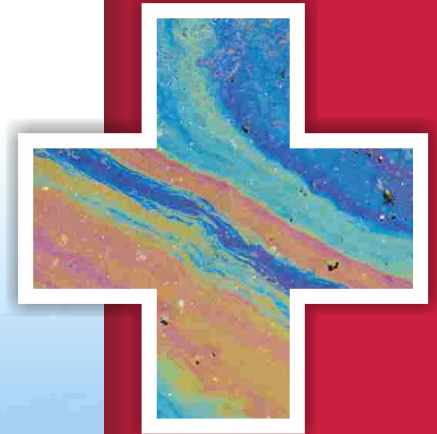


**NAYLOR**  
ENVIRONMENTAL

**SMART+**  
**sponge**<sup>®</sup>

**Oil Filtration & Pathogen  
Reduction Products**

**Solutions  
for Water  
Framework  
Directive  
Compliance**



**The smarter  
solution to deal  
with hydrocarbon  
pollution and  
comply with the  
Water Framework  
Directive**

- Treats stormwater & urban run-off
- Removes hydrocarbons
- Destroys bacteria
- Filters heavy metals
- Allows solid waste recycling
- Complies with the Water Framework Directive
- Complies with Bathing Water Directive

**email: [environmental@naylor.co.uk](mailto:environmental@naylor.co.uk) web: [www.naylor.co.uk](http://www.naylor.co.uk)**



Winners -  
Growing Business



The MANUFACTURING  
EXCELLENCE Awards  
Winner - Best SME



**Tel 01226 794135**

Fax 01226 791531

## Used Oil Facts

- It is estimated that a quarter of a billion gallons of used oil is generated each year in the UK from industry and motor vehicles
- The fate of much of this used oil is unknown but a large proportion is presumably disposed of improperly
- 1 in 5 households carry out a do-it-yourself oil change
- The oil from a single oil change ( 1 gallon ) can contaminate 1 million gallons of drinking water - a year's supply of water for 50 people
- Oil contributes to 20% of all UK water pollution incidents
- Used oil is a useful substance that, when recovered, can be used as a fuel and saves resources

## Used Oils Impact on the Environment

- 10 litres of oil from one car can pollute a lake the size of two football pitches
- Used motor oil contains toxic substances such as toluene, lead, cadmium and benzene
- Oil films prevent replenishment of dissolved oxygen, impair photosynthesis and block sunlight
- Sump oil accounts for 40% of oil pollution of the nation's harbours and waterways
- Concentrations of 50 to 100 parts per million of used oil can foul sewage treatment plants
- Oil dumped on land reduces soil productivity
- Many industrialised countries, worldwide, recover a greater portion of their used oil as fuel and lubricants than the United Kingdom

A large, vibrant, multi-colored oil spill covering the right half of the page. The colors range from deep blues and purples to bright yellows and oranges, with dark, irregular shapes scattered throughout, suggesting debris or different oil components. The overall effect is one of environmental contamination and pollution.

*It is estimated that a  
**quarter  
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and motor vehicles*

## THE **SMARTER** SOLUTION TO: Treat surface water pollution

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*“A revolutionary new product that is taking the global surface water market by storm”*

### Smart Sponge®

- Treats stormwater & urban run-off
- Removes hydrocarbons
- Destroys bacteria
- Filters heavy metals & sediment

Smart Sponge® was developed for the oil industry, the Smart Sponge® is based on patented polymer technologies and is the only non-toxic, fully recyclable filtration system that destroys bacteria and absorbs hydrocarbons on contact. Contaminated stormwater run-off, known as 'non-point source pollution', is a major source of contamination for lakes, streams, rivers, estuaries, coastal waters and even groundwater and forms part of the focus for the Water Framework Directive and Bathing Water Directive.

Smart Sponge® is a proprietary combination of synthetic polymers with a unique molecular structure that is chemically selective to hydrocarbons. Smart Sponge® fully encapsulates recovered oil, preventing absorbed oil from leaching and is also capable of removing low levels of oil from water, thereby successfully removing sheen. The spent product is able to be used within a Waste for Energy process as it produces between 10,000 - 18,000 BTU per pound, thereby creating a closed-loop solution with no resultant waste product.

# THE SMARTER SOLUTION TO: Spill kits

## The Smart Sponge® technology, Smart Sponge® is NOT a spill kit

*"Smart Sponge® has the capacity to absorb up to five times its own weight (depending on the type of oil contaminant) and remove up to 95% of the hydrocarbons present in stormwater run-off."*

