

Gas Coalescing Filters



Overview

Gas-Liquid Coalescers have been a part of the Oil and Gas Industry since the early 1980's. Also known as Reverse Flow Coalescers, their primary function is to remove liquid aerosols from natural gas streams. Their function may be as simple as removing contaminant to bring natural gas to pipeline specifications, or to protect expensive downstream equipment. This equipment may include:

- **Gas Turbines** – small particulate and droplets contaminate internal parts causing wear and ultimately costly repairs
- **Molecular Sieves** – lube oils cause issues during regeneration cycles necessitating replacement of molecular sieve bed
- **Amine Plants & Glycol Absorbers** – contamination causes foaming, loss of fluids and increased cost of chemical additives
- **Metering Stations** – sensitive ultrasonic equipment may provide false readings due to excessive contamination
- **Propane Refrigeration Systems** – lube oil contamination from compressors must be removed from propane streams to meet specification
- **Low NOx Burners and Gas Fired Heaters** – dirty off-gas fouls up burner tips and results in increased emissions and a decrease in efficiency
- **Heat Exchangers** – contamination of tubes gradually reduces exchanger efficiency
- **Compressors** – dirty fuel gas to compressor engine results in premature wear of internal components



The contaminant filtered by a Coalescer is typically much finer than that removed by other filtration equipment, and may include:

- **Low surface tension aerosol such as lube oil and hydrocarbon carryover**
- **Shear sensitive corrosion by-products such as iron sulfide and iron oxide**
- **Difficult to remove pipeline and plant chemicals¹**

¹Consult your JCI Filtration & Separation specialist for element compatibility.

Our complete line of JVC coalescing filters can be fully customized to suit your design needs. Fully packaged units with instrumentation and piping are also available.

Understanding Gas/Liquid Coalescing

HOW IT WORKS:

Liquid aerosol in the gas stream is formed via three mechanisms:

- entrainment - the movement of free liquid into a gas stream
- condensation - vapor turns into liquid
- atomization - the shearing of droplets

To Coalesce means to 'grow': a Coalescer facilitates droplet-to-droplet interaction and growth by means of trapping entrained liquids within the matrix of the cartridge media.

There are three primary mechanisms of coalescing:

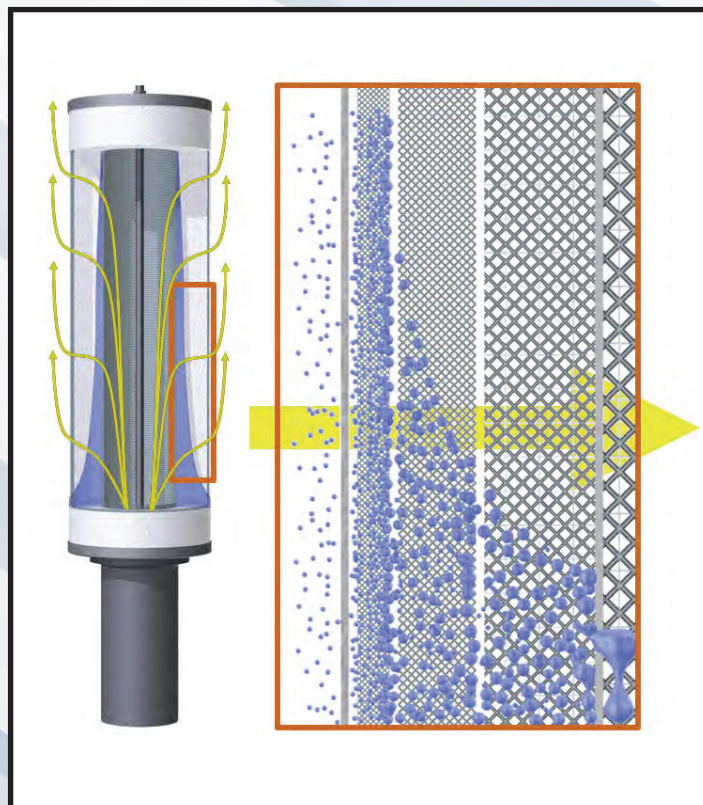
- direct interception
- inertial impaction
- Brownian motion and diffusion

In each case the aim is to maximize the probability that a droplet will collide with media fibers. A crucial factor of coalescing is the consistency of filter media including pore size, fiber diameter and its uniform distribution. Engineered media and strict quality control ensures maximum performance for your application.

