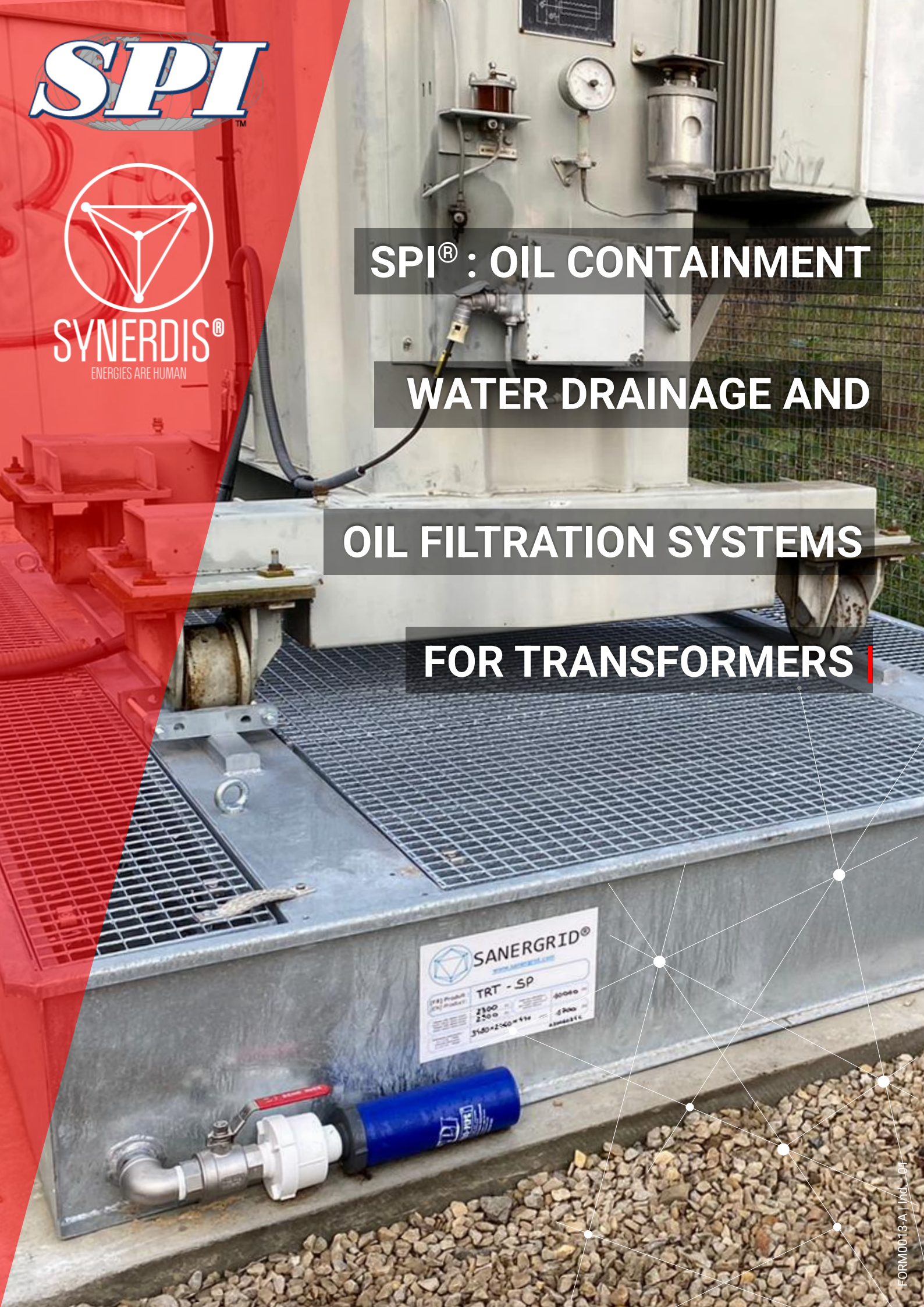
SPI™

SYNERDIS®
ENERGIES ARE HUMAN

SPI® : OIL CONTAINMENT WATER DRAINAGE AND OIL FILTRATION SYSTEMS FOR TRANSFORMERS



FORM0018-A | Ind. - 01

SAFELY DRAIN TRANSFORMER BUNDS WITHOUT HYDROCARBONS

SPI® Hydrocarbon Filters for Electrical Transformers

Power Transformer on SANERGRID TRT-MODULO 4 oil retention tanks equipped with SPI PIT416 drainage cartridges

Many industrial systems, including electrical transformers, use dielectric oils—typically mineral oils or hydrocarbons—for cooling and insulation. If spilled, these substances can severely contaminate soil and groundwater.

To mitigate this environmental risk, transformers must be installed with **secondary containment systems**, such as concrete pits or metal tanks, sized to hold **at least 100% of the transformer's oil volume**—a requirement known as **total containment**.

