LL Series

COALESCER FILTERS
LIQUID-LIQUID
TAILOR MADE

MAIN APPLICATIONS:

- OIL & GAS
- PETROCHEMICAL
- FINE CHEMICAL
- POWER GENERATION

CHARACTERISTICS:

- Construction materials:
  Carbon steel
  Stainless steel
  (other materials available as option).
- Design according to:
  ASME Sect. VIII Div. 1
  EN 13445
  (other calculation code available as option).
- Conform to 2014/68/UE PED Directive.
- Conform to 2014/34/UE ATEX Directive.
- Available with U-Stamp certification.
- Top cover closure:
  ANSI or EN flanges
  Swing bolts - eye bolts type
  Quick opening closure yoke or band-lock type.
- Available for pressure up to 900# rating.
- In/out connections up to 24" (DN 600).
- Vertical or horizontal arrangement.
- Suitable for separation of both dispersed phases from hydrocarbons or solvents and for the separation of hydrocarbons from aqueous solutions.
- Available with three different arrangements:
  Vertical double stage LL coalescer
  Horizontal double stage LL coalescer
  Horizontal single stage LL coalescer
- High separation efficiency also with caustics, amines and/or low IFT fluids (< 0.3 dyne/cm).
- Minimal initial Delta-P.

ASCO FILTRI
a mott company

ASCO Filtri S.p.A.
Viale delle Scienze, 8
20082 Binasco (MI) - Italy
Phone: +39 02 89703.1
Fax: +39 02 89703.410
E-mail: info@ascofiltri.com
Web: www.ascofiltri.com

Brochure no.: 190-LL-22-UK-1

LL Series

COALESCER FILTERS
LIQUID-LIQUID
TAILOR MADE

TECHNICAL DATA

CONSTRUTION MATERIALS
Body:
- Carbon steel
- 304/L-SS
- 316/L-SS
- *Other materials available*

Raiser and tubesheet:
- Carbon steel
- 304/L-SS
- 316/L-SS

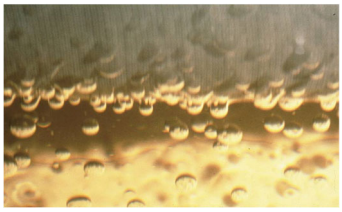
GASKETS
- SPIRALWOUND
- KLINGERSIL
- BUNA-N
- VITON
- RING JOINT

IN/OUT
- Up to 24"

DESIGN PRESSURE
- Up to 900#

ACCESSORIES
- DIFF. PRESSURE GAUGE
- DIFF. PRESSURE SWITCH
- DIFF. PRESSURE TRANSMITTER
- AUTOMATIC VENT
- DRAIN VALVE
- SAFETY VALVE
- AUTOMATIC DRAIN
- LEVEL CONTROLS

How a coalescer works:
The coalescence between two liquid phases is a mechanical process in which, with the wise use of coalescing filter elements and separators, the dispersed liquid phase can be separated; the dispersed phase drops are usually sized from 1 to 50 µm and generate very stable emulsions making the product cloudy or opalescent.
Coalescing filters are suitable for separating free and undissolved phases from the main liquid: the most common application is the separation of water from liquid hydrocarbons.



Coalescing cartridges capture the small droplets of the dispersed phase and magnify them by coalescing until they are large enough (1 to 5 mm) to be separated by gravity. Coalescing cartridges can be installed both vertically and horizontally.

Tiny drops of dispersed phase adhere to it when coming into contact with the filaments of the coalescing media; the continuous flow pushes the drops along the filaments until they reach the intersection point between two filaments, here the drops merge (coalescing) into larger drops. These larger drops are then transported to the outside of the cartridge. In case of water separating from hydrocarbons, the dispersed phase has a higher specific weight than hydrocarbons, therefore the drops are separated from the coalescing element and sedimented by gravity on the bottom of the filter; the larger the drops, the faster and more efficient their sedimentation is.

The flow direction is from inside to outside of the coalescing cartridges; in this way, the surface speed is reduced and helps to prevent the risk of separated droplets breaking up and being dragged downstream within the main flow.
When the dispersed phase is an aqueous solution, the presence of a second stage increases the total separation efficiency by preventing the smallest drops, carried by the main stream, from leaving the filter.

