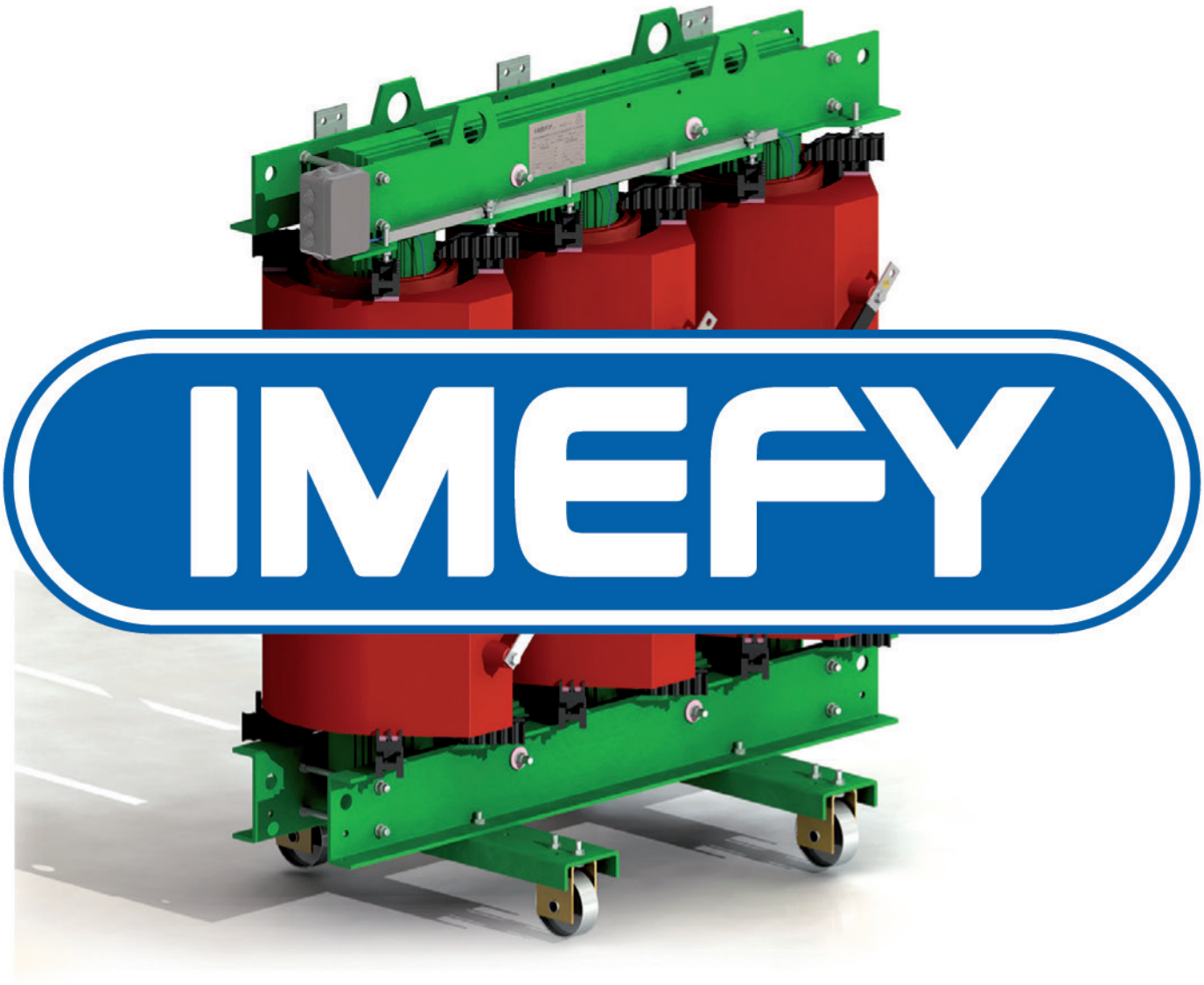
Cast Resin Transformers



IMEFY

ISO 9001

Cert N° 091054A

CESI

E2-C2-F1

Cert N° B0005487

ISO 14001

Cert N° 390037

imefy.it

IMEFY factory Arezzo - Italy

THE COMPANY

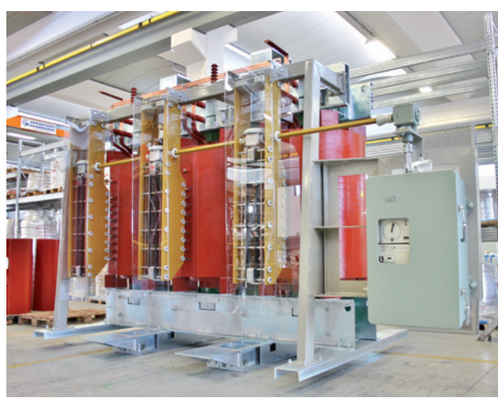
IMEFY Italy arises from organizational and technical productive synergies of the best international level.

IMEFY SL, is a Spanish company with headquarter near to Madrid, that since 1973 manufacture oil filled insulated and then epoxy resin insulated transformers, maintaining an uninterrupted productive growth during this time, such to reach a manufacturing capability with power rating up to 250 MVAand voltage up to 150 kV.

IMEFY SL is the first company in Spain and the third in Europe for the quantity of transformers manufactured.
The other partners offer an over thirty-years experience in the Cast Resin Transformers sector, practically since the first pioneer experiments to nowadays.

This experience is ensured by two technician, Mr. Maggini and Mr. Toscanini, that have been working for all this time in medium voltage cast resin transformers designing and production, indeed the headquarter of IMEFY Italy is located in Tuscany, specifically in the city of Arezzo.

That was the start of Imefy Italy, cast resin transformers manufacturing company, that thanks to the enormous available know how, is able to satisfy any kind of customer requirement.



5 MVA ± 4x990V - 33.000 / 6.600 V

16 MVA - 20.000 / 10.000 V

THE CHARACTERISTICS

The cast resin transformers produced by IMEFY are designed and manufactured in accordance of the main international standard, IEC, CENELEC, CEI, VDE, BSI, and, on request, on any other standard may be required.

Applications:

- Wind farms
- Photovoltaic plants
- CHP Combined heat and power plants
- UPS systems
- Datacenters
- Railways, Tramways, funicular railways and metro
- Welding systems
- Lifting systems
- Induction furances
- Variable speed and variable frequency drives
- Well drilling systems

Main technical characteristics:

• Power rating	up to 25.000 kVA
• Frequency	50 - 60 Hz
• Nominal primary and secondary voltage	up to 36 kV
• Isolation Class	up to H.

CHOICE OF THE TRANSFORMER

The transformers have to be installed very often as close as possible to the user source, for this reason, together with other utilization and maintenance aspects that we don't mention, the choice of transformers with mineral oil insulation, that are a source, in the plant where they are installed, of a big calorific power is often not recommendable. The safety features and the autoestinguishing property are the milestones of the choice, therefore it's preferable to install Cast Resin Transformers inside of department and/or area with high fire risk.

CAST RESIN TRANSFORMERS

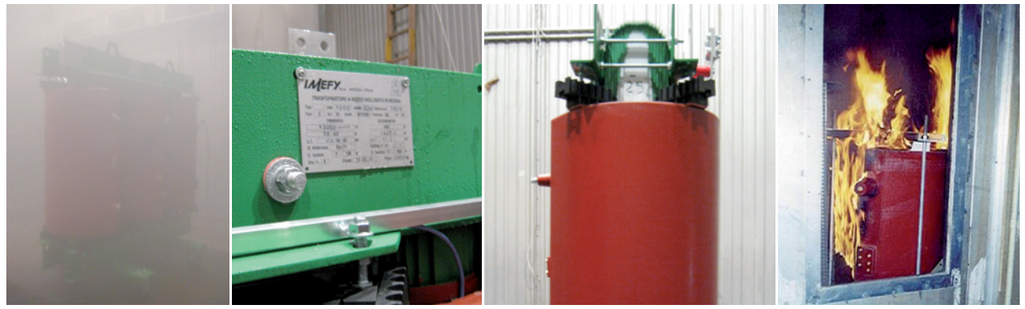
The cast resin transformer is a special type of dry transformer (CEI EN 60076-11), in other words is a transformers where the active parts are not immersed in an insulating liquid. When transformers have one or more windings casted they are commonly known as Cast Resin Transformers.
These special transformers thanks to the development achieved with manufacturing techniques and employed materials like epoxy resin, are finding an always larger scope of application for their high service reliability, their practically no needed maintenance and the lower environmental impact compared to oil transformers, reducing to the minimum the fire risks and the environmental pollution. The cast resin transformer medium voltage active parts are casted with epoxy resin after being secured to a mould and preheated under vacuum, in order to avoid air bubbles presence or gas inside of insulating materials. This casting process gives to the medium voltage windings the possibility to have a perfect cylindrical and smooth surface minimizing the deposit of pollution and/or corrosive particles, and to be mechanically strong and waterproof. The casted windings are divided in many tapes having only one turn for each layer, thanks to that the internal voltage stresses are reduced to the minimum with reduced partial discharge sparking possibilities. The winding is usually made with aluminum tape. Aluminium is the material used because its coefficient of thermal expansion is very close to the one of resin, therefore mechanical stresses due to transformers temperature variation are very limited. The low voltage windings are manufactured with a single aluminum foil having same high as the one of medium voltage. This manufacturing characteristic, to have MV made by more tape of aluminum and LV in one single aluminum foil minimize the axial stresses in case of an eventual short-circuit. The insulation between turns is ensured by an epoxy resin pre-impregnated foil that through a heat treatment and also during the service life match with the secondary conductor making the winding solid and strong but at the same time free to move with a certain flexibility. The windings so manufactured are very resistant against condensation and pollution.

