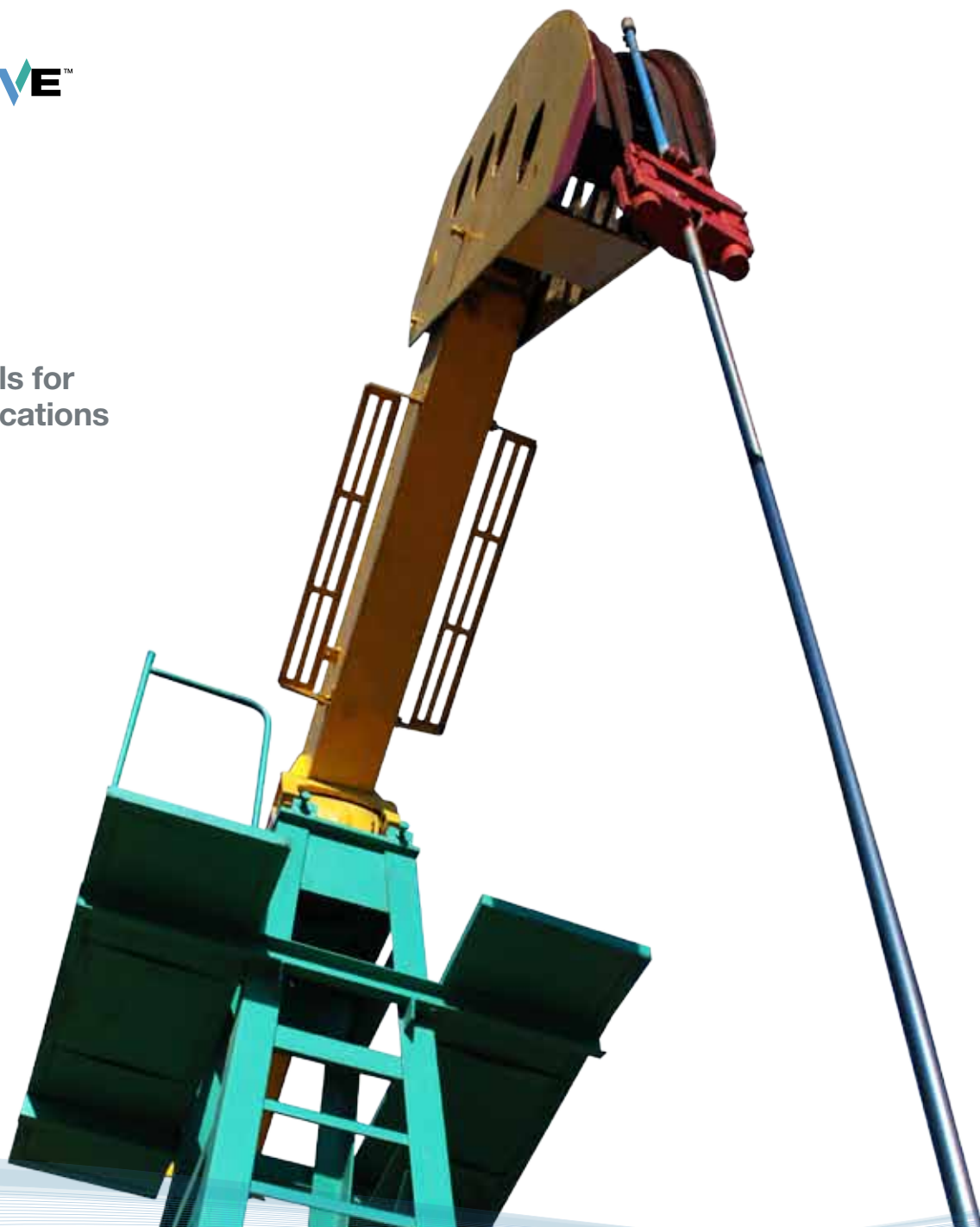


MOMENTIVE™

**Silicon Materials for
Oil & Gas Applications**



Momentive Performance Materials:

An industry leader in diesel fuel foam control

First to launch a new range of Silbreak* silicone demulsifiers for upstream oil and gas applications

First to commercialize Silbreak 638 silicone demulsifier, a highly efficient foam control agent and demulsifier

First to commercialize a high performance SAG* 831 antifoam emulsion in oil and gas applications and FF160/FF170 high performance antifoams for hydrocarbon foams

Overview

Momentive Performance Materials offers a broad global product line of silicon-based materials that are excellent candidates to consider for Oil & Gas applications. They are sold under the Silbreak, SAG and Element14* brand names and are widely used as additives or boosters to help enhance productivity or improve cost/performance in these applications.