The sizing and selection of the coalescing filter type is closely linked to the following factors:

- density difference between continuous and dispersed phases which affects the sedimentation rate after coalescence, the greater the density difference and the better and faster the separation;
- interfacial tension (IFT) between the two phases which affects the maximum droplet size of the dispersed phase; the lower the IFT, the greater the stability of the emulsion and consequently the separation of the dispersed phase is more critical;
- Viscosity of the continuous phase; the higher the viscosity, the slower and more difficult is the gravitational separation of the separated drops.

ASCO Filtri S.p.A.
Viale delle Scienze, 8
20082 Binasco (MI) - Italy
Phone: +39 02 89703.1
Fax: +39 02 89703.410
E-mail: info@ascofiltri.com
Web: www.ascofiltri.com

ASCO FILTRI
a mott company

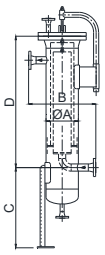
LL Series

COALESCER FILTERS
LIQUID-LIQUID
TAILOR MADE

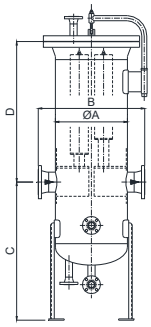
LL/V series dimensions - Vertical double stage filters:

Model	Dwg.	Dimensions [mm]					Cartridges qty	
		ØA	B	C	D	In/out	Coalescer	Separator
152LLTV0101CA02A	1	273	600	700	1150	2"	1 x 40"	1 x 33"
152LLTV0201CA03A	2	406.4	720	1100	1300	3"	2 x 40"	1 x 38"
152LLTV0202CA03A	2	457.2	770	1150	1300	3"	2 x 40"	2 x 38"
152LLTV0302CA04A	2	508	900	1200	1350	4"	3 x 40"	2 x 38"
152LLTV0403CA04A	2	609.6	1060	1200	1350	4"	4 x 40"	3 x 38"
152LLTV0404CA06A	2	609.6	1060	1200	1850	6"	4 x 60"	4 x 38"
152LLTV0604CA06A	2	660.4	1100	1300	1400	6"	6 x 40"	4 x 38"
152LLTV0704CA06A	2	711.2	1150	1300	1400	6"	7 x 40"	4 x 38"
152LLTV0605CA06A	2	711.2	1150	1300	1900	6"	6 x 60"	5 x 38"
152LLTV0805CA06A	2	762	1200	1300	1400	6"	8 x 40"	5 x 38"
152LLTV0807CA08A	2	812.8	1350	1300	1900	8"	8 x 60"	7 x 38"
152LLTV1006CA08A	2	863.6	1440	1350	1400	8"	10 x 40"	6 x 38"
152LLTV1207CA06A	2	914.4	1500	1350	1400	8"	12 x 40"	7 x 38"
152LLTV1308CA08A	2	965.2	1570	1350	1400	8"	13 x 40"	8 x 38"
152LLTV1308CA10A	2	1016	1600	1400	1450	10"	13 x 60"	8 x 38"
152LLTV1610CA10A	2	1066.8	1660	1400	1450	10"	16 x 40"	10 x 38"
152LLTV1915CA10A	2	1219.2	1800	1450	1450	10"	19 x 40"	15 x 38"
152LLTV1617CA10A	2	1219.2	1800	1450	1950	10"	16 x 60"	17 x 38"

DWG. 1



DWG. 2



The allowable flow-rate depends by installed coalescing and separating cartridges, by inlet liquids quantity , by both continuous and dispersed phases characteristics, by surfactants presence and by the interfacial tension between the two phases.
The double-stage vertical filters work in optimal conditions with diesel oil or hydrocarbons with IFT (interfacial tension) compared to water ≥ 30 dynes / cm to ensure a free water level at the outlet ≤ 15 ppm.
The dimensions indicated and the quantity of cartridges are valid for ratings up to 150#; for higher ratings, contact ASCO Filtri. The dimensions are purely indicative, contact Asco Filtri to receive a specific sizing for your needs.
In case of alkaline or caustic dispersed phases (fluids with high pH) or containing amines, do not use fiberglass filter media but use cartridges with nylon or fluoropolymer media. For fluids with low IFT use horizontal single-stage coalescing filters.

