

WESTRAFO

SUSTAINABLE PEAK LOAD DISTRIBUTION TRANSFORMERS



SPL COMPACT ECO SERIES
WITH ENVIROTEMP™ FR3™ NATURAL ESTER

LEADING EXPERTISE

WESTRAFO

50 YEARS OF FAMILY COMMITMENT

Westrafo is the result of the work and commitment of two generations, in the electromechanical sector for the past 50 years.

A know-how passed from father to son through years of cooperation, that has evolved into the creation of a project unifying great technical skills derived from experience with advanced technology and new efficiency standards, to produce high quality and highly reliable transformers.

We paved the road to our success with great collaborators and ambitious projects, devoted to our clients and always attentive to the environmental impact of our production. This is the reason why we chose to partner with Cargill for this very ambitious project.



TOP QUALITY INDUSTRIAL SOLUTIONS

Cargill has been reliably selecting, modifying and reacting various biobased chemistries to create innovative solutions for industrial customers.

It offers products and services that help customers around the globe to increase performance and lower total cost – all in a responsible and sustainable manner. Cargill's solutions include dielectric fluids, such as Envirotemp™ FR3™ natural ester for power and distribution transformers, in both new and retrofill applications.

Their team of dielectric fluid experts have extensive fluid application knowledge as well as transformer design experience enabling a collaborative partnership with utilities and us, in order to develop the right solution for any customer specific needs.

Together with Cargill, our focus is to bring innovative, renewable solutions that enhance performance, optimize cost structures and processes and have a positive environmental impact, like the SPL series.

WESTRAFO OFFERS:

-  TRANSFORMERS FOR GREEN ENERGY APPLICATIONS
-  POWER TRANSFORMERS UP TO 40 MVA
-  CAST RESIN POWER AND DISTRIBUTION TRANSFORMERS
-  TRANSFORMERS FOR SPECIAL APPLICATIONS
-  PAD MOUNTED TRANSFORMERS
-  MV COMPLETE SUBSTATIONS

CARGILL'S PREMIERE ENVIROTEMP™ FR3™ FLUID IS RECOGNIZED BY:



SPL COMPACT ECO SERIES: A REVOLUTIONARY CONCEPT MEETS OUR HIGH QUALITY STANDARD FEATURES

SPL – SUSTAINABLE PEAK LOAD DISTRIBUTION TRANSFORMERS INSULATED WITH NATURAL ESTER

Our transformer technology has been proven with more than 50 years of experience. The construction materials of our transformers and its well-proven design are configured to maintain their efficiency and reliability over a long lifetime.

Now, we have combined the excellence of our standard Eco Design production with new generation features.

The key element is FR3 fluid, which thanks to its unique characteristics, allows us to expand and improve the performance standards of our transformer.

FR3 fluid is designed to work in synergy with the transformer to deliver 5 key benefits.

The design and manufacture of our WTE SPL series have successfully passed routine and type tests by CESI, Report N. B7002604