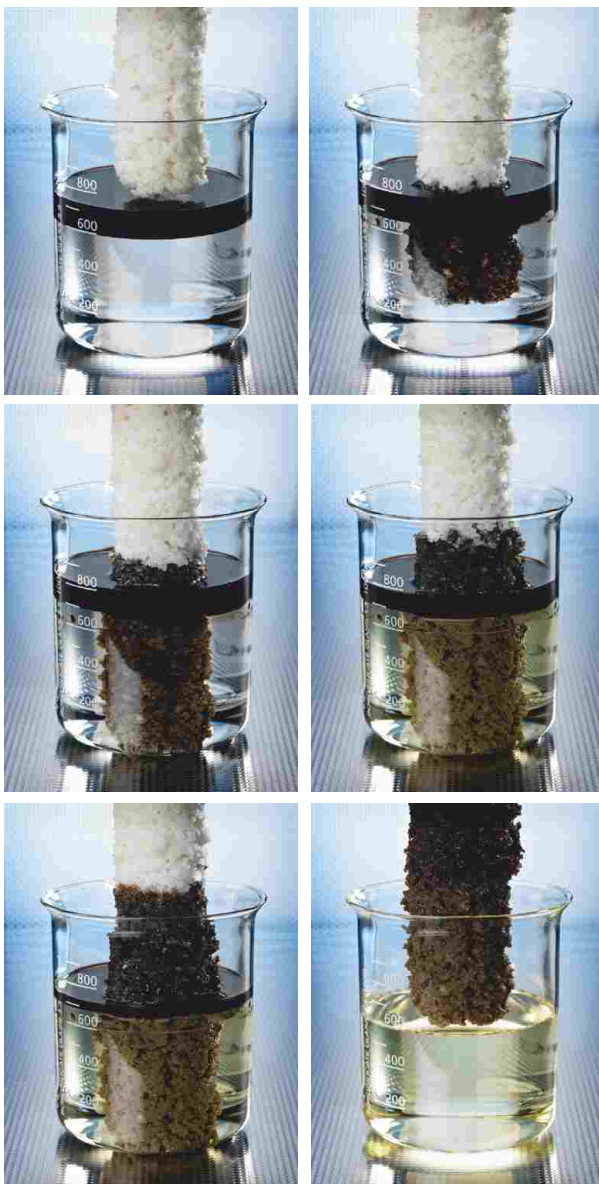
# Absorbent VS Adsorbent

The Smart Sponge® proprietary blend of polymers is oleophilic – an absorbent, which means that hydrocarbons are bonded within its chemical matrix. Therefore, absorption is permanent and saturated product cannot be washed off, squeezed out, or leached from the material during subsequent rain events.

Once absorbed, those pollutants are transformed into a stable solid for easy recycling, providing a closed-loop solution to water pollution. Traditional adsorbents lack this absorbent characteristic. Instead they feature an adsorbent capability that merely attracts hydrocarbons to their surface, but cannot prevent them from leaching back into the environment.

## Smart Sponge® Key Features:

- Chemically selective to hydrocarbons
- Removes surface sheen
- Transforms pollutants into a stable solid
- Non-leaching
- Fully recyclable



Smart Sponge® - a proprietary polymer technology unique in its ability to effectively remove, absorb and retain hydrocarbons from flowing or static water. Smart Sponge® technology maximises the effectiveness of its oil-absorbing polymers by forming them into an extremely porous structure that allows effective, long-lasting absorption, without clogging or channelling, which is common among any other filtration media in a powder, particulate or fibre form.

*Oil contributes to 20% of all UK water pollution incidents.*



The Smart Sponge® polymers are also hydrophobic and oleophilic – allowing water to pass through while hydrocarbons are absorbed. The structure is so effective, that even as it swells with contaminants, high flow rates and filtering capabilities are still maintained. Field and laboratory tests have confirmed the Smart Sponge® capacity to absorb 2-4 times its own weight or more (depending on the type of oil contaminant) and remove up to 95% of the hydrocarbons present in stormwater run-off.

## THE SMARTER SOLUTION TO: Support infrastructure

### Wiltshire Council Gully Trials Case Study

"Wiltshire Council is always seeking ways of improving its service to the community while at the same time remaining as kind to the environment as possible. So when Wiltshire Council was introduced to the Smart Sponge® technology (SST) with its synthetic polymers used for removing hydrocarbons and oil derivatives from surface water, we decided to trial the product.

The various tests demonstrated just how the technology built into the Smart Sponge® system offered an easy solution to the problem many local authorities face when dealing with gullywaste and the ever-increasing costs associated with its disposal. Currently Wiltshire Council disposes of gully waste by way of landfill, which has environmental and cost implications.

Wiltshire Council undertook its own year long trials that clearly show that financial savings can be made by reducing the volume of contaminated waste as the Smart Sponge® transforms captured pollutants into a solid waste for recycling as a Waste to Fuel energy or as landfill waste. In addition this also had a significant reduction in environmental impact!



Water quality samples and weight of SS were taken every three months from each test gully over a 12 month period. Eight road gullies and one interceptor had PAH values averaging 8500ppm. **The PAH levels have decreased over this 12 month period to under 1ppm.** To date, the trial has clearly proven that SS reduces the level of PAH in contaminated surface water run-off, far exceeding EU legislations criteria. In the future, Wiltshire Council is aiming to recycle the spent SS as a waste to fuel energy, which burns at 10 - 18,000 BTU per pound. In the immediate future we are installing Smart Sponge technology in all of the depots we use to tip out gully waste.



#### Brian Lanham Weather and Drainage Manager

*"Working alongside the Smart Sponge® team whilst investigating this product has made the decision making so much easier, and I believe we have chosen the right product for the right job."*

#### Sarah Peterson Technical Assistant

*"Smart Sponge® has shown excellent results throughout our entire trial. I have been impressed with every aspect of Smart Sponge®, especially the ease of using and maintaining the product. I am very much looking forward to the next developments involving the use of Smart Sponge® within Wiltshire."*

### West Lothian River Protection Trials Case Study

In February 2012, West Lothian Council decided to trial the Smart Sponge® Ultra Urban Filters at the downpipes for the A899 Road Bridge a four-lane carriageway over 700 metres long which drains runoff directly into the River Almond through four 225mm diameter pipes to see how much hydrocarbon pollution could be prevented from entering the river.

They decided to trial the Naylor Smart Sponge® Ultra Urban Filters (UUF) positioned at the base of the down pipes from the bridge - this is one of several Smart Sponge® bridge solutions that is available and was chosen to allow ground level easy access for monitoring and changeover purposes.

Four UUF units were installed in February 2012 and monitored by SAC Consulting Limited under an Environmental Monitoring Contract with West Lothian Council as part of their remit to monitor various water courses. The four units were removed in October 2013 and found to have absorbed over 48 litres of hydrocarbons from the run off into the river as well as high levels of silt & sedimentation changing the liquid contaminant into a solid waste.

The project has successfully demonstrated the ability of Smart Sponge® to absorb hydrocarbons from the runoff from the bridge and of the three treatment options available from Smart Sponge® the Ultra Urban Filter provides the greatest absorption rates whilst also intercepting detritus from the bridge deck.