ARRANGEMENT:

- VERTICAL
- 1° STAGE - COALESCER:
  - FIBERGLASS / CELLULOSE
  - FIBERGLASS / NYLON
  - 100% NYLON
  - 100% FLUOROPOLYMER
- 2° STAGE - SEPARATOR:
  - PTFE COATED MESH
  - POLYMERIS MESH
-

Operation:

The LL / V series filters are vertical liquid-liquid coalescing filters, with two stages and high separation efficiency; they are suitable for separating dispersed water-based phases from hydrocarbons having an IFT ≥ 30 dynes / cm and viscosity of the continuous phase not exceeding 30 cP.

Being a mechanical filtration; the coalescing filter will only remove the free water, while it will have no effect on the portion of solubilized water.

The contaminated fluid passes from the inside to the outside through the coalescing cartridges of the first stage which, thanks to the multilayer composition of the coalescing filter media, separates the suspended droplets of the dispersed phase, agglomerating them into larger droplets than once left the coalescing cartridge can, by gravity, settle on the bottom of the filter to be then drained through a dedicated connection.

The smaller drops that cannot be separate by gravity are intercepted by the second stage separator cartridges which, thanks to the hydro-repellent effect of its filter media, block and allow them to agglomerate into larger and heavier drops than they are, once they settle on the bottom of the filter.

LL-V filters are normally used for the separation of water from finished products such as:

Gasoil	Fuel oil
Kerosene	Gasoline
Lube oil	Propane

To select the most suitable filter for your service, contact Asco Filtri.

ASCO FILTRI
a mott company

ASCO Filtri S.p.A.
Viale delle Scienze, 8
20082 Binasco (MI) - Italy
Phone: +39 02 89703.1
Fax: +39 02 89703.410
E-mail: info@ascofiltri.com
Web: www.ascofiltri.com

LL Series

COALESCER FILTERS
LIQUID-LIQUID
TAILOR MADE

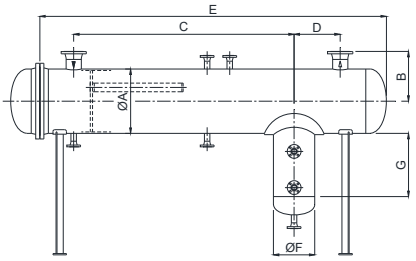
CONFIGURAZIONE:

- **ORIZZONTALE**
- **STADIO COALESCENTE:**
  - **FIBRA DI VETRO / CELLULOSA**
  - **FIBRA DI VETRO / NYLON**
  - **100% NYLON**
  - **100% FLUOROPOLIMERO**
  - **100% POLIESTERE**

LL/H series dimensions - Horizontal single stage filters

CC 340 cartridges		CC 640 cartridges		Dimensions [mm]							
Model	Qty	Model	Qty	ØA	B	C [*]	D	E [*]	ØF	G [**]	In/out
95LLTH014CZ02A	1 x 40"	152LLTH014CZ02A	1 x 40"	219.1	260	2220	220	3100	168.3	400	2"
95LLTH024CZ03A	2 x 40"	152LLTH014CZ03A	1 x 40"	273	290	2260	260	3210	219.1	400	3"
95LLTH034CZ03A	3 x 40"	152LLTH16CZ03A	1 x 40"	323.8	310	2260	260	3270	219.1	400	3"
95LLTH044CZ04A	4 x 40"	152LLTH034CZ04A	3 x 40"	406.4	360	2270	270	3340	219.1	400	4"
95LTH054CZ04A	5 x 40"	152LLTH044CZ04A	4 x 40"	457.2	390	2300	300	3430	273	400	4"
95LTH064CZ04A	6 x 40"										
95LLTH074CZ04A	7 x 40"	152LLTH054CZ04A	5 x 40"	508	410	2300	300	3450	273	500	4"
95LLTH084CZ04A	8 x 40"	152LLTH064CZ04A	6 x 40"	558.8	440	2300	300	3450	273	500	4"
95LLTH094CZ06A	9 x 40"	152LLTH074CZ06A	7 x 40"	609.6	460	2360	360	3660	323.8	500	6"
95LLTH104CZ06A	10 x 40"										
95LLTH114CZ06A	11 x 40"										
95LLTH124CZ06A	12 x 40"										
95LLTH134CZ06A	13 x 40"	152LLTH084CZ06A	8 x 40"	660.4	490	2370	370	3660	355.6	500	6"
		152LLTH094CZ06A	9 x 40"								
95LLTH144CZ06A	14 x 40"	152LLTH104CZ06A	10 x 40"	711.2	510	2370	370	3680	355.6	600	6"
95LLTH154CZ06A	15 x 40"	152LLTH114CZ06A 152LLTH124CZ06A	11 x 40" 12 x 40"	762	540	2370	370	3700	355.6	600	6"
95LLTH164CZ06A	16 x 40"										
95LLTH174CZ06A	17 x 40"										
95LLTH184CZ06A	18 x 40"										
95LLTH194CZ06A	19 x 40"										
95LLTH204CZ06A	20 x 40"	152LLTH134CZ06A 152LLTH144CZ06A	13 x 40" 14 x 40"	812.8	570	2390	390	3710	406.4	700	6"
95LLTH214CZ06A	21 x 40"										
95LLTH224CZ06A	22 x 40"										