4 MVA - 20.000 / 420 V

16 MVA - 20.000 / 10.000 V

CLIMATIC, ENVIRONMENTAL AND FIRE BEHAVIOUR CLASSES

The CENELEC cast resin transformers technical committee have defined the minimum requirements for transformers utilization in particularly adverse ambient condition like the presence of damp, industrial/marine pollution and high fire risk. These documents elaborated by CENELEC, and the required qualifications and the test procedures intended to verify them have been included in IEC 60076-11.
In the followings table are listed the different classifications that higlights what above mentioned.



Our transformer during E3 - E2 - C2 - F1

ENVIRONMENTAL CLASSES	
E0	No condensation occurs on the transformers and pollution is negligible. This is commonly achieved in a clean, dry indoor installation.
E1	Occasional condensation can occur on the transformer (for example, when the transformer is de-energised). Limited pollution is possible.
E2	Frequent condensation or heavy pollution or combination of both, with conductivity of water in the range between 0.5 S/m and 1.5 S/m.
E3	Nearly total condensation or heavy pollution or combination of both, with conductivity of water in the range between 3.6 S/m and 4 S/m.

CLIMATIC CLASSES	
C1	The transformer is suitable for operation at ambient temperature not below –5°C but may be exposed during transport and storage to ambient temperatures down to –25°C.
C2	The transformer is suitable for operation, transport and storage at ambient temperatures down to –25°C.

FIRE BEHAVIO UR CLASSES	
F0	There is no special fire risk to consider. Except for the characteristics inherent in the design of the transformer, no special measures are taken to limit flammability.
F1	Transformers subject to a fire hazard, it's required: • Restricted flammability • Within a fixed time the fire should auto-extinguish • Minimized emission of toxic substances and opaque smokes • Materials and combustion products must be practically exte

All IMEFY transformers are certified: E3 - E2 - C2 - F1

According to standard IEC 60076 - 11

Certificate CESI B0005487

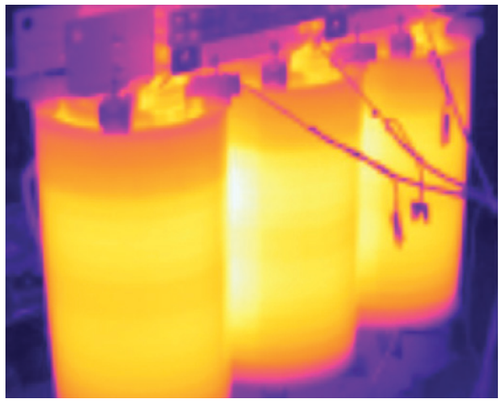
IMEFY E3-E2-C2-F1

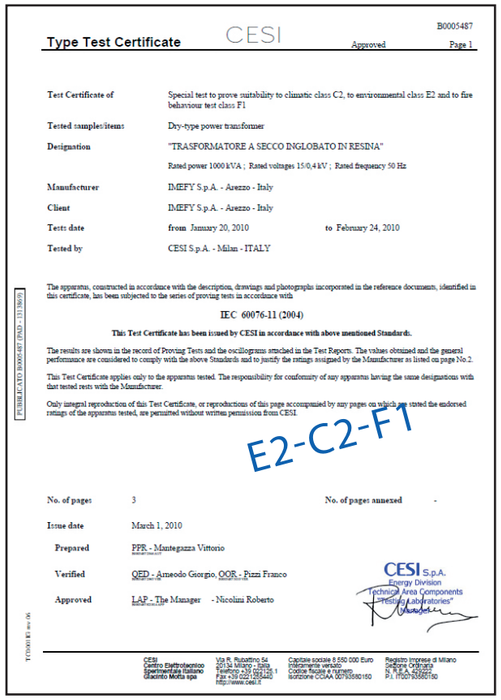
On February 2010 IMEFY has achieved the E2-C2-F1 certification on a 1000 KVA transformer in CESI – Milano under test procedure according to IEC 60076-11 standards.
Already on 1997 and again later on 2001 IMEFY achieved the same certificate on transformers with different power ratings.
Contextually to the last test procedure IMEFY have completed, on the same 1000 KVA transformer, the test for the new ambiental class E3 (IEC 60076-16 standards).

E3-E2-C2-F1

IMEFY

Once again IMEFY lead for timeliness and quality, faithful to the vocation of feeling firsts.





Type Test Certificate — CESI — B0005487 — Approved — Page 1

Test Certificate of	Special test to prove suitability to climatic class C2, to environmental class E2 and to fire behaviour test class F1
Tested samples/items	Dry-type power transformer
Designation	"TRASFORMATORE A SECCO INGLOBATO IN RESINA" Rated power 1000 kVA ; Rated voltages 15/0,4 kV ; Rated frequency 50 Hz
Manufacturer	IMEFY S.p.A. - Arezzo - Italy
Client	IMEFY S.p.A. - Arezzo - Italy
Tests date	from January 20, 2010 to February 24, 2010
Tested by	CESI S.p.A. - Milan - ITALY

The apparatus, constructed in accordance with the description, drawings and photographs incorporated in the reference documents, identified in this certificate, has been subjected to the series of proving tests in accordance with

IEC 60076-11 (2004)

This Test Certificate has been issued by CESI in accordance with above mentioned Standards.

The results are shown in the record of Proving Tests and the oscillograms attached in the Test Reports. The values obtained and the general performance are considered to comply with the above Standards and to justify the ratings assigned by the Manufacturer as listed on page No 2.

This Test Certificate applies only to the apparatus tested. The responsibility for conformity of any apparatus having the same designations with that tested rests with the Manufacturer.

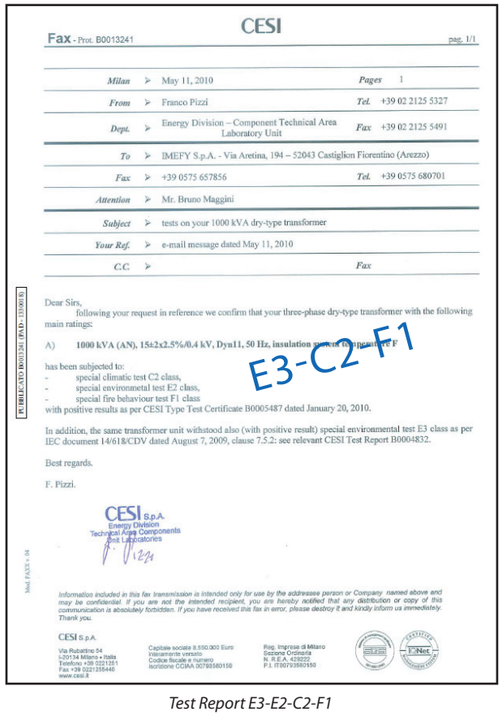
Only integral reproduction of this Test Certificate, or reproductions of this page accompanied by any pages on which are stated the endorsed ratings of the apparatus tested, are permitted without written permission from CESI.

E2-C2-F1

No. of pages	3	No. of pages annexed	-
Issue date	March 1, 2010		
Prepared	PPR - Mantegazza Vittorio		
Verified	QED - Ameodo Giorgio, QOR - Pizzi Franco		
Approved	LAP - The Manager - Nicolini Roberto		

CESI S.p.A. Energy Division Technical Area Components Test Laboratories

CESI Centro Elettrotecnico Sperimentale Italiano Giacinto Motta spa — Via R. Rubattino 54, 20134 Milano, Italia, Telefono +39 0221251, Telefax +39 0221 255440, http://www.cesi.it — Capitale sociale 8.550.000 Euro interamente versato, Codice fiscale e numero iscrizione CCIAA 00793580150 — Registro Imprese di Milano Sezione Ordinaria, N. R.E.A. 429220, P.I. IT00793580150



Fax - Prot. B0013241 — CESI — pag. 1/1

Milan	May 11, 2010	Pages	1
From	Franco Pizzi	Tel.	+39 02 2125 5327
Dept.	Energy Division – Component Technical Area Laboratory Unit	Fax	+39 02 2125 5491
To	IMEFY S.p.A. - Via Aretina, 194 – 52043 Castiglion Fiorentino (Arezzo)		
Fax	+39 0575 657856	Tel.	+39 0575 680701
Attention	Mr. Bruno Maggini		
Subject	tests on your 1000 kVA dry-type transformer		
Your Ref.	e-mail message dated May 11, 2010		
C.C.		Fax	

Dear Sirs,
following your request in reference we confirm that your three-phase dry-type transformer with the following main ratings:

A) **1000 kVA (AN), 15±2x2.5%/0.4 kV, Dyn11, 50 Hz, insulation** [illegible] page No 2 F

has been subjected to:
- special climatic test C2 class,
- special environmetal test E2 class,
- special fire behaviour test F1 class

with positive results as per CESI Type Test Certificate B0005487 dated January 20, 2010.

