



TERGITOL™ L Series Surfactants

Including
Biodegradable
Grades

Defoaming Surfactants

TERGITOL™ L Series Surfactants

A Full Line of Nonionic Options

TERGITOL™ L Series Surfactants capitalize on Dow's extensive expertise in ethylene oxide (EO) and propylene oxide (PO) chemistry. We have expanded our line of nonionic surfactants to deliver these liquid EO/PO block copolymers, which have numerous applications in defoaming, wetting, and emulsifying.

Compliance with European Detergent Regulation

TERGITOL™ L Surfactants, with the exception of TERGITOL™ L-101, pass OECD 301 ready biodegradability screening tests and comply with the biodegradability criteria as laid down in Regulation (EC) No. 648/2004 of the European Parliament and of the Council of 31 March 2004 on detergents. The ultimate biodegradability of these products, coupled with their low acute environmental and mammalian toxicity, means that they carry no European hazard classification. Consequently, they are ideal for replacing non-compliant surfactants in formulations which will be impacted by the European Detergent Regulation.

Dow Achieves Multi-Property Control

Dow has unlocked the synergy between its global surfactants and polyglycols businesses to further explore EO and PO chemistry. We have incorporated EO and PO into the same molecule to produce TERGITOL™ L Series Surfactants. These products take advantage of our ability to adjust the oxide ratio and oxide amount to control the chemical and physical properties of the final product.

This enables us to deliver a range of products providing the right features and benefits for specific applications.

Dow's unique raw materials position (we are a back-integrated global manufacturer of both EO and PO) helps ensure you of consistent product quality and a secure supply of TERGITOL™ L Series products.

Flexible Properties for Defoaming, Wetting, and Emulsifying

TERGITOL™ L Series Surfactants are high performance products that feature excellent solvency, low foam characteristics, and chemical stability. Other valuable performance properties include good thermal stability, broad compatibility with additives, and miscibility in various organic liquids. TERGITOL™ L Series products are liquid at room temperature and have little to no odor.

These surfactants have high flash points, and their low flammability makes them safe to handle and store. TERGITOL™ L Series Surfactants are inert and stable. They do not

hydrolyze or become rancid in storage and they are pH stable and non-corrosive. The chart at right describes the solubility of TERGITOL™ L Series Surfactants in common solvents.

The Line of TERGITOL™ L Series Surfactants Includes...

TERGITOL™ L-61

TERGITOL™ L-61 Surfactant is an efficient foam control agent because of its low foam characteristics and inverse water solubility. TERGITOL™ L-61 is used in foam control processes such as fermentation of monosodium glutamate, lactic and citric acids; food processing; food washing; water treatment; and metal working products. Low surface tension makes TERGITOL™ L-61 a particularly efficient rinse aid and low foam wetting agent in autodish detergents, industrial and institutional cleaning, and in clean-in-place (CIP) applications such as food, dairy, and brewery cleaning.

TERGITOL™ L-62

TERGITOL™ L-62 Surfactant provides both foam control and detergency. It is an efficient foam control agent because of its low foam characteristics and inverse water solubility. TERGITOL™ L-62 is used in foam control processes such as fermentation, food processing, food washing, water treatment, and metal working products. Other applications include rinse aids, autodish detergents, industrial and institutional cleaning, and paints and coatings.



Typical Properties[†]

Product	Molecular Weight	Pour Point °C	Viscosity @ 38°C (cSt)	Cloud Point 1% aq (°C)	HLB Emulsion Type	Surface Tension (dynes/cm)	Ross-Miles Foam Height, Initial (mm)/final (mm)
TERGITOL™ L-61	2000	-32	168	24	3 (W/O)	40	0/0
TERGITOL™ L-62	2500	-6	231	32	7 (O/W)	41	45/30
TERGITOL™ L-64	2700	7	284	62	15 (O/W)	39	60/8
TERGITOL™ L-81	2750	-20	244	20	2 (W/O)	36	0/0
TERGITOL™ L-101*	3900	-18	399	18	1 (W/O)	33	30/25

[†]Typical Properties, not to be construed as specifications.

*Does not comply with European Detergent Regulation.

