

Silicone additives for laundry care applications

DOW

®





Control foam

Enhance feel

*Compact
formulations*

Silicone antifoams and softening agents from Dow add performance...and value

Silicones have been used in laundry products for more than 25 years to provide effective foam control in consumer washing machines. In the textile industry, silicone products have been used for even longer to enhance garment comfort, garment protection and ease of care.

For laundry care applications, Dow offers a wide variety of silicone additives, including:

- Silicone foam control agents for detergents used in traditional and high-efficiency (HE) washing machines
- Silicone softening agents for fabric softeners

Through the DOWSIL™ and XIAMETER™ brands, our silicone antifoams and softening agents provide real solutions for both manufacturers and consumers.

Silicones can add value and lower the cost of formulations because they are versatile, provide long-lasting performance and have low use levels — replacing larger volumes of other materials.

Foam control agents

The DOWSIL™ and XIAMETER™ brands offer outstanding foam control products. During the manufacture of detergents — and during their use by the consumer or the professional — these products can address foam in three ways:

- Control (foam control agents)
- Prevent (antifoams)
- Knock down (defoamers)

Process applications

Antifoams help maximize process efficiency by ensuring that unwanted foam does not slow or shut down the manufacture of detergents. That's why Dow offers antifoams to:

- Help all types of liquid processing
- Densify laundry powders, by de-airing the wet slurry in the spray-drying tower process
- Facilitate all types of bottle-filling operations

Consumer applications

Antifoams are also critical in many consumer laundry applications. For example, steady control of foam in a washing machine is desired, rather than its complete elimination or prevention. Proper foam control is essential in both traditional agitator washers with high water volumes and HE washers with low water volumes — with different demands for each application.

Consumers also have long-standing perceptions about foam levels. Too little foam, for example, may leave the consumer questioning the detergent's cleaning efficiency. Too much foam can interfere with washing machine operation.

Cost-effective solutions

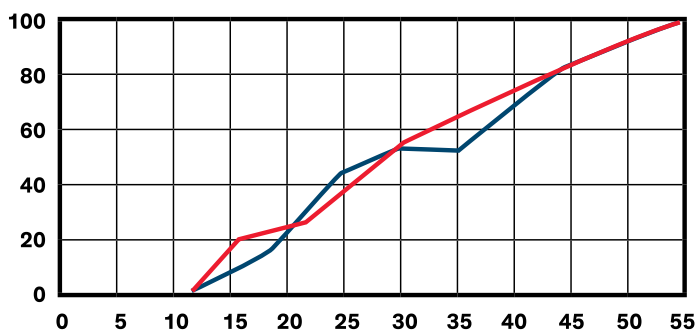
Thanks to their long-lasting performance and low use levels (typically 0.1 to 0.4%), silicone antifoams are recognized as a cost-effective solution for foam control in detergents. They offer efficient and robust foam control over a broad range of temperatures and wash conditions.

Ideal for liquid and powdered detergents

Silicone antifoam compounds and ready-to-use emulsions can be stabilized in liquid detergents. In addition, granulated antifoams can be easily incorporated into laundry powder and tablet detergents using a simple dry mixing process.

For powdered detergents, silicones must be carefully dispersed and protected in a granule form to achieve superior foam performance. Granulated antifoams are stable in storage under extreme conditions of temperature and humidity, as demonstrated in Figure 1. Furthermore, granulated silicones do not cake and are free-flowing, so they are easily incorporated into your formulations.

Figure 1: Powdered antifoam gives good protection of antifoam performance



- Fresh antifoam: Good performance initially
- Aged powdered antifoam (aged for 8 weeks at 35°C and 70% humidity): Good protection, good performance and good stability

The performance of silicones

Silicones provide many benefits for fabric care. Some of the general properties that make silicones an excellent fit include:

- Liquid, even at high molecular weight
- Low surface tension
- High spreading ability
- High hydrophobicity
- High gas permeation
- High refractive index

These silicone properties translate into specific fabric care and laundry care benefits, such as:

- Excellent lubricity
- Softness
- Film forming
- Breathability or barrier for volatiles
- Transparency, gloss and color intensity
- Flexibility versus rigidity

Silicone antifoams

Compounds

Silicone antifoam compounds are 100% active ingredients.