There are two styles of coalescing media available:

- Pleated – multiple pleats to maximize surface area
- Depth – a single thick cylinder for shear sensitive contaminant

You can count on JCI to recommend the best style of element for your application.



Coalescer Design

A correctly designed Gas Coalescer consists of two stages: the Knockout Stage and the Element Stage. Each stage is sized for maximum liquid removal and necessitates a set of liquid controls.

Knockout Stage

As natural gas enters a properly designed Coalescer and turns upward, its velocity is reduced, allowing larger droplets to fall out due to gravity (*Stoke's Law*). This compartment also stores the liquids below the high velocity zone protecting the cartridges from flooding. In applications with higher liquid loads, a JCI mesh pad or a vane pack is sized and fitted into this stage.

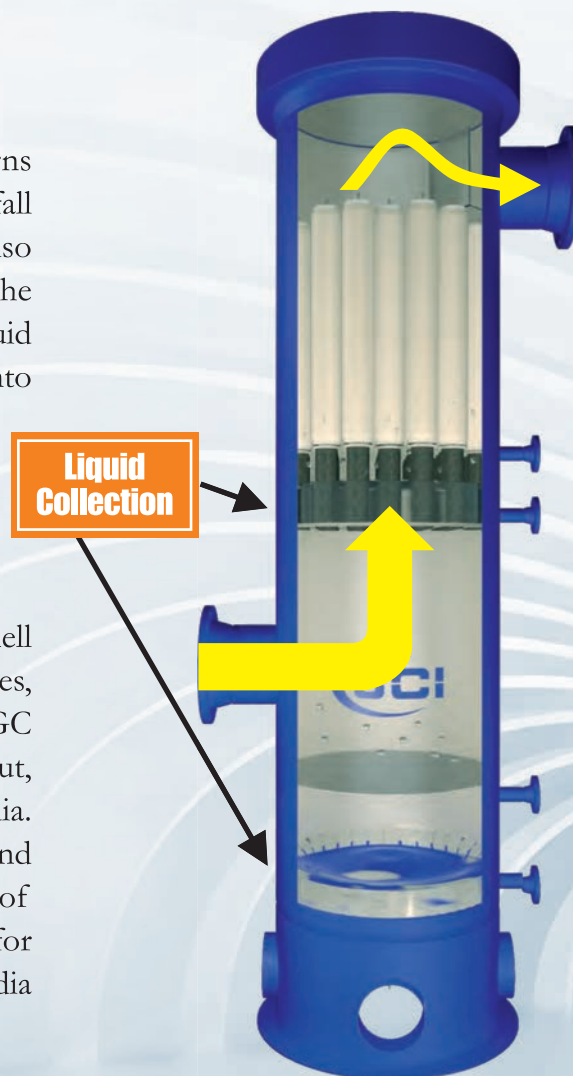
Element Stage

The element stage of the Coalescer is fitted with Jonell JPMG series pleated cartridges or the JMG depth cartridges, both made from micro-fiber glass coalescing media, or JGC polymeric media. This direction of flow is inside to out, resulting in a reduction in gas velocity through the media. This reduction increases the droplet residence time and reduces the drag forces, increasing the probability of collision with other droplets and allowing sufficient time for drainage. The annular velocity of gas after exiting the media is also crucial to prevent liquid 'lift-off' from the elements.

Jonell coalescing elements are built with a drain layer which facilitates liquid removal while providing a calm interface between liquid and gas. The gradient density media of a depth element also provides excellent protection against shear sensitive solids.

Element spacing is crucial to maintain reduced gas velocities and allow coalesced droplets to drip from the drain layer into the quiescent zone below.

In order to prevent channeling through the media, a minimum distance between the top of the elements and the outlet nozzle must also be calculated. Positive element seal, riser support, outlet baffle and liquid holding capacity are other crucial aspects of Gas Coalescer design.



Element Selection



Jonell standard JPMG and JMG element construction includes:

Micro fiberglass media designed to efficiently coalesce liquid droplets and remove solid particulate down to 0.3 microns. Plated steel end caps and cores are joined mechanically to ensure high integrity of the element. There is a polyester outer drain layer to facilitate uniform drainage of liquids.

Also Available:

Tri-DEP™ polymeric media made from trilobal shape fibers for greater contaminant loading and increased life cycle, with inner and outer cage for maximum durability.