Solubility

	TERGITOL™ L-61	TERGITOL™ L-62	TERGITOL™ L-64	TERGITOL™ L-81	TERGITOL™ L-101
Water	Insoluble	>10%	>10%	Insoluble	Insoluble
Ethanol	>10%	>10%	>10%	>10%	>10%
Isopropanol	>10%	>10%	>10%	>10%	>10%
Ethylene Glycol	Insoluble	Insoluble	Insoluble	Insoluble	Insoluble
Propylene Glycol	>10%	>10%	>10%	Insoluble	Insoluble
Toluene	>10%	>10%	>10%	>10%	>10%
Kerosene	>10%	Insoluble	Insoluble	>10%	Insoluble
Mineral Oil	Insoluble	Insoluble	Insoluble	Insoluble	Insoluble



TERGITOL™ L-64

TERGITOL™ L-64 Surfactant has good wetting ability, a high degree of detergency, and low foam characteristics. It is readily miscible in water and can be used in combination with other surfactants in a wide range of aqueous formulations. TERGITOL™ L-64 is an exceptional high temperature foam control agent due to its inverse water solubility and low foam characteristics. It is used in such processes as fermentation, food processing, adhesives, paper processing, and metal working products. TERGITOL™ L-64 is also used as a rinse aid, an emulsifier in latex paints, and a component of sanitizing solutions. TERGITOL™ L-64 is the most hydrophilic of the TERGITOL™ L Series products.

TERGITOL™ L-81

TERGITOL™ L-81 Surfactant is a viscous liquid at room temperature. Low foam characteristics and inverse water solubility make TERGITOL™ L-81 Surfactant an excellent foam control agent. TERGITOL™ L-81 Surfactant is used in fermentation of lactic and citric acids and some alcohols, food processing, and metal working products, including degreasing chemicals and cutting oils. It can be used as a chemical intermediate. Other applications include rinse aids and other industrial and institutional cleaning applications.

TERGITOL™ L-101

TERGITOL™ L-101 Surfactant does not comply with the European Detergent Regulation. However, the low foam characteristics and low cloud point of TERGITOL™ L-101 Surfactant make it an efficient foam control agent in aqueous environments. TERGITOL™ L-101 is used in fermentation of lactic and citric acids, food processing, and metal working products, including degreasing chemicals and cutting oils. TERGITOL™ L-101 has the highest molecular weight of the TERGITOL™ L Series products. TERGITOL™ L-101 is also the most hydrophobic product.

Performance of TERGITOL™ L Series Surfactants

The following data show the performance and properties of TERGITOL™ L Series Surfactants.

Foam Behavior Waring Blender Foam

The charts below compare the foam characteristics of aqueous solutions of TERGITOL™ L Series Surfactants at 25°C and 50°C. The data show that TERGITOL™ L-61 Surfactant produces the lowest foam, with no foam at 50°C. TERGITOL™ L-101 Surfactant produces moderate foam at 25°C, but lower foam at 50°C. TERGITOL™ L-62 Surfactant produces the most unstable foam. TERGITOL™ L-64 Surfactant develops the highest levels of foam, with greater foam instability at the higher temperature. TERGITOL™ L-81 is water dispersible (not soluble) and no foam measurements were made.

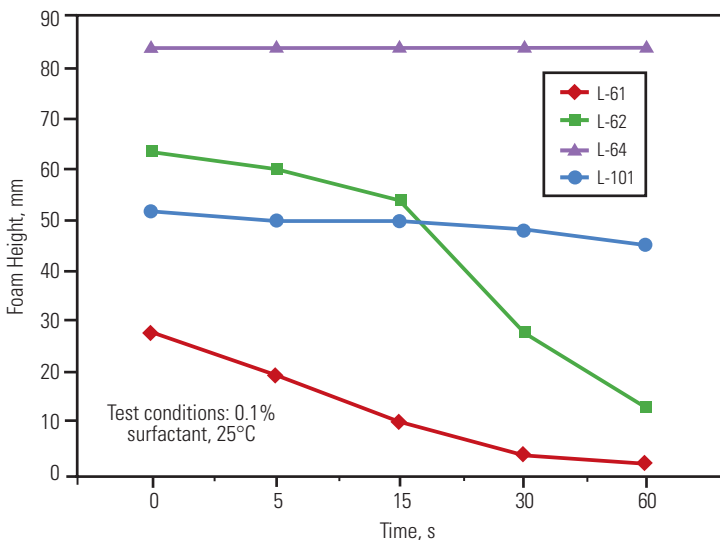
Defoaming Performance

Defoaming performance provided by TERGITOL™ L Series Surfactants is a function of cloud point and end-use temperature. TERGITOL™ L Series Surfactants are water-soluble at low temperatures but flocculate upon warming beyond a particular “cloud” point. Each surfactant has its own characteristic cloud point. TERGITOL™ L-81 and L-101 Surfactants have the lowest cloud points among L Series products while TERGITOL™ L-64 has the highest cloud point. The chart at right shows the operating ranges for aqueous defoaming of TERGITOL™ L Series Surfactants. TERGITOL™ L-61, L-81 and L-101 are the best defoamers in the L Series products line.