#### Graeme Hedger Officer with West Lothian Council

*"The pilot scheme has tested Smart Sponge® products in a variety of challenging locations. Evidence from the monitored trial suggests that the products are effective at intercepting and locking up hydrocarbons in runoff preventing pollution from reaching receiving watercourses helping the council meet its obligations under the European Water Framework Directive. The use of Smart Sponge® products is to be continued beyond duration of the pilot scheme in a number of the locations included in the pilot scheme."*

## THE **SMARTER** SOLUTION TO: Remove pathogens from stormwater

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*"The presence of bacteria in stormwater is a serious problem and poses significant health risks that increasingly result in the contamination of water bodies."*

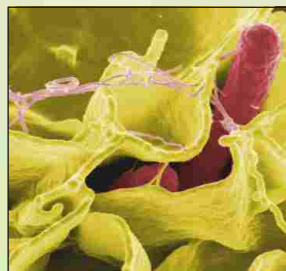
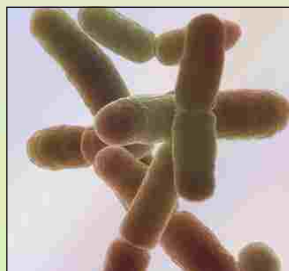
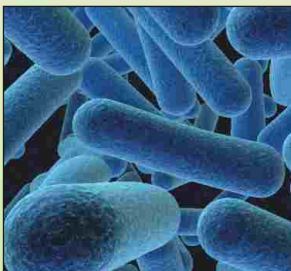
*Roger Goulding - National Advisor, EA.*

*"We've looked at the capability of Smart Sponge® Plus to remove bacteria from urban streams and drainage affecting bathing waters. Following dramatic successes in the laboratory, field trials have shown potential for it to work....."*

## Smart Sponge® **PLUS**

Apart from the standard Smart Sponge® there is also Smart Sponge® **PLUS** which has all the features of being able to remove hydrocarbons as well as being the only non-toxic, fully recyclable filtration system that destroys bacteria at street level.

The presence of bacteria in stormwater is a serious problem and poses significant health risks that increasingly result in the contamination of water bodies. The greatest opportunity to reduce this bacterial count is during rain events through the control and treatment of stormwater run-off. This can be achieved by the Smart Filter® system fitted with Smart Sponge® **PLUS** which can also be adapted and used as part of a full treatment system for Combined Sewer Overflows (CSO's)



*Smart Sponge® Plus's ability to remove E.coli, Enterococci, Salmonella and many more pathogens from moving water makes it the ideal solution.*

# THE SMARTER SOLUTION TO: Remove pathogens from stormwater

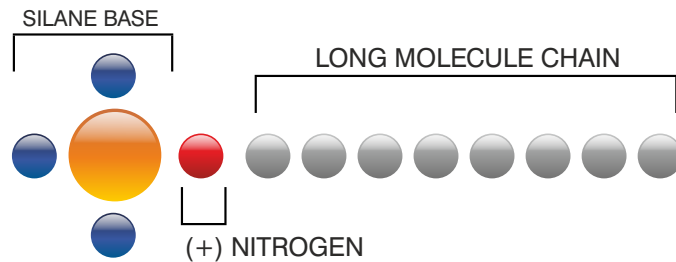
## Smart Sponge® PLUS technology

### Smart Sponge® PLUS for Hydrocarbons Plus Bacteria

- Smart Sponge® PLUS dramatically reduces coliform bacteria found in stormwater, industrial wastewater and municipal wastewater
- Smart Sponge® PLUS can be engineered using controlled test parameters (such as modifying flow rates and coliform bacteria concentration) to meet your performance requirements
- Smart Sponge® PLUS is designed to assist water systems to meet Total Maximum Daily Load Limits (TMDLs) for coliform bacteria
- When properly installed and maintained Smart Sponge® PLUS provides a significant reduction in coliform bacteria

Smart Sponge® PLUS – has all the features of standard Smart Sponge® as well as the dual action capability of destroying disease-causing micro-organisms from surface water such as:

- Aspergillus Niger • Trichophyton Mentagrophytes • Penicillium Pinophilum
- Chaetomium Globosum • Trichoderma Virens • Aureobasidium Pullulans
- Escherichia Coli • Salmonella • Streptococcus • Enterococci



Environment Agency laboratory tests confirmed a 99.9% removal of E. Coli and 99.5% reduction for Enterococci with a Smart Sponge® Plus treatment train, clearly demonstrating its effectiveness in achieving Log 1 and Log 2 reduction levels.

*Roger Goulding - National Advisor, EA*

*"We've looked at the capability of Smart Sponge® Plus to remove bacteria from urban streams and drainage affecting bathing waters. Following dramatic successes in the laboratory, field trials have shown potential for it to work, if silt and sediment can be successfully removed before the treatment train."*

## Anti-microbial agent

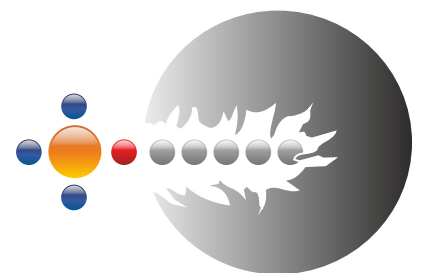
In the Smart Sponge® PLUS, the anti-microbial agent is chemically and permanently bound to the polymer surface and serves to control fungi, static odour and mildew.

The anti-microbial mechanism is based on the agent's electromagnetic interaction with the micro-organism cell membrane, causing the micro-organism disruption but no chemical or physical change in the agent.

Anti-microbial activity does not reduce the agent capability or cause its depletion and, therefore, maintains long-term effectiveness. Test results demonstrated the maximum bacterial removal rates of Smart Sponge® PLUS in both dry and wet weather sampling for fecal coliform ranged from 89.4 to 99.6 percent; and for Enterococcus, 96.2 to 99.9 percent.

Contaminants	Concentration Range	P.S.D d50	Performance	Filter bed depth
Oil & Grease	> 100ppm	-	>95%	> 100mm
	< 100ppm	-	>75%	> 100mm
<b>Bacteria</b>				
E.coli	1x10 <sup>3</sup> CFU*/100ml	-	>90%	>1.5m
Fecal Coliform	1x10 <sup>3</sup> CFU*/100ml	-	>90%	>0.9m
Enterococcus	1x10 <sup>4</sup> CFU*/100ml	-	>90%	>0.9m
Total Coliforms	1x10 <sup>4</sup> CFU*/100ml	-	>90%	>1.5m
TSS	100-300ppm	>15μ	>80%	>1.5m
TSS	>100ppm	>100μ	>80%	>0.6m
T. Phosphorous		>15μ	>40%	>1.5m

\* Colony Forming Units



**Physical inactivation of Bacteria - Rupture of the Cell Wall**

# THE SMARTER SOLUTION TO: Remove hydrocarbons from carriageway run-off

*"In tests, Wiltshire County Council reduced hydrocarbon concentrations in their road gullies from 8,000ppm to 1ppm"*

## Smart Gully® Range

The clever push fit design incorporates a finned rubber gasket ensuring a snug fit replacing the rodding bung ensuring no loss of hydraulic capacity or engineering design. Smart Gully® incorporates the unique Smart Sponge® technology that removes hydrocarbons from stormwater.

