

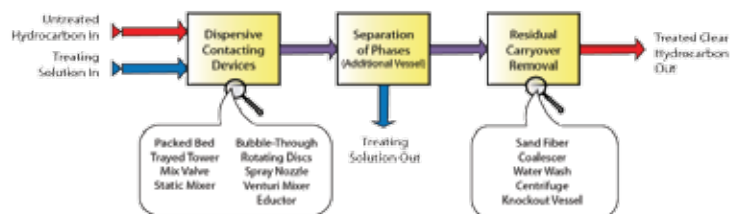
FIBER FILM®

Non-dispersive Hydrocarbon Treating



Introduced in 1974, the FIBER FILM® Contactor is the foundation for a variety of caustic, amine and acid treating processes. Merichem processes using FIBER FILM Contactors have been licensed worldwide and successfully applied to treating problems throughout the hydrocarbon processing industries. One of the most common applications of FIBER FILM Contactor technology is in caustic treatment, an essential part of hydrocarbon processing for impurity removal. Merichem's FIBER FILM Contactor technology achieves non-dispersive phase contact without the problems inherent in conventional dispersive mixing devices.

Conventional Systems = Conventional Problems

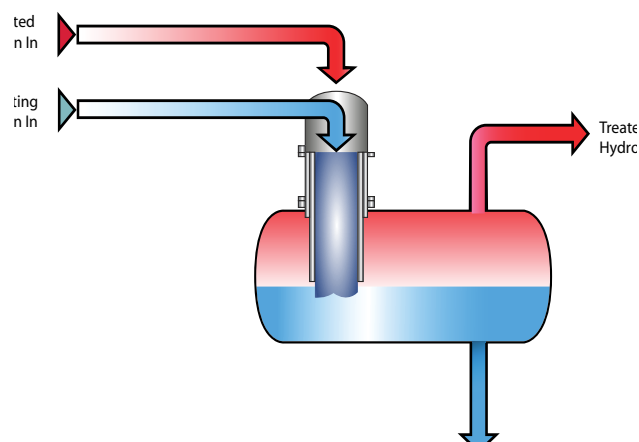


Caustic treating processes with dispersive mixing devices were once the only option available to the industry. Yet conventional dispersion and phase separation methods are subject to numerous shortcomings – lack of turndown capability, pluggage, flooding, channeling, unpredictable treating results, long settling times, aqueous phase carryover, generation of dilute aqueous wastes, lower service factor, hydrocarbon losses, larger plot space, product contamination, and additional processing steps and equipment needed to separate phases.

The conventional method of contacting two immiscible liquids – such as hydrocarbon and caustic or amine – is to disperse one liquid thoroughly into the other as small droplets. Impurities pass between the two phases at the surface of the droplet. Mass transfer can only be improved by creating more numerous and smaller droplets in order to increase surface area.

Even when the dispersion-based system provides adequate treatment, separating the two phases is usually extremely inefficient. The mixture must remain in the phase separator until the caustic droplets settle out by gravity, a process that may take hours. As the treating requirement becomes more difficult, mixing energy is increased to maximize interfacial surface area leading to a greater dispersion of the aqueous phase causing the separation time to become exponentially longer.

Stable emulsions can form in the mixing device resulting in massive carryover out of the separator vessel. Due to excessive carryover, expensive equipment such as knockout vessels, sand filters, and water wash units must be installed downstream to remove the dispersed aqueous phase from the treated product. Treatment is often interrupted if an emulsion develops.



In a FIBER FILM Contactor, the aqueous phase adheres to (wets) the metal fibers and is continually renewed as it flows down the length of the fiber via a combination of gravity and interfacial drag between the two immiscible phases. Hydrocarbon also flows through the cylinder cocurrently and in between the aqueous-wetted fibers. The large surface area and tight packing of the metal fibers bring ultra-thin falling films of the aqueous phase into intimate contact with the hydrocarbon phase. The interfacial surface area produced is orders of magnitude larger than in conventional devices allowing impurities to easily diffuse between phases.

FIBER FILM® Technologies

Extraction

ACIDEX™
AMINEX™
AMINEX™ COS
AQUAFINING™
CHLOREX™
ESTEREX™
EXOMER™
MERIFINING™
NAPFINING™
NAPFINING™ HiTAN
THIOLEX™
THIOLEX™ COS

Oxidation

MERICAT™
MERICAT™ C
MERICAT™ J
MERICAT™ II

Spent Caustic

ECOMERICAT™
REGEN®
REGEN® ULS

FIBER FILM[®]

Non-dispersive Hydrocarbon Treating



FIBER FILM[®] Contactor technology offers numerous advantages:

Effective treating results — Achieves maximum removal of impurities from the hydrocarbon to meet today's stringent standards.

High mass transfer efficiency — The large interfacial surface area, the microscopic diffusion distance, and the continuous renewal of the aqueous phase combine to yield mass transfer efficiencies far greater than possible with conventional treatment.

Elimination of carryover — Because the aqueous phase adheres to the fibers in the FIBER FILM Contactor rather than being dispersed into the hydrocarbon phase, carryover is virtually eliminated.

Elimination of emulsion formation — Since effective phase contact occurs without dispersion, stable emulsions will not form in the FIBER FILM Contactor unit.