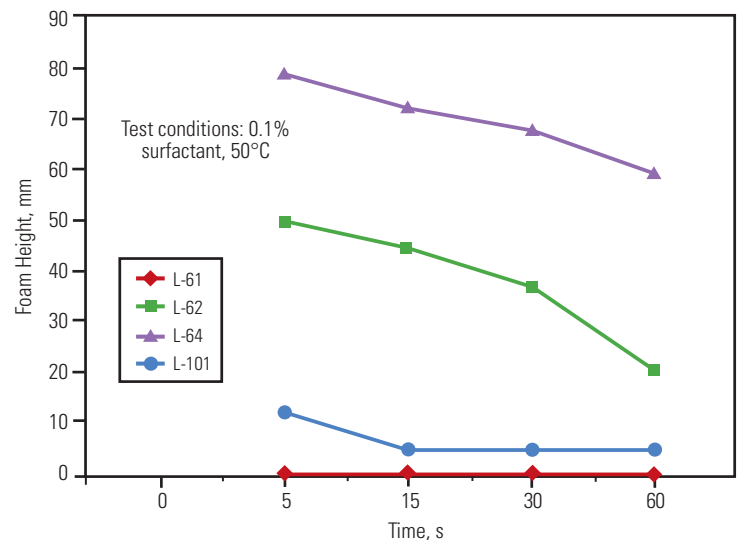
The chart at lower right provides an example of the defoaming performance of TERGITOL™ L Series Surfactants. In this case, TERGITOL™ L-61 and TERGITOL™ L-101 effectively control the foam produced by milk solids in a built formulation. Milk soil defoaming is often necessary for food and dairy process cleaners, as well as machine dishwasher and rinse aid applications.



Waring Blender Foam Height at 25°C

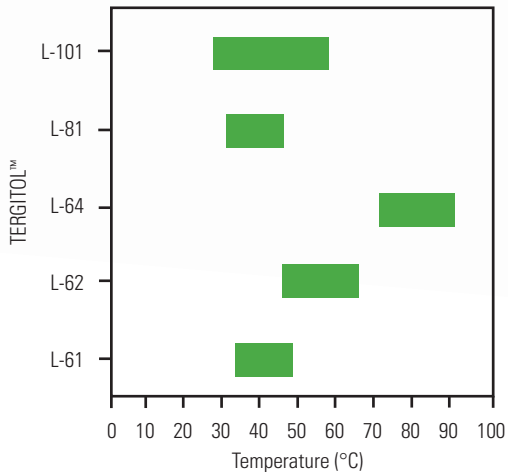


Waring Blender Foam Height at 50°C

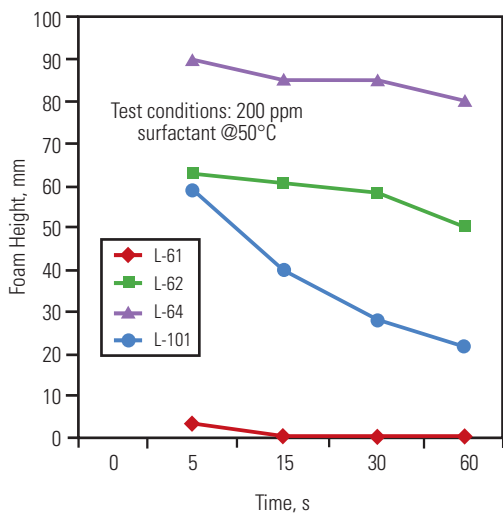




Operating Ranges for Defoaming Aqueous Solutions



Milk Soil Defoaming*



*The test was conducted using 158 ml of 200 ppm surfactant, 15 ml 10% milk solids, and 0.60g alkaline base (35% TSP, 42.2% Na metasilicate, 23.4% Na carbonate).

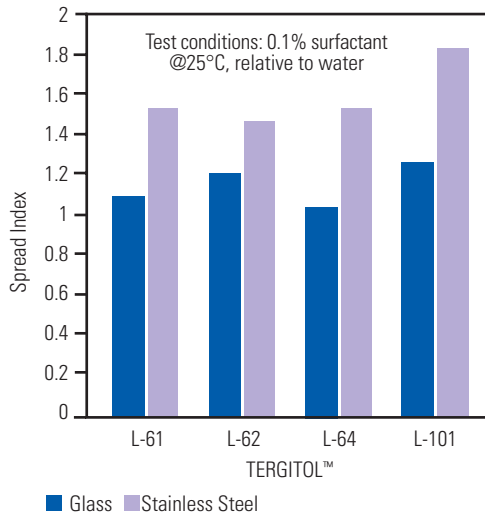
Wetting

Wetting is a useful measure for choosing surfactants in cleaning applications. Wetting increases sheeting action to help reduce spotting or filming on dishware and other hard surfaces.

