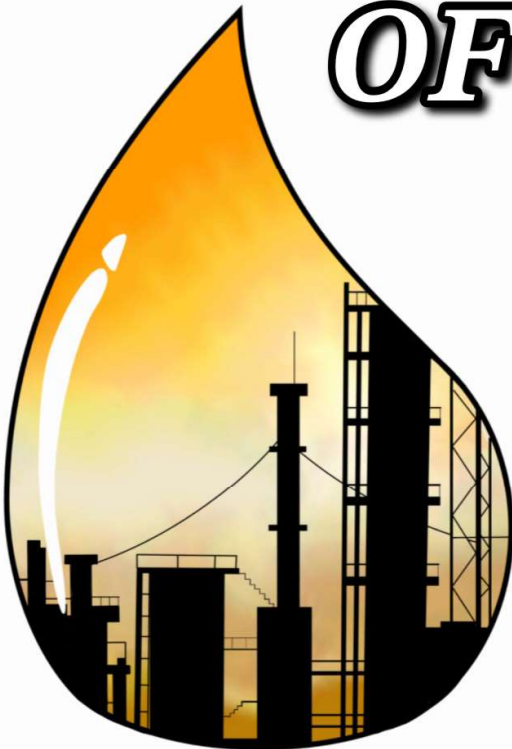




VACUUM TREATMENT OF THE DIELECTRIC OIL



THE COMPANY

For over a century, **BRIZIO BASI** is a leader in the field of **vacuum technology**

Founded in **1922**, the company has always embraced innovation, becoming a point of reference in the **italian and international market**

Among its prestigious ones customers there are companies leading in the **sectors**: electrical, avionics, automotive, medical, pharmaceutical, glass, composites and cultural heritage



THE OIL TREATMENT

Brizio Basi develops and produces systems for the **treatment** of various types of oils, following a process which is structured as follows:

This **cycle** can be repeated several times to ensure optimal results. Once the desired value has been reached, the oil is ready for use.



*Application sectors:
automotive, electrical,
medical*

1. **Aspiration** from a feed pump by the mechanical-magnetic preliminary filter located on the inlet pipe, or directly via the lamination tower

2. **Heating** by low heat density armored resistors

3. Passage to the **degassing tower** where the oil is exposed to vacuum

4. **Distribution on Rashig rings**, which allow the vacuum to extract moisture and other volatile substances present in the oil

5. Passage through **micron filters**

PHISICAL-CHEMICAL PROPERTIES OF THE DIELECTRIC OIL

Viscosity

The dielectric oil must have an optimal viscosity to ensure efficient flow and adequate cooling of the system

Flash point

A high flash point is essential for safety, preventing the risk of fires and explosions

Dielectric strength

This property guarantees electrical insulation, preventing short circuits and harmful discharges



FUNCTION OF DIELECTRIC OIL FOR TRANSFORMERS

1

Insulation

Dielectric oil provides effective electrical insulation between parts of the high voltage transformer

2

Cooling

Circulating through the transformer, the oil absorbs the heat generated and dissipates it, keeping the system at safe temperatures

3

Corrosion prevention

The chemical properties of the oil protect the transformer from corrosion, increasing its useful life



DIELECTRIC OIL REGENERATION TREATMENTS

1

Filtration

Removes particles and impurities, restoring the purity of the oil

2

Decoloration

Eliminates any coloration due to aging, restoring the clear appearance

3

Dehydration

Reduces moisture content, improving dielectric properties

4

Deaeration

Removes air bubbles, avoiding electric discharges and partialization phenomena



MOST USED SYSTEMS FOR THE DIELECTRIC OIL TREATMENT

Centrifugation

Removes free water dispersed in the oil by centrifugal separation.

Vacuum drying

Reduces dissolved moisture content through a vacuum evaporation process.

Chemical absorbents

Special adsorbents such as silica gel capture the moisture present in the oil.

Selective membranes

Membrane filters selectively remove water, keeping other properties unchanged.



