

THE SABIAN LINE OF BLACK WALNUT SHELL FILTERS

The SABIAN™ Black Walnut Shell (BWS) Filter technology presents a solution that is credible, competitive and simple to operate and maintain. We can help to provide a higher return on investment than our competitors, and usually exceeds the minimum desired Oil-in-Water and Total Suspended Solids (TSS) targets.

Walnut Shells

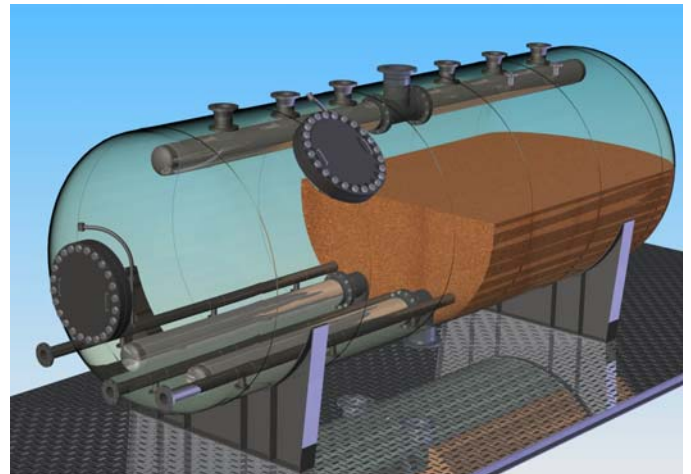
Black Walnut Shell are a unique naturally occurring media that are water wet and have a low affinity for oil. When ground into similar sized granules, they become an ideal filter bed media, in which suspended oil is coalesced. During flow through the filter bed globular oil particles are formed that are sufficiently large to become trapped within the media, while water is allowed to pass through.

In addition, black Walnut Shells also have a high modulus of elasticity, leading to excellent durability.



Objectives

The filters objective is designed to continuously clean water for downstream applications (including injection into formations, chemical precipitation softening, silica reduction and stream generation). For these applications, the SABIAN™ filter is turned to produce less than 2 ppm oil, even during times of upset.



Unique Design

With the Sabian Filter's unique patent-pending design, no standby time is required for backwash, backwash volume is low and flow patterns are such that filtration surface area is optimized and no settling dead zones occur during the backwash process.

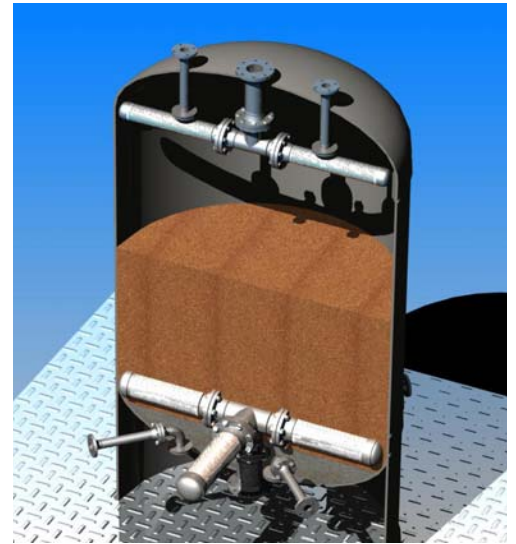
Sabian BWS filters are configured in three potential arrangements **a)** single chamber vertical units for flows up to 50,000 bwpd, **b)** single chamber horizontal units for flows higher than 50,000 bwpd and **c)** multiple chamber horizontal units for high flow rates or customer requirements for redundancy. Multi chamber configurations range from 2-4 chambers depending on the flow rate requiring treatment. During operation several chambers are dedicated to filtration while one chamber remains in standby mode so it is always available to receive inlet water when a backwash cycle begins. Each chamber runs through a rotation cycle so that each chamber alternates its role as the standby. This type of operation eliminates the need for spare filters.

Filtration

During the filtration process water enters near the top of the vessel and flows down through a 4ft packed nutshell bed. Filtered water exits the bottom through a fine screen, while oil droplets and solid particles remain trapped within the media. Due to the physical properties of the media oil is repelled predominantly in the top 18” of bed while clean water passes through to the outlet.

Back-Washing

To clean the media the vessel will periodically “back-wash”. During this process the media is fluidized in-situ allowing oil and solids to be stripped. At the completion of this short cycle the media is then re-settled and the filtration process is repeated. The unit will back-wash automatically when either the differential pressure across the bed is exceeded or a pre-set running time is reached.



During back-washing the bed is rejuvenated using high pressure, multiphase (gas/water) jets that agitate the media, releasing the accumulated oil. The introduction of gas during back-washing is a unique approach taken by Exterran Water Solutions significantly reduces backwash waste volumes. The multiphase jet also creates large scale turbulent flow that both fully fluidize the walnut shell bed, and also help float the oil deposit to the surface. This back-wash exits through a screen near the top of the vessel which prevents any shells from leaving the vessel.



Flow Rate (BPWD)	Vessel Diameter (ft)	Vessel Diameter (m)	Vessel Length (ft)(T/T)	Vessel Length (m)(T/T)	Orientation
10,000	6	1.8	8	2.4	Vertical
25,000	9.5	2.9	7	2.1	Vertical
50,000	8.5	2.6	19.5	5.9	Horizontal
75,000	8.5	2.6	31	9.4	Horizontal
100,000	9.5	2.9	39	11.9	Horizontal
125,000	9.5	2.9	50	15.24	Horizontal
150,000	9.5	2.9	60.5	18.4	Horizontal

All numbers are for guidance only, contact Exterran Water Solutions for site specific designs.

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