Spread Index Wetting

The chart at right compares the wetting performance of TERGITOL™ L Series Surfactants on glass and stainless steel using the spread index method. The data show TERGITOL™ L-101 is the best wetting product on hard surfaces such as stainless steel.

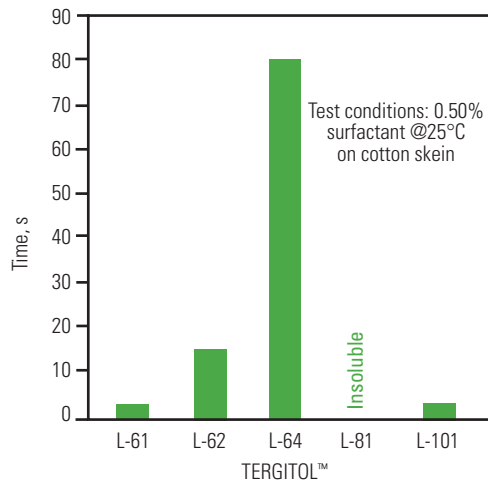
Spread Index Wetting



Draves Wetting

Draves Wetting

The next chart compares the Draves wetting performance of TERGITOL™ L Series Surfactants. The data show TERGITOL™ L-61 and TERGITOL™ L-101 are the best wetting products on soft (or cloth) surfaces.



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Emulsions and Dispersions

The structure of TERGITOL™ L Series Surfactants is key to their utility in emulsions, emulsion polymerization, and dispersions. Nonionic surfactants can keep particles or droplets dispersed by steric stabilization. TERGITOL™ L Surfactants have a large hydrophobic (PO) section surrounded by two hydrophilic sections. The hydrophobic section adsorbs onto the particle or droplet surfaces while the hydrophilic (EO) tail extends into the Stern layer, which is the layer of water and ions immediately surrounding the particle.

The hydrophilic portion interacts with the solvent present in the emulsion polymerization or pigment dispersion medium, forming a hydration sheath. Nonionic surfactants inhibit particle agglomeration by extending the Stern layer and physically keeping the dispersion particles apart. The effectiveness of TERGITOL™ L Surfactants is not altered by pH changes or water hardness.

Applications

TERGITOL™ L Series Surfactants are used in a wide variety of applications, including cleaning, paints and coatings, fermentation, pulp and paper, and other industrial applications. The defoaming performance of these products, coupled with their inverse water solubility, wetting, and emulsifying behaviors, provides the key to their broad utility.

Following are example applications for TERGITOL™ L Series Surfactants by key performance property. The selection guide on the next page identifies applications for individual products.

Foam Control and Defoaming

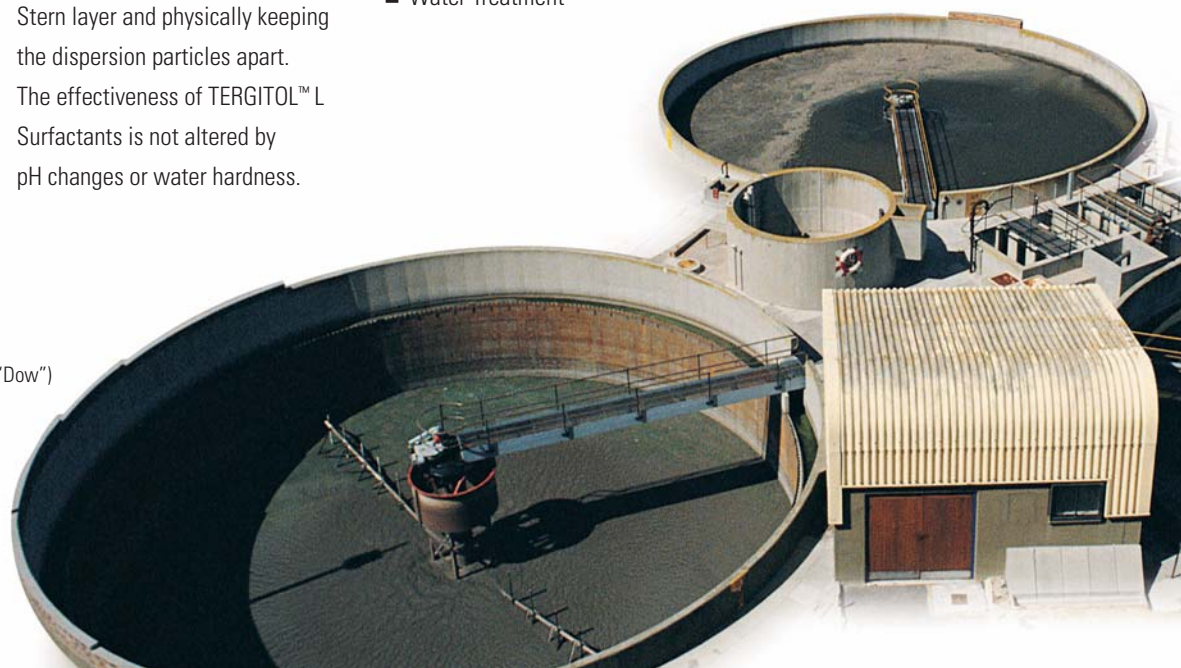
- Fermentation
- Machine Dishwash/Rinse Aids
- Metal Cleaning
- Paints & Coatings
- Paper Processing
- Textiles
- Water Treatment