E3-C2-F1

In addition, the same transformer unit withstood also (with positive result) special environmental test E3 class as per IEC document 14/618/CDV dated August 7, 2009, clause 7.5.2: see relevant CESI Test Report B0004832.

Best regards.

F. Pizzi.

CESI S.p.A. Energy Division Technical Area Components Test Laboratories

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CESI S.p.A. Via Rubattino 54, I-20134 Milano • Italia, Telefono +39 0221251, Fax +39 0221255440, www.cesi.it — Capitale sociale 8.550.000 Euro interamente versato, Codice fiscale e numero iscrizione CCIAA 00793580150 — Reg. Imprese di Milano Sezione Ordinaria, N. R.E.A. 429220, P.I. IT00793580150

Certificate E2-C2-F1

Test Report E3-E2-C2-F1

RATED POWER IN CONTINUOUS LOADING

It's the value of power rating expressed in kVA.
The active power that can be taken by a two winding transformer is given by the product of rating power and power factor (cos).
In our example:
1600 kVA and load with cos = 0.9
we have a deliverable active power of 1440 kW.

RATED FREQUENCY

It's the frequency of the electrical net where the transformer will be installed. Usually this value can be 50Hz or 60Hz.

RATED PRIMARY VOLTAGE

It's the voltage of the electric net or of the plant where the transformer will be installed, usually it's the higher value between the two nominal voltage (HV).

PRIMARY REGULATION

It's a tapping system, that change the turns relationship, it balance line voltage drops or voltage sudden changes on the line. Usually it's a five position of ± 2x2.5% of the rated voltage. The regulation is made changing the position of the link bars on all the three windings, compulsorily with the transformers out of service.

RATED NO LOAD SECONDARY VOLTAGE

It's the value of output no load secondary voltage, usually the lowest value of the two nominal voltages (LV).

INSTALLATION

The cast resin transformer cannot be installed directly outdoor, but can be used outdoor if properly protected against atmospheric agents like rain, snow and hail. This can be obtained putting the cast resin transformer inside of appropriate metallic enclosures commonly known as box. Usually it's installed indoor with or without protective box. In any case it's important to maintain the correct insulating and safety distance from any energized point of the transformer and any other grounded point that surround it, here follows some tables that can give an idea of such distances.
In the following table we show the indicated minimum distance for insulation that have to be maintained between the energized parts of the transformers and the surrounding metallic parts or elements of our energized installations.
When the transformer is inside the enclosure there's no need to keep these distances because they are already

Max voltage (Um) (kV)	Withstand voltage		Insulating distance (cm)
	FI (kV)	Impulse (kV)	
3.6	10	20 - 40	6
7.2	20	40 - 60	6 - 9
12	28	60 - 75	9 - 12
17.5	38	75 - 95	1 - 16
24	50	95 - 125	16 - 22
36	70	145 - 170	27 - 32

maintained from the enclosure. During installation you must avoid the risk of accidental contacts by people with the active parts, resin included. The minimum safety distance protection for people against accidental contacts according to main international standards are listed in the following table.

Max voltage (Um) (kV)	Withstand voltage		Safety distance (cm)
	FI (kV)	Impulse (kV)	
3.6	10	20 - 40	15
7.2	20	40 - 60	15
12	28	60 - 75	15
17.5	38	75 - 95	18 - 20
24	50	95 - 125	22 - 28
36	70	145 - 170	34 - 40

Box standard IP31

TYPE OF COOLING

The cast resin transformers are usually cooled with natural cooling by air (AN), sometimes special needs require the use of fans for cooling with forced air (AF). At all times concerning the installation of a transformer we must always pay attention to keep the ventilation openings clear to allow the natural dissipation of heating produced from the transformer because of Joule effect. For a correct installation and a longer life of the transformer it is necessary to dissipate the heat produced by the magnetic core and by the windings depending of Joule effects paying attention not to exceed the limit of over temperature in compliance of the thermal class of the transformer.
We must ensure proper cooling through circulation of natural air, the same should flow through the transformers surfaces with a natural flow from the bottom to the top.
For this reason there should be created, in the room where the transformer is installed, some proper openings so that for every kW of losses there could be an air flow of 3,5 cubic meters per minute. In the transformer room there should be created openings at the bottom for the entry of cooling air and at the opposite side of the top for the exit of the thermal loaded air (Ex Picture 1).
The theoretical formula for the calculation of openings to be done depending on losses to be dissipated is the following:

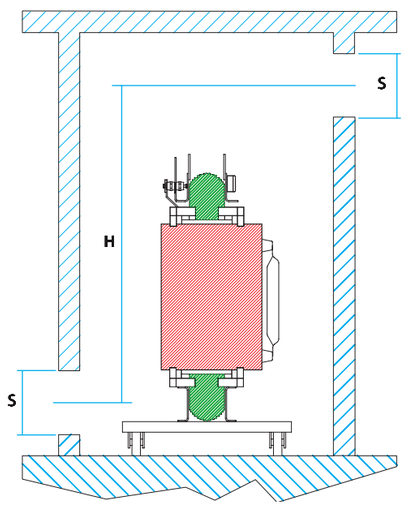
$$S = (0{,}188 \times P) / \sqrt{H}$$

(Ref. Picture 1)

S = Open surface (mq)

P = Addition of no load losses and load losses at 120°C (kW)

H = Height of the two open surfaces (m)



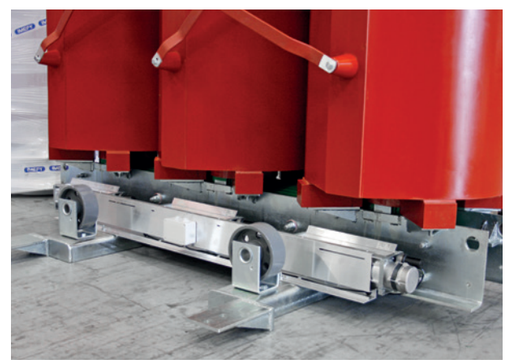
Picture 1

INSULATION CLASS

The insulation level and the corresponding class for each winding is in compliance with the maximum Voltage of the system. FI is the test at industrial frequency for one minute. The impulse test have two values for each class.

Max voltage (Um) (kV)	Withstand voltage	
	FI (kV)	Impulse (kV)
3.6	10	20 - 40
7.2	20	40 - 60
12	28	60 - 75
17.5	38	75 - 95
24	50	95 - 125
36	70	145 - 170

6 MVA - 20.000 / 6.300 V



Tangential fans

THERMAL CLASSES, AMBIENT TEMPERATURE, MAXIMUM OVERTEMPERATURE, ALTITUDE

In compliance with the thermal insulation classes, in the following table are listed the limit of over temperature that the transformer's windings can withstand with 40°C of maximum ambient temperature.

Thermal classes	Maximum over temperature (K)
B	80
F	100
H	125

These values are decreased in case the transformers are projected to be installed over 1000 meters of altitude, they are tested at standard altitudes , by 2.5% for each 500m in case of natural cooling.
Each transformer is supplied with three thermo probe (PT100 Ω), if not differently specified by the customer, located one on each LV winding to be connected at an electronic microprocessor with two level (alarm and trip), for which calibration we suggest the following values:

Thermal classes	Alarm temperature (°C)	trip temperature (°C)
B	120	140
F	130	150
H	150	170

VECTOR GROUP

The windings of each single phase can be connected star, delta or zig-zag. In the different solutions that we can obtain the system of induced voltage on low voltage is out of phase of a certain angle against the the same obtained by medium voltages and this angle is a multiple of 30°. This group is identified with an alphanumeric code where the letter show the type of connection.

Y = star D = delta Z = zig-zag

1.6 MVA - 10.000 / 400 V

Noise level test at CESI (MI)

The capital letter character refers to the winding with the higher voltage and the lowercase character refer to the winding with lowest voltage, the star connection is usually followed by the letter "n" that means that the neutral must be available.
After the letters we can find a number that identifies the group, so the coefficient that we must multiply to 30° to obtain the angle displacement between the delta of the primary concatenate voltages and the delta of the secondary voltage, depending by the connection type of the windings. For example the Dyn11 group identifies a transformer with the primary medium voltage winding with delta connection and the secondary low voltage winding star connected with available neutral and an angle displacement of 330°.

NO LOAD LOSSES

Also called iron losses, as they are localized in the magnetic core. It is the active power takeover by the transformer when it is energized at nominal voltage and frequency. It's understandable that these losses are always present in the transformers also without the load.
The current absorbed in these operating conditions is the no-load current.

LOAD LOSSES

Also called short circuit losses because they are measured during the short circuit test being localized in the windings. It's the active power absorbed for Joule effect from the windings with the load connected at nominal voltage.
They are referred at the temperature of 75°C or more properly at 120°C.