Potential Applications

Foam Control

- Diesel fuel
- Lube oils
- Gas sweetening
- Butadiene units
- Cokers
- Gas oil separators
- Drilling muds

Crude Oil Production

- Demulsification
- Proppant treatment
- Fines control
- Fracturing foamers
- Foamers for FAL

SAG* Antifoams

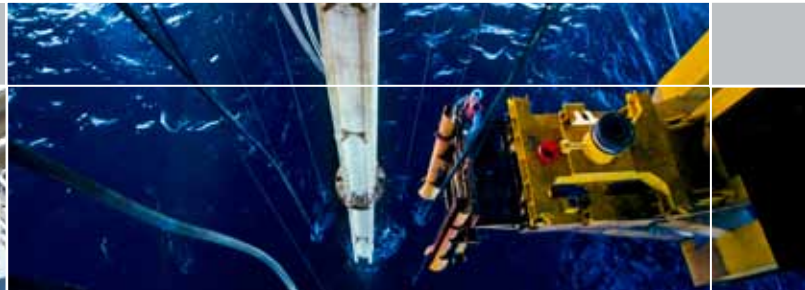
SAG silicone antifoams are used in the Oil & Gas industry where they have demonstrated their ability to effectively control foam in a variety of applications, such as diesel fuel, gas sweetening, butadiene units, gas oil separators, drilling muds and others. The newer generation SAG silicone antifoams have been shown to offer lower use levels, stability in extreme weather conditions, easier handling, improved compatibility and stability to provide better overall performance in many oil and gas applications.

Silbreak* Silicone Demulsifiers

Silbreak silicone demulsifiers are a new class of demulsifiers that combine the outstanding surface activity of the siloxane polymer with the water or oil solubility of organic substituents. They are based on organically modified siloxane molecules and therefore behave significantly differently from polydimethylsiloxanes. Silbreak silicone demulsifiers are not intended to replace organic demulsifiers, but can be used, generally at very low concentrations, as boosters or adjuncts to help:

- Improve overall cost/performance
- Increase speed of separation
- Improve interface quality
- Reduce BS&W
- Lower temperature of demulsification

Momentive Performance Materials has demonstrated commitment to the Oil & Gas industry through innovation. The first generation of Silbreak silicone demulsifiers, based on polyol/silicones, typically delivered significant performance improvements in clean water. The second generation of Silbreak silicone demulsifiers, such as Silbreak 400, 402 and 503 silicone demulsifiers, have exhibited a remarkable boosting effect at very low concentrations, helping reduce BS&W or decrease temperature of demulsification. Silbreak 638 silicone demulsifier may be an excellent candidate to consider for foam control in gas oil separators handling gas lifted heavy crudes. Silbreak 638 demulsifier has demonstrated excellent degassing and defoaming with very low silicon metal loading in the crude.



Potential Benefits

Momentive Foam Control Agents

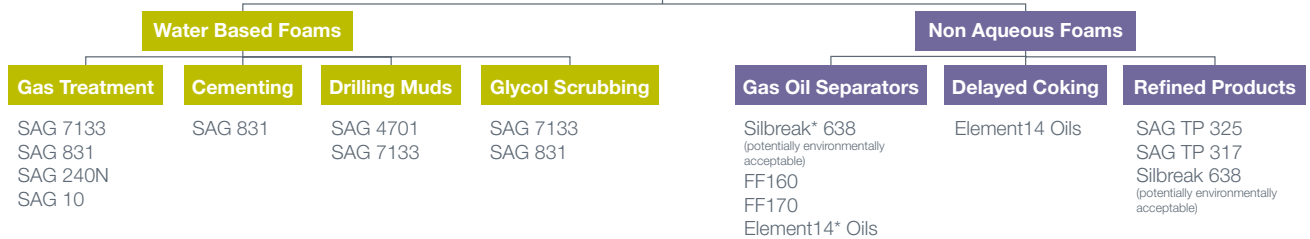
Water Based Foams

- Stability/compatibility in high ionic strength solutions, which can lead to durable effect and long intervals between maintenance shut downs
- Low concentration, continued dosage can result in stable DeltaP and excellent line control
- Formulated to withstand extreme climates
- Excellent foam control at low silicone loading in the system
- Excellent deaeration performance

Non Aqueous Foams

- Deaeration as well as foam destruction can result in maximum gas extraction, cleaner flares, increased productivity
- Silbreak 638 silicone demulsifier is low viscosity and generally easy to handle
- Foam control with significantly lower silicon metal loading in the crude
- May combine foam control and compatibility in packages for the refined grades

SAG* Antifoams



| SAG Antifoams | Amine/Butadiene Units | Drilling Muds | Gas Oil Separators | High performance diesel fuel | Compatibility | Deaeration | Defoaming | Durability | Dosage | |
|--|-----------------------|---------------|--------------------|------------------------------|---------------|------------|-----------|------------|----------|-------------------------------|
| SAG 7133 Silicone Antifoam Emulsion | yes | yes | | | high | medium | high | medium | medium | 12% solids antifoam emulsion |
| SAG 831 Silicone Antifoam Emulsion | yes | | | | high | medium | high | high | low | 45% solids antifoam emulsion |
| SAG 4701 Silicone Antifoam Emulsion | | yes | | | medium | high | high | medium | medium | 10% solids antifoam emulsion |
| SAG 240N Silicone Antifoam Emulsion | yes | | | | high | medium | high | medium | low | 43% solids antifoam emulsion |
| SAG 10 Silicone Antifoam Emulsion | yes | | | | low | medium | medium | medium | medium | 15% solids antifoam emulsion |
| Silbreak 638 silicone demulsifier | | | yes | | high | high | high | high | low | 50% actives silicone antifoam |
| FF160 Foam Control Agent | | | yes | | low | high | high | high | very low | 100% actives fluorosilicone |
| FF170 Foam Control Agent | | | yes | | low | high | high | high | very low | 100% actives fluorosilicone |
| SAG TP 325 Foam Control Agent | | | | yes | high | high | high | high | low | 50% actives silicone antifoam |
| SAG TP 317 Foam Control Agent | | | | yes | high | high | high | high | medium | 50% actives silicone antifoam |