Product	Typical product properties			
	Active content (%)	Viscosity (cP)	Specific gravity	Kosher certified
XIAMETER™ ACP-1500 Antifoam Compound	100	1000	1.00	Yes*
XIAMETER™ ACP-3302 Antifoam Compound	100	27500	1.00	No
XIAMETER™ ACP-3425 Antifoam Compound	100	3100	1.03	No

*U.S./Europe only

Self-emulsifying compound

To aid their dispersion in aqueous media, combinations of silicone antifoam compounds and non-aqueous dispersion delivery systems are also available. XIAMETER™ ACP-0544 Antifoam Compound is a water-dispersible 100% silicone antifoam compound containing hydrophobic silica, silicone surfactants and PDMS.

Product	Typical product properties			
	Active content (%)	Viscosity (cP)	Specific gravity	Kosher certified
XIAMETER™ ACP-0544 Antifoam Compound	100	3000	1.03	No

Powdered antifoam

Silicone powdered antifoam is a granulated preparation of the antifoam compound. Encapsulated antifoam (EAF) is made of 100% detergent active ingredients.

Product	Typical product properties			
	Active content (%)	Bulk density (g/l)	Particle size (µm)	Appearance
XIAMETER™ APW-4248 Powdered Antifoam	12	700	500	White, free-flowing
XIAMETER™ APW-4253 Powdered Antifoam	9	900	600	White, free-flowing
XIAMETER™ APW-4311 Powdered Antifoam	15.5	700	500	White, free-flowing
XIAMETER™ APW-4412 Powdered Antifoam	12.5	500	650	Off-white, free-flowing

Concentrates

Silicone antifoam concentrates are active at low addition levels. They are easy to use in liquid detergent and fabric softener formulas and provide fast foam breaking during the rinse stage.

Product	Typical product properties		
	Active content (%)	Viscosity (cP)	Specific gravity
DOWSIL™ AF-8014 Antifoam	100	1500	1.00
DOWSIL™ AC-8066 Antifoam	100	1300	1.00

Emulsions

Silicone antifoam emulsions are non-ionic aqueous emulsions of silicone antifoam compounds.

Product	Typical product properties			
	Active content (%)	Viscosity (cP)	Specific gravity	Kosher certified
XIAMETER™ AFE-0020 Antifoam Emulsion	20	600	4.0	No
XIAMETER™ AFE-0110** Antifoam Emulsion	10	2000	7.0	No
XIAMETER™ AFE-0310 Antifoam Emulsion	30	2500	4.0	No
XIAMETER™ AFE-0400** Antifoam Emulsion	10	1250	6.0	No
XIAMETER™ AFE-0700 Antifoam Emulsion	10	1750	8.0	No
XIAMETER™ AFE-1410 Antifoam Emulsion	10	5000	7.0	No
XIAMETER™ AFE-1430 Antifoam Emulsion	30	2500	3.5	No
XIAMETER™ AFE-1510 Antifoam Emulsion	10	3800	3.5	Yes*
XIAMETER™ AFE-1520 Antifoam Emulsion	20	5000	3.5	Yes*
XIAMETER™ AFE-2210 Antifoam Emulsion	10	2700	7.0	No