SHORT CIRCUIT VOLTAGE

It's the value of voltage that should be applied to the primary winding connections to allow the flow of nominal current with the secondary winding closed on short circuit (percentage expression of nominal voltage).
It's very important when is planned the installation of transformers in parallel condition because the relative values of short circuit voltage (Vcc%) set the partition of the load. At changes of short circuit voltage, the short circuit current at the secondary windings connections change as well, according to: Icc = (100/Vcc) x I2n Where I2n is the secondary rated current. In big systems, to reduce the short circuit currents is frequently the choice of transformers with Vcc= 8-10%.

NOISE LEVEL

The noise produced by a cast resin transformer comes from the vibration of the magnetic sheets subjected to a magnetic field variable in the time. The international standards indicates the maximum level of sound power at rated frequency and voltage according to the existing laws and regulations. For handiness are rather warranted levels of acoustic pressure at 1 meter. The walls and the ceiling where the transformer is installed cause for reflection an increase of the buzz in the air. The noise produced by the transformer, usually a buzzing spread to walls also through the supports of the machine to the floor, for this reasons the utilization of insulating materials, like rubber supports, decrease this spread so that it's not necessary to insulate the walls and the ceiling of the room.

OVERLOADS

The cast resin transformers, using air flow for cooling, require a longer time to warm-up their temperature, for this reasons they are more over loadable than oil transformers. Cast resin transformers can be overloaded as long as the windings over temperature won't keep long above of accepted values. For the easiness of installation it's very widespread the use of radial flow fans on-board mounted.
The use of these fans allows to overload the transformer on average at 125% also permanently, taking into account that the load losses increase with the square of the current so with 125% they increase of 1.56 time the rated value. For this reason the utilization of fans is advised only to deal with particular emergency situations or to have more power in some times. The IMEFY transformers have anyway the followings overload levels allowed as well in standard product with ambient temperature at 30°C:

- 105% continuously
- 110% for 2 hours only one time in 24 hours
- 120% for 1 hour only one time in 24 hours
- 130% for 30 minutes only one time in 24 hours

TEMPERATURE CONTROL

In their life the transformers are characterized from high operating temperatures that must be constantly controlled. Over-heating are not depending only on the load and/or overcurrent but also on environmental aspects such as inefficient movement of both natural and forced air, increased ambient temperature essentially due to a bad ventilation of the installation chamber.
For this reason are always provided some controllers for the three phase and sometimes also core temperature measurement. All transformers, unless otherwise specified, have a set of PT100 thermo-probes, one for each low voltage column of the machine, through these thermo probes with the support of an electronic microprocessor is possible to read the temperatures values and also to set the alarm and trip values of the transformers from the electrical line. The recommended values for the different climatic classes are stated on the page n°8 of our Utilization and Maintenance Manual.

INRUSH CURRENT

The medium voltage transformers, at the inrush time, have a magnetization current, high but with short duration, that can be the reason of an unexpected action of the electrical protections on the MV side.
The international standards don't deal this topic and the values are usually given from the manufacturer that has took these values empirically in the course of the time.
The time delay we recomend for all power ratings is 0.80 ÷ 1 seconds.

Rated power (kVA)	Peak value of inrush current x In
250	12
400	11
630	10
1000	9
1600	7
2500	5

10 MVA - 15.000 / 6.300 V

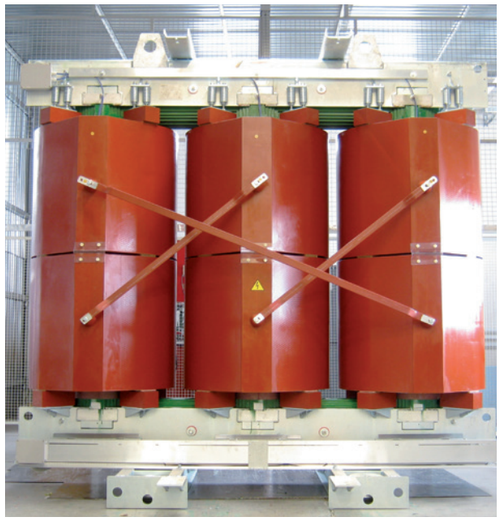
BY THE ISTALLATION OF A CAST RESIN TRANSFORMER :

Total costs = Ccap + Cpo + Cpcc + Cmn (€/year)

Cost of economic capital
Ccap = (Pt + Pin) x {[(1+ti)n x ti] / [(1+ti)n - 1]}
Pt = price of the transformer
Pin = installation costs (connection, civil works...)
ti = interest rate n = number of years
No load losses cost
Cpo = Ce x P0 x h
Ce = cost of electric energy (€/ kWh)
Po = no load lasses (kW)
h = hours of operation (8.760 for trasformer every connected to the electrical net)
Cost of load losses with a costant load
Cpcc = Ce x Pcc x h x k
Ce = cost of electric energy (€/ kWh)
Pcc = load losses (kW)
h = hours of operation (8.760 for trasformer every connected to the electrical net)
k = loading = effective kVA / rated kVA

Mantainence costs = Cmn = 0 for IMEFY spa transformers

Our test room for impulse test



6 MVA - 20.000 / 10.000 V

TESTS

All IMEFY transformers are tested following the procedures and according to IEC 60076-11 routine tests:

- Separate source AC withstand voltage test
- Induced AC withstand voltage test
- Measurement of Partial discharge test
- Measurement of No-load losses and no-load current
- Measurement of voltage ratio and check of phase displacement
- Measurement of Winding resistance
- Measurement of Load losses
- Measurement of short-circuit impedance.

In IMEFY testing laboratories in Arezzo is olso possible to perform, on request, the following type tests:
- Noise level test
- Lightning impulse test
- Temperature rise test

Partial discharges test at CESI (MI)

POWER FACTOR CORRECTION

big part of the energy dissipated from the transformers is reactive energy being magnetizing energy. The compensation of this energy can be obtained through appropriate battery of capacitors power factor correction permanently connected to the secondary windings of the transformers. The power of this battery should be chosen depending on the magnetizing no load power of the transformers, here follows the simple rule for the calculation of the battery power factor correction size for the no load current of the transformer:

$Q = (I_0\% \times Pn) / 100$ (kVAR)

Example for a 630 kVA transformer.

Q = (0.73 x 630) / 100 = 4.6 kVAR

For unification it will be necessary a battery of 5 kVAR.

TRANSFORMER'S PARALLEL

A frequent condition in transformer's installation is the parallel between two or more machineries, they are in parallel when they are powered by the same MV line and they give power to the same LV line. The necessary conditions to be able to do a parallel are the followings:
- same voltage ratio
- same vector group
- same short-circuit voltage (in limits of tolerances ± 10%)
- relationship between rating must be included between 0.50 and 2.

The last two conditions are about the load allocation, indeed the currents are divided with opposite relationship of Vcc and proportionately to respective rating powers.

ELECTROMAGNETIC COMPATIBILITY

The cast resin transformers have to be considered for the noise caused by the magnetic field that creates the missing flux produced by the current of secondary connections.
The magnetic field issued by windings is reduced and anyway lower than the one is issued by LV connections, the values of the same furthermore decrease quickly at the growth of the distance from the transformer. As previously mentioned the resin transformers are often installed in metallic cases or in properly screened rooms that reduce three to four times the dimension of the produced magnetic field.

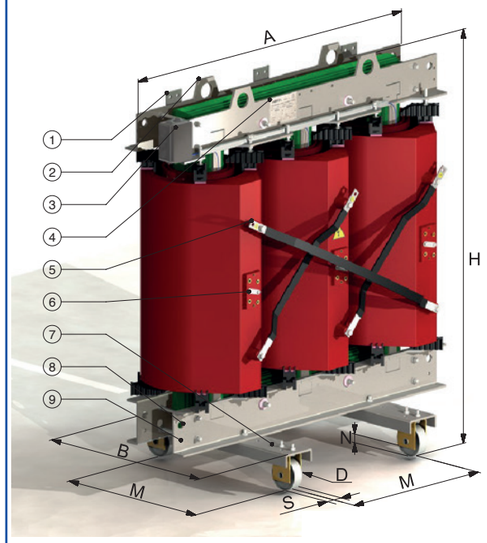
CE MARKING

The instruction 89/336/EEC issued by the European DG III Industry board about the subject of electromagnetic compatibility, suggest the "high voltage inductors" and the "high voltage transformers", as machineries excluded from application field of the same instruction. Anyway in view of the new standards actually under study of Europian Union we invite you to contact our quality department for additional informations, qualitydep@imefy.it .

