ELETRAFO SRL

TRASFORMATORI ELETTRICI

OIL-FILLED TRANSFORMERS
DRY-TYPE AND CAST RESIN INSULATED TRANSFORMER

THE COMPANY

Eletrafo was born as a company specialized in the repair of mineral oil-filled transformers.

The production facility is situated in **Mesero,** within the province of Milan; the establishment is owned and encompasses an area of approximately 800 square meters.

Over the years, in addition to repairs, the company has been able to manage an in-house production of **oil-filled, resin-filled, and dry-type transformers in Class H.**
This has been achieved through **internal design**, utilization of our **own technicians**, and **specialized workforce.**

In a short period, the company has been able to expand its customer base thanks to the offered products, which are of **excellent quality, high reliability, and provide an outstanding quality-to-price ratio.**

It has successfully developed its sales network both on a **national and European level.**

Eletrafo is capable of meeting the needs of every type of clientele through **repairs, maintenance, and supplies of any kind of transformer**, both oil-filled and dry-type, as well as resin-insulated.

It is also able to supply new machines for replacements having the same characteristics and overall dimensions of the transformers to be replaced.

All *transformers* undergo inspections during production and are tested in a testing facility equipped with state-of-the-art equipment, where the corresponding test certificate is issued in compliance with **CEI-IEC 60076 standards**

The company is in constant evolution and is committed to providing its customers with the best possible products and services.
To this end, it has obtained **ISO 9001 and ISO 14001 certifications**, which attest to the high level of quality and sustainability of its production processes

Furthermore, **the company** has refined its **studies** and **designs** on transformers to meet the specific needs of **transformers immersed in mineral oil baths, transformers for converters, traction transformers, and induction furnace transformers**

Through this commitment, **the company** is proficient in presenting its clientele a comprehensive selection of **premium transformers**, crafted utilizing **finest-grade materials and components**.
Additionally, the products adhere to the most current **safety and environmental regulations.**
Consequently, the company emerges as a dependable and qualified partner for all enterprises seeking **top-tier transformer solutions.**

PRODUCTION OF OIL TRANSFORMERS

BUILDING CRITERIA

MAGNETIC CIRCUIT

The **cores of our transformers** are constructed using **cold-rolled grain-oriented laminations**, which have a **low value of specific losses**. This indicates that they are more **energy-efficient** and generate **less heat** from an **energy perspective**.

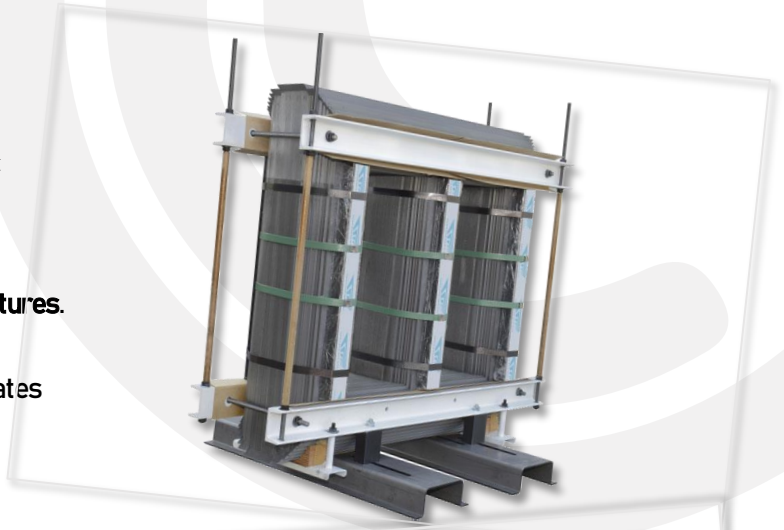
The **cores** are also designed to have **minimal residual flux**, reduced insertion current, and **low noise levels**.

The **insulation** between the laminations is achieved using **carlyte, an inorganic oxide** that is entirely **insensitive to high temperatures**. This implies that our **transformers** can operate **under elevated temperature conditions** without **degradation of the insulation**.

