



# FILTRATION APPLICATIONS IN HYDROCRACKING

Hydrocracking is a refining process that converts heavy oils into lighter distillates (naphtha, kerosene, diesel, etc.).

This process can significantly improve refining margins by upgrading lower-value products into higher-value, high demand products.

The two main chemical reactions in a hydrocracker are the catalytic cracking of heavy hydrocarbons into lighter unsaturated hydrocarbons and saturation of these newly formed hydrocarbons with hydrogen. At the same time that hydrocracking takes place, sulfur, nitrogen, and oxygen are almost completely removed, and olefins are saturated so products are a mixture of essentially pure paraffins, naphthenes, and aromatics.

Not every refinery will have a hydrocracker, still as demand for middle distillates such as jet fuel, kerosene, and diesel increase, refiners are finding an incentive to build them to increase

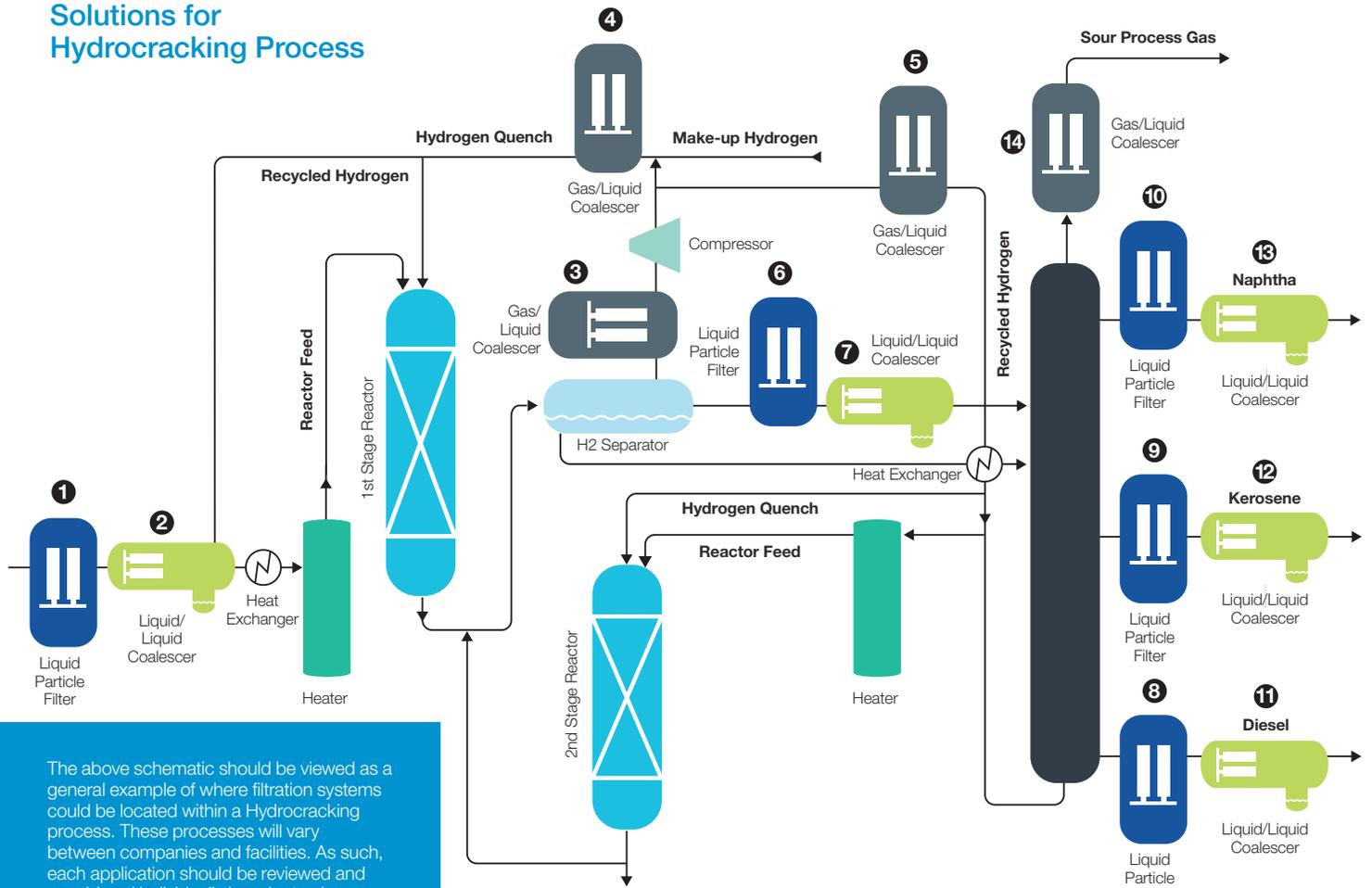
distillate yield. In the low-sulfur world, the hydrocracker is part of the process of converting high-sulfur materials into low-sulfur fuels for vehicles, ships, and airplanes.