Lightning impulse test at CESI (MI)

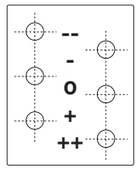
Short circuit test at CESI (MI)

Lightning impulse test at CESI (MI)



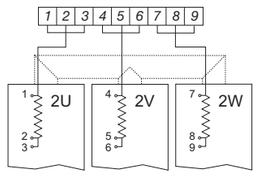
1 - Low voltage terminal
2 - Lifting lugs
3 - Connection Box IP55 for PT100
4 - Rating plate
5 - High voltage terminal
6 - Tap-changer
7 - Trolley for shifting
8 - Couplers
9 - Earthing terminal

TAP - CHANGER ± 2 X 2,5%

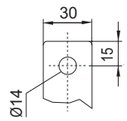


Variation	Position
+ 5%	++
+ 2,5%	+
0	0
- 2,5%	–
- 5%	– –

CONNECTION OUTLINE PT 100 ohm



HIGH VOLTAGE TERMINAL



100 : 3.150 KVA

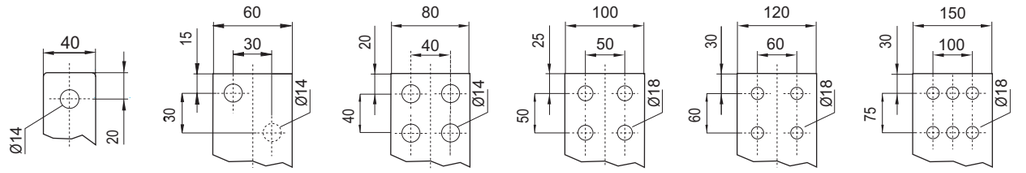
EXAMPLE OF RATED CARACHTERISTICS
Three phases cast resin Transformer

Description		A
Quantity	N°	1
Code Art.		1600 - Co-Bk
Envir.clim.& fire classes (CESI cert. B0005487)		E3 - E2 - C2 - F1
Rated Power	kVA	1.600
Rated Frequency	Hz	50
HV rating	kV	20
HV tapping adjustment	%	± 2 x 2,5
No - load LV rating	V	400
Material Conductor HV / LV		Al / Al
Protection windings HV / LV		Casted / Painted
Installation		Indoor
Cooling system		AN
HV Winding insulation level	kV	24-50-95
LV Winding insulation level	kV	1,1 - 3⁄
Vector group		Dyn11
HV connection		Delta
LV connection		Star + Neutral
HV - LV winding insulation class		F - F
Maximum ambient temperature	°C	40
Max temperature rise HV-LV-Core	K	100 - 100
Height above sea level	m	< = 1000
Technical guarantees are referred ratio	kV	20 / 0,4
No - load losses at Vn	W	3.100
Load losses (120°C)	W	16.000
Short circuit impedance (120°C)	%	6
No - load current at Vn	%	0.7
Sound power (LWA)	dB(A)	76
Dimensions (L x W x H)	mm	1700x1000x2150
Weight	Kg	3.450

STANDARD ACCESSORIES

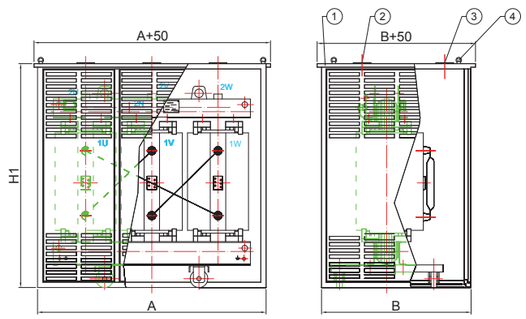
N° 3 PT100 Ω - Connections plates for HV and LV terminals - Lifting lugs - Bi-directional rollers for lengthways or sideways travel - Rating plate - N° 2 Earthing terminal - Tow attachement - Auxiliary terminal box IP 55 clamp.

LOW VOLTAGE TERMINAL



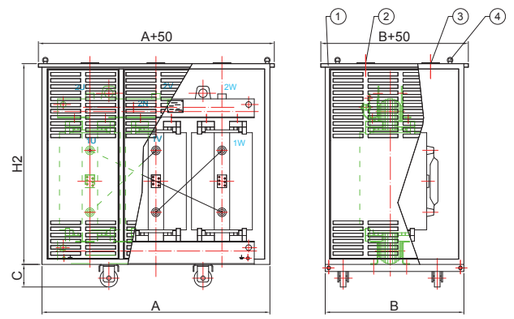
100 : 250 KVA | **315 : 500 KVA** | **630 : 800 KVA** | **1.000 : 1.250 KVA** | **1.600 : 2.000 KVA** | **2.500 : 3.150 KVA**

PROCTION BOX TYPE "AUTOPORTANTE"



Pos.	N°	DESCRIPTION
1	1	BOX ROOF
2	3	INSULATED FLANGE FOR LV CABLES ENTRANCE DIM. 300 X 300 mm
3	1	INSULATED FLANGE FOR HV CABLES ENTRANCE DIM. 300 X 300 mm
4	2	ROOF LIFTING LUGS

PROCTION BOX TYPE "SOLIDALE"



POWER KVA	DIMENSIONS (mm) A	B	H 1	H 2	C	WEIGHT Kg
≤ 500	1.750	1.100	1.600	1.440	160	220
630 - 1000	1.950	1.200	1.950	1.790	160 180	285
1.250 - 1.600	2.250	1.350	2.330	2.150	180	390
2.000 - 3.150	2.600	1.450	2.600	2.350	250	480

Values valid for series 12 - 17,5 - 24 KV

IMEFY	CAST RESIN TRANSFORMERS FOR DISTRIBUTION - SERIES 12 KV Vcc. 4%														IEC60076-11 EN 50541-1			TAB - 12 KV Vcc. 4%	
Power KVA	Ins. lev. KV	Code series	No load losses Po - Watt Ao	Bo	Co	Load losses P.c.cto - 120°C Ak	Bk	Vcc. %	Io %	LpA dBA	LwA dB(A)	A	B	H	M	D	S	N	Weight Kg
100	12 KV	Ao-Ak	260			1800		4	2	43	51	1110	700	1200	520	125	40	35	780
		Ao-Bk	260				2000					1110	700	1200					760
		Bo-Ak		330		1800						1110	700	1200					780
		Bo-Bk		330			2000					1110	700	1200					760
		Co-Ak			440	1800			2,1	50	59	1110	700	1200					780
		Co-Bk			440		2000					1110	700	1200					760
160		Ao-Ak	350			2500			1,7	46	54	1140	700	1280					900
		Ao-Bk	350				2700					1140	700	1280					900
		Bo-Ak		450		2500						1140	700	1260					880
		Bo-Bk		450			2700					1140	700	1260					880
		Co-Ak			610	2500			1,8	53	62	1140	700	1250					860
		Co-Bk			610		2700					1140	700	1250					860
250		Ao-Ak	500			3200			1,4	48	57	1220	700	1320					1200
		Ao-Bk	500				3500					1250	700	1320					1100
		Bo-Ak		610		3200						1230	700	1300					1050
		Bo-Bk		610			3500					1230	700	1300					1050
		Co-Ak			820	3200			1,5	56	65	1230	700	1280					1000
		Co-Bk			820		3500					1230	700	1280					1000
315		Ao-Ak	600			3850			1,2	49	58	1300	800	1300					1310
		Ao-Bk	600				4400					1300	800	1300					1310
		Bo-Ak		745		3850						1300	800	1290					1280
		Bo-Bk		745			4400					1300	800	1290					1280
		Co-Ak			880	3850			1,3	58	67	1290	800	1290					1250
		Co-Bk			880		4400					1290	800	1290					1250
400		Ao-Ak	700			4500			1,1	51	60	1340	800	1450					1500
		Ao-Bk	700				4900					1340	800	1450					1480
		Bo-Ak		880		4500						1320	800	1430					1450
		Bo-Bk		880			4900					1320	800	1430					1420
		Co-Ak			1150	4500			1,2	59	68	1300	800	1400					1350
		Co-Bk			1150		4900					1300	800	1400	670				1320
500		Ao-Ak	850			5600			1	52	61	1380	800	1550					1650
		Ao-Bk	850				6600					1380	800	1550					1600
		Bo-Ak		1050		5600						1350	800	1550					1600
		Bo-Bk		1050			6600					1350	800	1550					1580
		Co-Ak			1300	5600			1,1	60	69	1320	800	1530					1520
		Co-Bk			1300		6600					1320	800	1530					1500
630		Ao-Ak	1000			6700			0,9	53	62	1420	800	1660					1980
		Ao-Bk	1000				7300					1420	800	1660					1950
		Bo-Ak		1150		6700						1400	800	1650					1900
		Bo-Bk		1150			7300					1400	800	1650					1870
		Co-Ak			1500	6700			1	61	70	1380	800	1630					1850
		Co-Bk			1500		7300					1380	800	1630					1830