The material utilized for the **cores** is of **high quality and is meticulously handled and assembled to minimize air gaps.** This indicates that our transformers are more reliable and have a **longer lifespan.**

The **meticulous assembly** and subsequent core pressing ensure a **minimal rate of vibrations** and, consequently, a significant reduction in **noise levels.** This makes **our transformers quieter and more comfortable to use.**

In conclusion, our transformers are **crafted using high-quality materials and components**, designed to ensure high **energy efficiency**, **low noise levels, and long-lasting durability.**



WINDINGS

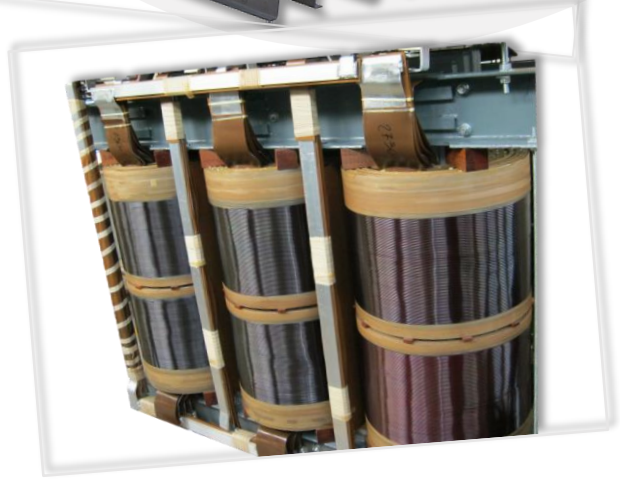
The windings of our transformers are constructed **using high-conductivity electrolytic aluminum or copper conductors, insulated with pure cellulose paper or Class 2 enamel**. The types typically manufactured include **layer, helical, or foil windings**.

For **medium voltages**, layer-type windings are employed, designed and constructed to ensure a uniform distribution of stresses originating from atmospheric or system conditions. This ensures **greater reliability and longevity of the transformers.**

For **low voltages**, helical or foil-type windings are employed, designed to ensure excellent resistance to short-circuit stresses. **This guarantees increased safety of the transformers** in case of unforeseen electrical events.

The **axial channels** between the layers of windings ensure excellent and uniform circulation of oil for cooling. This guarantees that **the transformers operate efficiently and safely even under high load conditions.**

The **maximum symmetry** of any tap connections prevents dangerous current imbalances, **eliminating troublesome electrodynamic stresses in case of a short circuit**. This ensures **the utmost reliability** and **safety of the transformers.**



TANK

The **transformer tank** is made of **sheet steel** of adequate thickness to withstand **mechanical stress.**

The bottom of the tank is equipped with **slides or wheels** to facilitate handling.

The **cover** is secured to the enclosure with bolts arranged around the entire perimeter.

The seal between the cover and the enclosure is achieved with a **gasket that prevents oil leakage.**

The **transformer cooling** is achieved through **waves or radiators** placed on the sides of the enclosure.

All the metal parts of the transformer are treated and **painted with European standards -approved paints**.

This treatment **protects the metal parts from atmospheric agents such as rain, snow, sunlight, and wind,** thus increasing their **lifespan over time**

INSULATING COOLING OIL

The **insulating oils normally** used are:

- **Mineral Oil:** This type of oil is obtained through fractional **distillation of crude oil**. It is an **excellent electrical insulator** and does not contain **PCB, inorganic acids, alkalis, dissolved sulfur, asphaltic products, vegetable or animal oils, or other impurities**. It is classified as **Type A.A** according to **IEC standards**