Jonell coalescing elements are available in various standard and custom sizes, pleated and depth configurations to fit virtually every application, as well as cross over to other brands. They are engineered and manufactured in standard fiberglass, micro-glass and polymeric media to ensure compatibility with any process.

JPMG SERIES

Material of Construction	Pleated Micro Fiberglass
Maximum Temperature	300°F
Minimum Temperature	-60°F
Change Out Differential	15 PSID
Burst Pressure	>75 PSID
Available Micron Rating	0.3 Microns
Standard Sizes	312, 318, 324, 336, 536

JMG SERIES

Material of Construction	Micro Fiberglass
Maximum Temperature	275°F
Minimum Temperature	-60°F
Change Out Differential	15 PSID
Burst Pressure	>75 PSID
Available Micron Rating	0.3 Microns
Standard Sizes	312, 318, 324, 336, 536

JGC SERIES

Material of Construction	Polyester/Polypropylene
Maximum Temperature	240°F
Minimum Temperature	-60°F
Change Out Differential	15 PSID
Burst Pressure	>75 PSID
Available Micron Rating	0.3 Microns
Standard Sizes	312, 318, 324, 336, 536

Jonell Series JVCS Standard Fuel Gas Coalescing Filters

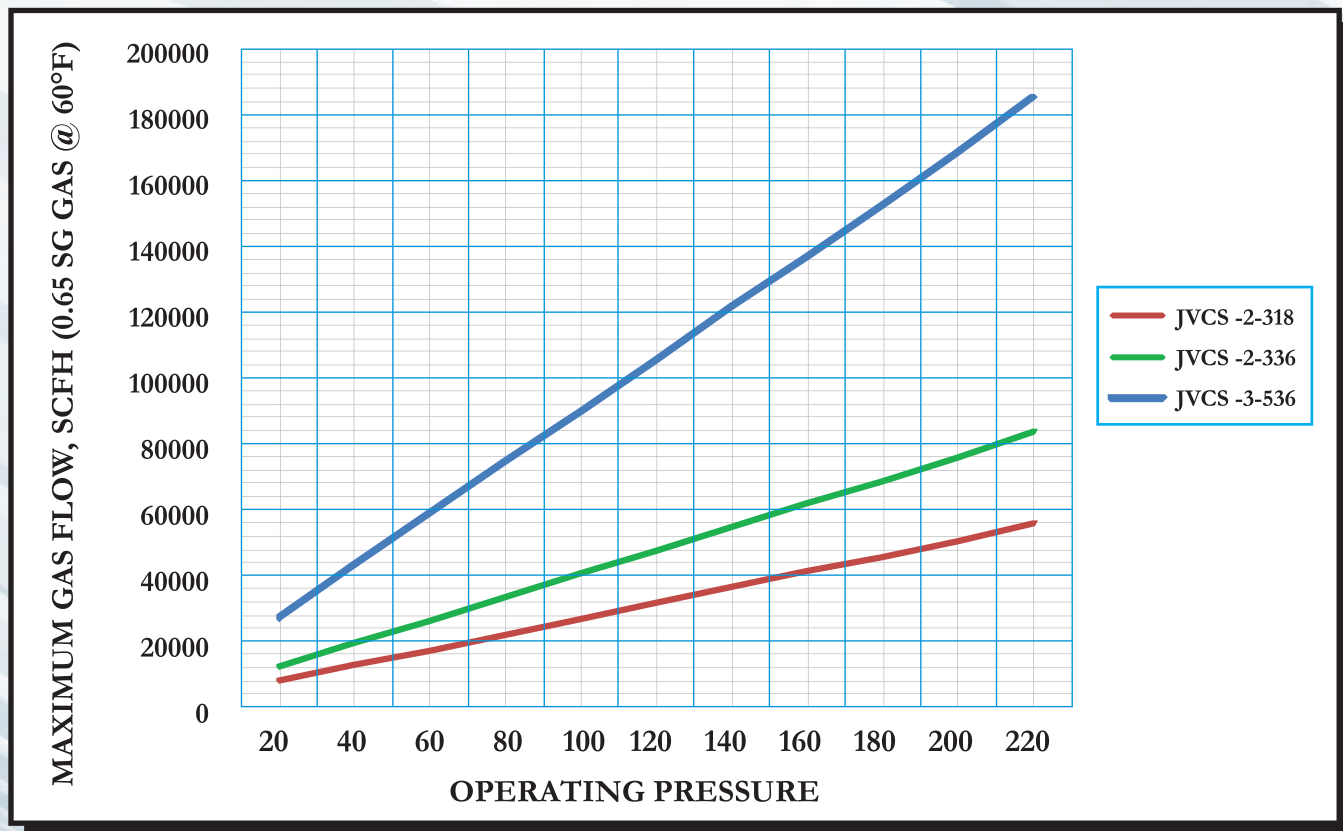
Our JVCS line of gas coalescers offer a standard, low cost, yet high efficiency alternative for all your fuel gas filtration needs, as well as other applications involving low liquid loading and gas volumes. The vessels are designed to ASME code and utilize high efficiency coalescing elements in a variety of lengths to offer maximum flexibility. The elbow-inlet design allows for a single stage of controls.

