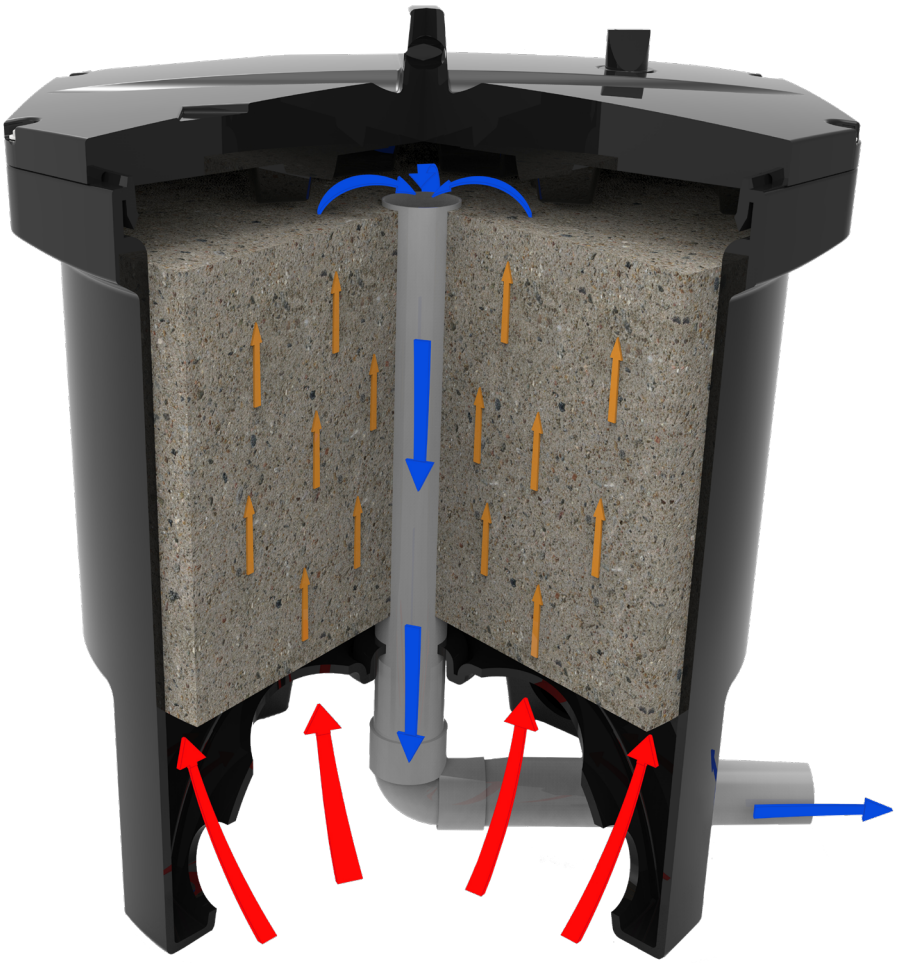
SPEL

Quality solutions protecting our global environment



SPELFilter®

Cartridge Filter System

spelproducts.co.uk

SPELFilter®

Overview

SPELFilter® is a highly engineered stormwater filtration device designed to removed sediments (TSS), heavy metals, nitrogen and phosphorous. It is effective at removing both particulate and dissolved pollutants including metals and nutrients.

SPELFilter's design has no moving parts, hydraulic pressure forces water through the filter media, discharges through the centre tube and out through the outlet collection manifold pipe work.

Upon completion of a treatment cycle, each cartridge backwashes and effectively dislodges particulates from the filtration layers. This re-establishes filter porosity. The dislodged particles accumulate on the vault floor for easy removal during maintenance.

The modular cartridge based system allows for simple, cost effective maintenance by exchanging one or all of the cartridges as required.

Laboratory SPELFilter performance testing was carried out at field scale by both the Water Research Laboratory of the University of New South Wales and Drapper Environmental Consultants and endorsed by Chester University

University of Chester — Thornton Science Park

CREST

Certification of Confidence

Based on an academic review of available SPELFilter design and performance literature, this document hereby confers confidence in the performance values reported below [1]. Laboratory SPELFilter performance testing was carried out at field scale by both the *Water Research Laboratory* of the *University of New South Wales* and *Drapper Environmental Consultants*. Applied test methodologies were based on established test protocols, expertise and published studies relevant to the assessment of proprietary runoff water treatment devices. With respect to the capture of sediments and metals, test methodologies broadly fell within the specifications of the *CIRIA SuDS Manual 2015* and thereby, the *British Water Code of Practice for the Assessment of Manufactured Treatment Devices Designed to Treat Surface Water Runoff*. Further to the requirements of the code, capture efficiencies relative to total nitrogen and total phosphorus were also determined. Where differences of approach were apparent, these were not considered to undermine the overall practical reliability of the performance values reported.