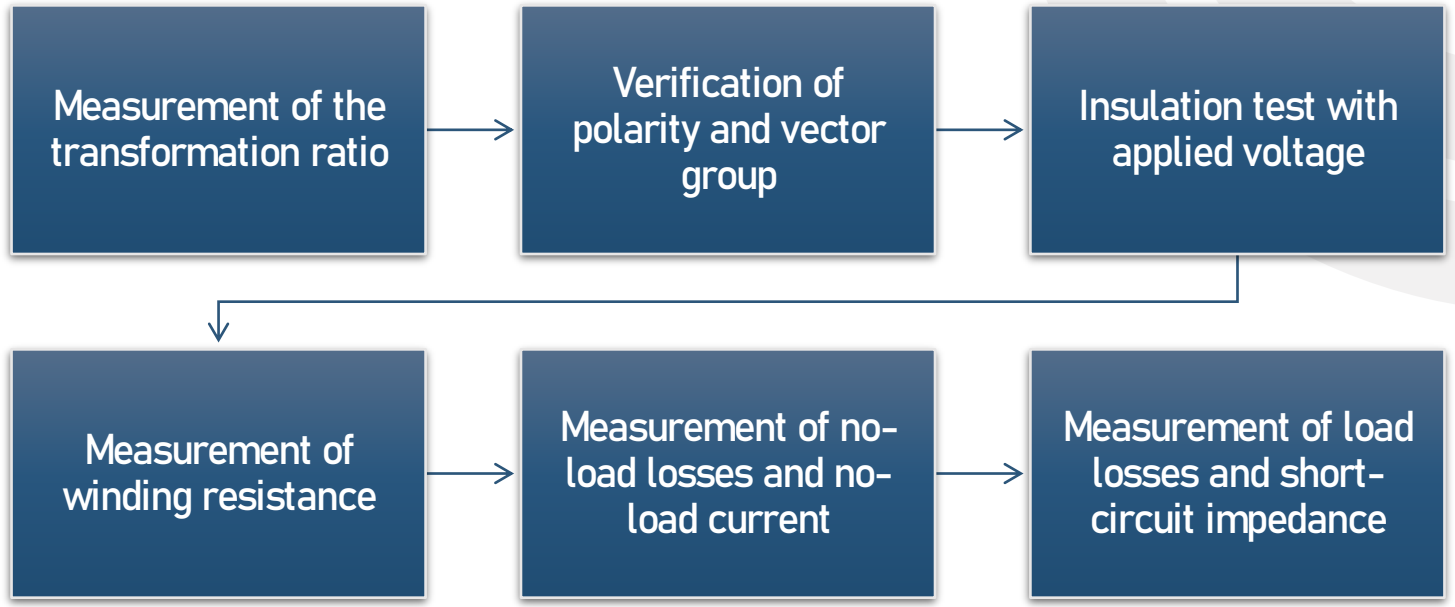
- **Tras24 Oil:** This type of **oil (modified ester)** has **excellent insulating** properties and the particular characteristic of **extinguishing and not propagating flames**

- **Vegetable Oil 7426:** This type of **oil (natural ester)** is a **dielectric fluid based on vegetable oils** and is not classified as hazardous according to Regulation **(EC) 1272/2008 (CLP). It is a biodegradable product and is not classified as environmentally toxic.**

Each type of **insulating oil** has its own unique characteristics and properties. The choice of the type of oil to use depends on various factors, such as the type of **transformer, operating conditions, and applicable regulations.**

TEST

Our transformers are subjected to rigorous tests to ensure their **quality and safety.** The tests are carried out in accordance with **CEI and IEC** standards and include the **following tests:**

