

PhaseSep® EL Coalescers

Effectively Separate Liquid/Liquid Dispersions
Optimize Coalescer and/or Pre-filter Life



FCPHASEELENa

Introduction

Pall's PhaseSep EL coalescer provides chemical/ petrochemical, oil & gas, and refinery plants containing aggressive or high temperature streams with improved separation efficiency via a coarse coalescer format. This product performs well in applications with high solids and difficult oil/water emulsions. The PhaseSep EL coalescer differentiates from bulk separators and commodity coalescers by achieving **low OPEX** and **lower CAPEX** with high efficiency contaminant separation.

PhaseSep EL Coalescer vs. 'Original' PhaseSep Coalescer

- Lower OPEX from longer pre-filter and coalescer life due to coarser ratings
- Directly retrofittable with PhaseSep coalescer
- Uses new medium specifically selected to yield desired performance in target applications

Typical Applications

Not all coalescers provide a high efficiency quantitative removal of dispersed liquid contaminants and can handle emulsions with low interfacial tensions (IFTs). For example, conventional cartridge and mesh pack coalescers made of glass fiber media begin to lose efficiency when the IFT of the emulsion gets below 20 dynes/cm. In contrast, the PhaseSep EL coalescer from Pall is constructed of a high-efficiency, engineered polymer medium, making it well suited for numerous aggressive service liquid/liquid separation applications with low IFTs.

- Separation of pyrolysis gas from quench water in ethylene plants, especially on high solids streams found in gas crackers
- Removal of hydrocarbons from rich side amine streams
- Hot hydrocarbon condensate dewatering to protect stabilizer columns
- Hydrocarbon removal from sour water on streams with wide-ranging pH variation
- De-oiling of produced water streams
- Ensure final product quality specifications are maintained



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

Product Benefits

Features	Advantages	Benefits
<p>High Performance, Coarse Grade engineered polymer medium</p>	<ul style="list-style-type: none"> • Longer service life of coalescer and prefilter elements on high solids or high tar applications <hr/> <ul style="list-style-type: none"> • Reduced incidents of off-spec outlet <hr/> <ul style="list-style-type: none"> • Tolerant to process upsets, can remove slugs of liquids 	<ul style="list-style-type: none"> • Lower coalescer operating and changeout costs versus less efficient alternative solutions such as lower efficiency cartridge coalescers, depth bed coalescers, mesh pack coalescers, electrostatic separators and sand filters • Ability to move to coarser prefiltration, enabling fewer cartridge change-outs with reduced maintenance and waste disposal costs <hr/> <ul style="list-style-type: none"> • Reduces ethylene process quench water boiler blowdown • Lowers ethylene dilution steam generator fouling • Reduces sulfur plant upsets from hydrocarbon carryover • Protects condensate stabilizer and sour water stripper (SWS) columns from fouling and corrosion • Eliminates final product reprocessing, settling time, and/or return transportation costs • Ensures produced water environmental compliance • Reduces costly corrosion problems downstream • Prevents catalyst deactivation in downstream processes <hr/> <ul style="list-style-type: none"> • Consistent fluid quality, even under many upstream process variations
<p>Non-disarming coalescing medium</p>	<ul style="list-style-type: none"> • The medium does not disarm in the presence of surfactants. Disarming occurs when surfactants (either natural or additives) 'coat' and progressively neutralize the surface of the medium <hr/> <ul style="list-style-type: none"> • Ability to operate effectively as a L/L coalescer with IFTs as low as 6 dynes/cm 	<ul style="list-style-type: none"> • Consistent fluid quality throughout coalescer service life • Reduces labor and disposal cost from short service life of disarmed glass fiber coalescer elements or mesh packs <hr/> <ul style="list-style-type: none"> • Reliable use of liquid/liquid coalescers on challenging applications such as quench water, hydrocarbon condensate, sour water stripping (SWS), rich amine, produced water, L/L separation upgrades and general high efficiency water/oil separation needs. Demonstrated removal capability of < 20 ppmw oil & grease down to an IFT of 6 dynes/cm¹
<p>Availability of a High Performance Integrated Stack Design – Coalescer and Separator</p>	<ul style="list-style-type: none"> • High efficiency and increased flow per cartridge because of even flow distribution in each vertical coalescer/separator stack. In commodity two-stage systems, the separators are located at different distances from the coalescers, causing poor flow distribution and efficiency loss 	<ul style="list-style-type: none"> • Consistent fluid quality • Smaller, lower cost system

¹ Performance can vary depending on application.

