

# IPEL

## OIL IMMERSED TRANSFORMERS 20kV

Founded in 1997, IPEL has started as a small, modern, competent Greek company, dealing in electro technical equipment. During its last four years of activity, IPEL has supplied and installed a large number of equipment and has become one of the most important Greek firms in the field of electric transformers, gen-sets, M.V Switchboards and other electrical energy distribution systems.



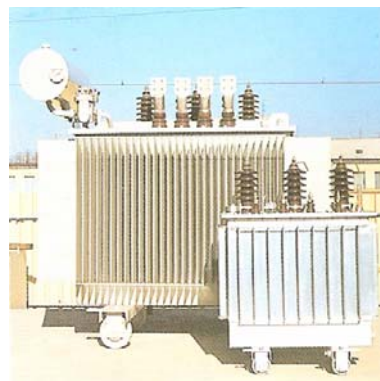
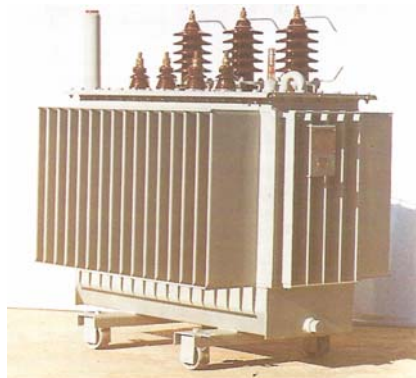
IPEL has achieved a great estimation among final users, plants installators, consultants and electrical operators. Its name is well known all over Greece as an innovator not only for the technology that the company represents but also for the engineering, project management, commissioning and maintenance of complex electrical projects.

The company's success is based on the office-team of IPEL which has many years of experience in the Greek market and has the ability to anticipate the ever more complex demands of its customers.

### TECHNICAL SPECIFICATIONS OF OIL IMMERSED TRANSFORMERS

#### Low voltage bushings

Low voltage bushings fitted with flag connectors can, if requested, be fitted with insulating covers and the tank can be equipped with a cable box which ensures safety against accidental life contact to the LV terminals.



#### Reduced noise level and losses

The transformers, with very low no-load losses and reduced noise level, are especially suitable for operation in the vicinity of apartment buildings or hospitals and in all other areas where a low noise level is required or where transformer loading values undergo considerable changes.

#### Applicable standards

IEC 76 and IEC 354 and/or DIN 42 500 as well as other international standards and regulations.

#### Accessories

Every transformer is equipped with bi-directional swivel rollers which can be set for forward or sideways movement.

A floating oil level indicator is placed on the tank cover. Transformers rated between 50kVA and 3150kVA are equipped with pressure valves to protect the transformer against high pressure inside the tank, which can occur in unusually high overload conditions.

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### Technical Characteristics

The tanks of the transformers 50kVA – 3150kVA are hermetically sealed, completely filled with oil and tightly covered. Therefore there is no contact between oil and air so that special oil – checks during operation are not necessary. All changes in the volume of oil brought about by changes in oil temperature during operation are taken over by flexible corrugated walls of the tank.

All transformers 50kVA – 3150kVA can be equipped with oil conservator upon request.

### Accessories on request

Plastic or metal angle cable terminals can be supplied instead of standard porcelain bushings. Cable ends are attached to the angle cable terminals (only for PVC cables with shields) and mechanically locked in the terminal handle. This solution saves space and ensures safety of life contact.

### Three Phase Oil-Immersed Transformers

Oil-immersed transformers are three phase transformers designed to supply industrial, municipal and rural distribution networks.

They can operate continuously in indoor and outdoor transformer stations in networks with voltage values 6kV up to 20kV. Standard oil-immersed transformers are suitable for operation in temperate climates and can be installed both on open sites and in buildings with good ventilation, at altitudes up to 1000m above sea level, in temperatures between -25°C and +40°C with annual average not exceeding +20°C. Other types designed to operate in specific site conditions can be supplied upon request.

### Design

Transformer cores are made of low – loss cold rolled sheet steel and have been designed so as to reduce the no – load losses to a minimum.

Transformer windings are made of electrolytic copper. High voltage windings are made of enameled round wire or paper-insulated flat wire.

Low voltage windings are made of paper – insulated flat wire or copper strip.