The allowable flow-rate depends by installed coalescing and separating cartridges, by inlet liquids quantity , by both continuous and dispersed phases characteristics, by surfactants presence and by the interfacial tension between the two phases.
Single stage horizontal filters are the ideal solution for continuous phases with IFT (interfacial voltage) versus dispersed phase extremely low and can offer high performance even with IFT <0.5 dyne / cm.
The dimensions indicated and the quantity of cartridges are valid for ratings up to 150#; for higher ratings, contact ASCO Filtri. The dimensions are purely indicative, contact Asco Filtri to receive a specific sizing for your needs. Larger filters available on request.



[*] The "C" and "E" lengths, varies according to the settling length necessary for the separation of the dispersed phase; it is mainly influenced by the IFT of the liquids, the specific gravity delta between the two liquids, the settling rate and the viscosity of the continuous phase.
*]**] The "G" height of the sump depends on dispersed phase volume and the required accumulation time.*
The values indicated are purely indicative, always check the filter sizing with Asco Filtri.

Operation:

The LL/H series are horizontal single stage liquid-liquid coalescing filters with very high separation efficiency; they are the ideal solution for separating dispersed phases with extremely low interfacial tensions, guaranteeing high efficiencies even in the presence of IFT values < 0.5 dyne/cm.
The LL/H series filters are also suitable for the separation of hydrocarbons or solvents from continuous aqueous phases.

As for vertical filters, being a mechanical filtration; the coalescing filter will only remove the free water while it will have no effect on the solubilized water.

The contaminated fluid passes from the inside to the outside through the coalescing cartridges, which, thanks to the multilayer composition of the coalescing filter media, separates the suspended dispersed phase droplets, agglomerating them in larger drops than once the coalescing cartridge is left, they can, by gravity, settle on the bottom of the filter to be then collected in the sump and then subsequently drained through a dedicated connection.

The single horizontal stage design require during the sizing phase an accurate calculation of the settling velocity of the dispersed phase drops in order to ensure the effective separation and avoid their dragging into the continuous phase.

To select the most suitable filter for your service, always contact Asco Filtri.

ASCO Filtri S.p.A.
Viale delle Scienze, 8
20082 Binasco (MI) - Italy
Phone: +39 02 89703.1
Fax: +39 02 89703.410
E-mail: info@ascofiltri.com
Web: www.ascofiltri.com

ASCO FILTRI
a mott company

LL Series

COALESCER FILTERS
LIQUID-LIQUID
TAILOR MADE

LL/H series designed for continuous aqueous phases:
The horizontal LL/H series filters are also widely used in the separation of hydrocarbons or solvents from aqueous solutions; typical applications are in the treatment of oily water, production water before re-injection into wells, acid water extracted from the various separators present in the refinery before being sent to the treatment plants (SWS) or quench water from which to separate py-gas in ethylene plants.

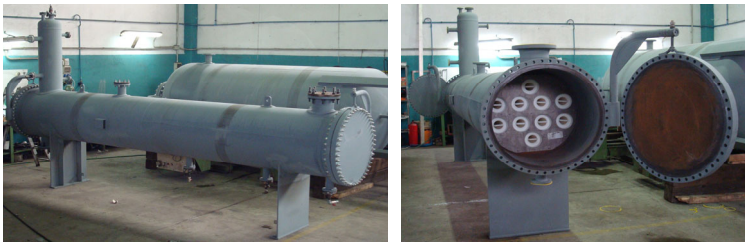
In these cases, the continuous phase is heavier than the dispersed phase, therefore the filter will have a specific configuration: i.e. the collection sump of the dispersed phase is placed in the upper side of the filter.
As for the separation of aqueous phases from hydrocarbons, the separation efficiency will be affected by the presence of acid phases, the value of the interfacial tension and the difference in specific weight between the two liquids.