When transformers are installed outdoors, **rainwater accumulation** in the containment poses an additional risk. In the event of both **rainfall and oil leaks**, the **bund** could overflow—discharging pollutants into the environment. To prevent this, the containment must be fitted with a **drainage system that continuously evacuates rainwater** while **retaining hydrocarbons** within the bund.

Power transformer concrete bund equipped with automatic sump pump and PETRO BARRIER™ filtration system

The Groupe SANERGRID® & SYNERDIS® distribute hydrocarbon filters from SPI®: the inventor of this technology and a world leader in the field for over 35 years. We offer rainwater drainage solutions that are resistant to both dielectric oil and hydrocarbons, available in standard or custom filter cartridges. These cartridges operate either:

- **By gravity,** directly inside the retention pits, functioning without electricity and featuring a self-locking mechanism,
- **Or through pumped systems** located outside the pits, which can be equipped with level detectors and alarms.

Since 1990, in all tested cases, the hydrocarbon discharge rate at the filter outlet has been below 5 ppm, in compliance with EN 858-1 standards and water regulations.

PETRO PIPE PI-616-M2 in SKID for gravity drainage of offset pits, approx. 200 L/min

PETRO PIT 416 filter installed on a concrete retention bund

Mobile PETRO PIPE for pumping subterranean pits in power substations

PETRO PIPE PIT 416 for temporary flexible tank TRFLEX ECO+ SANERGRID, storage of power transformer

SPI® TECHNOLOGY AND EXPERTISE

"Water is drained, oil is retained" is the motto of SPI® filters. These filters incorporate **hydrophobic** (water-repellent) and **oleophilic** (oil-attracting) components, enabling them to solidify hydrocarbons and separate them from water, even when transformer oil is in a miscible or emulsified state.
This unique technology is integrated into the **PETRO PIT®**, **PETRO PIPE®**, **PETRO PLUG®**, **STORM BARRIER®**, and **PETRO BARRIER™** cartridges, which filter the rainwater according to 3 distinct functions:

1- EVACUATION FUNCTION: drainage

In normal operation without hydrocarbons, the SPI® filter allows water to pass through. The greater the water volume in the retention bund, the larger the filter diameter required to ensure sufficient discharge flow rates. (*refer to our different product ranges and references on the next page*). We provide support in selecting and sizing the appropriate number and type of filters based on the specific type of oil used.

➔ **Importance of Pre-filtration:** Dust, mud, and impurities in rainwater can affect the evacuation efficiency of the filters, which is why pre-filtration of rainwater is an important element of SPI® filters. *We recommend the appropriate pre-filter based on the filter used and the desired installation*.

Filter in standard configuration:
Designed for rainwater evacuation - normal conditions.

2- FILTRATION FUNCTION: decontamination

At this stage, the material is activated but not saturated, filtering hydrocarbon traces to below 5 ppm while allowing water to pass through. When hydrocarbons are present in the water, the material "activates," capturing and solidifying the pollutant molecules locally. Active material not in contact with hydrocarbons remains inactive, allowing water molecules to continue flowing through.

➔ **Reduction of Flow Rate During Filtration:** The solidified hydrocarbons reduce the available space for water flow, thus decreasing the filter's flow rate according to the amount of hydrocarbons gradually trapped in the filter.

Activated but not saturated material: *Hydrocarbon traces are filtered out, allowing water to pass through.*

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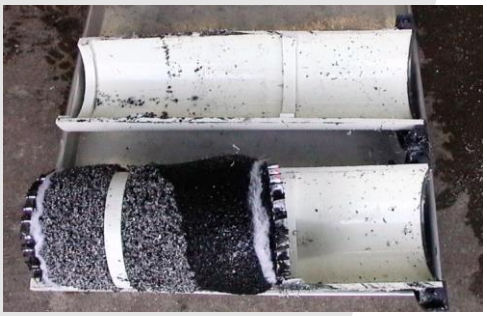
3- BLOCKAGE FUNCTION: “Tackifying” solidification

The filter becomes saturated with oils and hydrocarbons. Following a massive influx of hydrocarbons into the filter, or an amount equal to the filter's saturation capacity, the active material autonomously clogs and forms a tight seal: oil and water can no longer pass through and remain blocked upstream of the retention.

➔ **Human Intervention Required:** A leak causing the blockage must be identified and addressed, the pit cleaned, and the filter replaced. This hermetic seal can withstand up to 1 bar of pressure (approximately 10 meters in a water column).



Example: a PETRO PIPE saturated with hydrocarbons, cut in half, showing the active material that has formed a plug.

