Pall Corporation

NEW: AquaSep® EL Coalescers

Effectively Separate Liquid/Liquid Dispersions on Medium, Coarse, or Higher Solids Emulsions

Introduction

Pall's new AquaSep EL liquid/liquid coalescer system is a lower cost solution to separate higher solids and medium to coarse emulsions versus competitive cartridge coalescers, mesh pack coalescers, sand beds and electrostatic precipitators (ESPs). Its cost effectiveness is due to the ability of each coalescer element to process a higher flow in a higher solids environment while still providing superior effluent quality. For existing cartridge coalescer systems, the AquaSep EL element provides superior *continuous* removal of liquid contaminant thereby making it a more reliable solution than competitive offerings. See Figures 1 and 2 below.

AquaSep EL Liquid/Liquid Coalescers available in 6, 20, and 40 inch lengths

Typical Applications

Not all coalescers provide a high 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 new AquaSep EL coalescer from Pall is constructed of a high-efficiency, polymeric medium, making it well suited for numerous liquid/liquid separation applications with very low IFTs including:

- Water removal from hydrocarbon condensates before stabilization, fractionation or pipeline transport
- Removal of oil from sour water to protect sour water stripping (SWS) as well as downstream sulfur plant and water treatment operations
- Water removal from high solids coker fractionates
- Performance upgrades to existing cartridge or mesh pack coalescers, sand beds and ESPs
- General oil/water separation needs across upstream, midstream and downstream processes

Comparative Performance

Effluent Quality – AquaSep EL vs. Competitive Polymeric Coalescers, 0.1% Water Ingression, 30 dynes/cm Horizontal Configuration

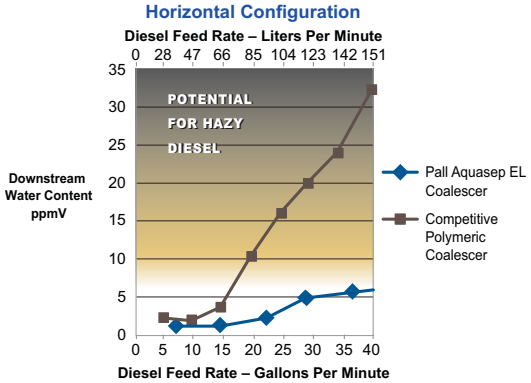


Figure 1

Effluent Quality – AquaSep EL vs. Competitive Glass Fiber Coalescers, 0.1% Water Ingression, 30 dynes/cm Horizontal Configuration

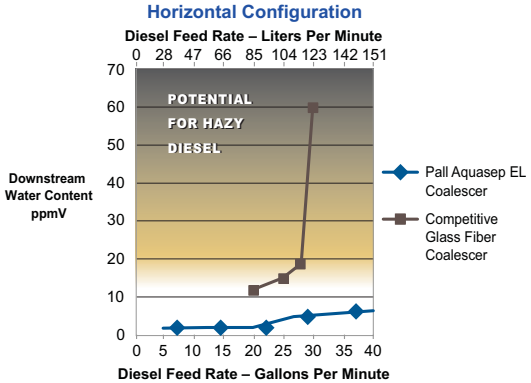


Figure 2

NOTE: Comparison tests were performed in a Pall laboratory with a limited number of 20 inch elements that were purchased through standard commercial channels. Lab results may not be identical to test results with actual process fluid under field conditions.