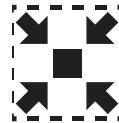
OPTIMIZED TRANSFORMER
PERFORMANCE AND GRID
RELIABILITY



INCREASED LOAD CAPACITY
DUE TO HIGH TEMPERATURE
CAPABILITY



REDUCED COST OF TOTAL
OWNERSHIP

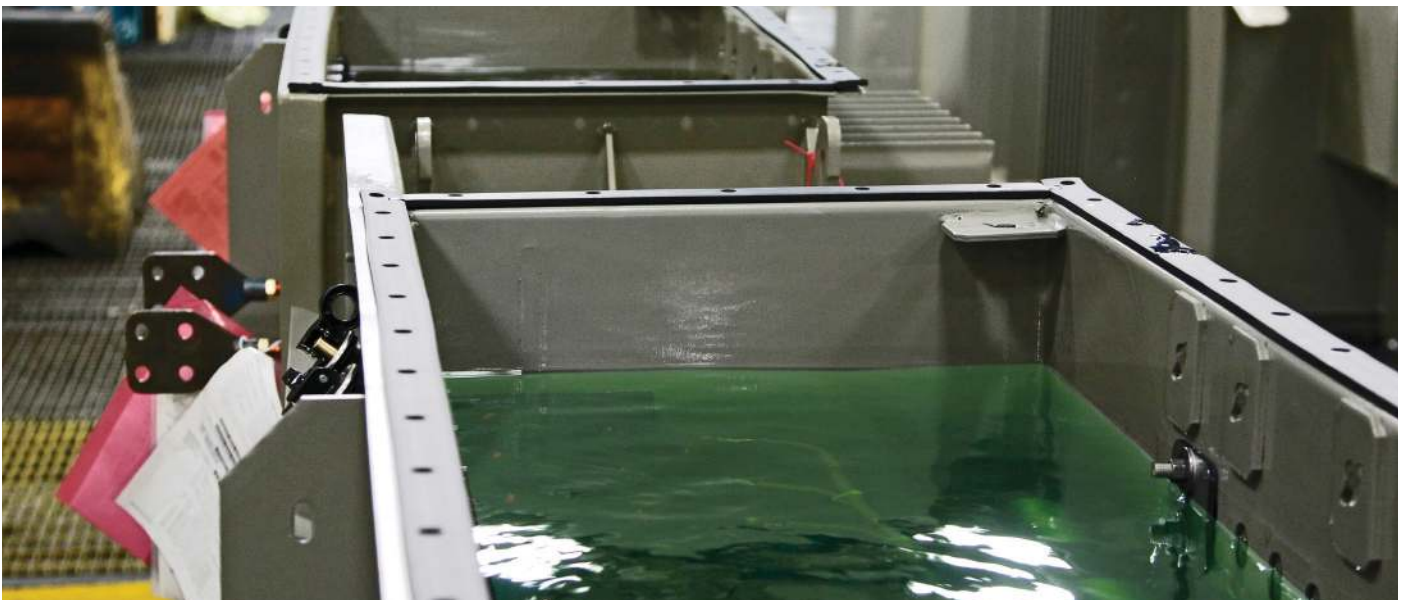


COMPACT DESIGN



INCREASED FIRE SAFETY AND
ECO SUSTAINABILITY

FOR MORE INFORMATION ON OUR TECHNOLOGY AND DESIGN, PLEASE VISIT:
WWW.WESTRAFO.COM



OPTIMIZED PERFORMANCE & GRID RELIABILITY



ENHANCED PROTECTION OF THE INSULATION SYSTEM

The quality and the design of the insulation system influences the expected lifetime of the transformer.

FR3 fluid has the ability to extend the life of insulation paper 5-8 times that of mineral oil transformers, improving grid reliability and reducing maintenance costs.

- FR3 fluid has 10x the water saturation of mineral oil.
- It absorbs the free water generated in an operating transformer.
- The higher the operating temperature is, the more water FR3 fluid absorbs.
- The natural ester does not generate sludge like mineral oil, thus maintaining its dielectric strength and improving transformer reliability.
- Simplified oil containment*.



FR3™ natural ester fluid vs. Mineral oil Sealed Tube Test - IEEE C57.100, Annex B



*Please verify all environmental parameters of FR3 fluid and SPL transformers according to the applicable law in your country before installation, or contact our sales office for assistance.

KEY FIGURES:

5 to 8X
EXTENSION OF
INSULATION LIFE

HIGHER THERMAL CAPABILITY (IEEE C57.154 - IEC 60076-14)



EXTRA POWER DUE TO THERMAL OPTIMIZATION

The sustainable peak load concept allows utilities and users to:

OPTION 1: Extend asset life at current 110° C hotspot.

This option can provide additional NPV savings as the transformer insulation life is extended.

OPTION 2: Increase load capability up to 20% with 130°C hotspot.

This option can enable increased capacity without sacrificing the insulation life through an optimized transformer design.

