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Nut Shell Filters

Introduction

Shell filtration is a water polishing technology used to remove hydrocarbon liquids from water down to very low concentrations (in some cases $\leftarrow 3$ ppm). With the tightening of environmental standards and more stringent client requirements, the oil removal technologies previously used do not always meet the standards required resulting in the installation of technologies like Nut Shell Filters.

Nut Shell Filters are commonly used as tertiary water treatment (or water polishing) devices and are therefore, installed downstream of other produced water treatment equipment such as Deoiler Hydrocyclones and Gas Flotation units.

Design Basis

A Nut Shell Filter system typically includes a number of components:

- Nut Shell media
- Nut Shell Filter vessel
- Agitator or alternative media displacement equipment
- Switching valves
- PLC / DCS control logic

Nut Shell Filters are generally designed with all equipment mounted on a single, compact skid for rapid installation and start up.

The size of the Nut Shell Filter vessel depends on a number of factors including:

- Operating conditions
- Produced water properties
- Filter capacity
- Inlet oil concentration
- Outlet specifications

From this basic information SUEZ ensures that the Nut Shell Filter is suitably designed to meet all outlet specifications.



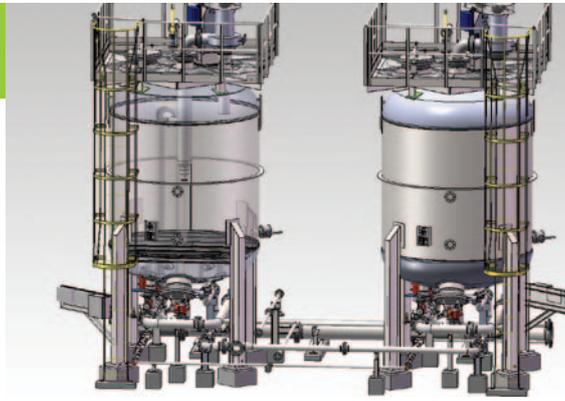
Nut Shell Filter

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Nut Shell Filters



Process Description

SUEZ Nut Shell Filters are designed to remove fine solids and hydrocarbon liquids from water as a secondary or tertiary stage of water treatment.

Oily water is introduced into the vessel and distributed to ensure even flow throughout the vessel. As the water flows through the vessel the Nut Shell media adsorbs the oil and fine solids allowing clean water to exit the vessel.

Nut Shell Filters are typically used to achieve outlet oil concentrations of ≤ 5 ppmv, although concentrations down to ≤ 1 ppmv can be achieved.

Nut Shell Filters are also capable of removing particulate solids down to 3 microns in size.

During operation, oily water enters the vessel and flows through the Nut Shell media. The media physically adsorbs the oil and fine solids and prevents these from passing through the vessel. Over time the oil and fine solids accumulate on the media. To regenerate the filter media, vessel flow is reversed thereby washing the adsorbed oil and fine solids off the media.

There are several methods of regenerating Nut Shell Filters. These methods all require the backflow of the produced water and a physical disturbance of the Nut Shell media bed, whether with an agitator or physical motion of the Nut Shell media. This movement displaces the media bed and releases the filtered oil and fine solids from the media.

Advantages offered by Nut Shell Filters include:

- Low operating costs
- High flux rates
- Low backflow volume & tankage requirements
- No air, gas or steam source required
- Complete fluidization of filter bed
- Supply water used for backflow
- Short backwash cycles (11-15 minutes)
- Not affected by motion (suits floating installations)

Note that during regeneration the Nut Shell Filter is not operational and the process options include the use of duty / standby beds or buffer tanks. The optimal overall process design is dependent on the requirements of each specific site.

Product Range & Materials

SUEZ can provide Nut Shell Filter designs based on either walnut Nut Shells, pecan Nut Shells or a combination of these.

Different Nut Shell types allow SUEZ to tailor solutions to each client's specific situation and needs.

Materials of construction are selected based on the process fluid and operating environment. Materials such as carbon steel (typically internally coated), stainless steel or duplex stainless steel are all viable materials of construction. Non-metallic materials such as GRP and fibreglass are also available.

Applications

Nut Shell filters should be used where there are stringent outlet oil and solids concentration requirements as they reduce the oil and fine solids concentrations to very low levels, which are unachievable by many other forms of oil removal technologies.

Nut Shell Filters are typically used as part of an overall water treatment plant, and may be the 2nd, 3rd or 4th stage of treatment within a process train.

It is important that the overall plant design is considered when contemplating the use of Nut Shell Filters and it is recommended that expert advice is sought to best understand which water treatment technology is best suited to each specific site's requirements.