LL/H coalescer for hydrocarbons separation from water.

LL/H series: Demister conversion kit:
Liquid-liquid coalescing horizontal filters are often equipped with demister instead of filter cartridges; demisters are coalescing systems consolidated over the years but which, due to their nature, cannot reach the efficiency levels of a coalescing filter equipped with cartridges.
Asco Filtri is able to offer conversion kits to install coalescing cartridges in existing filters with the aim of increasing the separation efficiency and/or the total flow rate, without making changes to the existing vessel.

LL/H coalescer filter for water removal from ULSD (Ultra Low Sulphur Diesel).

Prefiltration to protect coalescing cartridges:
A prefiltration system with cartridges to protect the coalescing elements from premature clogging it is always recommended.
The wide range of cartridges for solids in the Asco Filtri product portfolio allows maximum flexibility and the best solution for every need: it is possible to supply horizontal pre-filters with high-flow HPF series cartridges, vertical filters with traditional or large diameter, both for depth filtration available in polypropylene, polyester or nylon, pleated glassfiber, while metal prefilters are used only in some rare cases.
The degree of filtration depends on the type of coalescing cartridge installed, but as a rule, the best protection of the coalescing elements is obtained with 5 or 10 µm prefilters.
It is possible, for some specific application, to supply horizontal filters that integrate both the prefiltration and the coalescing stage in a single vessel, allowing for significant cost savings.



LL/H coalescer filter with integrated prefiltration stage for oily water.

ASCO FILTRI
a mott company

ASCO Filtri S.p.A.
Viale delle Scienze, 8
20082 Binasco (MI) - Italy
Phone: +39 02 89703.1
Fax: +39 02 89703.410
E-mail: info@ascofiltri.com
Web: www.ascofiltri.com

LL Series

COALESCER FILTERS
LIQUID-LIQUID
TAILOR MADE

CONTINUOUS PHASES:

- GASOIL
- FUEL OIL
- GASOLINE
- KEROSENE
- LPG
- NAPHTHA
- AMMONIA
- OILY WATER
- SOUR WATER
- H_2O_2 WORKING SOLUTION
- ACID SOLUTIONS
- SOLVENTS

DISPERSED PHASES:

- WATER
- CAUSTIC SOLUTION
- AMINE
- HYDROCARBONS
- PYGAS
- SOLVENTS
- HYDROGEN PEROXIDE

Coalescer elements selection:

The correct operation of a liquid-liquid coalescing filter starts from the correct selection of the filter media; the selection depends on the application and the value of IFT (interfacial tension) existing between the two phases.
The wide choice of coalescing media available allows to give the correct answer to even the most critical needs.

IFT	Coalescing media	Continuous phase	Dispersed phase	Series
> 30 dyne/cm	Fiberglass	Kerosene, gasoline, gasoil	Water	LL/V
> 20 dyne/cm	Fiberglass + nylon	Fuel oil with aromatics and solvents LPG , kerosene, gasoil	Water	LL/V
> 15 dyne/cm	Nylon	Fuel oil with aromatics and solvents Caustic LPG and kerosene	Water Caustic solutions	LL/V LL/H
> 3 dyne/cm	Polyolefin	Ammonia Water	Oil Hydrocarbons	LL/H
> 3 dyne/cm	Polyester	Kerosene, gasoline, gasoil	Water	LL/H
> 0.5 dyne/cm	Fluoropolymer	Kerosene, gasoline, gasoil, LPG Caustic hydrocarbons H_2O_2 working solutions Water	Water Caustic water Hydrogen peroxide Hydrocarbons	LL/H

LL/H coalescer for caustic water separation from LPG.

Titanium LL/H coalescer for water separation from acid solution.

Contact us for any further information.

ASCO Filtri S.p.A.
Viale delle Scienze, 8
20082 Binasco (MI) - Italy
Phone: +39 02 89703.1
Fax: +39 02 89703.410
E-mail: info@ascofiltri.com
Web: www.ascofiltri.com

ASCO FILTRI
a mott company