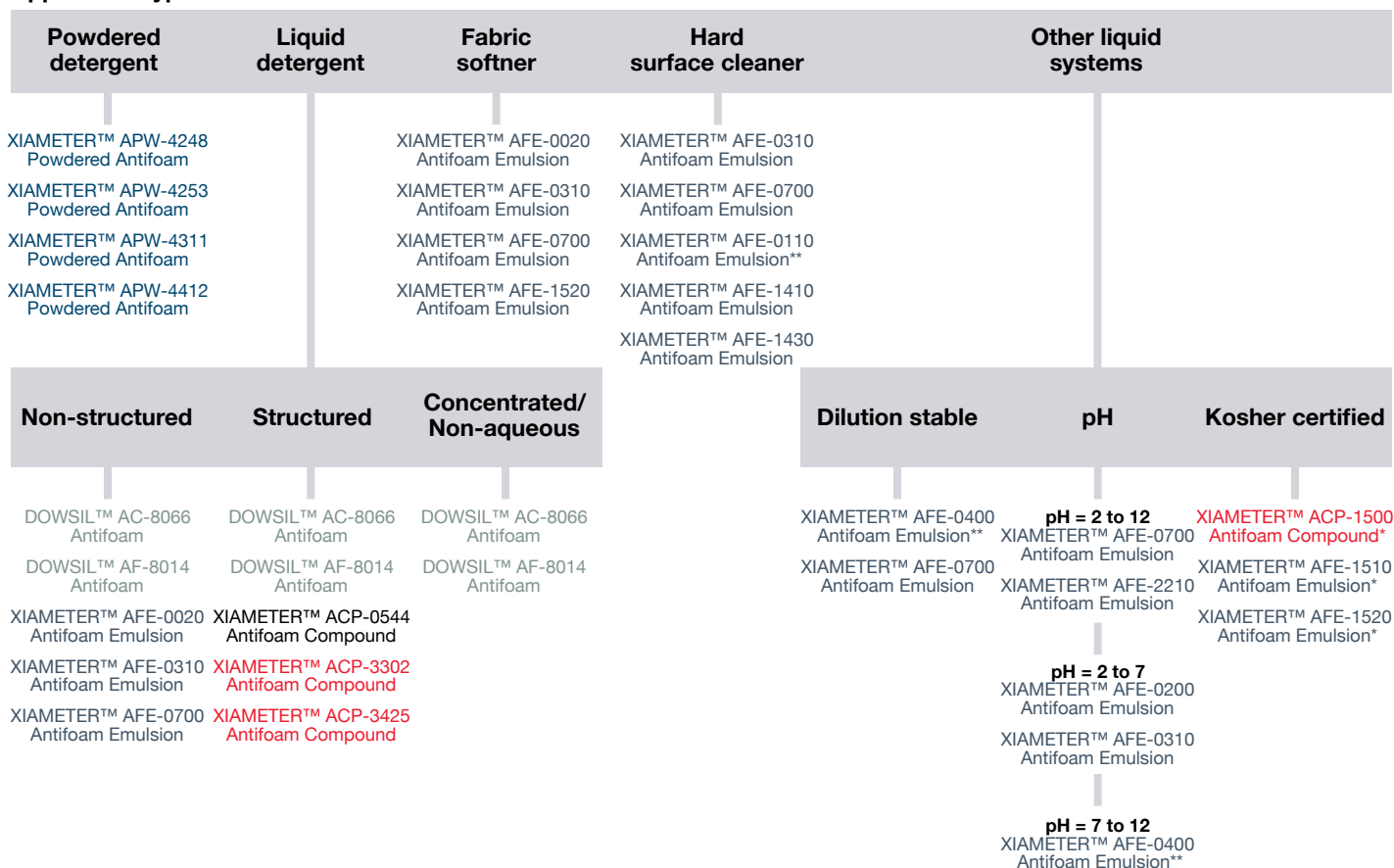
*U.S./Europe only

**Material not available in U.S.

Specification writers: These values are not intended for use in preparing specifications. Please contact your local DOWSIL™ or XIAMETER™ brand sales representative prior to writing specifications on these products.

