switch oils by removing particles, gasses, and water.

The Solution

Current Action Maintenance Plan	New Action Maintenance Plan
When BDV is below 30 kV, it is common practice to change out the transformer. The 'old' transformer is then overhauled in the workshop and equipped with new oil.	When BDV is below 30kV, use a Vacuum Dehydration Unit to filter out the moisture and particles out of the oil and recondition the oil
PROS: <ul style="list-style-type: none"> This is common practice, a routine job 	PROS: <ul style="list-style-type: none"> Low carbon footprint No changeout of the oil & overhaul on the transformer Low operational cost Only Vacuum Dehydration Unit and an extra filter element are used.
CONS: <ul style="list-style-type: none"> High carbon footprint Reallocating the transformers and changing out the oil. 	CONS: <ul style="list-style-type: none"> The operator needs to be at the site when Vacuum Dehydration Unit is used* High initial costs for purchasing a Vacuum Dehydration unit <p><i>*A fairly large vacuum dehydrator is used to minimize the time necessary to improve BDV (< 8 hours).</i></p>

The Results

By using the Vacuum dehydration unit, Jous improved the BDV of this transformer from 26 kV to 56 kV in 6 hours without any additional maintenance work and logistics. This substantially benefits the overall carbon footprint of the company.