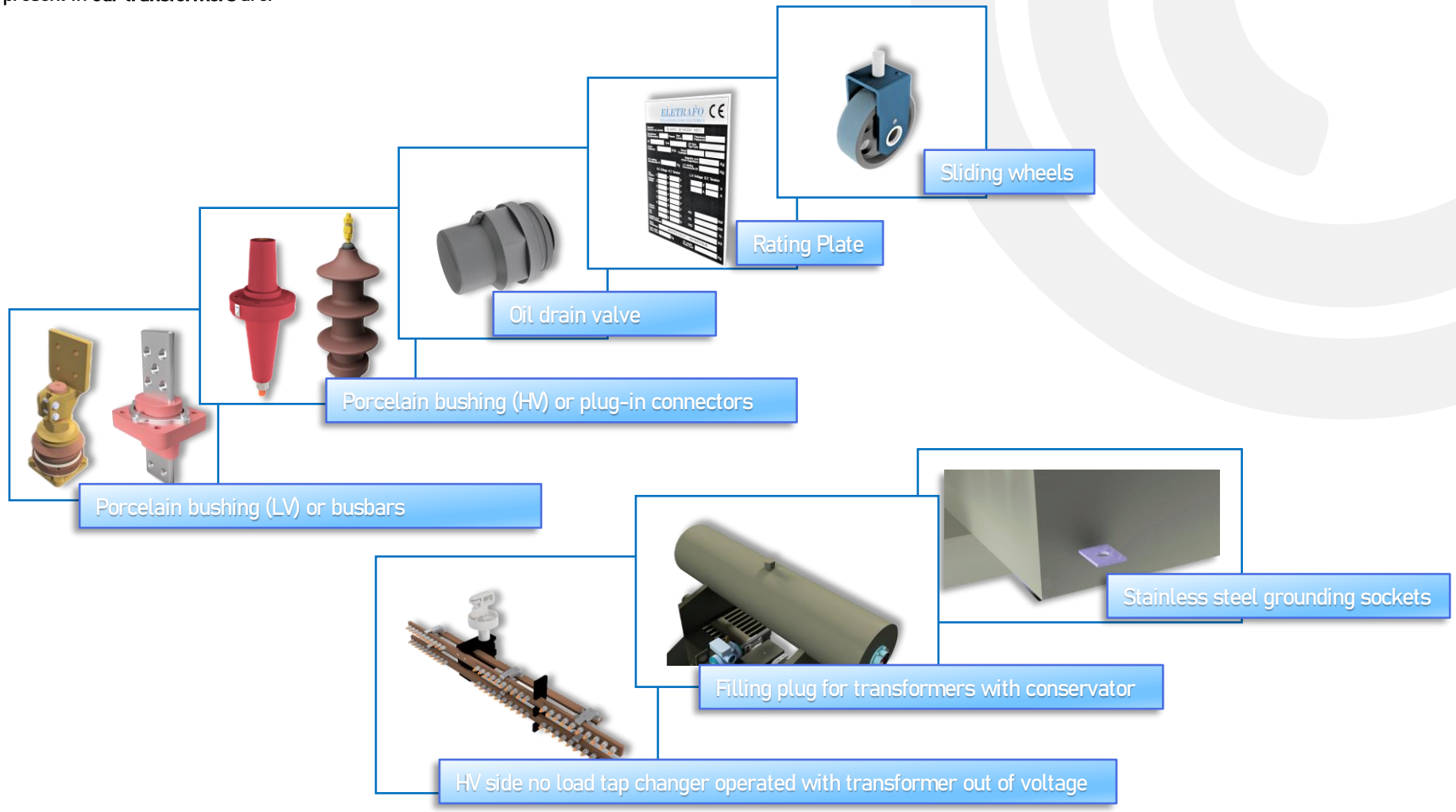


The **test results** are recorded and stored in a dedicated register. The register is used to monitor the **quality of transformers and to identify any issues that may arise in the future.**

We are proud to offer our customers **high-quality and reliable transformers.** Our transformers are designed to stand the test of time and meet the most demanding requirements.