The design of the windings ensures very good electric characteristics, excellent lightning resistance and short-circuits strength. For voltage regulation an off-load five - or three - step tap changer is used. The position of the tap changer is set by turning the handle on the tank cover.

### Voltage strength

Distribution transformers rated up to 2000 kVA are, in addition to type test according to IEC-standards, also type tested with a chopped wave as well as with a step wave (up to 2000 kV/ $\mu$ s) according to the Finnish standard SFS 2646 (1987). These type tests ensure the strength of the winding to withstand atmospheric over voltages when using arcing horns.

Low voltage windings for all distribution transformers have an insulation level of 3 kV according to IEC 76.

### Short-circuit strength

The transformers are dimensioned to withstand thermal and dynamic short-circuit stresses according to IEC-standards. As a special test, dynamic short/circuit tests are performed in accordance with IEC testing procedure.

### Overload capacity

The distribution transformers can be overloaded according to IEC Publication 354 "loading guide for oil-immersed transformers".

For instance: At an ambient temperature of -25° C the transformer can be loaded with 140% for 2 hours per 24 hours after a continuous 2/3 load.

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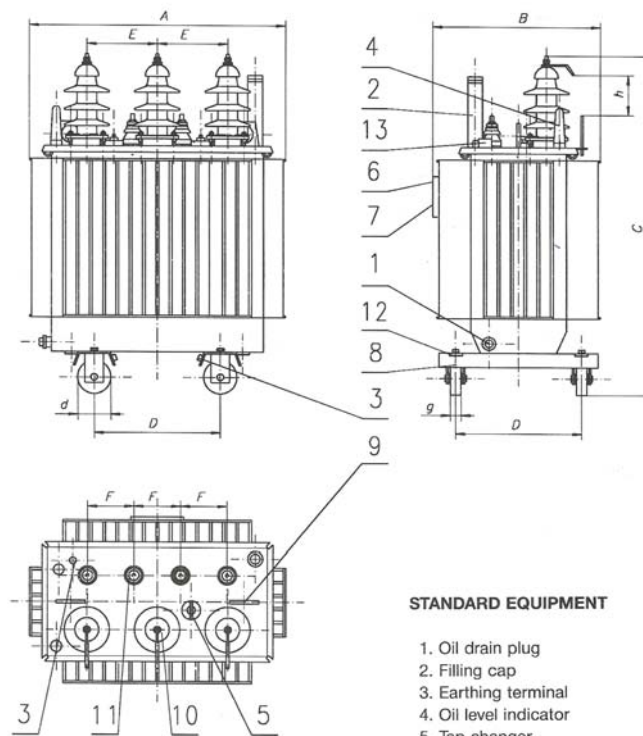
## OIL IMMERSED TRANSFORMERS 20kV

### Vacuum treatment

Drying and vacuum treatment takes place in a special oven, where the windings are warmed up by (electric) current simultaneously as the air is evacuated from the oven down to a vacuum of  $<5$  mbar. Oil is filled into the transformer while it is still under vacuum, in this way moisture and gases are effectively removed from the windings and oil.

### Surface treatment

Prior to painting the transformers are cleaned, sand blasted and degreased and there after iron phosphates and oven dried. Priming and finishing is carried out by flow painting in several layers. Flow painting gives the best guarantee of a uniform thickness all over the transformer surface. The total coat thickness is at least  $140/\mu\text{m}$ . The colour is RAL 7031 or according to customer standard. Smaller transformer can alternatively be hot-dip galvanized.