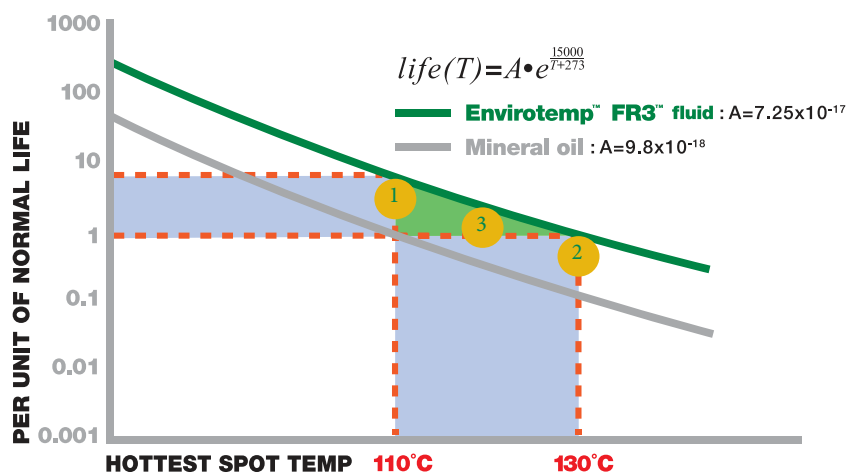
OPTION 3: Incrementally extend asset life and increase load capability with 120°C hotspot.

This option can offer some additional life extension and capacity increase, which is particularly useful in densely populated or space constrained areas.

The SPL concept uses the traditional nominal life temperature (110°C hotspot) for the nameplate rating and it leverages a peak loading capability at the superior temperature limits (130°C hotspot).

Paper	Dielectric Fluid	Thermal Class	Hot spot	IEEE AWR	IEC AWR
TUK	Mineral Oil	120	110°C	65°C	75K
TUK	Natural Ester	140	130°C	85°C	95K

Thermally Upgraded Kraft Paper (TUK or TUP) life curve



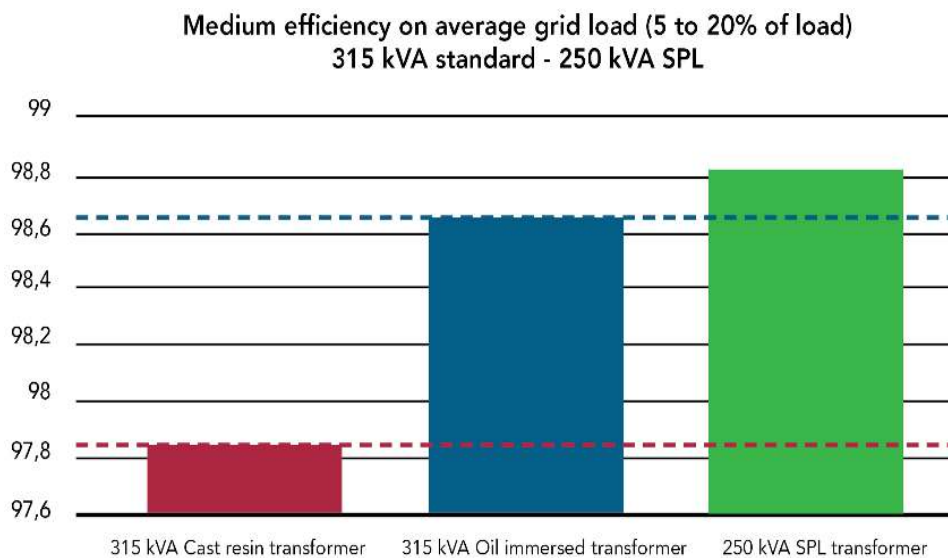
REDUCED TOTAL COST OF OWNERSHIP



RATIONALIZATION OF ASSET LIFE AND OPERATION COSTS

Based on the experience of major utilities around the globe, the yearly average loading of distribution transformers in the electric grid is between 10% and 25%.

