



SILTECH CORPORATION
225 Wicksteed Avenue
Toronto, Ontario, Canada, M4H 1G5
(416)424-4567 (Tel) (416)424-3158 (Fax)

TECHNICAL DATA SHEET

Silube[®] 316

PEG/PPG-Free Silicone Invert Emulsifier

DESCRIPTION

Silube[®] 316 is a unique multi-hydroxyl functional silicone which acts as a low to medium HLB emulsifier. **Silube 316** has no ethoxylated components. The INCI name is TMP Lauryl Dimethicone.

TYPICAL PROPERTIES

Appearance	Clear Liquid
Colour, Gardner	2
Solids, %	100
Viscosity, cPs	1500
Water Solubility (1%/10%)	Insoluble/Insoluble
IPA Solubility (1%/10%)	Soluble/Soluble
Estimated HLB	3-5
Hydroxyl Value	85

USES AND APPLICATION

Silube 316 is a PEG-free, water-insoluble, alcohol soluble and hydro alcoholic soluble silicone that stabilizes water in oil (W/O) and water in silicone (W/Si) emulsions while also imparting novel features and textures. **Silube 316** excels at pigment dispersion and is ideal for color cosmetics.

Color Cosmetics

Silube 316 provides a unique light skin feel especially in color cosmetics. **Silube 316** enhances pigment dispersion which minimizes complexity and costs by eliminating the need for additional co-emulsifiers or pigment dispersant additives. **Silube 316** can be used as a pigment dispersion in applications such as mascara, eye products, lipsticks, lip gloss and mousse foundation, etc. **Silube 316** is compatible with most cosmetic ingredients, but also with special ingredients such as electrolytes and various active ingredients.

Skin Care and Sun Care

Silube 316 can be used to stabilize invert emulsions such as creams, liquid foundations, sunscreens, and 2-in-1 BB creams (sunscreens). **Silube 316** is effective in difficult systems like sunscreens, makeups and complex emulsion systems.

Processing

Silube 316 is suitable for use in both cold and hot processes.

Special Consideration

Please note that 1500 is a typical viscosity for this product, but the viscosity has been shown to increase slowly over time. If stored for more than 2 years the viscosity could exceed 2500 cps.

Silube 316 is typically used at concentrations ranging from 1.0 - 5.0% by total formulation weight.

APPLICATION DATA

The performance of **Silube 316** has been demonstrated in the lab across six example formulations. These include an invert emulsion, a cold process invert emulsion, makeup, sunscreen, W/Si base and a 2-in-1 BB sunscreen. These were evaluated for physical properties, feel and appearance.

Table 1: Invert (W/O) Emulsion

Phase A	gms
D.I. Water	65.3
Glycerine	5.0
MgSO ₄ ·7H ₂ O	2.0
Phase B	
Mineral Oil	11.2
C ₁₃₋₁₅ Isoparaffin	7.6
Silube 316	5.0
Microcrystalline Wax	2.4
Macadamia Nut Oil	1.5
Phase C	
Citric Acid	q.s.

Table 2: Cold Process (W/O)

Phase A	gms
D.I. Water	78.12
Propylene Glycol	5.0
NaCl	1.0
Phase B1	
Silube 316	1.68
Silwax B116	1.7
Silwax® D02	1.0
Siltech F-50	4.0
Siltech C-955	4.0
Eutanol G	3.0
Phase B2	
Magnesium Stearate	0.3
Phase C	
Sharomix MCI	0.2

Table 3: W/Si Emulsion

Phase A	gms
D.I. Water	77.2
Propylene Glycol	5.0
MgSO ₄ ·7H ₂ O	2.0
Phase B1	
Silube 316	1.6
Silwax D02	1.0
Siltech F-100	8.7
Siltech C-955	4.0
Phase B2	
Magnesium Stearate	0.3
Phase C	
Sharomix MCI	0.2

Procedure (W/O Emulsion):

1. Combine ingredients in Part A and mix well, then heat to 75°C.
2. Combine ingredients in Part B and mix well, then heat to 75°C.
3. Add Part A into Part B under mixing at 75 °C.
4. Cool down batch to room temperature and then add q.s. citric acid to pH around 5.5 ~ 6.
5. Homogenize at 20,000 rpm for 1 minute.

