

# Ethylene Quench water returned to 'clear and bright' using Pall PhaseSep® EL coalescers



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## CASE STUDY

### Background

Ethylene is one of the most important petrochemical intermediates and is a feedstock for various end products like food packaging/containers, bottles, films, pipes, antifreeze, etc.

The ethylene production process is a complex multi-stage process. The two primary feedstocks are naphtha and natural gas (ethane, propane, butane, etc.). The first step is to take the feedstocks and 'crack' them into ethylene and other various by-products by subjecting them to high temperatures (300 to 900 °C/ 572 to 1652 °F) in the absence of oxygen, a process known as pyrolysis.

After the ethylene cracker, heavy oil may be present from carryover into the quench water. To re-use part of the quench water for steam production, it must be processed to remove hydrocarbon contaminants, including pyrolysis gasoline (py-gas). Failure to do so will cause fouling of heat exchangers and boilers, lead to poor separation in stripping units, and increase energy consumption.

### Problem

Process engineers at a major mixed feed cracker ethylene producer in Europe needed to remove free py-gas from process quench water downstream of the coalescer to minimize fouling and heat transfer decrease in their heat exchangers. They approached Pall to recommend an upgrade to the current filtration and separation system installed on its Dilution Steam System (DSS).

### Quench Water system

- Flowrate: up to 90 m<sup>3</sup>/hr
- Operating Temperature: 82°C

### Solution

Pall carried-out field trials using a pilot unit during 5 weeks to validate the performance of the proposed upgrade using Pall PhaseSep EL Liquid/Liquid coalescers. The coalescer was protected by a  $\beta_{23(c)}$  >5,000 particulate pre-filter to avoid any premature clogging due to large solid contaminants.

Once this 2-stage configuration was validated, a Pall rental skid was supplied as an immediate solution, allowing time for Pall to install the appropriate internals into the existing filter vessels to complete the permanent filter upgrade. This full-scale operation confirmed the excellent result achieved by the pilot unit, i.e. a clear & bright process quench water, with no visible free hydrocarbons or py-gas downstream of the rental skid.



Quench Water samples taken upstream and downstream of the coalescer pilot unit

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## Conclusion

By upgrading its Dilution Steam System with Pall PhaseSep EL advanced coalescence technology, the ethylene producer was able to maximize its production output by improving the efficiency of its heat exchangers. This result was achieved by the significant reduction of polymerization reactions due to the absence of free py-gas in the process quench water.

Since installation, the PhaseSep EL coalescer elements have been operating with consistent performance, allowing the ethylene processing plant to meet its production output targets in both quality & quantity of ethylene produced.

*PhaseSep EL Liquid/Liquid Coalescers available in 20 and 40 inch lengths.*



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