The Smart Gullies® have a Smart Gully Adaptor® already fitted and are supplied complete with a purpose designed Smart Pak® already installed and are available for both plastic and concrete gullies.

Range table (Complete Smart Gully® units)

Prod No.	Description	Dims (mm)
SGCO2	Concrete Smart Gully®	375 ID 900 deep
SGCO3	Concrete Smart Gully®	450 ID 750 deep
SGCO4	Concrete Smart Gully®	450 ID 900 deep
SGCO5	Concrete Smart Gully®	450 ID 1050 deep
SGP67004	Plastic Smart Gully®	450 ID 900 deep x 160 outlet
SGP67005	Plastic Smart Gully®	450 ID 750 deep x 160 outlet
SGP67003	Plastic Smart Gully®	450 ID 900 deep x 178 outlet
SGP67009	Plastic Smart Gully®	450 ID 750 deep x 178 outlet
SGP67002	Plastic Smart Gully®	375 ID 750 deep x 178 outlet
SGV07536	Vitrified Clay Smart Gully®	300 ID 610 deep x 100 outlet
SGV07537	Vitrified Clay Smart Gully®	300 ID 610 deep x 150 outlet
SGV07545	Vitrified Clay Smart Gully®	375 ID 760 deep x 150 outlet
SGV07556	Vitrified Clay Smart Gully®	450 ID 915 deep x 150 outlet

\* all Smart Gullies® c/w 1 x Adaptor.

The special Smart Gully Adaptors® (SGA) are also available for retrofitting in existing gullies:



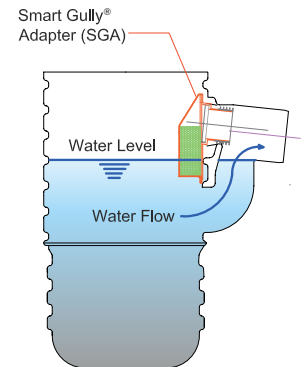
SGA - Backplate



SGA - Frontplate

Range table (Smart Gully Adaptor® units & spares)

Prod No.	Description	Dims (mm)
SGA01 - 12	Smart Gully Adaptor® (body only)	H260 x W160 x D75 Not including spigot
SGA02 - 12	Smart Gully Adaptor® c/w Smart Pak & seal	H260 x W160 x D75 Not including spigot
SGS01	Smart Seal for SGA (spare)	100 x 110 dia
SMPK66-2.5	Smart Sponge® Smart Pak refill	150 x 150 x 62.5



Naylor Smart Gully® Showing SGA inserted into rodding eye, resulting in no reduction in flow.

Smart Sponge® technology is based on its proprietary blend of synthetic polymers aimed at removal of hydrocarbons and oil derivatives from surface water.

This unique process creates a very porous structure with hydrophobic and oleophilic characteristics capable of selectively removing hydrocarbons while allowing high flow through rates for water.

As hydrocarbons are absorbed into its structure, the Smart Sponge® swells and maintains porosity and filtering capabilities.



The Smart Sponge® unique molecular structure is based on innovative polymer technologies that are chemically selective to hydrocarbons.

The SGA's have a purpose designed Smart Pak® fitted to absorb the hydrocarbons - it is specially designed to last 12 months in a worst case scenario and maintenance is simplicity itself and takes just a few seconds.

The Smart Sponge® technology transforms the pollutants into a stable solid waste for easy recycling.

Smart Sponge® waste to energy finalises the closed-loop solution with the spent Smart Sponge® creating 10,000-18,000 BTU per pound with no resulting waste product.

Smart Sponge® can also be used as an anti-microbial technology capable of destroying disease causing micro-organisms from surface water such as E.coli, Streptococcus and Enterococci to name but a few.



## THE SMARTER SOLUTION TO:

# Remove hydrocarbons from oil water interceptors

*In recent tests carried out on a 'typical' MOD facility, it was shown that a 64% saving in maintenance costs could be achieved together with a 99% saving in the volume of environmental waste*

## Passive Skimmer / Interceptor Enhancer Range

The Smart Sponge® Passive Skimmers are installed within existing interceptors/separators (OWI's) to dramatically increase the effectiveness of the OWI (from typically 45% removal to 95% removal) whilst at the same time reducing annual maintenance costs by up to 64%.

The regulations controlling the maintenance of interceptors/separators (OWI's) advise six monthly inspections and emptying and recharging with clean water when required. A new method of reducing both maintenance costs and environmental waste when servicing OWI's by the use of the Smart Sponge® Interceptor Enhancers has shown dramatic results.

The Smart Sponge® absorbs the hydrocarbon contamination and locks it into the molecular structure of the polymer, transferring the hydrocarbons into a solid waste suitable for either controlled disposal or for use as an alternative fuel. This unique ability means that instead of disposing of tonnes of contaminated liquid waste it is now possible to reduce this dramatically to a few kilos of solid waste, thus achieving dramatic savings in both cost and environmental benefits.