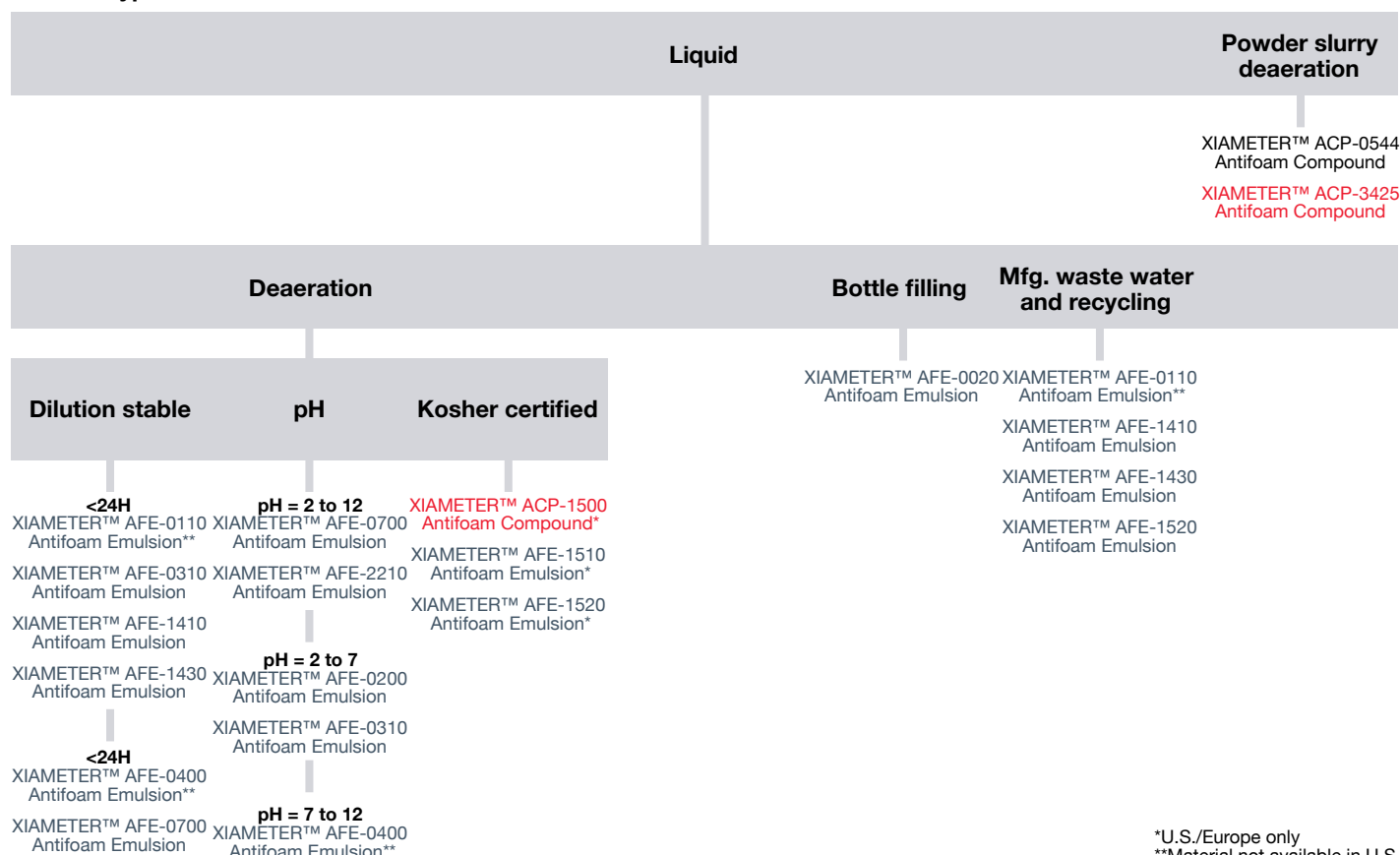
Antifoams for consumer benefits

Application type



Antifoams as process aids

Process type



*U.S./Europe only

**Material not available in U.S

Silicone softening agents

Used in textile manufacturing and in fabric care, various silicone additives increase the softness of fabric, reduce wrinkles, make fabric easier to iron and help retain the fabric's shape. Softeners also can improve color retention, offer stain protection and increase the mechanical strength of a fabric, helping it last longer.