Thanks to the increased loadability of optimized Westrafo SPL transformers, a utility can save as much as 20% of total ownership cost, due to the reduction of the No-Load Losses, reducing the total dissipated energy during one year. Many users will be able to rationalize the cost of the transformers by choosing a smaller transformer to be installed in the grid. Whenever the loading peak is reached during the day, the transformer will be able to sustain it for a typical short duration peak loading time.



Example: 15% loading $\cos \phi = 1$, efficiency at a single loading condition.

The complete load profile shows that SPL transformers are more efficient than cast resin transformers up to the 75% of load, and more efficient than oil immersed transformers up to the 25% of load, enabling better resistance to load peaks and warming. For more information and custom load profiles, please contact our sales offices.

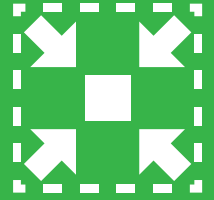
Moreover, choosing an SPL distribution transformer can result in a consistent rationalization of costs* for:

- Total ownership
- Maintenance operations*
- Space & logistics
- Spill remediation
- Deluge systems
- Fire prevention

* Please verify parameters of FR3 fluid and SPL transformers according to the applicable law in your country before installation, or contact our sales office for assistance.



COMPACT DESIGN WITH REDUCED SIZE & WEIGHT



DIMENSIONAL AND LOGISTIC IMPROVEMENTS

Distribution transformers are usually oversized to the load they serve in order to protect the transformer and enhance their performance.



Thanks to the SPL concept, utilities will be able to install transformers that better match actual grid load, obtaining fleet performance and cost flexibility with right sized transformers.

Transformers can have the same load capability but a smaller footprint, without raising concerns about the life of the transformer.

An SPL transformer does not need supplementary oil collection basins and can typically be installed with less clearing space.

KEY FIGURES:

-20%
VOLUME

-10%
FOOTPRINT

-15%
LESS DIELECTRIC FLUIDS
IN TRANSFORMER

Transformer key figures, comparing a mineral oil transformer with the smaller nominal rating SPL transformer.

INCREASED FIRE SAFETY & ECO SUSTAINABILITY



A SAFER OPTION FOR INSTALLATION

SPL transformers are a safer option for installation, whether it is required in civil applications in crowded city centers, or in remote areas with no immediate fire safety access.

One solution is FR3 fluid as it has the highest fire point of all K-class fluids, reaching over 360°C without catching fire. According to IEC 61936, costs related to expensive deluge systems for fire walls in power transformer installations could be reduced. As a UL Classified and FM Global Approved less-flammable fluid, transformers containing FR3 fluid can be installed closer to buildings which is useful in space constrained areas or retrofill applications.

Westrafo's SPL transformers are also safe for the environment: FR3 fluid is non-toxic, both in Acute Aquatic Toxicity (OECD 201 to 203) test and Acute Oral Toxicity (OECD 420), non-hazardous in water and soil and readily biodegradable. This translates to simpler, less costly spill remediation and fluid collection systems*, as well as being a great alternative for the environmental sustainability.

*Please verify parameters of FR3 fluid and SPL transformers according to the applicable law in your country before installation, or contact our sales office for assistance.

KEY FIGURES:

+20%
Load Capability

99%
Readily Biodegradable

360°C
Fire Point



SPL COMPACT ECO SERIES FILLED WITH FR3 NATURAL ESTER

SUITABLE FOR A PERMANENT ADDITIONAL LOADABILITY APPROXIMATELY 150%

The SPL concept uses the traditional nominal life temperature (**IEC 60076-2 - BLACK**) for the name-plate rating and it leverages a peak loading capability at the superior temperature limits (**IEC 60076-14 - GREEN**). Standard design with MV side up to 24 kV - 50 or 60 Hz Frequency - Dyn11 or Dyn5 - sealed type construction, losses according to EU Regulation 548/2014. Customizable according to grid configuration.

