Shell Soaker Visbreaking

Overview

The Shell Soaker Visbreaking process is ideally suited for the reduction of heavy fuel oil product by reducing residue viscosity and maximizing production of distillates. Typical feeds include atmospheric and vacuum residues and solvent deasphalter pitch. The Shell Soaker Visbreaking process is jointly licensed by Shell and CB&I Lummus.

CB&I Lummus and Shell have extensive technical and commercial experience in soaker visbreaking, which results in highly efficient and reliable units. Over 80 Shell Soaker Visbreaking units have been built or converted from coil visbreakers and crude units. Over 70% of the total visbreaking capacity built during the last 10 years was based on this Shell technology. It offers demonstrated advantages that include significantly lower fuel requirements, increased heater run-length, and higher conversion operation with better viscosity reduction.

The technology provides refiners with the means to conserve valuable cutter stock while still producing high quality, stable fuel oil. This conservation of valuable cutter stock, combined with fuel savings derived from the technology, offers an overall cost advantage that leads to project payouts of one to two years.

Shell's visbreaking process can be tailored to meet the refiners' specific needs. A vacuum flasher can be added to obtain increased distillate recovery. Incorporating two-stage cracking in combination with a vacuum flasher will increase conversion and distillate recovery.

With typically 20% of the vacuum residue feed converted to distillate and lighter products, the Shell Soaker Visbreaking process is one of the lowest cost conversion options.

Advantages

Process Features	Process Benefits
Lower cracking temperatures and longer residence time	Selective cracking to distillate product • Less sensitive to operational and feedstock fluctuations • Better process control • Longer run-lengths and less down time
Use of soaker drum with special internals minimizes backmixing	Higher conversion for the same fuel oil stability • More distillate production • Less cutter stock usage
Smaller furnace	Lower investment cost • Less waste heat recovery equipment • Lower fuel consumption
Lower furnace pressure drop	Less power consumption

Performance Characteristics

Typical Feedstocks	
0.4-0.7%	Higher conversion (165°C-)
1-2%	More distillate yield (350°C-)
30-35%	Lower heat duty
15%	Lower investment cost

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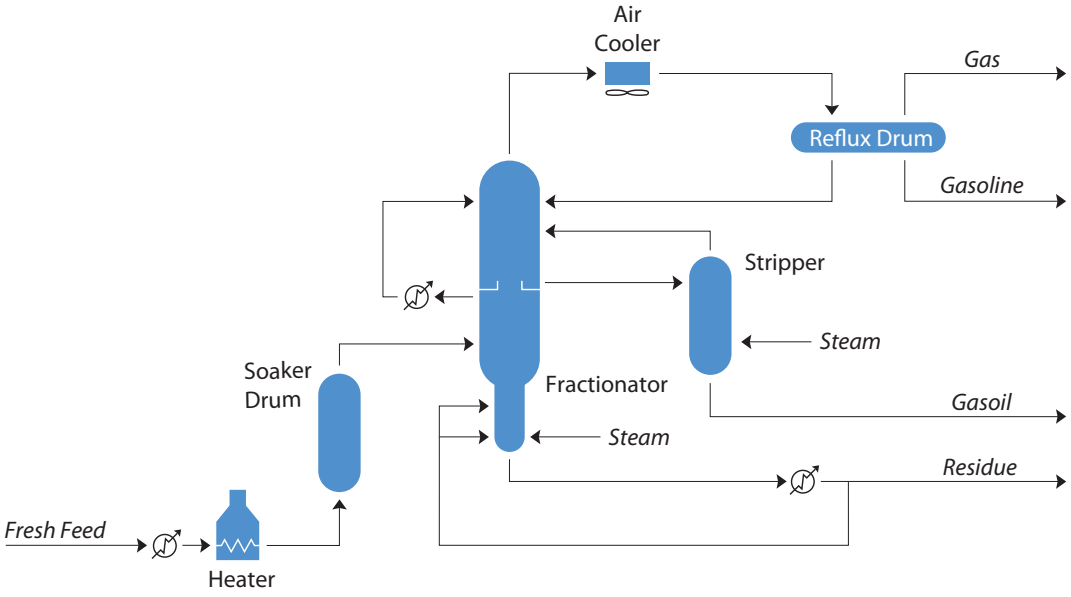
Process Flow Diagram



Process Description

Residue feed is pumped through the preheat exchangers before entering the visbreaker heater, where the residue is heated to the required cracking temperature. The high efficiency heater is also utilized to superheat stripping steam. Heater effluent is sent to the soaker drum where most of the thermal cracking and viscosity reduction takes place under controlled conditions. Soaker drum effluent is flashed and then quenched in the fractionator. Heat integration is maximized in order to keep fuel consumption to a minimum. The flashed vapors can be fractionated into gas, gasoline, gasoil and visbreaker residue. Liquid visbreaker residue is steam-stripped in the bottm of the fractionator and pumped through the cooling circuit to battery limits. Visbreaker gasoil, which is drawn off as a side stream, is steam-stripped, cooled and sent to battery limits. Alternately, the gasoil fraction can be included with the visbreaker effluent. It is also possible to obtain a heavy vacuum gasoil fraction by adding a vacuum flasher downstream of the fractionator. Cutter stocks, such as light cycle oil or heavy atmospheric gasoil, may be added to the visbreaker residue/gasoil mixture to meet the desired fuel oil specification.