Surface Runoff Water Treatment Device:	**SPELFilter**	
Connectable Area:	**Full height [850 mm]**	**400 m² per filter**
	Half height [550 mm]	**200 m² per filter**
Treatment Flow Rate:	**Full height**	**3 L/s per filter**
	Half height	**1.5 L/s per filter**
Max. Installation Flow Rate:	**As above; multiplication of the number of filters needed to treat the required flow.**	

Capture Efficiencies

Total Suspended Sediment:	**91%**
Total Phosphorous:	**76%**
Total Nitrogen:	**58%**
Dissolved Metals:	**63%***
Total Metals (dissolved and sediments):	**84%****

Note: This document does not replace the academic review report [1].

Review Conducted by:

16/07/2021

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* Average based on reported efficiencies for copper, zinc and lead [1]. Efficiencies were determined relative to inlet concentrations that were even lower than those specified by the British Water Code of Practice.
** Assumes total metals fraction to be 75% sediments and 25% dissolved and hence, efficiency is determined by weighted summation [2].

1] Ward D (2021), SPELFilter Design & Performance Review: Requirements for Application within the United Kingdom, Faculty of Science and Engineering, University of Chester, UK.
2] British Water How To Guide; Applying the CIRIA SuDS manual Simple Index Approach to Proprietary/Manufactured Stormwater Treatment Devices, Section 4.3 (British Water 2019, under review).

Full certificate availble upon request

SPELFilter®

Product Insight

The SPELFilter is a highly engineered stormwater filtration device designed to remove sediments, heavy metals, nitrogen and phosphorus from stormwater runoff.

The filters are housed in a fibreglass SPEL tank (with a 25 year tank shell warranty) that evenly distributes the flow between cartridges.

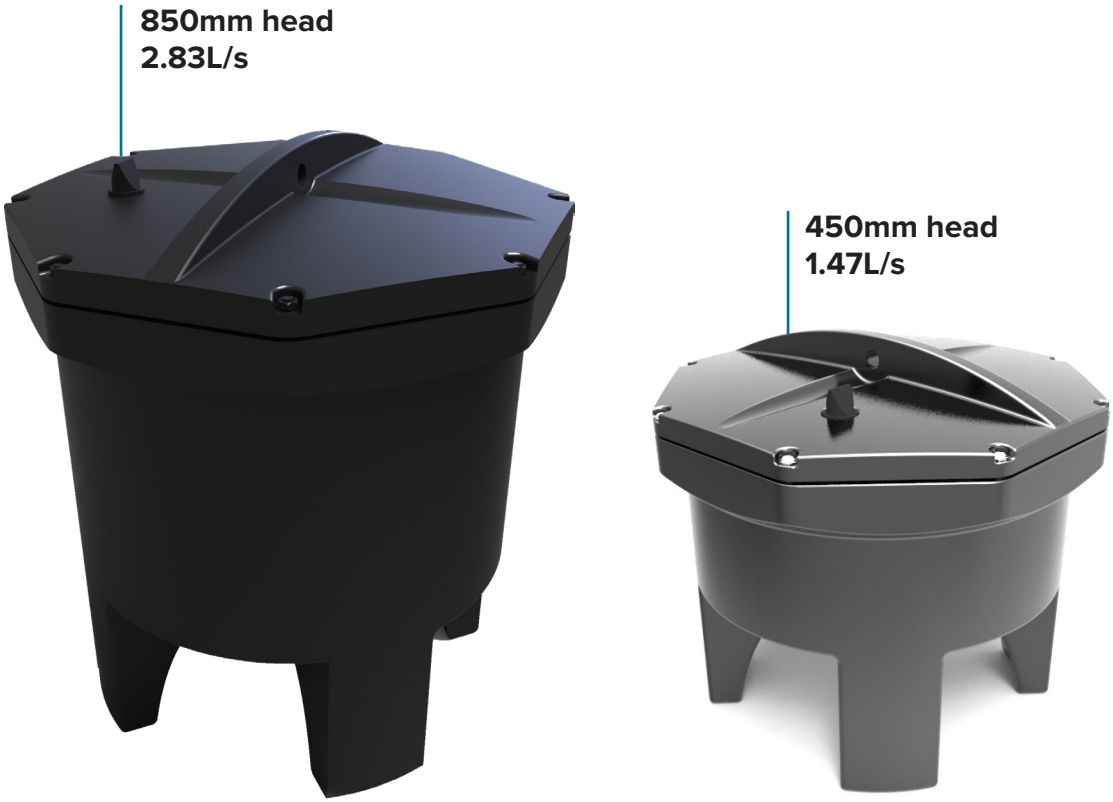
Flow through the filter cartridges is gravity driven and self-regulating, which makes the SPELFilter system a low maintenance, high performance stormwater treatment device.