Power	Losses	Rated Power		Efficiency @100% and $\cos\phi=1$	Dimensions					Weight	
		No Load losses (P_0)	Load losses (P_k) @75°C		Impedance Voltage Vcc (@ 75°C)	A	B	H	Trolley	Wheels	FR3 Fluid
kVA	W	W	%	%	mm	mm	mm	mm	ØxH mm	Kg	Kg
160	210	2350	4,0	98,43	1050	750	1350	520x520	125x40	210	890
200		3672	5,0	98,10							
250	300	3250	4,0	98,60	1100	850	1450	520x520	125x40	260	1110
315		5160	5,0	98,30							
400	430	4600	4,0	98,76	1200	1000	1550	670x670	125x40	395	1710
630		11411	6,3	98,16							
630	600	6500	4,0	98,89	1350	1000	1600	670x670	125x40	485	2000
800		10481	5,1	98,63							
800	650	8400	6,0	98,88	1400	1000	1700	670x670	125x40	520	2410
1000		13125	7,5	98,64							
1000	770	10500	6,0	98,89	1700	1000	1750	820x820	160x50	595	2740
1250		16406	7,5	98,64							
1250	950	11000	6,0	99,05	1700	1000	1850	820x820	160x50	695	3290
1600		18022	7,7	98,83							
1600	1200	14000	6,0	99,06	1750	1100	2000	820x820	160x50	745	3640
2000		21875	7,5	98,86							
2000	1450	18000	6,0	99,04	1850	1200	2100	1070x1070	200x70	860	4090
2500		28125	7,5	98,83							

Dimensions and weight may vary according to type of construction requested, type of accessories and final application.

STANDARD ACCESSORIES:

- N.2 grounding terminal
- N.1 identification plate according to EU Regulation N.548/2014
- N. 2 lifting lugs
- Lockable no-load tap changer
- Bi-directional wheels
- Use and maintenance manual
- Routine test report

ACCESSORIES ON REQUEST: (Other special accessories on demand)

- Oil thermometer indicator
- Overpressure valve
- Oil level indicator
- Plug-in connectors for MV or LV side
- Integrated safety detector (DMCR, DGPT2, etc.)
- MV/LV electromagnetic screen
- IP54 Protection box

CUSTOM SOLUTIONS

PROTOTYPE AND SPECIAL PROJECT DEVELOPMENT

SPL transformers are highly customizable according to the type of application for which they are designed and of the typical load curve they are intended to serve.

Power, voltage, efficiency and all the components of the transformer can be selected according to its final use.

Our customization includes accessory kits and special designs for:

- Green energy application
- Power up to 40 MVA and 170 kV
- Rectifier application
- Replacement of cast resin and normal distribution transformers according to customer's request

REFURBISHMENT OF EXISTING TRANSFORMERS

Westrafo and Cargill can be your reliable partners to rationalize and increase the value of your transformer stock, replacing the old mineral oil of transformers with FR3 fluid, giving new life and improved efficiency of obsolete models. FR3 fluid is compatible with mineral oil and can be replaced without changing the solid insulation of the transformer.

For more information about all the possibilities of customization of SPL transformers and FR3 fluid, do not hesitate to contact our sales offices.



OTHER SERVICES

INTEGRATED SOLUTIONS

Westrafo offers integrated solutions to improve your purchase and your after sales experience, tailoring a complete range of services to your needs.

Consultancy on fluid use & application

Retrofill

Tendering stage support

Packing and shipping

Customer assistance during commissioning

Spare parts supply

Troubleshooting and reparation

Substitution of old transformers

Transformer rental

GUARANTEED QUALITY

Westrafo is certified UNI EN ISO:9001 and UNI EN ISO:14001.



Our quality controls involve the commercial and procurement process, the monitoring of suppliers and supply of material, as well as every stage of production and management in the production facilities.

Every process in Westrafo is coded through quality procedures ensuring the traceability and transparency of manufacture.

Ask for more information at info@westrafo.com, we will be happy to assist you.



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FR3™ fluid is a Cargill product.



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