Product Benefits

Features	Advantages	Benefits
High Performance, Coarse Grade Polymeric Medium	• Up to 60% higher flow per coalescing element	• Smaller, lower cost system
	• Reduced incidents of off-spec product	• Eliminates reprocessing, product degradation and transportation costs • Reduces costly corrosion problems in downstream equipment • Prevents catalyst deactivation in downstream processes
	• Longer service life of coalescer and prefilter elements on higher solids applications	• Lower operating costs versus less effcient alternative solutions • Mesh pack coalescers, salt driers, electrostatic separators and sand filters • Fewer cartridge change-outs, reduced maintenance costs and waste disposal costs
	• Tolerant to process upsets, can remove slugs of liquids	• Consistent fluid quality
Non-disarming Medium	• The medium does not disarm in the presence of surfactants. Disarming occurs when surfactants (either natural or additives) “coat” the surface of the medium	• Consistent fluid quality • Eliminates ongoing labor costs to change out disarmed glass fiber coalescer elements or mesh packs
	• Ability to separate emulsions with IFTs lower than 20 dynes/cm	• Reliable use of liquid/liquid coalescers on challenging applications such as hydrocarbon condensate, sour water stripping (SWS), coker fractionates, L/L separation upgrades and general high efficiency water/oil separation needs
Availability of a High Performance Integrated Stack Design—Coalescer and Separator	• Higher flow per cartridge because of even flow distribution. In conventional two-stage systems, the separators are located at different distances from the coalescers. This causes poor flow distribution.	• Consistent fluid quality • Smaller, lower cost system

Left: Top end cap and o-ring seal of Pall’s coalescer

Above: End cap configurations of Pall’s separator *(left)* and coalescer *(right)*

Right: Pall’s coalescer *(top)* and separator *(bottom)* shown in an integrated vertical stack design

Description

The AquaSep EL system is a multiple-stage system starting with filtration to remove particulate matter, followed by either a one-stage horizontal coalescer or a two-stage integrated vertical coalescer/separator stack to separate the two liquid phases. AquaSep EL coalescers will remove free water to a level as low as 15 ppmv[1] and be effective over a wide range of conditions such as inlet liquid contaminant concentration as high as 10% and interfacial tension less than 20 dynes/cm.

Table 1: Coalescer Selection Guide

Process Condition	Recommended Product
The dispersed phase fluid is aqueous and a horizontal footprint is acceptable	AquaSep 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	AquaSep EL coalescer/separator stack in a vertical housing

AquaSep 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 AquaSep 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.

AquaSep 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. The flow 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.

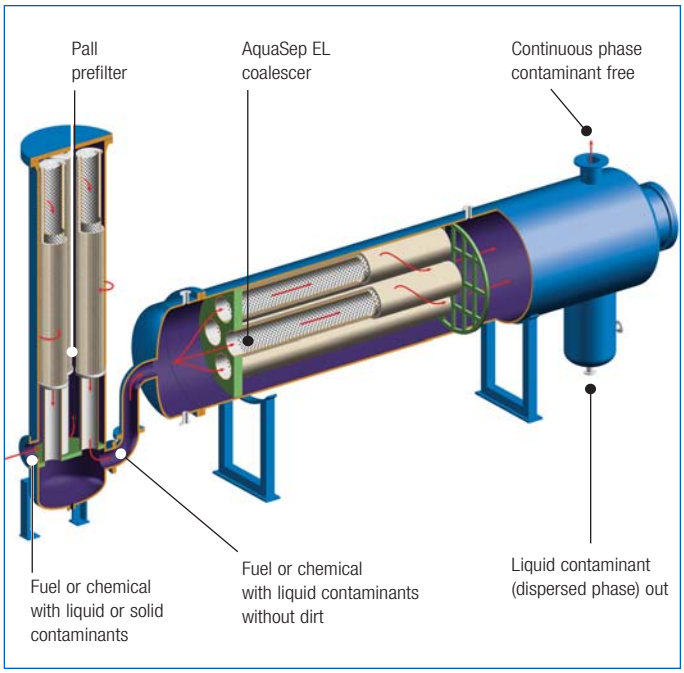


Figure 3: AquaSep EL Liquid/Liquid Separation System with Coalescer in a Horizontal Housing with a Prefilter

