SYNERDIS®

ENERGIES ARE HUMAN

SPI® : ANTI-HYDROCARBONS FILTRATION SYSTEMS FOR TRANSFORMERS

FORM0013-A | Ind. : 01

RAINWATER DRAINAGE WITHOUT HYDROCARBONS

SPI® Hydrocarbon Filters for Electrical Transformers

Oil Power Transformer on Concrete Retention Tank Equipped with Fire-Stop Rollers

Many pieces of industrial equipment, such as electrical transformers, use oils or hydrocarbons for internal cooling or insulation. These dielectric oils can contaminate soil and water if spilled.

To address this pollution risk, electrical transformers must be equipped with secondary containment systems in the form of concrete pits or metal tanks with a capacity of at least 100% of the transformer's oil volume—referred to as total containment.

When the oil-filled transformer is placed outdoors and exposed to weather conditions, rainwater can fill this secondary containment. To prevent overflow in the event of simultaneous rain and oil leakage, the containment basin must be equipped with a **system capable of continuously filtering and evacuating rainwater** while retaining hydrocarbons within the secondary containment.

SYNERDIS® distributes hydrocarbon filters from SPI®, the inventor of this technology and world leader in the field for over 35 years. We offer solutions for rainwater drainage that are both dielectric oil and hydrocarbon resistant, available as standard or custom filter cartridges. These cartridges function either:

- by gravity directly in the retention pits, operating without electricity and being self-locking.
- through pumped systems 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 filters mounted in parallel

PETRO PIT 416 filter installed on a concrete retention basin

SKID PIPE for gravity drainage of remote pits, approx. 200 L/min

Mobile PETRO PIPE PUMP for pumping from remote pits, ENEDIS

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, whether the hydrocarbons are in a miscible or emulsified state.
This engineered technology is integrated into the **PETRO PIT®**, **PETRO PIPE®**, **PETRO PLUG®**, **STORM BARRIER®**, and **PETRO BARRIER™** cartridges, allowing these filters to perform three distinct functions, as demonstrated below:

1- EVACUATION FUNCTION: drainage

In normal operation without hydrocarbons, the SPI® filter allows water to pass through.
The higher the water level in the retention basin, the larger the filter diameter needs to be to ensure a higher evacuation flow rate (see our various ranges and references on the following page). We assist you in selecting and sizing the number and type of filters based on the 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.

Normal Operation of the Filter:
The active material allows water to pass through.

2- FILTRATION FUNCTION: depollution

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 number of hydrocarbons gradually trapped in the filter.

Activated but Not Saturated Material:
Hydrocarbon traces are filtered out, and the water can flow through.

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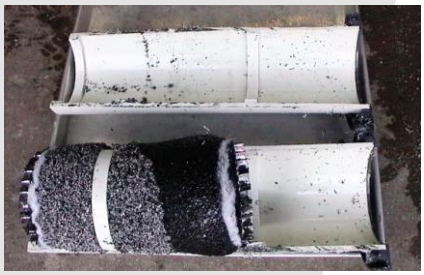
3- BLOCKAGE FUNCTION: « Tackifying » solidification

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 Filter Cartridges to Screw or Embed			Post-Lift Pump Filtration
	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

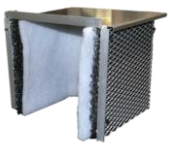
[1] Indicative manufacturer data: beyond this date, although the filter retains its solidification properties, complete blockage might only occur after a small amount of oil has escaped from the filter.
[2] Approximate nominal flow rates: based on a new filter, depending on the water column height in 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 et PTP
Pre-Filtration References	Screw-in Pre-Filtration **PFC**	Pre-Filtration Cage **PFB**	Pre-Filtration Cap **THP**	Custom Pre-Filtrations
				

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EUROPEAN APPLICATIONS AND REFERENCES

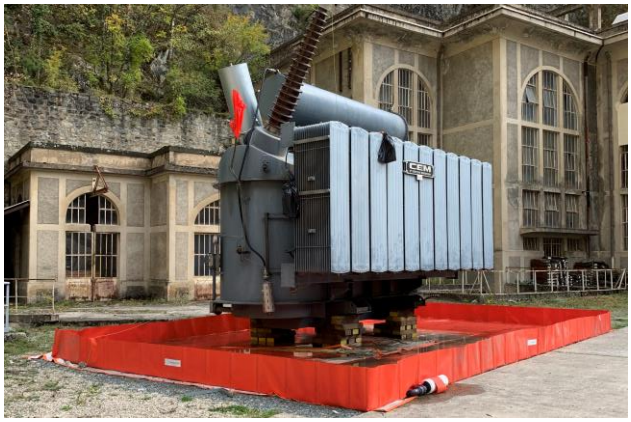
Electrical Companies: EDF, ENEDIS, RTE, NATIONAL GRID, ENEL, TERNA, ENDESA, UNION FENOSA, EON, SSE, UKPN, IBERDROLA….
Railway Companies: SNCF, ADIF, NETWORKRAIL, SNCB…
Transformer Manufacturers: Schneider Electric, ABB HITACHI, SIEMENS, CAHORS, IMEFY, TrafoELETTRO, Westrafo, Kolektor ETRA, GE…
Industrial 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…

Petro Barrier Pumped PTB 24 *outside the retention area, connected to a pump to filter the overflow from the remote pit - NATIONAL GRID*

SKID 1x4 PETRO PIPE *concrete inspection chamber connected to a transformer retention pit - EDF*

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

Retention Tank ***TRT-MODULO 2*** *for long-term transformer storage equipped with SPI* ***KIT PIT-410*** *- 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 - DALKIA*

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