Range table (Interceptor Enhancers/Passive Skimmers)

Prod No.	Description	Dims (mm)
PS1313-40	Small Passive Skimmer	330 X 330
PS1818-20	Medium Passive Skimmer	457 X 457
PS2727-10	Large Passive Skimmer	686 X 686

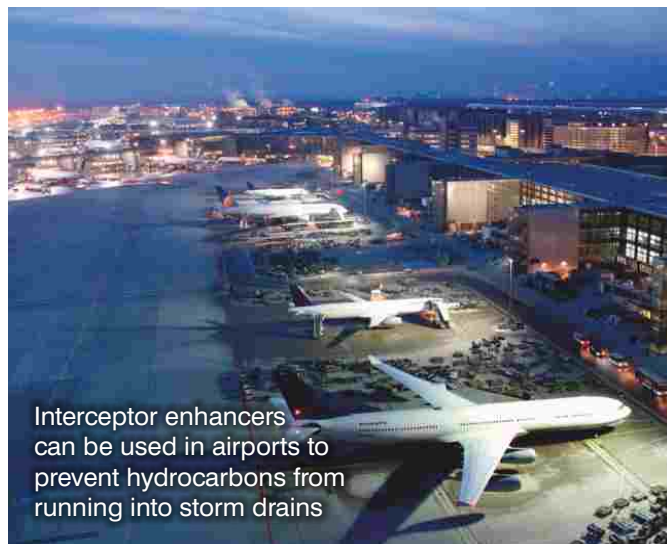
Pack sizes: Small - 40pk, Medium - 20pk, Large - 10pk



Traditionally, maintenance of an OWI would consist of a tanker with a 2 man gang extracting the whole volume of the OWI (in the case of even a medium sized OWI this could amount to 110,000 litres or 110 tonnes) which would take many trips plus the disposal costs of the contaminated waste. The tanker would then have to re-charge the OWI to bring it back to operating condition.

Taking the same OWI as an example and now using a Smart Sponge® Passive Skimmer as a solution, this would transform the 116 tonnes of liquid waste into just 145 kg of solid waste and the maintenance procedure becomes just a 2 man job with a van. The cost and environmental benefits of this new system are obvious, particularly when many such OWI's can be serviced in a typical day.

In recent tests carried out on a 'typical' MOD facility, it was shown that a 64% saving in maintenance costs could be achieved together with a 99% saving in the volume of environmental waste – and even this 1% of remaining waste can be used as an alternative fuel as part of the Waste for Energy initiative creating a truly closed-loop system of maintenance where everyone benefits.



Deployment Guidance (Oil Water Interceptors)

NSB*	Area Drained	No of PS to absorb hydrocarbon		
		PS1313	PS1818	PS2727
1.5S	833	10	6	3
3.0S	1,666	19	11	5
4.5S	2,499	28	16	8
6.0S	3,332	38	22	10
10S	5,553	NA	36	17
12S	6,670	NA	43	20
15S	8,330	NA	NA	25
20S	11,106	NA	NA	34
25S	13,883	NA	NA	42

\* Nominal Size Bypass

# The Smart Sponge® Family

## Smart Filter®, Smart Brake® & Smart Stop® Range

### The Smart Filter®:

Specifically designed for end of pipe applications and installations through which contaminated or polluted water flows. The unique design allows the Smart Filter® to either sit inside or outside the pipe connection and will absorb hydrocarbons that pass through the system during normal conditions. The Smart Filter® is available in 2 different standard sizes and will accommodate standard pipe sizes.

Flow rates are catered for through the design of the Smart Filter®, sized to take the first flush effect plus a safety factor of 2x with any excess passing through the bypass facility.



Smart Filter®



Orifice Plate

### The Smart Brake®:

Is a collaboration of design from the Smart Filter® and houses the Smart Paks within a more confined area which allows normal flow through the system. The Smart Brake's® unique design works during an event and slows the flow rate whilst absorbing any hydrocarbons present, allowing the final outfall flow to disperse reducing flooding, resulting in the contaminated flow from travelling further along a water course. The Smart Brake® will also absorb any hydrocarbons present within a normal flow, effectively acting as a Smart Filter®.



Unit showing overflow connection

### The Smart Stop®:

Uses the basic principles of the Smart Filter® but houses the Smart Paks within a more confined area which allows normal flow through the system. The Smart Stop's® unique design works during an event where more hydrocarbons are present within the resulting flow and the volume of hydrocarbons are quickly absorbed within the Smart Paks which swell into the defined cage and seal the outfall pipe providing the contaminated flow from travelling further along a water course. The contaminated water is then stopped at source enabling the hydrocarbon clean up to be targeted in one area reducing the impact to the environment. The Smart Brake® will also absorb any hydrocarbons present within a normal flow, effectively acting as a Smart Filter®.

**N.B. A suitable silt trap device is recommended prior to the Smart Filter® chamber to prolong the life of the Smart Sponge®. If this is impractical a silt sump is recommended within the Smart Filter® chamber.**

### Smart Filter® Standard Range

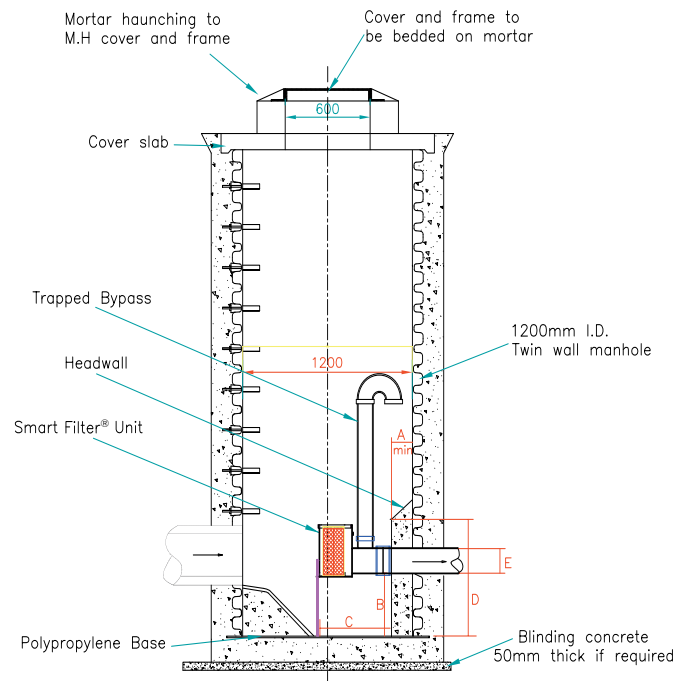
Prod No.	Description	Dims (mm)	Qty
SF01-30302	Smart Filter® c/w 2 No. 305 x 305 Std Smart Paks. 150 dia outlet for flow up to 14 l/s	360 x 330 x 330	1
SF02-38382	Smart Filter® c/w 2 No. 380 x 380 Std Smart Paks. 150 dia outlet for flow up to 22 l/s	400 x 400 x 400	1
SF01-30302P	Smart Filter® c/w 2 No. 305 x 305 Plus Smart Paks. 150 dia outlet for flow up to 14 l/s	360 x 330 x 330	1
SF02-38382P	Smart Filter® c/w 2 No. 380 x 380 Plus Smart Paks. 150 dia outlet for flow up to 22 l/s	400 x 400 x 400	1