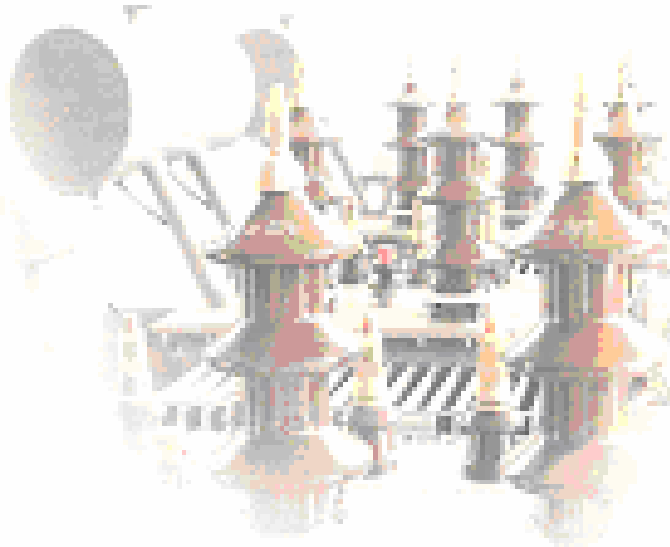
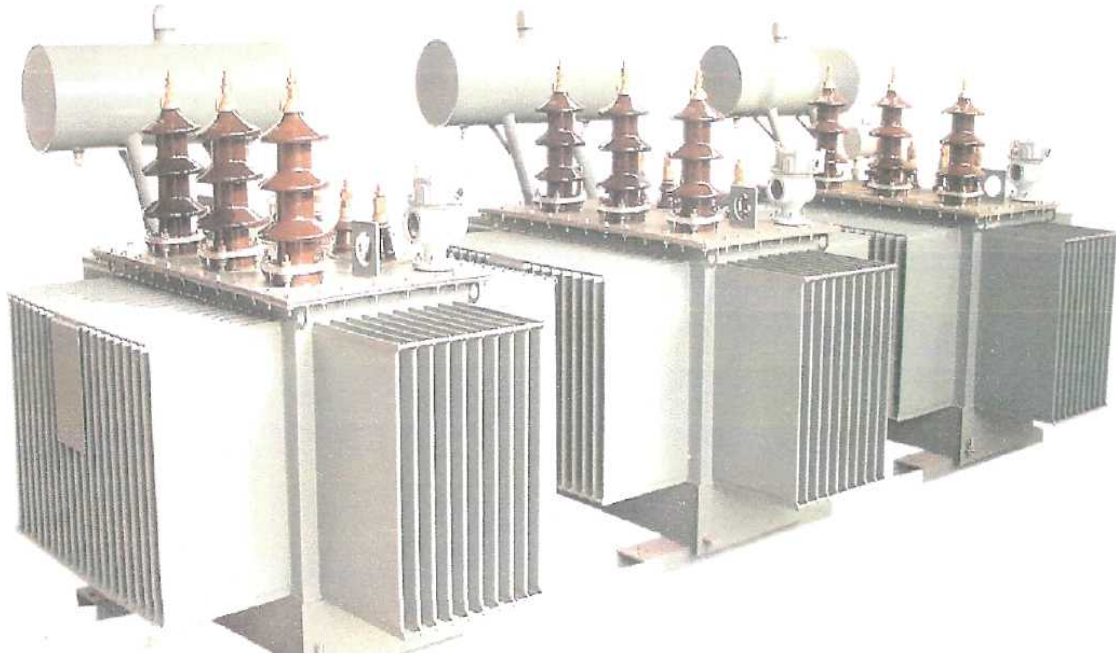


Fixing lugs are placed in corners under the upper frame of the tank for safe lashing of transformer during shipment.

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OIL IMMERSED TRANSFORMERS 20kV

NORMAL LOSES



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## OIL IMMERSED TRANSFORMERS 20kV 3 PHASE DISTRIBUTION TRANSFORMERS HAVING NORMAL LOSES

(on request all the above transformers can be fitted oil conservator or sealed type)

<b>RATED POWER</b>	<b>KVA</b>	<b>50</b>	<b>100</b>	<b>160</b>	<b>200</b>	<b>250</b>	<b>315</b>	<b>400</b>
<b>No load losses at rated voltage</b>	W	270	360	520	600	710	850	1000
<b>Load losses at 75°C</b>	W	1450	2370	3500	4100	7450	5750	7100
<b>Impedance voltage at 75°C</b>	%	4	4	4	4	4	4	4
<b>Oil weight</b>	Kg	90	105	140	170	185	200	240
<b>Total weight</b>	Kg	410	510	650	750	870	1020	1210
<b>Length</b>	mm	830	970	1040	1070	1100	1275	1360
<b>Width</b>	mm	500	700	750	800	820	910	1020
<b>Heigth</b>	mm	1040	1080	1160	1275	1260	1280	1290