We reserve ourselves to bring modifications to the data with no warning

CAST RESIN TRANSFORMERS FOR DISTRIBUTION - SERIES 12 KV

IEC60076-11 EN 50541-1 — TAB 12 KV

Power KVA	Ins. lev. KV	Code series	No load losses Po - Watt Ao	Bo	Co	Load losses P.c.cto - 120°C Ak	Bk	Vcc. %	Io %	LpA dBA	LwA dB(A)	A	B	H	M	D	S	N	Weight Kg
100	12 KV	Ao-Ak	260			1800		4	2	43	51	1150	700	1230	520	125	40	35	800
		Ao-Bk	260				2000					1150	700	1230					800
		Bo-Ak		330		1800						1140	700	1210					760
		Bo-Bk		330			2000					1140	700	1210					760
		Co-Ak			440	1800			2,1	50	59	1130	700	1200					750
		Co-Bk			440		2000					1130	700	1200					750
160		Ao-Ak	350			2600			1,7	46	54	1150	700	1230					800
		Ao-Bk	350				2700					1150	700	1230					800
		Bo-Ak		450		2600						1140	700	1210					760
		Bo-Bk		450			2700					1140	700	1210					760
		Co-Ak			610	2600			1,8	53	62	1130	700	1200					750
		Co-Bk			610		2700					1130	700	1200					750
250		Ao-Ak	500			3400			1,4	48	57	1250	700	1290					1100
		Ao-Bk	500				3500					1250	700	1290					1100
		Bo-Ak		610		3400						1230	700	1260					1050
		Bo-Bk		610			3500					1230	700	1260					1050
		Co-Ak			820	3400			1,5	56	65	1230	700	1260					1000
		Co-Bk			820		3500					1230	700	1260					1000
315		Ao-Ak	600			3950			1,2	49	58	1320	800	1300	670				1200
		Ao-Bk	600				4300					1320	800	1300					1200
		Bo-Ak		800		3950						1310	800	1290					1150
		Bo-Bk		800			4300					1310	800	1290					1100
		Co-Ak			1000	3950			1,3	58	67	1310	800	1290					1100
		Co-Bk			1000		4300					1310	800	1290					1100
400		Ao-Ak	700			4500			1,1	51	60	1350	800	1370					1350
		Ao-Bk	700				4900					1350	800	1370					1350
		Bo-Ak		880		4500						1340	800	1370					1280
		Bo-Bk		880			4900					1340	800	1370					1280
		Co-Ak			1150	4500			1,2	59	68	1320	800	1360					1200
		Co-Bk			1150		4900					1320	800	1360					1200
500		Ao-Ak	850			5800			1	52	61	1380	800	1450					1500
		Ao-Bk	850				6700					1380	800	1450					1500
		Bo-Ak		1100		5800						1360	800	1440					1460
		Bo-Bk		1100			6700					1360	800	1440					1460
		Co-Ak			1350	5800			1,1	60	69	1350	800	1430					1400
		Co-Bk			1350		6700					1350	800	1430					1400
630		Ao-Ak	1000			7100			0,9	53	62	1410	800	1570					1800
		Ao-Bk	1000				7300					1410	800	1570					1800
		Bo-Ak		1150		7100						1400	800	1550					1700
		Bo-Bk		1150			7300					1400	800	1550					1700
		Co-Ak			1500	7100			1	61	70	1380	800	1550					1650
		Co-Bk			1500		7300					1380	800	1550					1650
800		Ao-Ak	1100			8000		6	0,8	54	64	1460	800	1640		150	60	40	2100
		Ao-Bk	1100				9000					1460	800	1640					2100
		Bo-Ak		1300		8000						1450	800	1640					2050
		Bo-Bk		1300			9000					1450	800	1640					2050
		Co-Ak			1800	8000			0,9	62	71	1430	800	1630					2000
		Co-Bk			1800		9000					1430	800	1630					1950
1000		Ao-Ak	1300			9000			0,8	55	65	1530	1000	1900	820				2450
		Ao-Bk	1300				10000					1530	1000	1900					2400
		Bo-Ak		1500		9000						1520	1000	1880					2350
		Bo-Bk		1500			10000					1520	1000	1880					2350
		Co-Ak			2100	9000			0,85	63	73	1500	1000	1860					2250
		Co-Bk			2100		10000					1500	1000	1860					2200
1250		Ao-Ak	1500			11000			0,7	56	67	1620	1000	2030					3050
		Ao-Bk	1500				12000					1620	1000	2030					3050
		Bo-Ak		1800		11000						1600	1000	2030					2950
		Bo-Bk		1800			12000					1600	1000	2030					2950
		Co-Ak			2500	11000			0,8	63	75	1570	1000	2010					2750
		Co-Bk			2500		12000					1570	1000	2010					2700
1600		Ao-Ak	1800			13000			0,6	57	68	1710	1000	2100					3500
		Ao-Bk	1800				14500					1710	1000	2100					3500
		Bo-Ak		2200		13000						1710	1000	2100					3450
		Bo-Bk		2200			14500					1710	1000	2100					3450
		Co-Ak			2800	13000			0,7	65	76	1700	1000	2090					3300
		Co-Bk			2800		14500					1700	1000	2090					3300
2000		Ao-Ak	2200			15500			0,5	59	70	1880	1300	2250	1070	200	70	50	4500
		Ao-Bk	2200				18000					1880	1300	2250					4500
		Bo-Ak		2600		15500						1860	1300	2250					4400
		Bo-Bk		2600			18000					1860	1300	2250					4400
		Co-Ak			3600	15500			0,6	66	78	1830	1300	2220					4100
		Co-Bk			3600		18000					1830	1300	2220					4100
2500		Ao-Ak	2600			19000			0,45	60	71	1980	1300	2330					5200
		Ao-Bk	2600				23000					1980	1300	2330					5200
		Bo-Ak		3200		19000						1960	1300	2330					5100
		Bo-Bk		3200			23000					1960	1300	2330					5100
		Co-Ak			4300	19000			0,5	69	81	1950	1300	2320					4900
		Co-Bk			4300		23000					1950	1300	2320					4900
3150		Ao-Ak	3150			22000		7	0,4	61	74	2220	1300	2470					6800
		Ao-Bk	3150				26000					2220	1300	2470					6700
		Bo-Ak		3800		22000						2210	1300	2450					6600
		Bo-Bk		3800			26000					2210	1300	2450					6600
		Co-Ak			5300	22000			0,45	70	83	2170	1300	2440					6300
		Co-Bk			5300		26000					2170	1300	2440					6300