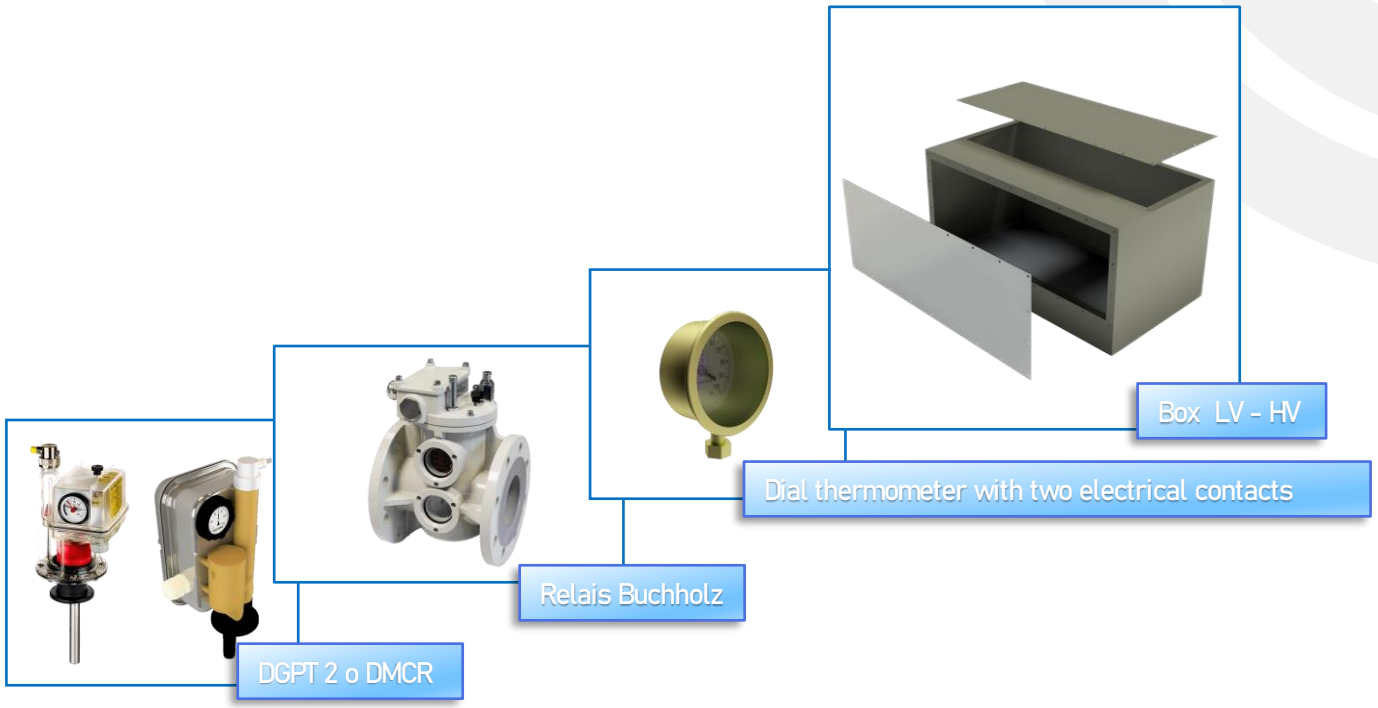
STANDARD COMPONENTS

The **standard components** present in **our transformers** are:



COMPONENTS ON REQUEST

Our products are available with a **variety of optional accessories**, including:



In addition to the choice of **components on request**, **our customers** can also request other **specific customizations**

QUALITY CONTROL AND CERTIFICATIONS

All **Eletrafo** production is based on the application of the **UNI EN ISO 9001** quality system in all phases of the process.

IQNet

THE INTERNATIONAL CERTIFICATION NETWORK

CERTIFICATE

SQS has issued an IQNet recognized certificate that the organization:

Eletrafo S.r.l.
Via Kennedy, 31
20010 Mesero (MI)
Italy

has implemented and maintains a

Management System

for the following scope:

Progettazione, costruzione di trasformatori elettrici in MT/BT, MT/MT e BT/BT.
Revisione e riparazione di trasformatori.

which fulfills the requirements of the following standard(s):

ISO 9001:2015 / ISO 14001:2015

Issued on: 2021-06-17
Expires on: 2024-06-16

This attestation is directly linked to the IQNet Partner's original certificate and shall not be used as a stand-alone document

Registration Number: CH - 50079

Alex Stoichitoiu
President of IQNet

Felix Müller
CEO SQS

IQNet Partner s*:
AENOR Spain AFNOR Certification France APCER Portugal CCC Cyprus CISQ Italy
CQC China CQM China CQS Czech Republic Cro Cert Croatia DQS Holding GmbH Germany EAGLE Certification Group USA
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* The list of IQNet partners is valid at the time of issue of this certificate. Updated information is available under www.iqnet-certification.com

SQS

Certificato

La SQS attesta che l'organizzazione di seguito indicata dispone di un sistema di gestione conforme
ai requisiti delle basi normative menzionate.

Eletrafo S.r.l.
Via Kennedy,
31
20010 Mesero
(MI)

Campo di applicazione

Progettazione, costruzione di trasformatori
elettrici in MT/BT, MT/MT e BT/BT.