### Smart Brake® Range

Prod No.	Description	Dims (mm)	Qty
SB01-30302	Smart Brake® c/w 2 No. 305 x 305 Std Smart Paks. Specify orifice size for desired flow	360 x 330 x 330	1
SB02-38382	Smart Brake® c/w 2 No. 380 x 380 Std Smart Paks. Specify orifice size for desired flow	400 x 400 x 400	1

### Smart Stop® Range

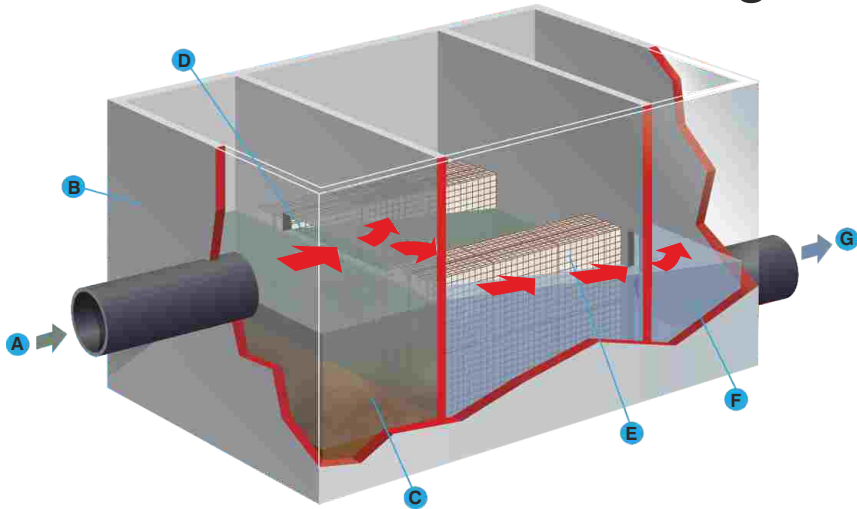
Prod No.	Description	Dims (mm)	Qty
SS01-30302	Smart Stop® c/w 2 No. 305 x 305 Std Smart Paks. 150 dia outlet for flow up to 14 l/s	360 x 330 x 330	1
SS02-38382	Smart Stop® c/w 2 No. 380 x 380 Std Smart Paks. 150 dia outlet for flow up to 22 l/s	400 x 400 x 400	1



Typical Installation showing overflow connection and silt trap.

# The Smart Sponge<sup>®</sup> Family

## Smart Filter<sup>®</sup> Chamber Range



### Diagram Key

- A. Inflow
- B. Lightweight composite chamber with vehicle loading capability
- C. Chamber with weir to trap sediment
- D. Flow passes through Smart Paks and through side orifices
- E. Smart Paks to absorb hydrocarbons
- F. Collection chamber with outlet to sewer
- G. Outflow

Note: Arrows show direction of water flow

### Smart Filters<sup>®</sup> for Highways, Large Catchment Areas etc:

Specifically designed for extreme storm events and larger flow situations, the basic principles of the smaller Smart Filters<sup>®</sup> can be adapted to virtually any flow and also adapted to site restrictions.

The Smart Filters<sup>®</sup> come in several standard modular chamber sizes but can also be manufactured bespoke to suit specific site conditions. Contaminated wastewater enters the system into a settlement chamber and passes through an orifice into a distribution chamber and then is passed through the Smart Sponge<sup>®</sup> units (Paks) which removes up to 95% of all hydrocarbons. The cleaned water then passes through purpose designed side orifices to exit the treatment chamber via the outlet pipe.



Smaller Smart Filter<sup>®</sup> being lowered into position

### Smart Filter's<sup>®</sup> Advantages:

- Treats 100% of the storm flow
- Removes 95% of hydrocarbons
- Removes heavy metals & silts
- Can cope with extreme conditions
- Shallow excavations
- Low head drop
- Modular design
- Virtually any flow catered for
- Waste product 100% recyclable
- Easy maintenance procedure

Prod No.	Description	Dimensions WxLxH	Treated Flow (l/s)	Max Flow (l/s)	380 x 380 Smart Paks	Pak Height (no.)	Aux Silt Capacity	Max Oil Capacity	Head Drop across unit
SF03.1A	Smart Filter <sup>®</sup> 44 l/s Flow, c/w 200mm dia pipes	0.8 x 1.2 x 1.2	10.9	44	4	1	190 litres	48 litres	380mm
SF03.1B	Smart Filter <sup>®</sup> 88 l/s Flow, c/w 300mm dia pipes	0.8 x 1.2 x 1.2	21.7	88	8	1	75 litres	96 litres	380mm
SF03.2A	Smart Filter <sup>®</sup> 130 l/s Flow, c/w 300mm dia pipes	1.2 x 1.8 x 2.0	32.6	130	12	1	210 litres	144 litres	380mm
SF03.2B	Smart Filter <sup>®</sup> 265 l/s Flow, c/w 300mm dia pipes	1.2 x 1.8 x 2.0	70.4	265	24	2	420 litres	288 litres	760mm
SF03.2C	Smart Filter <sup>®</sup> 350 l/s Flow, c/w 300mm dia pipes	1.2 x 1.8 x 2.0	94	350	32	2	75 litres	384 litres	760mm
SF03.3A	Smart Filter <sup>®</sup> 400 l/s Flow, c/w 300mm dia pipes	1.2 x 1.8 x 2.0	117	425	40	2	275 litres	480 litres	760mm

**N.B. A suitable hydrodynamic separator (HDS) should be utilised prior to the Smart Filter<sup>®</sup> to remove the majority of silt from entering the filter. An auxiliary silt storage, is provided as a fail safe on all units. Treated Flow calculations are calculated according to first flush effect for typical storms.**

# The Smart Sponge® Family

## Ultra-Urban® Filter Range

The Ultra-Urban® Filter with Smart Sponge® is an innovative low-cost BMP that helps meet anti-pollution requirements with effective filtration, efficient application and moderate maintenance. The Ultra-Urban® Filter absorbs oil and grease and captures trash and sediment from stormwater run-off before it enters the storm drain system. The Ultra-Urban® Filter is ideal for commercial, industrial and construction applications. The filter is available in two standard designs; one designed to clip onto the side of a catch basin in a row according to the flow (CO) and the other which is a single unit designed for typical drop-in catch basins and gullies (DI).

