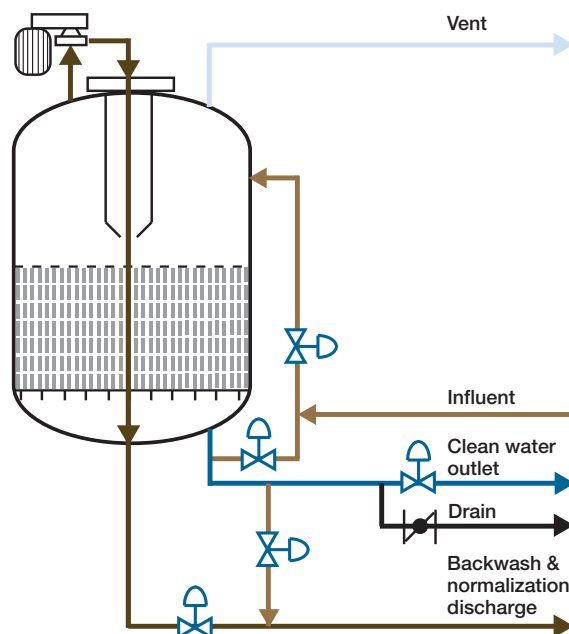
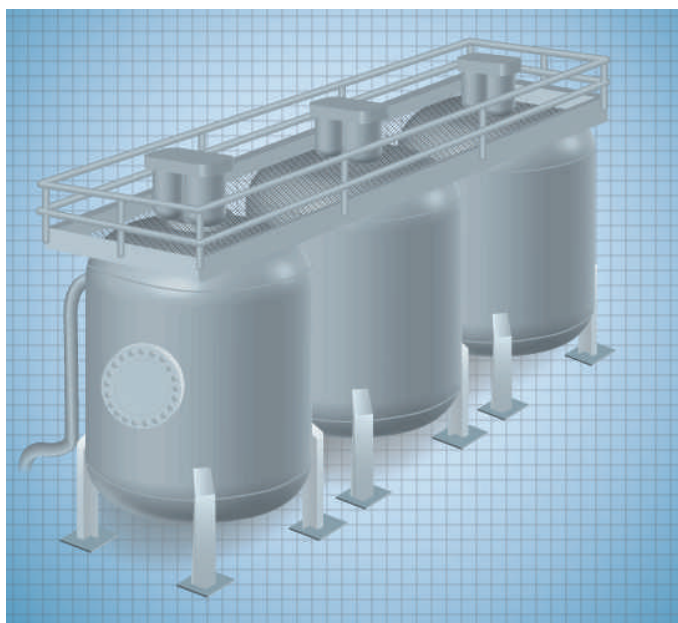


PROSHELL DEEP BED NUTSHELL FILTER



Together creating pure oil, gas and water.

When treatment of produced waters needs to go beyond the results of secondary treatment (typically 15-25 mg/l of oil and/or solids), ProSep provides high-performance tertiary treatment equipment. The ProShell Deep Bed Nutshell Filter can remove 98% of non-water soluble hydrocarbons and particulates greater than 5 microns in most cases, while significantly reducing or eliminating the need for large quantities of backwash water, scouring, and surfactants.



BENEFITS

- Deep bed design for contaminant retention reduces backwash frequency
- Influent stream utilization eliminates backwash water storage tanks and pumps
- System uses lowest backwash volume of available technologies
- Backwash cycle fully fluidizes and regenerates the media bed without additional air scouring
- “Green” technology aids in achieving “zero discharge”
- Nutshell media prevents the fouling / plugging typical of sand and multi-media filters
- Equipment has very low maintenance requirements

- Stainless steel internals and high-reliability backwash pump ensure >99% operational uptime
- Media attrition measures <5% annually

FEATURES

The unique qualities of crushed pecan / walnut shells make for a media that is oleophobic and elastic, yet extremely hard and durable. These characteristics of the ProShell Deep Bed Nutshell Filter lead to greatly diminished media attrition rates combined with maximum performance.

Under normal operating conditions, with a nominal inlet oil concentration of 50 mg/l or less and a comparable solids inlet concentration, nutshell filters will produce an effluent with less than 5 mg/l of dispersed oil and suspended solids without the addition of chemicals.

OPERATING PRINCIPLES

The ProShell Deep Bed Nutshell Filter System features a highly durable media screen supported at vessel bottom and an engineered fluidization path that successfully cleanses the media of oil and particles. The fluidization nozzle is strategically located to insure complete and rapid fluidization of the media bed, reducing backwash water volumes; the scrubber screen has been designed to retain the media within the filter vessel while efficiently drawing contaminants from the vessel. Raw feed water is used during all stages of the backwash cycle.

The nutshell filtration cycle begins when dirty fluid enters the vessel through a valve. As the contaminated fluid is forced through the media bed under pressure, oil and solids are trapped and accumulate within the bed. Clean, filtered water is discharged from the bottom of the vessel. The backwash process consists of 1) fluidizing the bed to dislodge contaminants, 2) discharging the contaminant-laden water, 3) delaying for one cycle which allows for the settling of the media bed, and 4) rinsing to remove any residual contaminants from the media bed prior to bring the filter back online.



MEDIA

The ProShell Deep Bed Nutshell Filter is filled with a blend of pecan and walnut shells which are specially

conditioned and ground to a uniform size. The ratio of walnut to pecan shells maximizes contaminant retention while minimizing media attrition.

CARTRIDGE AND ABSOLUTE FILTERS

ProSep also offers cartridge filters with excellent removal efficiencies. As stand-alone tertiary treatment, they can become operator- and OPEX-intensive with frequent cartridge change-outs required to handle typically high contaminant loads. ProSep cartridge filters installed downstream of properly operated nutshell filters, however, offer an excellent produced water treatment solution that approaches “zero-discharge” requirements. In this scheme the ProSep nutshell filter removes the bulk of the suspended solids and dispersed oil, minimizing the load on the ProSep cartridge filters and maximizing the time between element replacements.

REFERENCES

Available upon request.

FOR MORE INFORMATION

Contact your nearest ProSep office
www.prosep.com

About ProSep



ProSep is a technology-based process solutions provider for the upstream oil and gas industry.

The Company designs, develops, manufactures and commercializes technologies to separate oil, gas and water generated by oil and gas production.

ProSep's innovative offerings have been awarded three Spotlight on New Technology Awards from the annual Offshore Technology Conference in Houston in 2005 and onwards, comprising the proprietary technologies ProScav, C-Tour and ProSalt.

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