

## Refineries: Application Focus

### Delayed Coking

#### Process Description

Coking is a unit operation found in more complex refineries to convert tarry residual or 'resid' streams from vacuum and atmospheric distillation into value-added products and intermediates such as LPG, naphtha, diesel, light and heavy gas oils. Coking is often accomplished via a delayed coking unit that includes a furnace, two coking drums — one online and one in regeneration, and a fractionating column. In the process, the flow is heated to coking temperature in the furnace, then fed to the online coking drum. Large volumes of steam are injected after the furnace to delay the coking reaction until the flow enters the coking drum, where the heavy oil is cracked to lighter hydrocarbons, and into coke that mostly deposits in the drum for removal during the regeneration cycle. The cracked hydrocarbons then head to the fractionator column for separation of the different streams, with the bottoms recycled back to the inlet for another pass through the coker. In the fractionator, the remaining coke fines and initially injected steam exit the process in the fractionated products as particulate and water contamination. Depending on the product, removal of excess particulate and water is required to achieve final

Ensure your coker outputs meet your water quality requirements on final products and intermediates.



product quality, or to meet feedstock requirements for other unit operations, for example on kerosene or diesel streams feeding hydrotreaters.

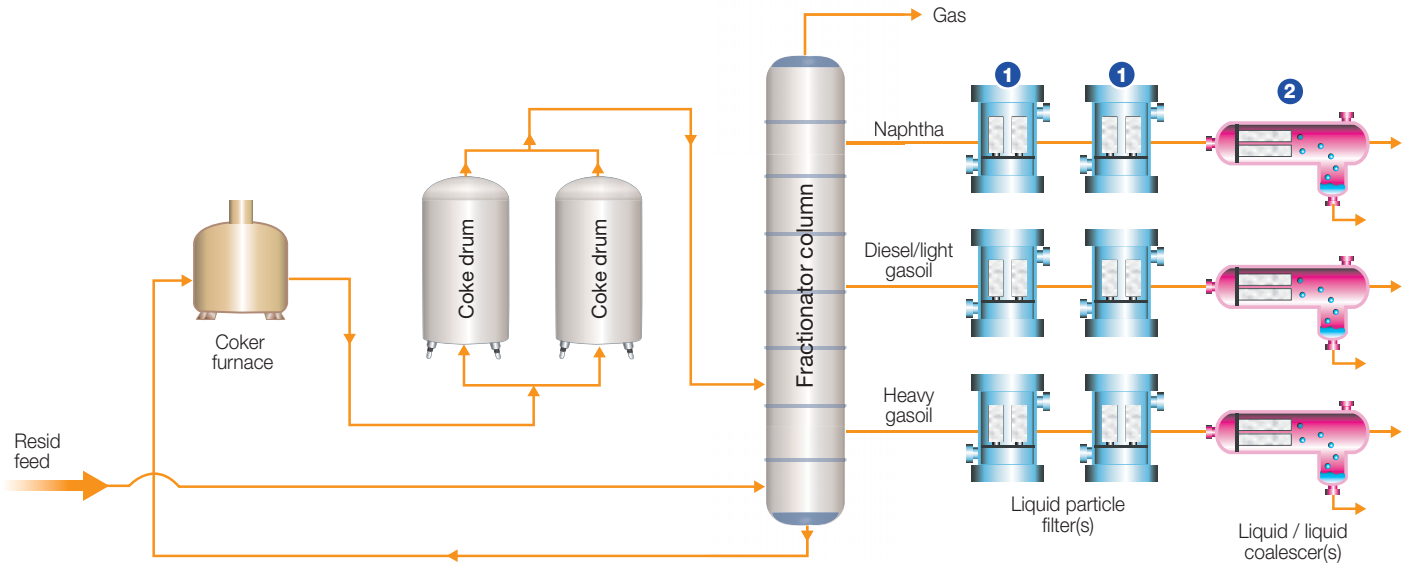
#### Refinery Needs

- Meet coker unit production quotas
- Ensure final product water and particulate standards are met on naphtha, diesel streams
- Protect downstream units from production or reliability issues due to high solids or water levels in the coker fractionates

#### Production Challenge/Pall Solution

Challenge	Solution
<b>Achieve daily coker unit production targets</b>	<b>Meet coker production targets, product quality specifications and downstream unit protection</b> by effective removal of particulate and free water contaminants that are driving fractionates out of specification
<b>Consistently meet particulate and water specification on naphtha and diesel streams headed for final product blending</b>	<b>For particulate control:</b> <ul style="list-style-type: none"> <li>• Solid particle contaminants in the coker are mostly coke fines, some very fine that may not be adequately removed by nominal filters, or filter media without fixed pore sizes that may exhibit unloading, media migration, channeling or poor sealing.</li> <li>• <b>A range of absolute and nominal rated filter elements is available to reliably reduce suspended solids to final product or intermediate solids specifications</b></li> </ul>
<b>Ensure downstream reactor bed protection from delta P build or deactivation due to solids fouling or water contamination</b>	<b>For liquids control:</b> <ul style="list-style-type: none"> <li>• Conventional glass fiber coalescers will disarm due to the high volume of surfactants in the fractionates — naturally occurring sulfur compounds, or additives such as corrosion inhibitors or well treating chemicals. Disarmed coalescers will let large volumes of free water downstream until the elements are changed out, producing high water content fractionate</li> <li>• Other separators such as mesh packs, chevrons, cyclones, sand beds or electrostatic precipitators will not provide effective removal of the fine droplet emulsion created by the surfactants, so that high levels of free water will be seen downstream</li> <li>• High efficiency AquaSep® EL coalescers operate without disarming and provide effective removal of the fine emulsions to as low as 15 ppmv free water, protecting final product quality and downstream processes such as hydrotreater beds.</li> </ul>

## Process Flow Diagram



## Key Applications/Filter Recommendations

Application	Pall Product	Advantages	Customer Benefits
1 Prefiltration prior to liquid/liquid coalescer	Ultipleat® High Flow filters, Coreless filters, and/or a range of FSI bag filters	Efficient removal of solids from the coalescer and the coker fractionates	Improves the efficiency and life of the liquid/liquid coalescer Ensures product quality and downstream unit reliability needs are met through effective removal of problematic solids
2 Water removal	AquaSep EL liquid/liquid coalescer	Consistently removes water from the coker fractionates	Ensures product quality and downstream unit reliability needs are met through effective removal of problematic free water



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