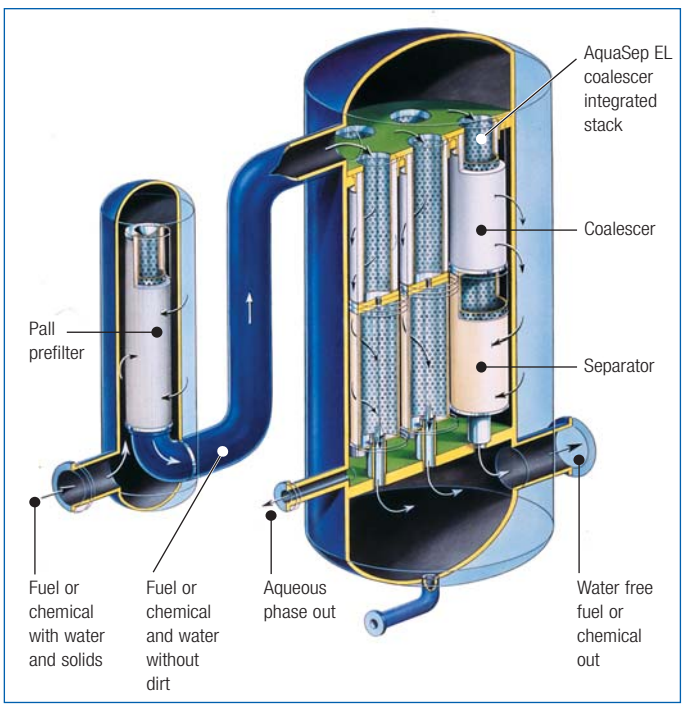


Figure 4: AquaSep EL Liquid/Liquid Separation System with an Integrated Coalescer/Separator Stack in a Vertical Housing with a Prefilter

[1] Performance can vary depending on application.

Compatibility

The AquaSep EL coalescer is compatible with hydrocarbon fuels, ethylene glycol, trace amounts of IPA and methanol, and water in the pH range of 4 - 8.5. For compatibility information with a specific chemical, please contact your Pall representative or distributor.

Product Specifications

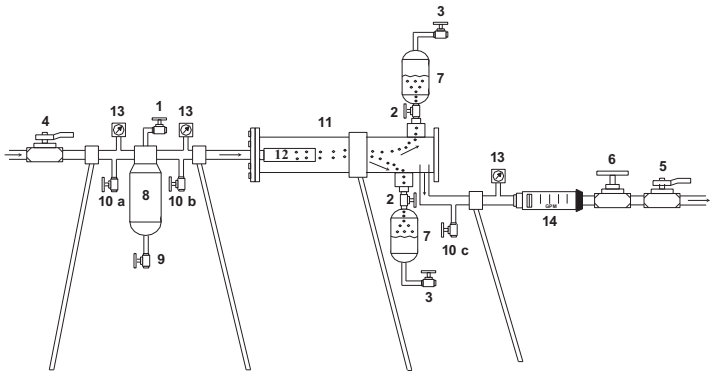
Maximum operating temperature:	60°C/140°F
Maximum differential pressure:	3.4 bard/50 psid at 21°C/70°F
Recommended change-out:	1.0 bard/15 psid at 21°C/70°F

Ordering Information

Part Number	Description	Outer Diameter (cm/in) nominal	Length (cm/in) nominal
LCS06ELBH	AquaSep EL Coalescer	7/2.75	15.2/6
LCS2ELBH	AquaSep EL Coalescer	10.7/4.2 (flange) 9.53/3.75 (main element)	50.8/20
LCS4ELBH	AquaSep EL Coalescer	10.7/4.2 (flange) 9.53/3.75 (main element)	101.6/40
LSS2F2H	Separator	9.53/3.75	50.8/20

AquaSep 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 AquaSep EL coalescer technology.



1) Pre Filter Vent Valve
2) Dispersed Phase Reservoir Isolation Valve
3) Dispersed Phase Reservoir Drain Valve
4) Inlet Isolation Valve
5) Outlet Isolation Valve
6) Regulating Valve
7) Dispersed Phase Reservoirs
8) Pre Filter Housing
9) Pre Filter Drain Valve
10) Sample Ports
11) L/L Coalescer Housing
12) Test Coalescer
13) Pressure Gauges
14) Flow Meter

Figure 5: Illustration of Pall pilot scale liquid/liquid coalescer test stand

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