TECHNICAL SPECIFICATIONS OF SPI® REFERENCES

Sub-category	Gravity filters, to be either screwed in or cast into place.			Pumped systems
	PETRO-PIT	**PETRO-PIPE**	**PETRO-PLUG / PETRO BARRIER & STORM BARRIER**	**PTB & PTP**
Range				
Usage	Horizontal or inclined at 25° at the lowest point of small retention volumes	Horizontal or inclined at 25° at the lowest point of medium and large retention volumes	Vertical, in the retention pit floor	Outside the retention, vertical, static or mobile equipped with wheels
Lifespan[1]	1 to 5 years depending on reference	3 to 5 years depending on reference	3 to 5 years depending on reference	3 to 5 years depending on reference
Approx. flow rate[2] (L/min)	2 to 5 depending on reference	8 to 16 depending on reference	3 to 200 depending on reference	50 to 500 depending on reference
Approx. saturation[3] (L)	1 L	3 to 4 L	1 L	15 L
Dimensions and Weight	40 to 50 cm / 1 to 2 kg	50 to 60 cm / 5 to 8 kg	40 to 100 cm / 2 to 100 kg	100 to 200 cm / 50 to 200 kg

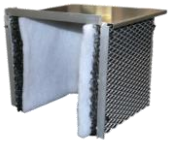
[1] Indicative manufacturer data: beyond this date, although the filter retains its solidification properties, complete blockage might only occur after a small amount of oil has escaped from the filter.
[2] Approximate nominal flow rates: based on a new filter, depending on the water column height in the pit or the aging condition of the filter, this data may vary.
[3] Saturation capacity is an approximate figure: subject to usage conditions and oil type, for which SANERGRID and SPI cannot commit.

PRE-FILTRATION: What is it?

SPI® hydrocarbon water filters are designed to react with all types of hydrocarbons. However, they are sensitive to mud and impurities carried by the water in retention pits. Without pre-filtration, these impurities can significantly reduce the efficiency of SPI® filters or even block them. Therefore, it is highly recommended to equip the filtering cartridges with the pre-filtration system associated with the desired filter model.

➔ **Pre-filter maintenance = extended filter lifespan:**
SPI pre-filters consist of several sets of metal grids and filter foams with different mesh sizes, designed to retain impurities before they reach the active filtration cartridge. Internal pre-filters are cleanable and replaceable on-site. The frequency of cleaning depends on the "dirtiness" level of the basin or retention pit.

EXAMPLES OF ASSOCIATED PRE-FILTRATION SYSTEMS

Range	PETRO-PIT	PETRO-PIPE	PETRO-PLUG & BARRIER STORM BARRIER	PTB & PTP
	Screw-in Pre-Filtration **PFC**	Pre-Filtration Cage **PFB**	Pre-Filtration Cap **THP**	Custom Pre-Filtrations
Pre-filtration references				

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EUROPEAN APPLICATIONS AND REFERENCES

Electrical Companies: EDF, ENEDIS, RTE, NATIONAL GRID, ENEL, TERNA, ENDESA, UNION FENOSA, EON, SSE, UKPN, IBERDROLA….
Solar companies: INGETEAM, SUNGROW, SMA, HUAWEI…
Railway Companies: SNCF, ADIF, NETWORK RAIL, SNCB…
Transformer Manufacturers: SCHNEIDER, HITACHI, SIEMENS, IMEFY, TrafoELETTRO, Westrafo, Kolektor ETRA, GE…
Industrial Groups: TOTAL, BASF, SOLVAY, ITER, CERN, VOLVO, BP, BAYER, REPSOL, INEOS, SMA, INGETEAM, SUNGROW, HUAWEI…
Installers and Engineering Firms: SPIE, EIFFAGE, VINCI, OMEXOM, EQUANS, BALFOUR BEATTY, JACOBS, COBRA, ISASTUR…

SPI technology works with all dielectric oils: mineral oil, synthetic ester or natural ester.

Petro Barrier Pumped PTB 24 *connected to sump pump or bund guard with oil and water detection level to guarantee >5 PPM NATIONAL GRID, RTE or EON*

PETROPIPE PI-616-M2 alone or mounted on SANERGRID SKID 1x4 PETRO PIPE *to drain by gravitation the transformer oil containment bund or concrete pit without risk of water contamination – EDF, CONEDISON or EXELON Group*

Modular Fire-Extinguishing Retention Tank ***ERT-MODULO 5*** *with access stairs and* ***PETRO PIT-416*** *filtration cartridges - REPSOL*

Retention Tank ***TRT-MODULO 2*** *for long-term transformer storage equipped with SPI* ***KIT PIT-416*** *- Transformer SNCF*

Flexible Storage Tank ***TRFLEX-ECO+*** *for temporary outdoor storage equipped with 2 SPI* ***PETRO-PIPE PI616-M2*** *filters - EDF*

TRT-MODULO 3 *Tank equipped with an* ***EXTICOV LHD*** *fire-resistant cover and* ***PETRO PIT*** *SPI filtration cartridge – NATURGY, IBERDROLA, SCHNEIDER, SNCF…*

SYNERDIS®, a company from GROUPE SANERGRID® ENERGY IN MOTION

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