Description

The PhaseSep EL system is typically a multiple-stage system, starting with prefiltration to remove particulate matter, followed by either a one-stage horizontal coalescer or two-stage integrated vertical coalescer/separator stack to separate the two liquid phases.

PhaseSep EL coalescers will remove oil and grease to a level of 20 ppmw, or free water to a level as low as 15 ppmv, and be effective over a wide range of conditions such as inlet liquid contaminant concentration as high as 0.1% and interfacial tension less than 10 dynes/cm¹.

The PhaseSep EL coalescer system is available in two different housing configurations. Both configurations begin with a filtration stage to remove solid contaminants.

PhaseSep EL Coalescer - Horizontal Housing Configuration

In a horizontal housing, the liquid/liquid mixture enters the coalescing element and flows inside-to-outside, small liquid dispersed phase droplets suspended in the continuous phase come together, or coalesce, as the mixture moves through the PhaseSep EL coalescer. The large coalesced droplets of the dispersed phase separate by gravity in the horizontal housing and are removed. The size of the housing is a function of the flow rate, IFT, viscosity, and specific gravity of the liquids.

PhaseSep EL Coalescer/Separator Stack - Vertical Housing Configuration

The liquid/liquid mixture enters the coalescing element and flows inside-to-outside. Small liquid droplets suspended in the continuous phase come together, or coalesce, as the mixture moves through the coalescer medium.

Contaminant-free liquid and large droplets of the dispersed phase flow toward the separator located directly below the coalescer stage. Flowing is outside-to-inside. The separator medium is hydrophobic preventing the aqueous phase from entering the separator. Only the non-aqueous continuous phase fluid flows through the separator. The two liquids are removed by separate drain connections.

Contaminant-free liquid and large droplets of the dispersed phase flow toward the separator located directly below the coalescer stage. Flow through the separator is outside-to-inside. The separator medium is hydrophobic and prevents the aqueous phase from entering the separator. Only the non-aqueous continuous phase fluid flows through the separator. The two liquids are removed by separate drain connections.

Table 1: Coalescer Selection Guide

Process Condition	Recommended Product
The dispersed phase fluid is aqueous and a horizontal vessel footprint is acceptable	PhaseSep EL coalescer in a horizontal housing without separator
The dispersed phase fluid is oil and the continuous phase fluid is aqueous	
The dispersed phase fluid is aqueous and minimal footprint is required	PhaseSep EL coalescer/separator stack in a vertical housing

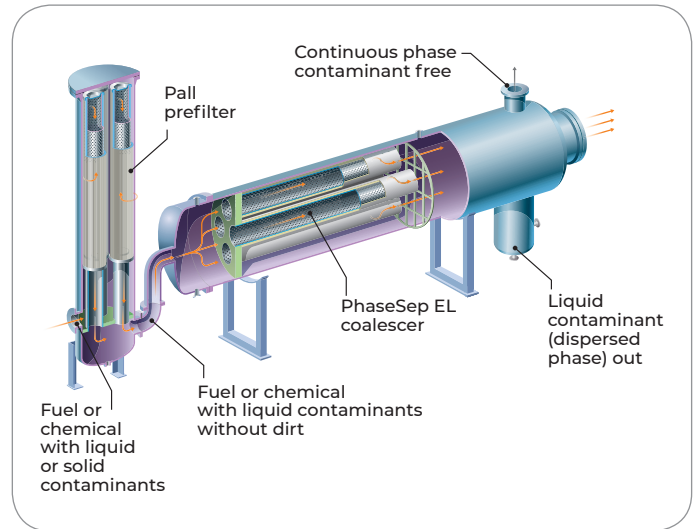


Figure 1: PhaseSep EL Liquid/Liquid Separation System with Coalescer in a Horizontal Housing with Prefilter (for removal of aqueous from hydrocarbon).