Procedure (Cold Process Invert Emulsion):

1. Combine part B1 with mixing (1000 rpm) at RT.
2. Disperse magnesium stearate (B2) into Part B1 with mixing 1,000 rpm for 1 min at room temperature.
3. Combine Part A, mix well at 400 RPM, then add to Part B at room temperature very slowly.
4. Homogenize for 2 minutes at 1,100 rpm.
5. Add Part C and mix well.

Procedure (W/Si Emulsion):

1. Combine part B1 with mixing (1000 rpm) at RT.
2. Disperse magnesium stearate (B2) into Part B1 with mixing 1,000 rpm for 1 min at room temperature.
3. Combine Part A, mix well at 400 RPM, then add to Part B at room temperature very slowly.
4. Homogenize for 2 minutes at 1,100 rpm.
5. Add Part C and mix well.

Procedure (W/O Sunscreen):

1. Combine Part B, blend well with Bamix mixer until homogeneous, while heating up to 75~80°C.
2. Combine Part A with mixing then heat up to 75~80°C.
3. Add Part A into Part B slowly while mixing for 5 minutes after addition
4. Cool down to 45 °C while shearing for 1 minute at 20,000 rpm.
5. Add Part C into batch while mixing.

Procedure (W/O Makeup and BB Sunscreen Cream):

1. Combine Part B, blend well with Bamix mixer until homogeneous, while heating up to 75~80°C.
2. Combine Part A with mixing then heat up to 75~80°C.
3. Add Part A into Part B slowly while mixing for 5 minutes after addition
4. Cool down to 45 °C while shearing for 1 minute at 2,000 rpm.
5. Add Part C into batch while mixing.

Table 4: W/O Sunscreen

Phase A	gms
D.I. Water	54.3
Propylene Glycol	5.0
NaCl	1.0
Na ₂ EDTA	0.1
Phase B	
Silube [®] 316	5.0
Silwax [®] D02	2.0
Caprylic/capric Triglyceride	3.5
Isopropyl Myristate	8.0
Coconut Oil	1.0
Raspberry Seed Oil	1.0
C ₁₀₋₃₀ Alkyl Acrylate	2.5
Titanium Dioxide	2.0
Octyl Methoxycinnamate	7.0
Benzophenone-3	5.0
Avobenzone	2.0
Phenonip	0.6
Phase C	
Sharomix MCI	q.s.
Fragrance	q.s.

Table 5: W/O Makeup

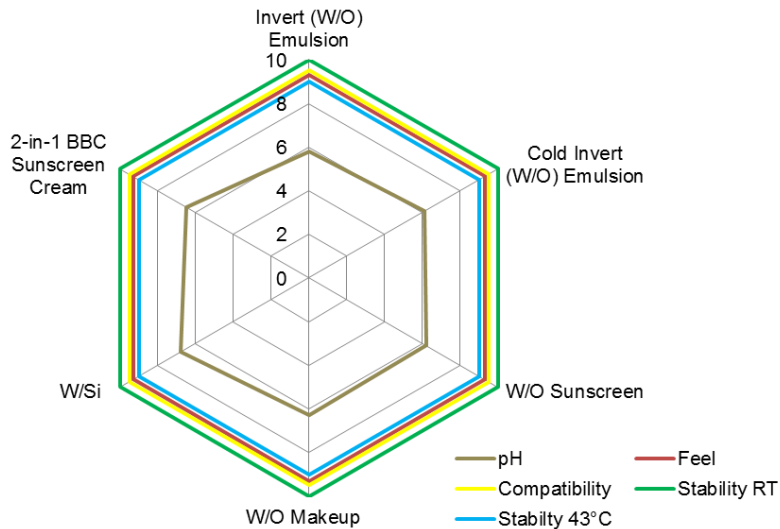
Phase A	gms
D.I. Water	54.19
Propylene Glycol	5.0
NaCl	1.0
Phase B	
Silube 316	5.0
Silwax D02	2.0
Isopropyl Myristate	8.0
Caprylic/capric Triglyceride	10.0
Siltech F100	1.0
Argan Oil	6.0
C ₁₀₋₃₀ Alkyl Acrylate	1.5
Magnesium Stearate	1.0
Unipure LC 987 AS	3.68
IRIS91-Y-77492	0.74
IRIS91-R-77491	0.22
IRIS91-B-77499	0.07
Phenonip	0.6
Phase C	
Sharomix MCI	q.s.
Fragrance	q.s.