SPELFilter Certified Mitigation Index

TSS	0.91
Metals	0.84

Features

Total suspended solids removal: 91%
Total metals (dissolved): 63%
Total metals (particulate): 68%
Total metals (dissolved and sediments): 84%
Total phosphorous removal: 76%
Total nitrogen removal: 58%



SPELFilter®

Operation

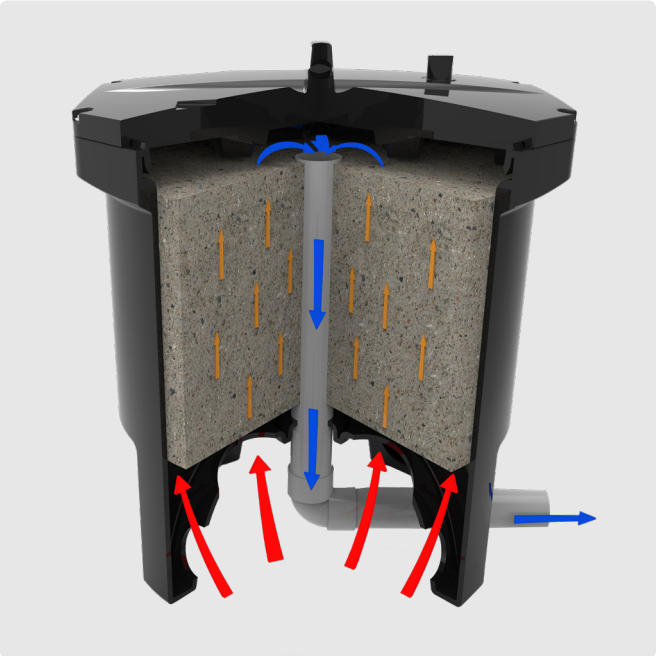
Proven Sand Filter Performance:

The uniform size silica-sand filter media provides for higher removal efficiencies than coarser types of media. SPELFilter media is inorganic – it doesn't leach nitrogen and other nutrients.

Greater flexibility:

Due to the significant surface area, designated flow path and high flow capacity, combined with the modular cartridge design, the SPELFilter system can be deployed in a variety of structures including precast vaults, GRP chambers or cast-in-situ structures.

Each system is designed to optimise your specific site and local authority requirements for the highest quality stormwater.



Filter Configurations

Maintenance

SPELFilter®

Benefits & Maintenance

The SPELFilter's design allows for a greater life span when frequently serviced. Maintenance is broken up into three categories which include: standard inspection, general cleaning, and cartridge replacement.

Standard inspection

Standard inspections are conducted at regular intervals. A SPEL representative shall undertake all measures outlined in Maintenance Procedure, Standard Inspection.

General Cleaning

General cleaning will need to be executed immediately during standard inspections if any of the following are detected:

- Build-up of debris/pollutants within the vault greater than 150mm.
- Accumulation of debris/pollutants on the outlet chamber of the SPELFilter vault
- After large storm events, tidal or flooding impacts at the request of the owner.

Cartridge Replacement

As the SPELFilter ages, pollutants will inundate the cartridge and ultimately reduce the treatment flow rate. At this point, a SPELFilter flow test apparatus will be utilities to determine if replacement cartridges are required.

The life cycle of the SPELFilter can be impacted if standard inspections and general maintenance is not undertaken in accordance with this operation and maintenance Guide. Other factors that will affect the above life cycle of the SPELFilter include:

- Installation of cartridge system during construction phase and impacted by construction sediment loads.
- Neglecting to install pre-treatment device.
- Unforeseen environmental hazards affecting the SPELFilter functionality.

Case Study: Chiltern Lifestyle Centre

SPEL provided six SPELFilter cartridges which will work alongside a SPEL ESR Stormceptor unit in protecting the valuable water source on site at Chiltern Lifestyle Centre.

Chilterns Lifestyle Centre offers a wide range of facilities to serve the local community, these include two pools with kids' teaching facilities and splash pad area, a fully equipped gym, and a wide range of spa and sporting options.

The SPELFilter was a great option for this project due to it's consistent pollutant removal abilities whilst using a smaller footprint. Easy to maintain and service, these filter cartridges can be easily replaced and serviced for years to come.

SPELFilter

Cartridge Filter System

The SPELFilter is a cartridge filter system that incorporates an upflow treatment process that maximises surface treatment area. Flow through the filter cartridges utilises a self-regulating siphon which results in a low maintenance and high performance surface water treatment.

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08/22