The Ultra-Urban® Filter, made of a high strength corrugated recycled content plastic, is designed for use in surface water drains that experience oil and grease pollution accompanied by sediment and debris. Rubbish and sediment accumulate in the upper basket chamber while oil and grease are absorbed in the filtration media.

Code	Max Flow (l/s)	Area Drained (m <sup>2</sup> )	Oil Capacity (litres)	Silt Capacity (cm <sup>3</sup> )	Typical Life (Years)	Media Life (Years)	Head Drop (mm)
DI1414N	17.7	1,275	21	425	2.3	1-3	790
DI1414H	12.0	860	13	230	2.1	1-3	560
DI1616N	22.7	1,635	25	510	2.1	1-3	790
DI1616H	17.0	1,225	19	285	2.1	1-3	560
DI2020N	31.5	2,260	31	850	1.9	1-3	790
DI2020H	23.3	1,675	24	480	1.9	1-3	560



Sectional view of UUF showing Smart Sponge®

**N.B. The above drained areas and Min Life calculations are based on a typical 50mm rainfall with an anticipated worse case hydrocarbon contamination level of 30mg/100ml (a more typical level would be 10mg for normal use).**

### Performance

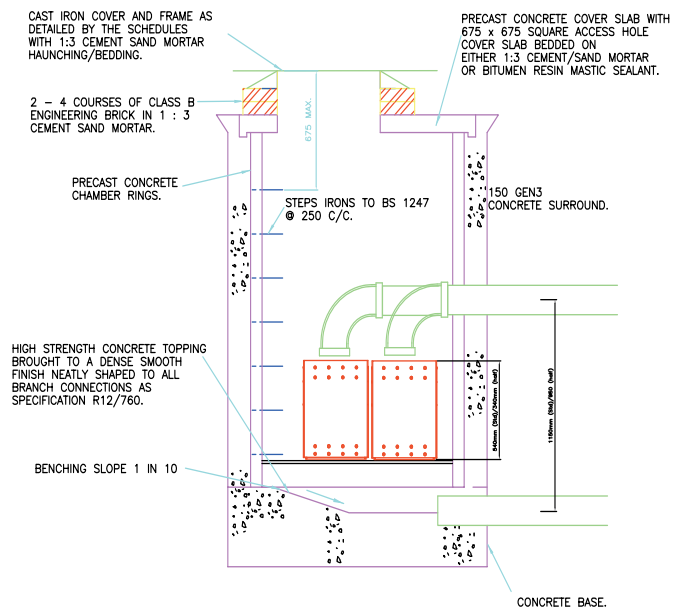
Field and laboratory tests have confirmed the capability of the Smart Sponge® to absorb, depending on the type of oil contaminant, up to 2-3 times its own weight and remove 70% to 95% of the hydrocarbons present in stormwater run-off, typically in the range of 5 to 30 mg/litre (ppm). The captured oil is permanently bound within the Smart Sponge®, eliminating leaching and allowing for easy disposal of the filtration media. Flow rates through the DI1616H filters exceed 17 l/s.

### Installation

The Ultra-Urban® Filter is easily installed and installation time varies depending upon mounting devices selected. A single mounting bracket made of 16 gauge galvanised steel is required for the installation of the CO series of UUF. The Ultra-Urban® Filter should not be installed where modules obstruct the drain pipe outlet. The size of the drain should allow room for stormwater overflow. The Drain Inlet (DI) series Ultra-Urban® Filter will suspend from the drain into the catch basin through a structural plastic mount and funnel mechanism (see drawings).

### Maintenance

The Ultra-Urban® Filter should be serviced as needed to remove sediment and debris, according to expected debris accumulation. The sediment and debris can be quickly vacuumed out of the modules through the opening of the drain with conventional maintenance equipment. For example, a CO installation with four to five Ultra-Urban® Filter modules can be typically serviced in 10 minutes or less. Under normal operating conditions the Ultra-Urban® Filter should be replaced every 1-3 years.



Twin Ultra Urban® Filters installed in typical chamber

### Design

The Ultra-Urban® Filters can be positioned within a chamber to take run-off from any area and require a difference in invert according to the drawing above. There is a range of sizes to choose from according to the area to be drained, with additional units able to be positioned alongside one another to increase the flow capability. Units should be emptied with a standard vacuum pipe on a regular basis and changed when they weigh approximately twice the installation weight.

# The Smart Sponge® Family

## Line Skimmers

Line Skimmers are ideal for creating lines of hydrocarbon protection in areas such as ponds and streams as well as clarifying wells and marinas. Installation is carried out by placing the line skimmers across the water course, tied off to fixed points. The line skimmers can also be tied to one another to create longer protection booms as required. Smart Sponge® Line Skimmers are non leaching so cannot contaminate the water during replacement



## Applications

- Preserving Ecologically Sensitive Areas
- Coastal Marshlands
- Estuaries
- Grass Flats
- Fishing and Breeding Grounds
- Boat Docks and Marinas
- Marine Fueling Locations
- Clarifying Wells



Prod No.	Dry Weight		Spent Weight		Litres
LS104-10 (1.2m)	0.7kg		2.8kg		2.4Ltr
LS110-04 (3m)	1.9kg		7.6kg		9.0Ltr
LS304-04 (1.2m)	2.2kg		8.8kg		6.5Ltr
LS308-04 (2.4m)	4.4kg		17.6kg		13.0Ltr
LS408-04 (2.4m)	5.9kg		23.6kg		17.0Ltr

Line Skimmer weights before and after application



Line Skimmers deployed at Linlithgow Loch

## Disposal Options

As local conditions, product use and exposure can vary widely, the end user must determine the most appropriate disposal method for a spent Smart Sponge® or Smart Sponge® Plus product. However Smart Sponge® samples saturated with hydrocarbons both in the lab and in the field have been tested according to the USA EPA's Toxicity Characteristic Leaching Procedure ("TCLP"). These tests show that Smart Sponge® is a "non-leaching" (i.e., non-detect or "N.D.") product. As a result, Smart Sponge® technology can afford many cost effective and environmentally friendly disposal options. The following waste disposal and resource recovery systems are available for disposal and/or recycling of the spent Smart Sponge® products.