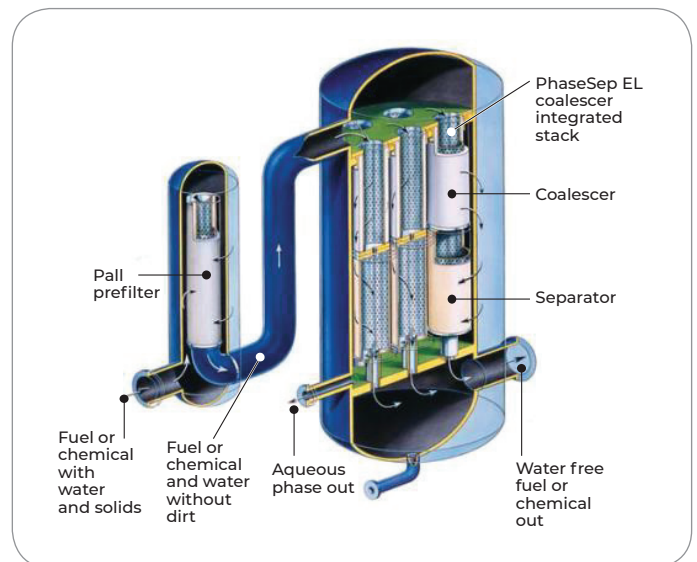


Figure 2: PhaseSep EL Liquid/Liquid Separation System with an Integrated Coalescer/Separator Stack in a Vertical Housing with a Prefilter.

¹ Performance can vary depending on application.

Compatibility

The PhaseSep EL coalescer is compatible with hydrocarbon fuels and fuel additives, alkanes, olefins, aromatics, ethylene glycol, trace amounts of IPA and methanol, water in the pH range of 1-14, alkanol amine – water solutions (MEA, DEA, MDEA, and fluids generally compatible with epoxy, fluorocarbon or 304 SS. For compatibility information with a specific chemical, please contact your Pall representative or distributor.

Product Specifications

Maximum operating temperature:	149°C/300°F
Maximum differential pressure:	3.5 bard/50 psid at 21°C/70°F
Oil in Water Performance!:	< 20 ppmw oil & grease per EPA1664 or ALPHA5520B
Water in Oil Performance!:	< 15 ppmv based on AquaGlo (free water) detection, up to 0.1% water
Recommended change-out:	1.0 bard/15 psid at 21°C/70°F

Ordering Information

Part Number	Description	Outer Diameter (cm/ in) nominal	Length (cm/ in) nominal
LCS06ELPH	PhaseSep EL 6" Test Coalescer	7/2.75	15.2/6
LCS2ELPH	PhaseSep EL 20" Coalescer	10.7/ 4.2 (flange) 9.53/3.75 (main element)	50.8/20
LCS4ELPH	PhaseSep EL 40" Coalescer	10.7/ 4.2 (flange) 9.53/3.75 (main element)	101.6/40
LSS2F2H	Separator	9.53/3.75	50.8/20

PhaseSep EL Coalescer Reduces Costs

Begin reducing your capital and operating costs today. Contact your local Pall distributor or call Pall directly to arrange for a budgetary quotation and pilot test of the PhaseSep EL coalescer technology.

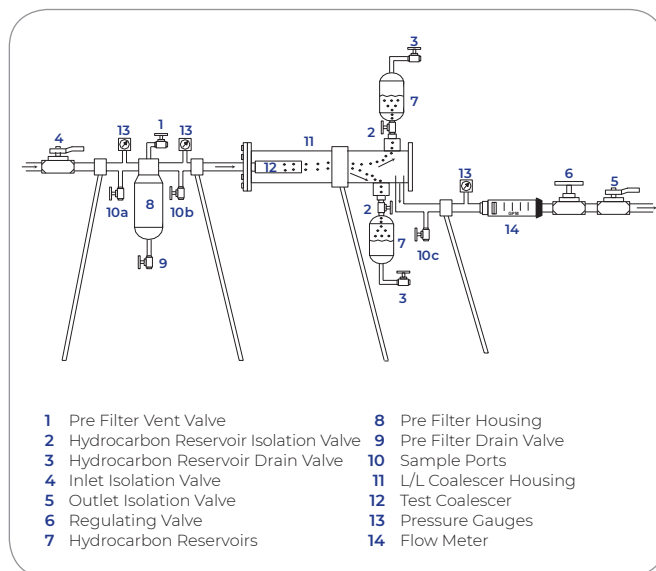


Figure 3: Illustration of Pall pilot scale liquid/liquid coalescer test stand



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