Wetting

- Dishwash Detergents and Rinse Aids
- Hard Surface Cleaners
- Laundry Aids
- Metal Cleaners
- Mold Release Agents
- Pulp & Paper Processing
- Textile Scours

Emulsion & Dispersion

- Agriculture
- Emulsion Polymerization
- Fragrance Solubilization
- Oil & Gas
- Paints & Coatings
- Pesticide Concentrates
- Pigment and Dye Dispersions



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TERGITOL™ L Series Selection Guide

	TERGITOL™ L-61	TERGITOL™ L-62	TERGITOL™ L-64	TERGITOL™ L-81	TERGITOL™ L-101*
Adhesives	■	■			
Bottle Washing	■	■			■
Detergent Tablets	■	■			■
Food Processing	■	■	■	■	■
Paints & Coatings	■	■	■		■
Pulp & Paper		■	■		
Rinse Aids	■	■	■	■	■
Textiles	■				■

*Does not comply with European Detergent Regulation.

TERGITOL™ L Series Surfactants FDA Clearances

TERGITOL™ Surfactant:	L-61	L-62	L-64	L-81	L-101
172.808 (b) (3)	■	■	■	■	■
173.340 (a) (2) ¹	■	■	■	■	■
175.105	■	■	■	■	■
176.180 (b) (2)	■	■	■	■	■
176.200 (d) (3)	■	■	■	■	■
176.210 (d) (3)	■	■	■	■	■
177.1200 (c)	■	■	■	■	■
177.1390 (c) (2) (ii) ²	■	■	■	■	■
177.1400 (b) (4)	■	■	■	■	■
178.1010 (b) (5)	■	■	■	■	■
178.1010 (b) (6)	■	■	■	■	■
178.1010 (b) (7)					■
178.1010 (b) (14)		■	■	■	■
178.1010 (b) (16)	■	■	■	■	■
178.3120 (d) (3)	■	■	■	■	■

¹ For use as described in 172.808 (b) (3).

² May be used in laminate structures provided they are separated from the food-contact layer by a functional barrier.

FDA Regulations (21 CFR)

Permitted Uses

172.808	Copolymer condensates of ethylene oxide and propylene oxide.
173.340 ¹	Defoaming agents for use in processing foods.
175.105	Component of adhesives used in articles intended for packaging, transporting, or holding food.
176.180	Components of paper and paperboard in contact with dry food.
176.200	Defoaming agents used in coatings on articles intended for use in producing, manufacturing, packing, processing, preparing, treating, packaging, transporting, or holding food.
176.210	Component of defoaming agent formulations used in the manufacture of paper and paperboard.
177.1200	As an adjuvant employed during the processing of cellulose pulp used in the manufacture of cellophane base sheet.
177.1390 ²	Adhesives in laminate structures for food contact at temperatures of 250°F and above.
177.1400	Water-insoluble hydroxyethyl cellulose film for packaging food.
178.1010	Component of certain sanitizing solutions for use on food processing equipment and utensils, and on beverage containers, including milk containers and equipment.
178.3120	Animal glue as a component of articles intended for use in producing, manufacturing, packing, processing, preparing, treating, packaging, transporting, or holding food.



TERGITOL™ L Series



To Learn More...

To learn more about TERGITOL™ L Series Surfactants and the full line of Dow nonionic and anionic surfactants – or to receive product samples – contact the Dow location for your region, listed below.

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