Table 6: W/O BB Sunscreen Cream

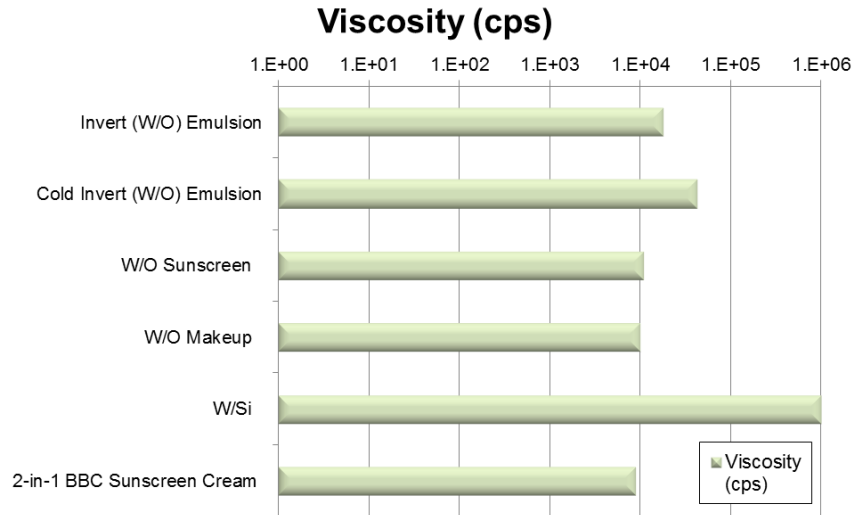
Phase A	gms
D.I. Water	46.71
Glycerine	5.0
NaCl	1.0
Phase B	
Silube 316	5.0
Silwax D02	1.28
Argan Oil	3.0
Caprylic/capric Triglyceride	10.0
Isopropyl Myristate	7.0
Siltech F100	1.0
Siltech CE-2000	1.70
Ethylhexyl Methoxycinnamate	7.50
Bentone 38V	0.50
Magnesium Stearate	1.00
Unipure LC 987 AS	3.68
IRIS91-Y-77492	0.74
IRIS91-R-77491	0.22
IRIS91-B-77499	0.07
Phenonip	0.60
Phase B2	
C ₁₀₋₃₀ Alkyl Acrylate	1.5
Avobenzone	2.5
Phase C	
Sharomix MCI	q.s.
Fragrance	q.s.

Properties

The emulsions made from **Silube[®] 316** are stable at room temperature and at 43°C. They show good feel properties, and no separation or oiling of the active ingredients.



The rheological properties of the emulsions made from **Silube® 316** are as expected. The viscosity of the W/Si base emulsions is 1,000,000 cps. The cold process W/O emulsion has a viscosity of 43,000 cps while the others are about 10,000 cps.



Detailed experimental data is available on request or the relevant technical papers can be downloaded from our website www.siltech.com.

SAFETY

Before handling, read the Material Safety Data Sheet and container label for safe use, physical and health hazard information.

STORAGE AND SHELF LIFE

When stored in the original, unopened containers between 10 and 40°C, **Silube 316** has a shelf life of 36 months from date of manufacture.

PACKAGING

Silube 316 is available in 20kg and 200kg plastic containers

DISCLAIMER

Siltech believes that the information in this technical data sheet is an accurate description of the typical uses of the product. Siltech, however, disclaims any liability for incidental or consequential damages, which may result from the use of the product that are beyond its control. Therefore, it is the user's responsibility to thoroughly test the product in their particular application to determine its performance, efficacy and safety. Nothing contained herein is to be considered as permission or a recommendation to infringe any patent or any other intellectual property right.

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