DEAREATION TREATMENT OF THE DIELECTRIC OIL

1

Atomization-nebulization

The oil is pulverized to increase the contact surface with the air

2

Depressurization

The application of vacuum removes air bubbles dissolved in the oil

3

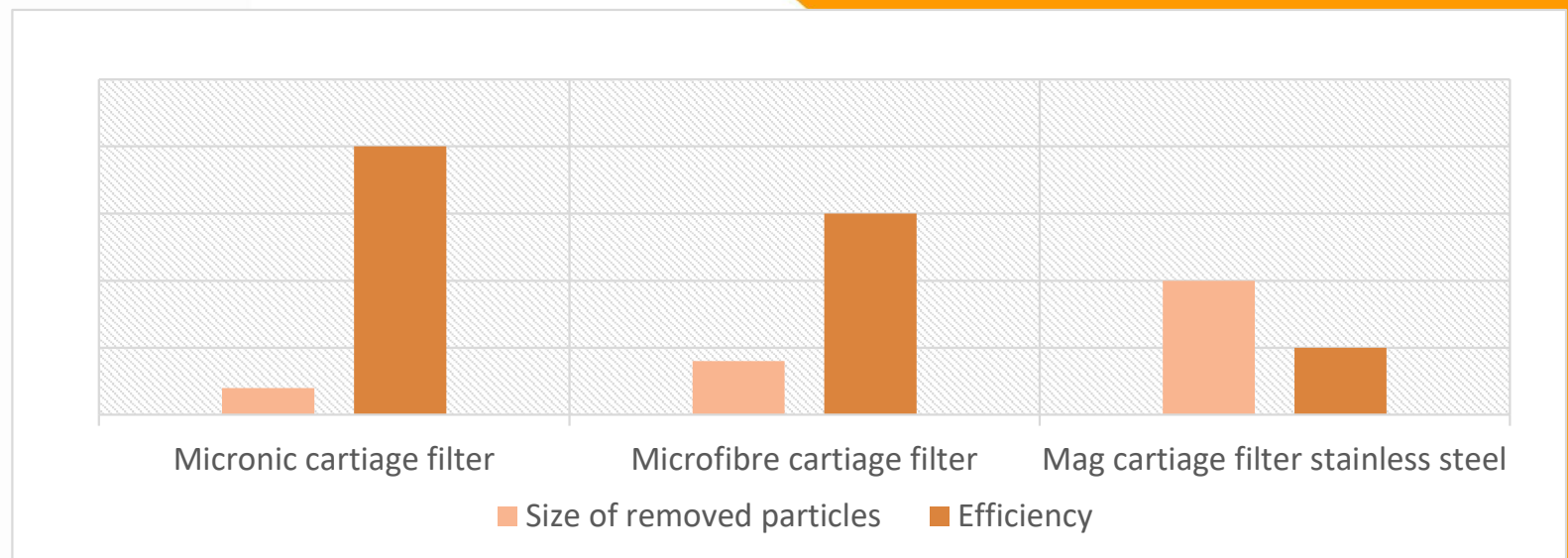
Heating

Heating the oil facilitates the release of air bubbles



FILTRATION TREATMENT OF THE DIELECTRIC OIL

Filter type	Size of removed particles	Efficiency
Micronic cartiage filter	$\geq 1 \mu\text{m}$	High
Microfibre cartiage filter	$\geq 2 \mu\text{m}$	Medium high
Mag cartiage filter stainless steel	$\geq 10 \mu\text{m}$	Medium



MOST REPRESENTATIVE CASES OF TREATMENT

1. Treatment of new oil to fill or top up a transformer

2. Treatment of used oil contained in a transformer

3. Treatment of used oil recovered from a transformer

4. Work on transformers that have suffered failures or whose core is considered humid

5. Interventions on transformers whose oil is considered humid



NEW DIELECTRIC OIL TREATMENT

If the oil is contained in tanks, it is in fairly good condition, and by passing it once through an oil treatment plant, it is brought to a more than good condition to be fed into the transformer.