Basi normative

ISO 9001:2015 Sistema di gestione per la qualità
ISO 14001:2015 Sistema di gestione ambientale

No. di reg. 50079

Validità 17. 06. 2021 – 16. 06.

A. Grisard, Presidente SQS

F. Müller, CEO SQS

Associazione Svizzera per Sistemi
Bürglen 209, 3052 Zollikofen, Svizzera

Swiss Made

Partner of IQNet

This system ensures that **our products** meet the **highest standards of quality and safety**, and are manufactured in accordance with **environmental regulations**

Eletrafo is committed to providing its customers with the best possible products and services.

Our **quality system** is a fundamental tool to achieve this goal, and allows us to guarantee our customers **maximum reliability and satisfaction.**

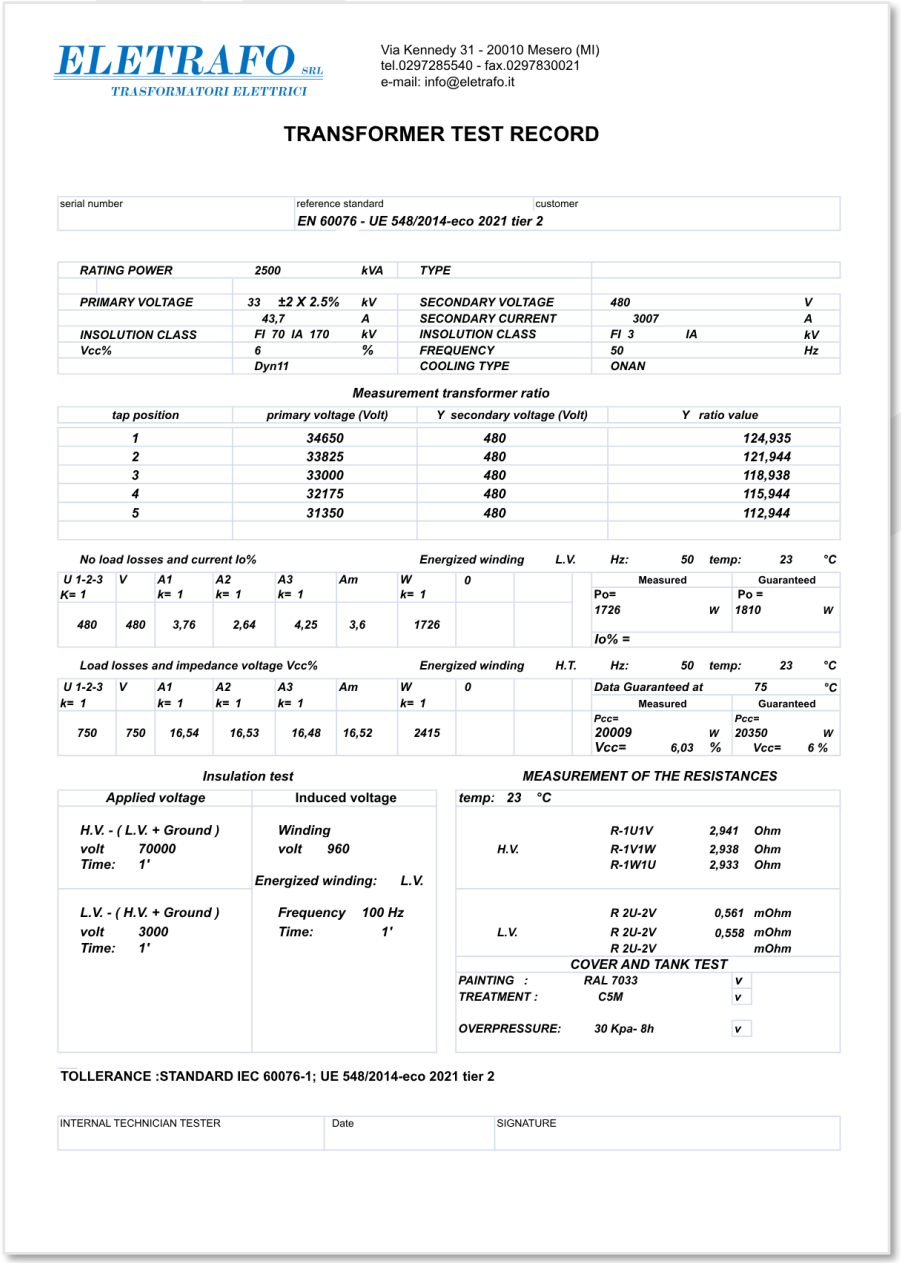
TESTS

During the production process, **tests are carried out** in accordance with the operating instructions of the **quality system.**