We reserve ourselves to bring modifications to the data with no warning

CAST RESIN TRANSFORMERS FOR DISTRIBUTION - SERIES 17,5-24 KV

IEC60076-11 EN 50541-1 — TAB 17,5-24 KV

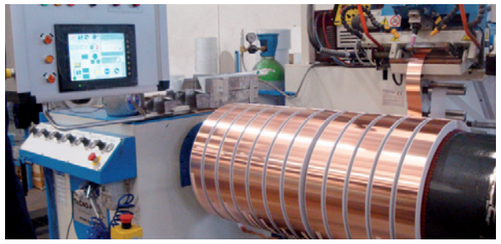
Power KVA	Ins. lev. KV	Code series	No load losses Po - Watt Ao	Bo	Co	Load losses P.c.cto - 120°C Ak	Bk	Vcc. %	Io %	LpA dBA	LwA dB(A)	A	B	H	M	D	S	N	Weight Kg
100	17,5 - 24 KV	Ao-Ak	280			1800		4	2	43	51	1230	700	1150	520	125	40	35	750
		Ao-Bk	280				2050					1230	700	1150					750
		Bo-Ak		340		1800						1230	700	1150					750
		Bo-Bk		340			2050					1230	700	1150					750
		Co-Ak			460	1800			2,1	50	59	1230	700	1150					750
		Co-Bk			460		2050					1230	700	1150					750
160		Ao-Ak	400			2600			1,7	46	54	1250	700	1180					800
		Ao-Bk	400				2900					1250	700	1180					800
		Bo-Ak		480		2600						1240	700	1180					800
		Bo-Bk		480			2900					1240	700	1180					800
		Co-Ak			650	2600			1,8	53	62	1240	700	1180					780
		Co-Bk			650		2900					1240	700	1180					780
250		Ao-Ak	520			3400			1,4	48	57	1320	700	1260					1150
		Ao-Bk	520				3800					1320	700	1260					1150
		Bo-Ak		650		3400						1320	700	1260					1100
		Bo-Bk		650			3800					1320	700	1260					1100
		Co-Ak			880	3400			1,5	56	65	1300	700	1250					1050
		Co-Bk			880		3800					1300	700	1250					1050
315		Ao-Ak	635			3950			1,2	49	58	1350	800	1280	670				1300
		Ao-Bk	635				4500					1350	800	1280					1250
		Bo-Ak		800		3950						1350	800	1270					1180
		Bo-Bk		800			4500					1350	800	1270					1150
		Co-Ak			1000	3950			1,3	58	67	1350	800	1270					1150
		Co-Bk			1000		4500					1310	800	1260					1100
400		Ao-Ak	750			4500			1,1	51	60	1360	800	1380					1380
		Ao-Bk	750				5500					1360	800	1380					1350
		Bo-Ak		940		4500						1350	800	1370					1330
		Bo-Bk		940			5500					1350	800	1370					1330
		Co-Ak			1200	4500			1,2	59	68	1340	800	1360					1300
		Co-Bk			1200		5500					1320	800	1360					1250
500		Ao-Ak	920			5800			1	52	61	1380	800	1450					1600
		Ao-Bk	920				6700					1380	800	1450					1550
		Bo-Ak		1100		5800						1370	800	1440					1500
		Bo-Bk		1100			6700					1370	800	1440					1500
		Co-Ak			1350	5800			1,1	60	69	1360	800	1440					1450
		Co-Bk			1350		6700					1360	800	1440					1450
630		Ao-Ak	1100			7100			0,9	53	62	1500	800	1600					2000
		Ao-Bk	1100				7600					1480	800	1580					1950
		Bo-Ak		1250		7100						1460	800	1580					1900
		Bo-Bk		1250			7600					1460	800	1580					1850
		Co-Ak			1650	7100			1	61	70	1430	800	1550					1750
		Co-Bk			1650		7600					1430	800	1550					1750
800		Ao-Ak	1300			8000		6	0,8	54	64	1480	800	1650		150	60	40	2350
		Ao-Bk	1300				9400					1470	800	1650					2300
		Bo-Ak		1500		8000						1470	800	1640					2200
		Bo-Bk		1500			9400					1470	800	1640					2150
		Co-Ak			2000	8000			0,9	62	71	1460	800	1630					2100
		Co-Bk			2000		9400					1460	800	1630					2050
1000		Ao-Ak	1550			9000			0,8	55	65	1560	1000	1900	820				2700
		Ao-Bk	1550				11000					1560	1000	1900					2600
		Bo-Ak		1800		9000						1560	1000	1900					2550
		Bo-Bk		1800			11000					1560	1000	1900					2500
		Co-Ak			2300	9000			0,85	63	73	1560	1000	1890					2450
		Co-Bk			2300		11000					1560	1000	1890					2400
1250		Ao-Ak	1800			11000			0,7	56	67	1680	1000	2040					3350
		Ao-Bk	1800				13000					1680	1000	2040					3150
		Bo-Ak		2100		11000						1670	1000	2040					3050
		Bo-Bk		2100			13000					1670	1000	2040					3000
		Co-Ak			2800	11000			0,8	63	75	1660	1000	2040					2950
		Co-Bk			2800		13000					1660	1000	2040					2900
1600		Ao-Ak	2200			13000			0,6	57	68	1790	1000	2170					3900
		Ao-Bk	2200				16000					1790	1000	2170					3800
		Bo-Ak		2400		13000						1780	1000	2160					3650
		Bo-Bk		2400			16000					1780	1000	2160					3600
		Co-Ak			3100	13000			0,7	65	76	1770	1000	2150					3500
		Co-Bk			3100		16000					1700	1000	2150					3450
2000		Ao-Ak	2600			16000			0,5	59	70	1900	1300	2310	1070	200	70	50	4800
		Ao-Bk	2600				18000					1890	1300	2310					4700
		Bo-Ak		3000		16000						1900	1300	2310					4500
		Bo-Bk		3000			18000					1890	1300	2300					4400
		Co-Ak			4000	16000			0,6	66	78	1890	1300	2300					4300
		Co-Bk			4000		18000					1890	1300	2300					4250
2500		Ao-Ak	3100			19000			0,45	60	71	2050	1300	2350					5700
		Ao-Bk	3100				23000					2050	1300	2350					5650
		Bo-Ak		3600		19000						2050	1300	2350					5450
		Bo-Bk		3600			23000					2050	1300	2350					5400
		Co-Ak			5000	19000			0,5	69	81	2040	1300	2340					5250
		Co-Bk			5000		23000					2040	1300	2340					5200
3150		Ao-Ak	3800			22000		7	0,4	61	74	2250	1300	2470					6900
		Ao-Bk	3800				28000					2250	1300	2470					6850
		Bo-Ak		4300		22000						2240	1300	2460					6550
		Bo-Bk		4300			28000					2240	1300	2450					6500
		Co-Ak			6000	22000			0,45	70	83	2240	1300	2420					6400
		Co-Bk			6000		28000					2240	1300	2420					6300

We reserve ourselves to bring modifications to the data with no warning

IMEFY	CAST RESIN TRANSFORMERS FOR DISTRIBUTION - SERIES 36 KV														IEC60076-11 EN 50541-1			TAB 36 KV	
Power KVA	Ins. lev. KV	Code series	No load losses Po - Watt Ao	Bo	Co	Load losses P.c.cto - 120°C Ak	Bk	Vcc. %	Io %	LpA dBA	LwA dB(A)	A	B	H	M	D	S	N	Weight Kg
100	36 KV	Ao-Ak	800			2000		4	2	45	56	1650	700	1480	520	125	40	35	1350
		Ao-Bk	800				2400					1650	700	1480					1350
		Bo-Ak		850		2000				52	61	1630	700	1460					1300
		Bo-Bk		850			2400					1630	700	1460					1300
		Co-Ak			920	2000			2,1	55	65	1610	700	1450					1250
		Co-Bk			920		2400					1610	700	1450					1250
160		Ao-Ak	850			2500			1,7	47	57	1650	700	1480					1350
		Ao-Bk	850				2700					1650	700	1480					1350
		Bo-Ak		900		2500				53	62	1630	700	1460					1300
		Bo-Bk		900			2700					1630	700	1460					1300
		Co-Ak			960	2500			1,8	57	66	1610	700	1450					1250
		Co-Bk			960		2700					1610	700	1450					1250
250		Ao-Ak	1000			3800			1,4	48	59	1680	700	1520					1600
		Ao-Bk	1000				4000					1680	700	1520					1560
		Bo-Ak		1100		3800				55	64	1650	700	1500					1520
		Bo-Bk		1100			4000					1650	700	1500					1500
		Co-Ak			1280	3800			1,5	58	67	1630	700	1500					1480
		Co-Bk			1280		4000					1630	700	1500					1450
315		Ao-Ak	925			4250			1,2	50	60	1740	800	1550					1800
		Ao-Bk	925				4700					1740	800	1550					1750
		Bo-Ak		1150		4250				55	65	1720	800	1530					1700
		Bo-Bk		1150			4700					1720	800	1530					1700
		Co-Ak			1300	4250			1,3	59	68	1700	800	1510					1680
		Co-Bk			1300		4700					1700	800	1510					1650
400		Ao-Ak	1200			5000			1,1	51	61	1740	800	1640					2100
		Ao-Bk	1200				5400					1730	800	1630					2000
		Bo-Ak		1300		5000				55	65	1730	800	1630					1950
		Bo-Bk		1300			5400					1730	800	1610					1900
		Co-Ak			1650	5000			1,2	60	69	1710	800	1600					1850
		Co-Bk			1650		5400					1710	800	1600					1800
500		Ao-Ak	1300			6000			1	52	62	1750	800	1750	670				2300
		Ao-Bk	1300				6600					1750	800	1750					2250
		Bo-Ak		1450		6000				57	67	1740	800	1740					2200
		Bo-Bk		1450			6600					1740	800	1740					2150
		Co-Ak			1800	6000			1,1	61	71	1740	800	1730					2100
		Co-Bk			1800		6600					1720	800	1720					2050
630		Ao-Ak	1400			7000		6	0,9	53	63	1810	800	1840					2750
		Ao-Bk	1400				7500					1780	800	1840					2650
		Bo-Ak		1600		7000				58	68	1760	800	1830					2600
		Bo-Bk		1600			7500					1760	800	1830					2550
		Co-Ak			2200	7000			1	62	72	1750	800	1820					2500
		Co-Bk			2200		7500					1750	800	1820					2400
800		Ao-Ak	1650			8400			0,8	54	64	1840	800	1910					3000
		Ao-Bk	1650				9000					1840	800	1910					2950
		Bo-Ak		1900		8400				58	69	1830	800	1900					2900
		Bo-Bk		1900			9000					1830	800	1900					2850
		Co-Ak			2700	8400			0,9	63	72	1810	800	1900					2800
		Co-Bk			2700		9000					1810	800	1900					2750
1000		Ao-Ak	1900			10000			0,8	55	65	1900	1000	2160	820	150	60	40	3500
		Ao-Bk	1900				11000					1900	1000	2150					3400
		Bo-Ak		2250		10000				60	70	1870	1000	2140					3300
		Bo-Bk		2250			11000					1870	1000	2140					3250
		Co-Ak			3100	10000			0,85	63	73	1840	1000	2100					3200
		Co-Bk			3100		11000					1840	1000	2100					3150
1250		Ao-Ak	2200			12000			0,7	56	67	1960	1000	2280					4000
		Ao-Bk	2200				13000					1960	1000	2280					3900
		Bo-Ak		2600		12000				61	72	1950	1000	2250					3800
		Bo-Bk		2600			13000					1950	1000	2250					3750
		Co-Ak			3600	12000			0,8	64	75	1930	1000	2230					3700
		Co-Bk			3600		13000					1930	1000	2230					3600
1600		Ao-Ak	2550			14000			0,6	57	68	1990	1000	2400					4500
		Ao-Bk	2550				16000					1990	1000	2380					4400
		Bo-Ak		3000		14000				62	73	1980	1000	2380					4250
		Bo-Bk		3000			16000					1980	1000	2360					4200
		Co-Ak			4200	14000			0,7	65	76	1960	1000	2350					4100
		Co-Bk			4200		16000					1960	1000	2350					4000
2000		Ao-Ak	3000			17000			0,5	60	72	2200	1300	2500	1070	200	70	50	5600
		Ao-Bk	3000				18500					2200	1300	2480					5500
		Bo-Ak		3500		17000				63	74	2170	1300	2470					5300
		Bo-Bk		3500			18500					2170	1300	2470					5250
		Co-Ak			5000	17000			0,6	66	78	2150	1300	2450					5200
		Co-Bk			5000		18500					2150	1300	2450					5100
2500		Ao-Ak	3500			20000			0,45	61	73	2320	1300	2550					6800
		Ao-Bk	3500				22500					2320	1300	2550					6700
		Bo-Ak		4200		20000				66	78	2310	1300	2520					6500
		Bo-Bk		4200			22500					2310	1300	2520					6400
		Co-Ak			5800	20000			0,5	69	81	2290	1300	2500					6300
		Co-Bk			5800		22500					2290	1300	2500					6200
3150		Ao-Ak	4100			25000		7	0,4	63	76	2500	1300	2650					8000
		Ao-Bk	4100				27500					2500	1300	2650					7900
		Bo-Ak		5000		25000				68	81	2470	1300	2630					7700
		Bo-Bk		5000			27500					2470	1300	2630					7600
		Co-Ak			6700	25000			0,45	70	83	2450	1300	2620					7500
		Co-Bk			6700		27500					2450	1300	2620					7400