Typically there are three types of standard units available:
JVCS-2-318 with 2" inlet/outlet nozzles and 318 style cartridge
JVCS-2-336 with 2" inlet/outlet nozzles and 336 style cartridge
JVCS-3-536 with 3" inlet/outlet nozzles and 536 style cartridge

Consult factory for design conditions and dimensional layout



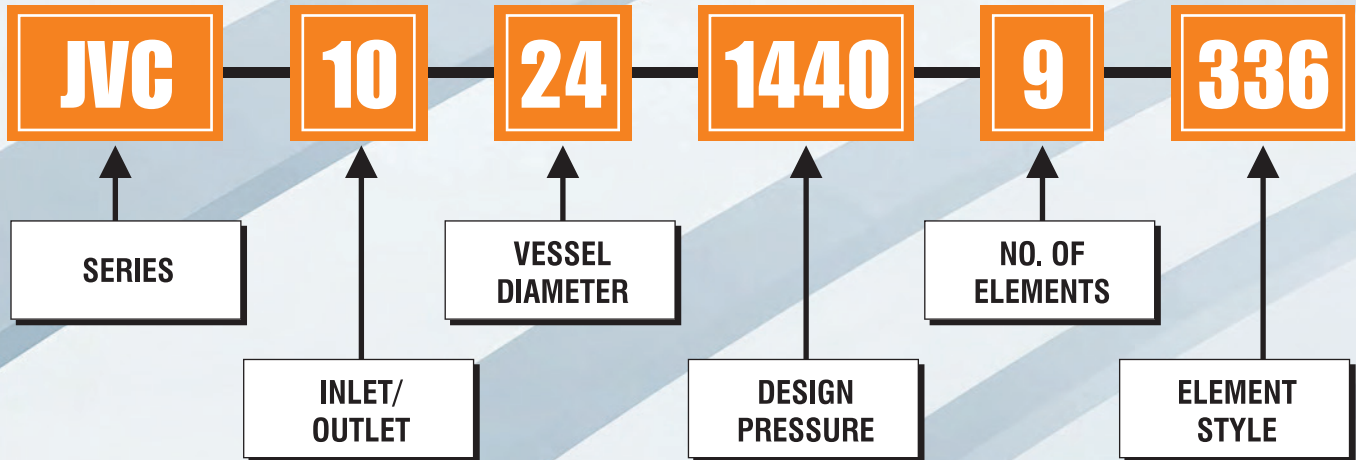
JVCS Sizing Information



NOTES:

- Estimated capacities are at standard conditions of 0.65 SG and 60°F.
- Apply the standard Gas Law correction factor to adjust for any variation in operating conditions by multiplying the correction factor by your flow rate (SCFH).
- Determine the point where operating pressure and corrected flow rate meet on the chart. The green or red line above the intersection point will denote the correct vessel size for your application.
- Estimated capacity is based on a total pressure drop across the unit of 2 psi or less.
- Vessel capacity is based on utilizing Jonell JPMG coalescing element.

Vessel Nomenclature



Inquiry Information

As a minimum, the following information is required for all Coalescing Filter sizing and pricing inquiries:

- Gas volumetric flow rate
- Gas specific gravity
- Gas operating pressure range
- Gas operating temperature range
- Type of contaminant to be filtered
- Amount of free and entrained liquid
- Vessel design conditions, including pressure, temperature and corrosion allowance

Contact Information:

Tel 403.313.1559

Fax 403.280.7926

sales@jci-group.com

www.jci-fs.com



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