All **transformers are tested** in compliance with **CEI-IEC standards** with routine tests performed in **our test room.**

Type tests can be performed in an external laboratory (for example, **CESI - Milan)**, with an additional cost for each test.
At the end of the tests, a **test report** is printed showing the **results of the tests and the technical characteristics of the transformer.**

The test report is issued to the customer together with **the transformer**.



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TRASFORMATORI ELETTRICI

Via Kennedy 31 - 20010 Mesero (MI)
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e-mail: info@eletrafo.it

TRANSFORMER TEST RECORD

serial number	reference standard	customer
	EN 60076 - UE 548/2014-eco 2021 tier 2	

RATING POWER	2500	kVA	TYPE				
PRIMARY VOLTAGE	33 ±2 X 2.5%	kV	SECONDARY VOLTAGE	480			V
	43,7	A	SECONDARY CURRENT	3007			A
INSOLUTION CLASS	FI 70 IA 170	kV	INSOLUTION CLASS	FI 3	IA		kV
Vcc%	6	%	FREQUENCY	50			Hz
	Dyn11		COOLING TYPE	ONAN			

Measurement transformer ratio

tap position	primary voltage (Volt)	Y secondary voltage (Volt)	Y ratio value
1	34650	480	124,935
2	33825	480	121,944
3	33000	480	118,938
4	32175	480	115,944
5	31350	480	112,944

No load losses and current Io% — Energized winding L.V. — Hz: 50 — temp: 23 °C

U 1-2-3 K= 1	V	A1 k= 1	A2 k= 1	A3 k= 1	Am	W k= 1	0		Measured	Guaranteed
									Po= 1726 W	Po = 1810 W
480	480	3,76	2,64	4,25	3,6	1726			Io% =	

Load losses and impedance voltage Vcc% — Energized winding H.T. — Hz: 50 — temp: 23 °C

U 1-2-3 k= 1	V	A1 k= 1	A2 k= 1	A3 k= 1	Am	W k= 1	0		Data Guaranteed at 75 °C	
									Measured	Guaranteed
									Pcc= 20009 W	Pcc= 20350 W
750	750	16,54	16,53	16,48	16,52	2415			Vcc= 6,03 %	Vcc= 6 %

Insulation test

Applied voltage	Induced voltage
H.V. - (L.V. + Ground) volt 70000 Time: 1'	Winding volt 960 Energized winding: L.V.
L.V. - (H.V. + Ground) volt 3000 Time: 1'	Frequency 100 Hz Time: 1'

MEASUREMENT OF THE RESISTANCES — temp: 23 °C

H.V.	R-1U1V	2,941	Ohm
	R-1V1W	2,938	Ohm
	R-1W1U	2,933	Ohm
L.V.	R 2U-2V	0,561	mOhm
	R 2U-2V	0,558	mOhm
	R 2U-2V		mOhm

COVER AND TANK TEST

PAINTING :	RAL 7033	v
TREATMENT :	C5M	v
OVERPRESSURE:	30 Kpa- 8h	v

TOLLERANCE :STANDARD IEC 60076-1; UE 548/2014-eco 2021 tier 2

INTERNAL TECHNICIAN TESTER	Date	SIGNATURE

REFERENCE STANDARDS

Our transformers are manufactured in compliance with the regulations:

- **IEC CEI EN 60076-1/10, EN 50464-1, UE 548/2014** for **mineral oil transformers**
- **IEC CEI EN 61558-1/4 for dry air transformers**
- **IEC CEI EN 60076-1,2,3,4,5 – 11, CEI EN 50541-1** for **transformers incorporated in resin**.

These regulations ensure that our transformers meet the highest standards of quality and safety.