Typical product data values should not be used as specifications. Assistance and specifications are available by contacting Momentive sales office.

Potential Benefits

Momentive Upstream Silicone Offerings

Demulsification

- Improved cost/performance at low concentrations
- Increased speed of separation or reduce BS&W
- Improved interface or clean water
- Reduced temperature of demulsification

Stimulation

- Reduced fines in siliceous formation during acid jobs

Foamers

- Stabilized foam for foam drilling or fracturing
- Stabilized crude oil foam in gas lift applications

Upstream Applications



| Silbreak Demulsifiers & Others | RSN | Viscosity, cSt | Speed of separation | Lower temperature | Lower BS&W | Clean water, sharp interface | |
|---|------|----------------|---------------------|-------------------|------------|------------------------------|--------------------------------------|
| Silbreak 321 silicone demulsifier | 8.2 | 2,000 | H | | | | Polyol/silicone |
| Silbreak 322 silicone demulsifier | 15.3 | 720 | | H | H | | Polyol/silicone |
| Silbreak 329 silicone demulsifier | 14.9 | 1,300 | | | H | H | Polyol/silicone |
| Silbreak 400 silicone demulsifier | 7.0 | 2,500 | H | H | H | | Polyol/epoxy/silicone |
| Silbreak 402 silicone demulsifier | 7.9 | 3,300 | | | H | H | Polyol/amine/silicone |
| Silbreak 600 silicone demulsifier | | 20 | | | | | Stable foam formation |
| Silbreak 638 silicone demulsifier | 9.4 | 150 | H | | H | | Polyol/alcohol/silicone |
| Silbreak 639 silicone demulsifier | 17.1 | 200 | | | H | H | Polyol/silicone |
| Silbreak 1324 silicone demulsifier | 6.6 | 2,400 | | H | | H | Polyol/silicone |
| Silbreak 1636 silicone demulsifier | 7.3 | 170 | | | H | | Polyol/alcohol/silicone |
| Silbreak 1840 silicone demulsifier | 12.0 | 300 | H | H | | H | Polyol/silicone |
| Silbreak 503 silicone demulsifier | 3.2 | 1,900 | H | H | H | | Polyol/organics/silicone |
| Silbreak 504 silicone demulsifier | 7.1 | 2,500 | | H | | H | Polyol/organics/silicone |
| Y-17491 | | 4 | | | | | High & stable formation permeability |

Patent Status

Nothing contained herein shall be construed to imply the non existence of any relevant patents or to constitute the permission, inducement or recommendation to practice any invention covered by any patent, without any authority from the owner of the patent.

Limitations

Customers must evaluate Momentive Performance Materials products and make their own determination as to fitness of use in their particular applications.

Product Safety, Handling and Storage

Customers considering the use of this product should review the latest Material Safety Data Sheet and label for product safety information, handling instructions, personal protective equipment if necessary, and any special storage conditions required. Material Safety Data Sheets are available at www.momentive.com or, upon request, from any Momentive Performance Materials representative. Use of other materials in conjunction with Momentive Performance Materials products (for example, primers) may require additional precautions. Please review and follow the safety information provided by the manufacturer of such other materials.

Emergency Service

Momentive Performance Materials maintains an around-the-clock emergency service for its products.

| Location | Emergency Service Provider | Emergency Contact Number |
|--------------------------------|-------------------------------------|----------------------------|
| Mainland U.S., Puerto Rico | CHEMTREC | 1.800.424.9300 |
| Alaska, Hawaii | CHEMTREC | 1.800.424.9300 |
| Canada, | CHEMTREC | 1.800.424.9300 |
| Europe, Israel | NCEC | +44(0) 1235239670 |
| Middle East | NCEC | +44(0) 1235239671 |
| Asia/Pacific (except China) | NCEC | +44(0) 1235239670 |
| China | NCEC | +86.10.5100.3039 |
| Latin America (except Brazil) | NCEC | +44(0) 1235239670 |
| Brazil | SOS Cotec | 08000111767 or 08007071767 |
| All other locations world wide | NCEC | +44(0) 1235239670 |
| At sea | Radio U.S. Coast Guard in US waters | |
| | NCEC in International waters | +44(0) 1235239670 |

For Health related calls, contact Momentive Performance Materials at +1.518.233.2500 (English only).

DO NOT WAIT. Phone if in doubt. You will be referred to a specialist for advice.



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