Advantages:

- Good durability of the filter cartridges
- Modest accumulation of ice in the capacitor (if present)
- Faster treatment process



USED DIELECTRIC OIL TREATMENT

Most common cases:

It is characterized by a higher particle and humidity content, and the quantity of dissolved gases can also be more relevant, therefore the treatment is more complicated.

- Oil coming from a transformer in which an arc has formed (it is very rich in carbonaceous particles and the filters can become clogged in a very short time)
- Oil coming from old transformers: it may contain various dissolved substances but generally they are not removed, except in a small part
- Oil containing quantities of moisture far above normal



TRANSFORMERS RECONDITIONING

- The transformer core is dried after purification and drying of the oil.
- Oil is the carrier both for bringing heat to the transformer core and for carrying pollutants out of the transformer (when it is dry and hot, it has more capacity to absorb the humidity that comes out of the core).
- The treatment will be concluded when you no longer see foam.

The oil is recycled in a closed circuit between the treatment group and the transformer.

- Dirty oil is taken from the bottom of the transformer;
- It enters the treatment plant where it is cleaned, heated and dried;
- Return to the transformer by entering from the top.



DIELECTRIC OIL QUALITY MONITORING

Acidity

It indicates the chemical aging of the oil

Dielectric Strength

Measures the insulating capacity of the oil

Water Content

Detects any moisture saturation

Contamination

Evaluate the presence of polluting particles



RECOMMENDATIONS

Importance of Maintenance

Regular monitoring and treatment of dielectric oil is essential to ensure the reliability and safety of electrical systems

Long Term Benefits

Investments in dielectric oil care result in longer transformer life and reduced operating costs.

Recommendations for Operators

Operators must carefully follow maintenance and monitoring protocols to preserve the properties of the dielectric oil over time.



PURPOSES FOR WHICH OIL TREATMENT PLANTS ARE USED

Oil treatment plants are built to treat the oil of electrical transformers

Treatment means the removal from the oil of physically polluting substances whose presence contributes to lowering its dielectric strength, that is particles, humidity and gases

Although **oil treatment** is a well-defined process, there is considerable differentiation determined by the starting parameters or the results that are desired to be achieved



BRIZIO BASI'S TREATMENT PLANT

BRIZIO BASI DOV treatment plants are designed in accordance with ENEL I-9002 specifications and are intended to treat a given flow rate of oil for electrical transformers.

In the case of **new oil**, moisture content up to 60 p.p.m. (parts per million) and dissolved gas content of approximately 10% by volume, the following average treatment values are obtained after a single pass:

- Residual moisture content less than 10 p.p.m.
- Residual gas content measured with the Pirelli method, less than 3 Torr (0.02%)
- Dielectric strength of the treated oil better than 50 KV, with measurement performed according to CEI standards, 1973 edition.



BRIZIO BASI'S TREATMENT PLANT

Limit performances:

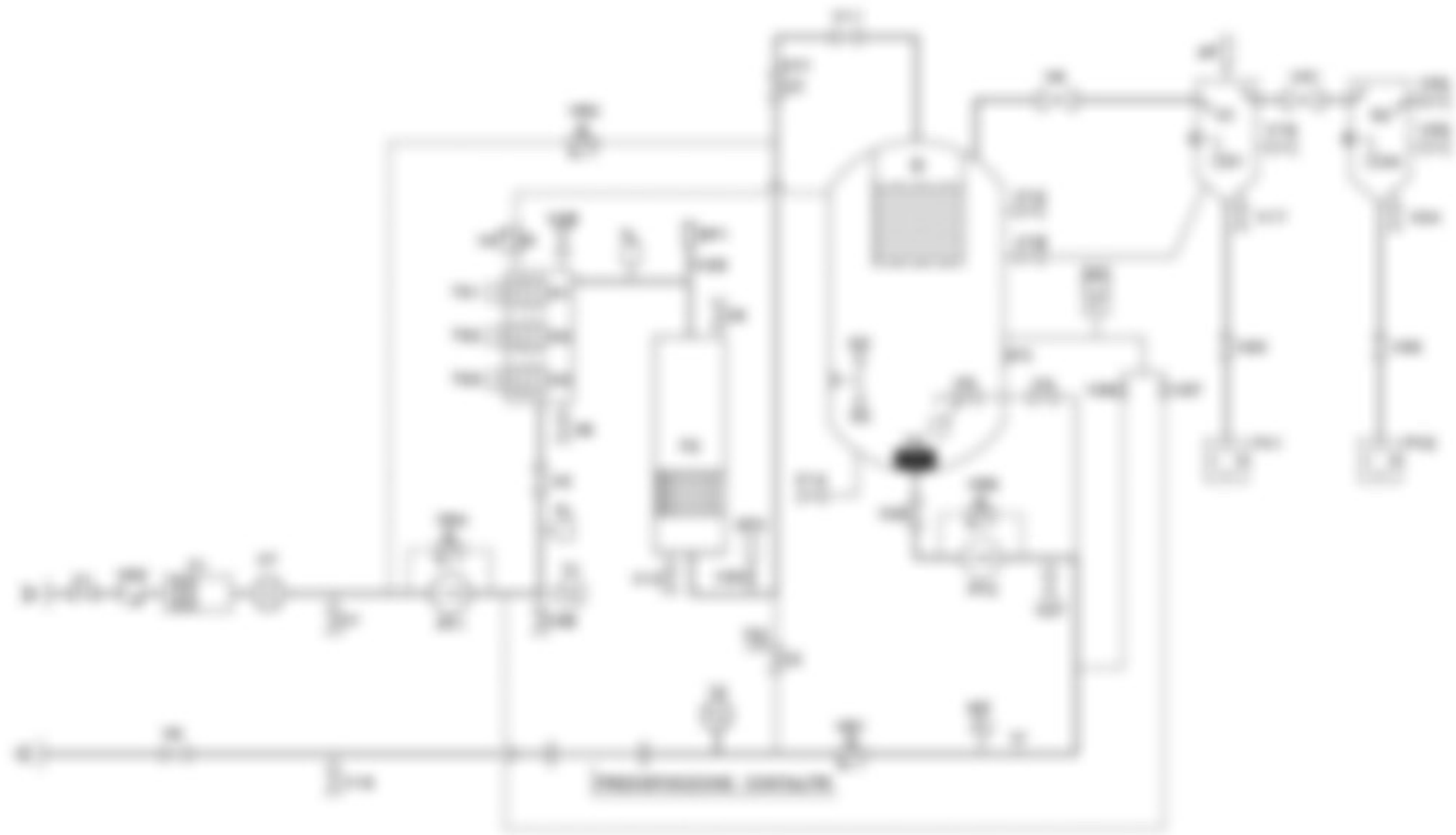
- Residual moisture content equal to or less than 3 p.p.m., with measurement performed according to ISO R 760 standards
- Residual gas content measured with the Pirelli method, equal to or less than 1 Torr (0.01%)
- Dielectric strength of the treated oil better than 70 KV, with measurement performed according to CEI standards, 1973 edition

Oil treatment systems can be used, in addition to the complete treatment (filtration, degassing and drying) of new oils, **also for:**

- Reconditioning of transformers already in operation
- On-site installation of new transformers
- Other functions



PRINCIPLE DIAGRAM



SECTIONS OF THE TREATMENT PLANT

The machine is made up of several **sections**, the main ones are:

- The oil supply, heating and filtration section
- The degassing, drying and oil extraction section
- The low temperature condensation section of water vapor (if present)
- The high vacuum pumping group section



SECTIONS OF THE TREATMENT PLANT

They can be used:

- All **at the same time**, with the possibility of treating new oils, or reconditioning transformers in operation
- **Independently**, resulting in machine versatility
- Using the emptying and low temperature condensation sections independently, for example vacuum in the box or insulation drying;
- Using the power supply, heating and filtration section independently (you can bring the transformer to temperature, and/or heat the oil in one or more separate tanks, if you do not have an independent auxiliary heater).