Reduced equipment size and cost — Since the FIBER FILM Contactor system does not depend on gravity settling or emulsion coalescence, processing vessels can be much smaller. In most cases, expensive downstream coalescers and other cleanup equipment are not required. With fewer pieces of smaller equipment, plant space is more efficiently utilized.

Simplified, easily operated equipment — By eliminating the clean-up stages, FIBER FILM Contactor systems are much simpler to operate and maintain than conventional treating equipment. In addition, Merichem's straightforward designs make automation and control easy.

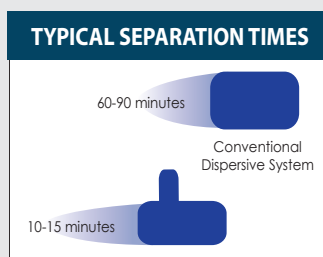
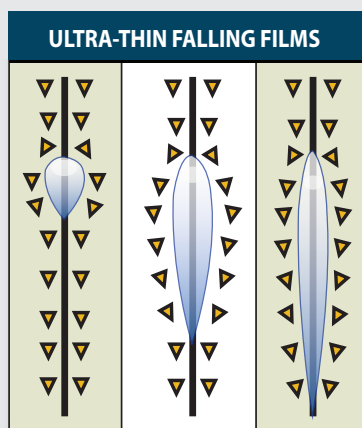
Lower operating costs — High caustic strength and recycle capability reduces use of fresh caustic disposal as well as providing excellent turndown capability.

Flexible, adaptable system design makes FIBER FILM[®] Contactor systems productive

Adaptable to Client needs — Merichem's FIBER FILM Contactor units are custom-designed to integrate with existing equipment to cost-effectively increase treating capacity and significantly reduce project schedules. These revamps typically increase capacity by 50–300%.

Future expansion capability — To meet projected expansion needs, FIBER FILM Contactor systems can be designed for economical capacity increase.

Modularized system availability — FIBER FILM Contactor systems can be modularized to reduce field fabrication and installation costs. This option also offers quicker implementation of grassroots systems, while Merichem's pre-shipment checkout significantly reduces start-up problems.



Emulsions and aqueous carryover are negligible since surface tension causes the aqueous phase to adhere to the metal fibers while the hydrocarbon phase flows freely between the wetted fibers. The result is a highly efficient mass transfer of impurities from one phase to the other with little to no emulsification, carryover, or high pressure drop.



FIBER FILM[®]

Technology Applications



	Source	Stream (Impurities)	Applicable FIBER FILM Technologies
Downstream	Crude Distillation Unit	Saturated LPG (H ₂ S, RSH, COS)	AMINEX™, THIOLEX™, REGEN®, REGEN® ULS
		LSR/HSR Naptha (H ₂ S, RSH)	THIOLEX™, REGEN®, MERICAT™
		Jet Fuel / Kerosene (RCOOH, RSH)	NAPFINING HITAN, MERICAT™ II, MERICAT™ J, AQUAFINING™
		Diesel (RCOOH)	NAPFINING HITAN, AQUAFINING™
	Catalytic Reformer	Unstabilized Reformate (H ₂ S, NH ₄ CL)	CHLOREX™
	FCCU or RCCU	Unsaturated LPG (H ₂ S, RSH, COS)	AMINEX™, THIOLEX™, REGEN®, REGEN® ULS
		Light FCC Gasoline (H ₂ S, RSH)	THIOLEX™, REGEN®, MERICAT™, EXOMER™
		Heavy or Full Range FCC Gasoline (H ₂ S, RSH)	MERICAT™, MERICAT™ II, MERICAT™ J, EXOMER™
	Alkylation	Unstabilized Alkylate (Esters)	ESTEREX™
	Coker, Visbreaker or Hydrocracker	LPG and Naptha (H ₂ S, RSH, COS)	AMINEX™, THIOLEX™, REGEN®, REGEN® ULS MERICAT™
Midstream	NGL Fractionation	Propane (H ₂ S, RSH, COS)	AMINEX™, THIOLEX™, REGEN®, REGEN® ULS
		Butane (H ₂ S, RSH)	THIOLEX™, REGEN®, REGEN® ULS
		Natural Gasoline (H ₂ S, RSH)	THIOLEX™, REGEN®, MERICAT™ II, MERICAT™ J
Upstream	Gas Production Field	LPG (H ₂ S, RSH, COS)	AMINEX™, THIOLEX™, REGEN®, REGEN® ULS
		Condensate (H ₂ S, RSH)	NAPFINING™, THIOLEX™, REGEN®, MERICAT™ II, MERICAT™ C
	Oil Production Field	Crude Oil (H ₂ S, CO ₂ , RCOOH, RSH)	NAPFINING™, MERICAT™ C
	Oil Sands Heavy Oil Upgrader	LPG (H ₂ S, RSH, COS)	AMINEX™, THIOLEX™, REGEN®, REGEN® ULS

Merichem Company
Liquid Hydrocarbon Treating
5450 Old Spanish Trail
Houston, Texas 77023

Tel: +1 713.428.5000
Fax: +1 713.921.4604
MPTsales@merichem.com
www.merichem.com