We reserve ourselves to bring modifications to the data with no warning

HV aluminium winding



HV copper winding

LOW VOLTAGE WINDING

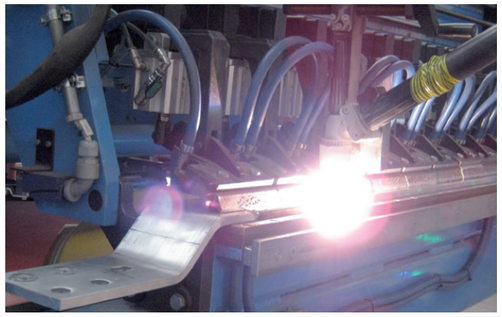
It's usually manufactured by a single foil of aluminum or copper because the dielectric stresses are very low. This construction allows to obtain a strong resistance against short-circuit stress. The insulation between the turns is ensured by the use of pre impregnated Class F insulating materials. The winding's terminals are TIG welded into the winding all the way through, they are in aluminium rigid alloy in way not to compromise the dynamic strength of the winding.

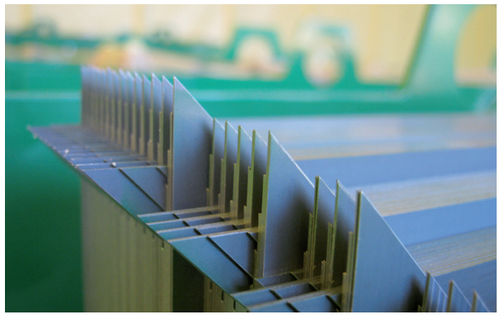
MEDIUM VOLTAGE WINDING

It consists of a series of sub-winding made of aluminium or copper foil, the insulation between turns is ensured by proper materials with a high insulation degrees. The winding is manufactured completely in automated machineries and after putting the connections it is pull down inside amould and inside of an oven for the pre heating stage.
The casting is done under vacuum, with a resin which is a mixture of quartz flour and epoxy resin properly weighout by an automated vacuum plant.
This type of winding have considerable advantages, indeed, the voltage difference between the turns is always the same having always only one turns for layer it permit to achieve higher impulse voltage withstand capability and a lower risk to have partial discharge.
IMEFY Cast Resin Transformer have a level of partial discharge lower than 5pC, testing did frequently also in CESI laboratories.
The choice of aluminium in the casting reduces to the minimum the dynamic stresses due to heating because the coefficient of expansion of aluminium is very close to the one of the epoxy resin.

MAGNETIC CORE

The magnetic core is manufactured with high permeability, low-loss grain-oriented steel sheets. The characteristics of these material minimizes losses due to stray currents. The joints are 45° step–lap type to minimize stray-flux losses and noise of the transformer.
The surface of the magnetic core is also covered by a special paint that protects the core against oxidation and corrosion, and meanwhile reduce the noise.





Certified quality

IMEFY, in line with the high quality of his products gas awarder in the recent years prestigious natinal and international certificates and approvals in cast resin technology sector.

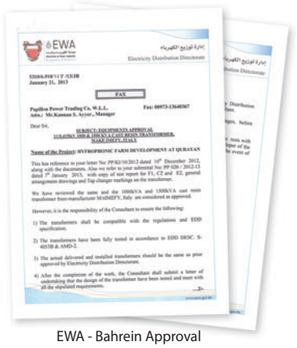
CESI E3-E2-C2-F1 Certificate

GOST - Russia Certificate


MEDC - Oman Approval


Sai Gon Utility - Vietnam Approval

KAHRAMAA - Qatar Approval



EWA - Bahrein Approval

ISO 14001 Certificate

ISO 9001 Certificate


Mall Plaza Egana - Chile


Blackrock Manganese Mine - Africa


World Trade Center - Bangladesh


Bar Ilan University - Israel


IRU CHP Plant - Estonia

REWE Oranienburg - Germany


Al Dura Refinery - Iraq


Fincantieri - Marghera Italy

TOP REFERENCES

16.000 kVA - 20 / 10 kV - Shopping Center "Passage" - Krasnogorsk city - Russia
10.000 kVA - 15 / 6,3 kV - Co-Generation Plant - Cuneo - Italy
7.500 kVA - 15 / 6,3 kV - Hydro Power Plant - Aosta - Italy
6.000 kVA - 20,75 / 6,3 kV - Co-Generation Plant - Crotone - Italy
6.000 kVA - 20 / 10 kV - Fincantieri - Venezia - Italy
6.000 kVA - 20 / 6,3 kV - Hydro Power Plant - Romania
6.000 kVA - 21 / 10 kV - Salerno Paper Mill - Salerno - Italy
5.500 kVA - 20 / 0,69-0.69 kV - Gruppo Felappi - Fano - Italy
5.000 kVA - 15 / 6 kV - Co-Generation Plant Salluzzo - Torino - Italy
5.000 kVA - 33 / 6,6 kV - Al-Dura Scheiba Refinery - Baghdad - Iraq
4.000 kVA - 10,5 / 6,3 kV - IRU CHP Co-Generation Plant - Tallin - Estonia
4.000 kVA - 20 / 6,9 kV - Heron Combined Power Plant - Thiva - Greece
4.000 kVA - 22 / 0,4 kV - Ferrero Factory - Torino - Italy
4.000 kVA - 15 / 0,4 kV - Saint Gobain - Cremona - Italy
4.000 kVA - 10 / 6,3 kV - Lukoil-Perm Oil Industry - Perm - Russia
4.000 kVA - 10 / 6,3 kV - Lukoil - Perm - Russia
4.000 kVA - 20 / 0,42 kV – New APM Terminal - Rotterdam - Netherland
3.300 kVA - 6 / 21 kV – Universal Hospital - Tirana - Albania
3.300 kVA - 20 / 0,4 kV - Centrale Hydro Alpe Adria - Udine - Italy
3.250 kVA - 6,6 / 2 x 2,2 kV - NMDC Limited (Siemens India) - Austria

TOP DESTINATIONS

Ports and Airports
New Apm Rotterdam Terminal / Netherland
Venice International Airport / Italy
Milan Linate International Airport / Italy

Skyscrapers
Dhaka World Trade Center / Bangladesh
Al Dareen Towers Doha / Qatar
Abdul Wahab Tower Doha / Qatar

Shopping Centers
Mall Plaza Egaña Santiago / Chile
Armani Store Milano / Italy
Prada Store Venice / Italy

Renewable Energy
Over 120 Transformers for Gamesa
Wind turbines
Over 50 Transformers for ABB photovoltaic

Hospitals
San Paolo Hospital Milan / Italy
Waterford Hospital / Ireland
Sidra Village Doha / Qatar

Universities
La Sapienza Roma / Italy
Bar Ilan univercity / Israel
Amasya Univercity / Turkey

Stadiums
Lusail Race Circuit Doha / Qatar
Ac Milan Inter Stadium / Italy
Juventus Stadium Torino / Italy

Factories
Ferrero Factory / Italy
ThyssenKrupp Factory / Italy
FIAT Factory and Crash test center / Italy

Power Plants
Heron Power Plant / Greece
Alstom Kraftwerk Powerplant / Norway
Iru Chp Plant Tallin / Estonia

Wind farms - Italy and Spain


Tunnel "Frejus"


Hydro Alpe Adria - Udine Italy


University "La Sapienza" - Rome Italy


Juventus Stadium - Torino Italy


Photovoltaic "Bentegodi" - Verona


High speed train Station - Ravenna Italy


Balakovo Nuclear power station - Russia


Fiat Mirafiori - Torino Italy

Airport Marco Polo - Venezia


Stadium San Paolo - Napoli Italy


Stadium San Siro Milano - Italy


Losail race track - Qatar


Adana Hospital Project - Turkey


Alstom Ktraftverk - Norwey


Ignalina Plant - Lithuania

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