Common filtration problems includes: particulate fouling around the process unit feed pumps and heat exchangers, carry-over hydrocarbons contaminating the recycled hydrogen compressor, carry-over lube oils from the recycled hydrogen compressor, trace hydrocarbon liquids contaminating the amine in the hydrogen recovery unit, trace water contamination in final products, etc.

## Benefits of an optimized filtration system includes:

- Reduced hydrogen contamination
- Protection of downstream equipment
- Reduced reactor bed plugging or fouling
- Ability to meet final product sales specification
- Reduced heat exchanger fouling and improved heat transfer performance
- Improved operation and process efficiency

# Solutions for Hydrocracking Process



The above schematic should be viewed as a general example of where filtration systems could be located within a Hydrocracking process. These processes will vary between companies and facilities. As such, each application should be reviewed and considered individually in order to choose the correct system technology.

Filter Solution	Filter Purpose	Filter Benefit
<b>01</b> Backwashable ProGuard Series filter systems or Replaceable LiquiPleat HF Series.	Removal of solid contaminants, such as scale, rust, and particulates from the hydrocracker feedstock.	Protects coalescer, prevents unscheduled reactor downtime, reduced fouling in heat exchangers extending time between maintenance and shutdowns, fewer catalyst change outs.
<b>02</b> Phase-LOK™ or Phase-PUR™ Series Liquid/Liquid Coalescers.	Removal of water from hydrocracker feedstock.	Prevents unscheduled reactor downtime, heat exchanger fouling, protection of downstream equipment, and extends catalyst bed life.
<b>03</b> Micro-LOK™ or Micro-DEP™ Series Gas/Liquid Coalescers.	Removal of liquids and solids from recycled hydrogen.	Efficient hydrogen compressor operation and significantly reduced maintenance costs.
<b>4-5</b> Micro-LOK™ or Micro-DEP™ Series Gas/Liquid Coalescers.	Removal of lube oil from compressor discharge gas.	Lower maintenance costs and improved reactor efficiency.
<b>06</b> LiquiPleat™ Series Pleated Liquid Elements and Vessels.	Removal of solid particulates from fractionator feedstock.	Improves coalescer efficiency and protects downstream equipment.
<b>07</b> Phase-LOK™ or Phase-PUR™ Series Liquid/Liquid Coalescers.	Removal of liquid contaminants from fractionator feedstock.	Maintains fractionator efficiency by preventing contamination build up on separator plates.
<b>8-10</b> LiquiPleat™ HF Series High Flow Liquid Elements and Vessels.	Removal of solid contaminants from the fractionator.	Protect liquid coalescers and downstream equipment. Maintain final product specifications.
<b>11-13</b> Phase-LOK™ or Phase PUR™ Series Liquid/Liquid Coalescers.	Removal of trace water contamination from the final product.	Protection of downstream equipment. Maintain final product specifications.
<b>14</b> Micro-LOK™ or Micro-DEP™ Series Gas/Liquid Coalescers.	Removal of trace hydrocarbon liquids from the sour process gas.	Prevention of amine contamination in the hydrogen recovery unit.