These different solutions can be carried out simultaneously, and when both the transformer and the oil are ready, the transformer can be filled, carrying out the final drying treatment of the oil during the transfer from the storage tank to the transformer, if the treatment of the oil in the tank has not already been run previously.



ULTRASONIC DEGASSING AND DEFOAMING OF LIQUIDS

The process:

The process of degassing and defoaming liquids using ultrasound is easy to observe. In a glass of water, suspended bubbles coalesce and rapidly rise.

In **agitated oils** or **refrigerants**, the presence of bubbles can cause problems, such as wear due to cavitation.

Sonication creates small vacuum bubbles that capture dissolved gas, causing them to grow and rise to the surface.

Ultrasound accelerates this process and reduces the redispersion of gas into the liquid, making degassing particularly useful for viscous liquids such as oils and resins, especially in shallow containers.



ULTRASONIC DEGASSING AND DEFOAMING OF LIQUIDS

Visually **measuring** the **effects of degassing** has limited accuracy, while measuring the gas content provides a more accurate assessment of the effectiveness of the ultrasonic process.

- **Liquids** contain **dissolved gases**, the concentration of which varies with temperature, pressure and agitation.
- **Ultrasound** reduces this concentration below the natural equilibrium level, exposing the liquid to bubbles and agitation.
- **After sonication**, the gas slowly redistributes throughout the liquid, allowing you to work with a fluid with a low gas content, especially if stored in a closed environment.



ULTRASONIC DEGASSING AND DEFOAMING OF LIQUIDS

Degassing before emulsifying and dispersing

- **Ultrasonic degassing** improves the quality of dispersions and emulsions by reducing the problem of surfactant-stabilized gas bubbles.
- These compounds, used to increase the stability of emulsions and dispersions, form a layer around the particles and can also encapsulate gas bubbles, making them difficult to remove.
- These **stabilized bubbles** reduce the effectiveness of the product and cause measurement errors.
- The **solution** consists in degassing the liquids with ultrasound before adding the dispersed phase and during mixing, thus avoiding the formation of new bubbles.



SOME OF OUR SOLUTIONS



DOV (Degassing Oil Vacuum)

Since the 1960s the company produces “DOV” equipment series for the dielectric oil vacuum treatment and in 2012 has introduced the DOV series.

Main applications:

- Insulating oil treatment and further fill up of electric transformers and switch gears;
- Transformers or electric switches reconditioning;
- Insulating oil treatment and electric transformers filling, keeping them under vacuum;
- Electric transformers treatment on the field, including the Insulating oil treatment and windings vacuum drying.



DOV FOR FACTORY APPLICATIONS, FIXED INSTALLATION



DOV FOR FACTORY APPLICATIONS, INSTALLATION WITH WHEELS AND STABILIZERS



DOV WITH WORKSITE TROLLEY



DOV ON ROAD TRAILER



DOV GREENLINE SERIES

It has been create to treat the vegetable dielectric oils, which compared to minerals have high density and viscosity, a high moisture content and a greater aptitude to incorporate it at room temperature and to combine with it.



DOV GREENLINE SERIES



DOV GREENLINE SERIES



The "GREENLINE" DOVs are optimized for the treatment of **vegetable oils**, which require particular precautions for a good treatment, they differ from the standard DOVs for:

- Addition of oil feed pump
- Adding the Roots pump
- Vacuum pump with greater flow rate
- Upgraded electric heaters
- Increased filtration system
- Refrigerator condenser
- Cartridges from 2u to 20m, standard 5u.

Sizes: 2000, 4000, 6000, 8000, 10,000, 12,000 l/h



DOV COMPACT SERIES

The DOV "COMPACT" is the new transformer oil treatment system series.