Traditional fabric softeners use organic quaternary ammonium compounds, known as "quats." When using silicone softener additives, formulators can remove part of the quat and add the silicone softening agent in lower amounts.

For example, in a formulation with 15% quat, 5% of that can be replaced with only 2% of the silicone agent. Typically less silicone is needed — often making the change cost-neutral.

By replacing other compounds with silicones — or by adding silicones to existing formulations (Figure 2) — this allows formulators to modify or enhance sensory and performance benefits of:

- Silkiness and softness
- Volume enhancement
- Ease of ironing
- Enhanced fiber strength
- Tear resistance

Textile manufacturers use silicones to provide conditioning benefits to their fabrics. These same benefits can also be delivered in the consumer's laundry room. Ever-demanding consumers have less time for clothing care, but want their clothes to look and feel better directly from the dryer and as new as possible after repeated washings. Silicone technology can deliver the advanced sensory and performance benefits to consumer laundry products to help meet those expectations.

Emulsions

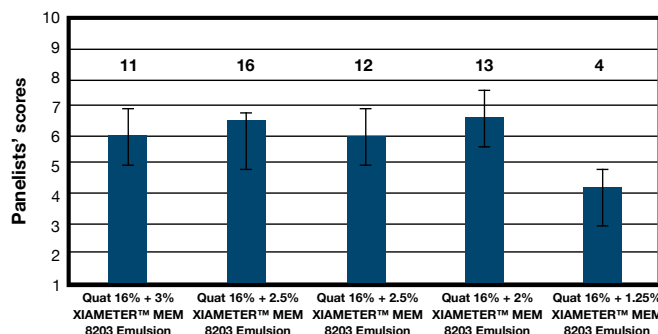
Silicone softening emulsions are used in rinse cycle fabric softener formulations. The benefits can include significant improvements in anti-wrinkle results, ease of ironing, ease of wrinkle removal and fabric water absorbency when compared with conventional fabric softeners.

Product	Typical product properties		
	Active content (%)	Viscosity (cP)	Functionality
XIAMETER™ MEM-0346 Emulsion	60	1000	Di-methyl
XIAMETER™ MEM-8035 Emulsion	35	5	Amino
XIAMETER™ MEM-8203 Emulsion	17	40	Amino

Fluids

Specialized silicone fluids are used for premium hydrophilic and specialty textile finishes. While traditional softeners generally cause fabrics to become extremely hydrophobic, softeners by Dow provide durable, wash-resistant performance with virtually no yellowing.

Figure 2: The addition of silicones enhances softening performance



XIAMETER™ MEM-8203 Emulsion was added to quat (16% active triethanolamine-based diesterquat) softener at varying levels. Evaluation of the softening benefits used panelists and paired comparisons of towel swatches. Testing shows that particular technologies are susceptible to delivering a perceivable softening benefit at much lower silicone concentration when added to a softener composition.

Want to see how our silicone additives will work in your application?



Scan this code or go to **www.dow.com** to request a sample of one or more of the products in this selection guide.

Need more information?

Dow has extensive experience in assessing antifoams and softening agents. Leverage our expertise to help you determine which additives are best suited to your application and how much you need. Simply contact us at **www.dow.com** to find out more.



How can we help you today?

When you need industry-leading innovation, Dow can help. Solutions by Dow are dedicated to meeting your needs for speciality materials, collaborative problem solving and innovation support. Learn how we can help you bring performance and cost effectiveness to your products, at **www.dow.com**.

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