### Waste to Energy Facilities

This is a specialised segment of the solid waste industry and within the USA this is a recognised route for used spent Smart Sponge® as an alternative fuel in the production of electricity. The spent Smart Sponge® generates between 10,000 – 18,000BTU per pound (0.45kg).

### Cement Kilns

This industry has used the spent Smart Sponge® as an alternative fuel in the production process of Portland Cement. This process is considered a beneficial re-use of waste products. The BTU value of spent Smart Sponge® is consistently above the average acceptable levels set for this high temperature process.

### Landfills

As mentioned above, spent Smart Sponge® products have been classified as a solid waste within the USA and have been accepted at Subtitle D Landfills. Discussions are ongoing with the Environment Agency to establish similar classification for the UK.







# THE SMARTER SOLUTION TO: Quick Installation & Maintenance

## Passive Skimmers

It is intended that proactive checks are completed on a six monthly basis, any remedial work will be managed reactively.

1. Fix a tether rope to the absorbent Passive Skimmer and record the weight in Kg
2. Fix the tether so that the Passive Skimmers can be recovered but allowing the skimmer to float freely.
3. Every 6 months withdraw the Passive Skimmer, shake off excess water and check and record weight. If weight is above trigger value replace skimmer.

Passive Skimmers are deemed spent if their weights are greater than:

Size	Dry Weight	Spent Weight
PS1313 (Small)	0.5kg 	2.0kg (approx. 2.4 litres) 
PS1818 (Medium)	0.9kg 	3.6kg (approx. 4.2 litres) 
PS2727 (Large)	1.9kg 	7.6kg (approx. 9.0 litres) 



Passive Skimmers are available in Small, Medium and Large packs PS1313 (Small) shown

## Smart Gully Adaptor®

Smart Gully Adaptor® Instructions for SGA Installation and Maintenance.



Insert the back plate into the rodding eye of the gully



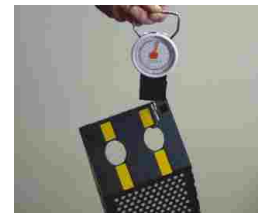
Slide the front plate with Smart Pak in down onto the back plate



Back plate will lock into position on the tabs provided



Remove the front plate by sliding upward



Weigh the unit with Smart Pak in



Remove and replace spent Smart Pak











Install new Smart Pak and refit

Size	Dry Weight	Spent Weight
SMPK (150X150X62.5)	0.5kg 	1.2kg (approx. 1.4 litres) 

## Smart Paks - Smart Filters®

It is intended that proactive checks are completed on a six monthly basis, any remedial work will be managed reactively.

1. Open the top of the Smart Filter® & using the plastic ties lift out the wire cage containing the Smart Paks, snip the plastic ties & remove the individual Smart Pak, shake off excess water & weigh the Smart Pak and record this on the maintenance schedule.
2. If the recorded weight is greater than twice the dry weight, replace the Smart Paks accordingly with new ones. If less than twice the weight, a changeover date can be calculated based on the relative weights.
3. Relace the Smart Paks back in the wire cages, renewing any plastic ties to hold the cages closed and slide the cage back into

Size	Dry Weight	Spent Weight	Size	Dry Weight	Spent Weight
SMPK1212-2.5	1.95kg 	4.6kg 	SMPK1515-2.5	2.9kg 	7.2kg 
SMPK1212-3	2.22kg 	5.5kg 	SMPK 1515-3	3.5kg 	8.7kg 

Smart Pak weights before and after application (assumes a non confined unit).

# THE SMARTER SOLUTION TO: Quick Installation & Maintenance

## Ultra-Urban® Filters

The Ultra-Urban® Filters can be installed as a drop in unit with a collar or as a slot in system secured to the side of the gully or inlet with brackets.


### The Ultra-Urban® Filter Is Easily Installed

Installation time varies depending upon mounting devices selected. A single mounting bracket made of 16-gauge galvanised steel is required for the installation of the Curb Opening (CO) series. The Ultra-Urban® Filter should not be installed where modules obstruct the drain pipe outlet. The size of the drain should allow room for stormwater over flow. The Drain Inlet (DI) series Ultra-Urban® Filter will suspend from the drain into the catch basin through a structural plastic mount and funnel mechanism.



### Low Maintenance

The Ultra-Urban® Filter should be serviced as needed to remove sediment and debris, according to expected debris accumulation. The sediment and debris can be quickly vacuumed out of the modules through the opening of the drain with conventional maintenance equipment. Under normal operating conditions the Ultra-Urban® Filter should be replaced every 1-3 years.

Prod No.	Dry Weight	Spent Weight	Litres
UUF1414N	9.1kg 	27kg 	21Ltr
UUF1414H	5.9kg 	17kg 	13Ltr
UUF1616N	10.9kg 	32kg 	25Ltr
UUF1616H	8.2kg 	24kg 	19Ltr
UUF2020N	13.6kg 	40kg 	31Ltr
UUF2020H	10kg 	30kg 	24Ltr

Solutions  
for Water  
Framework Directive  
Compliance

Smart Sponge® & Smart Sponge® PLUS technology effectively and efficiently reduces the amount of coliform bacteria, debris and hydrocarbons, to keep the UK's beaches, marinas, airports regulations in compliance with Bathing Water Directive and Stormwater regulations.





**A revolutionary new product  
that is taking the  
global surface water market  
by storm**



**BRITISH WATER**  
*expertise worldwide*

**Naylor Industries plc - more  
than 100 years of manufacturing  
and supply to the  
Construction Industry**

- Vitrified clay pipe systems for trench and trenchless installation
- Thermachem - Chemical Drainage and Industrial Ceramics
- Band-Seal couplings for the repair of and connections into existing pipelines
- Plastic Land Drainage, Twinwall Ducting Systems and Access Boxes
- Yorkshire Flowerpots, a range of frostproof plant pots



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