Maintaining the Brizio Basi's quality that has made it famous worldwide in the oil purification field, we have designed and produced these New machines, easy to use and dimensionally reduced, to meet the demands of several customers asking for minimum overall dimensions, in a way to be installed in a van.

Sizes: 1000, 2000 and 3000 liters/hour.



DOV COMPACT SERIES



DOV 170 OIL DEGASSING UNIT ON-LINE DRYING

The DOV "170" is designed to work connected online to the electric transformer, degassing continuously the dielectric oil.

The system is equipped with PLC and operator panel, small wheels for local handling, safety devices to avoid oil leaks.

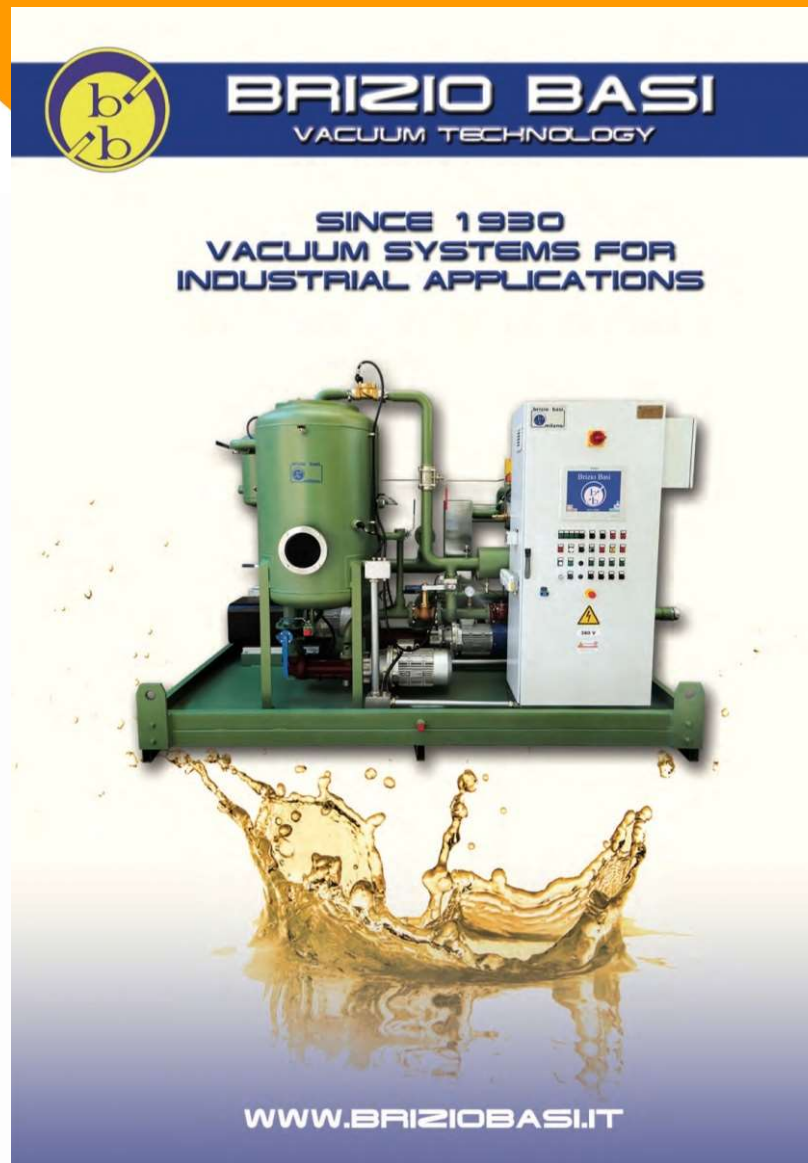
Usable for several application and different types of oils.

TECHNICAL INFORMATION:

- Flow rate adjustable: up to 470 l/h
- Dimensions: 800 x 1000 x 2100 h. mm.
- Weight 400 Kg.
- All components are made in EU.
- CE Mark



[Catalogo-DOV.pdf \(briziobasi.it\)](http://briziobasi.it)



THANK YOU FOR THE ATTENTION!