<b>RATED POWER</b>	<b>KVA</b>	<b>500</b>	<b>630</b>		<b>800</b>	<b>1000</b>	<b>1250</b>	<b>1600</b>
<b>No load losses at rated voltage</b>	W	1200	1400	1200	1400	1650	1900	2500
<b>Load losses at 75°C</b>	W	8100	9700	11000	13500	15500	18500	22300
<b>Impedance voltage at 75°C</b>	%	4	4	6	6	6	6	6
<b>Oil weight</b>	Kg	280	310	320	380	440	500	600
<b>Total weight</b>	Kg	1400	1650	1650	2050	2150	2600	3150
<b>Length</b>	mm	1480	1520	1680	1700	1780	1900	2220
<b>Width</b>	mm	1050	1170	1200	1270	1280	1400	1700
<b>Heigth</b>	mm	1330	1360	1360	1650	1750	1800	1870

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OIL IMMERSED TRANSFORMERS 20kV  
MEC LOSSES



# IPEL

## OIL IMMERSED TRANSFORMERS 20kV 3 PHASE DISTRIBUTION TRANSFORMERS HAVING MEC LOSES

(on request all the above transformers can be fitted oil conservator or sealed type)

RATED POWER	KVA	50	100	160	200	250	315	400	500
No load losses at rated voltage	W	190	320	460	550	650	780	930	1100
Load losses at 75°C	W	1100	1750	2350	2800	3250	3850	4600	5500
Impedance voltage at 75°C	%	4	4	4	4	4	4	4	4
Oil weight	Kg	105	115	150	170	180	210	240	290
Total weight	Kg	450	570	720	820	930	1060	1250	1450
Length	mm	880	900	950	1150	1250	1300	1320	1350
Width	mm	500	580	760	800	870	880	890	920
Height	mm	1100	1120	1250	1270	1280	1310	1350	1380

RATED POWER	KVA	630		800	1000	1250	1600	2000	2500	3150
No load losses at rated voltage	W	1300	1100	1200	1500	1750	2300	2650	3300	3900
Load losses at 75°C	W	6500	7000	9000	10500	14000	17000	22000	26500	33500
Impedance voltage at 75°C	%	4	6	6	6	6	6	6	6	6
Oil weight	Kg	310	330	380	430	480	590	830	850	950
Total weight	Kg	1700	1750	2030	2380	2680	3370	4300	4750	5500
Length	mm	1420	1490	1550	1880	1910	2050	2200	2300	2350
Width	mm	950	960	990	1030	1150	1520	1620	1640	2020
Height	mm	1390	1400	1430	1540	1760	1780	2000	2050	2100

# IPEL

OIL IMMERSED TRANSFORMERS 20kV  
REDUCED LOSSES



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## OIL IMMERSED TRANSFORMERS 20kV

### 3 PHASE DISTRIBUTION TRANSFORMERS

#### HAVING REDUCED LOSES, FITTED WITH CONSERVATOR

(on request all the above transformers can be fitted oil conservator or sealed type)

RATED POWER	KVA	50	100	160	200	250	315	400	500
No load losses at rated voltage	W	150	250	360	440	520	620	740	880
Load losses at 75°C	W	850	1400	1850	2200	2600	3200	3650	4400
Impedance voltage at 75°C	%	4	4	4	4	4	4	4	4
Oil weight	Kg	110	145	170	180	200	230	250	290
Total weight	Kg	500	690	820	840	1050	1140	1450	1570
Length	mm	850	870	920	1000	1180	1260	1270	1320
Width	mm	680	720	770	800	820	840	850	860
Height	mm	1110	1120	1150	1170	1290	1310	1320	1380

RATED POWER	KVA	630		800	1000	1250	1600	2000	2500	3150
No load losses at rated voltage	W	1050	900	1100	1330	1650	2090	2400	3040	3700
Load losses at 75°C	W	5200	5600	7200	9000	10500	13000	16000	21000	26000
Impedance voltage at 75°C	%	4	6	6	6	6	6	6	6	6
Oil weight	Kg	330	350	390	460	500	560	660	800	910
Total weight	Kg	1830	1950	2190	2550	3170	3750	4280	4850	5850
Length	mm	1400	1480	1500	1620	1770	1980	2000	2050	2150
Width	mm	930	1000	1020	1050	1180	1250	1410	1750	2080
Height	mm	1430	1410	1450	1510	1530	1550	1850	1900	1940

Our products are manufactured in cooperation with ART-TRA s.r.l.