



# Formulator Report: Floramac<sup>®</sup> 10 as a Silicone Alternative



**Floramac 10** [INCI: Ethyl Macadamiate] is a unique emollient that can be utilized in a variety of cosmetic and personal care formulations, including creams / lotions, sunscreens<sup>1</sup>, moisturizers, serums, color cosmetics, and hair care products. **Floramac 10** is functional within formulations, and lends to more favorable product aesthetics. **Floramac 10** assists in the dispersion and solubilization of sunscreens; provides a dry emolliency, giving formulas a skin feel similar to that of cyclopentasiloxane (without the volatility); and imparts a degree of skin hydration greater than silicones. It can also be gelled to mimic a skin feel similar to traditional silicones. Furthermore, its inherent refractive index lends to its ability to provide shine and gloss when used in leave-on products.

Botanically-derived **Floramac 10** is EU and China REACH compliant, TGA approved, and listed on AICS.

## Formulation Benefits:

- Assists in the dispersion and solubilization of sunscreens
- Dry emolliency
- Compatible with oils, volatile and non-volatile silicones
- Non-comedogenic
- Botanically-derived
- Allows for silicone-free claims
- Non-volatile
- High spread and low viscosity
- Tolerant of pro-oxidative environments
- Biodegradable<sup>2</sup>

## Clinical Study Facts<sup>3</sup>:

In double-blind, vehicle-controlled, clinical studies, **Floramac 10** produced the following benefits:

- **Similar skin feel** to that of silicones with viscosities  $\leq 100\text{cP}$  (**Figures 1-5**)
- **Increased skin gloss, moisturization, and silkiness / smoothness** as perceived by consumers (**Figures 1, 2, 4, and 5**)
- **Increased skin radiance** compared to each respective silicone (**Figure 6**)
- **Improved skin hydration** compared to each respective silicone (**Figure 6**)

## Purpose:

The purpose of this investigation was to evaluate **Floramac 10** as a naturally-derived silicone alternative. This was accomplished by comparing **Floramac 10** or gelled **Floramac 10** (indicated with a + sign) with silicones of varying viscosities (Table 1). Comparable attributes include physical properties, consumer perception of the neat silicones and silicone replacements, and bioinstrumental analysis of skin gloss and hydration of each silicone and silicone replacement incorporated at 5% into a simple o/w emulsion.

**Table 1. Physical Properties**

Test Emollient	Viscosity (cP)	Refractive Index
<b>Floramac 10</b>	7-8	1.44
Cyclopentasiloxane	4-5	1.40
<b>Floramac 10<sup>+4</sup></b>	7-8	1.45
Dimethicone (5cs)	5-6	1.40
<b>Floramac 10<sup>+5</sup></b>	303-304	not transparent
Dimethicone (10cs)	10-11	1.40
<b>Floramac 10<sup>+6</sup></b>	548-549	not transparent
Dimethicone (20cs)	19-20	1.40
<b>Floramac 10<sup>+7</sup></b>	77-78	not transparent
Dimethicone (100cs)	96-97	1.40

## Physical Properties:

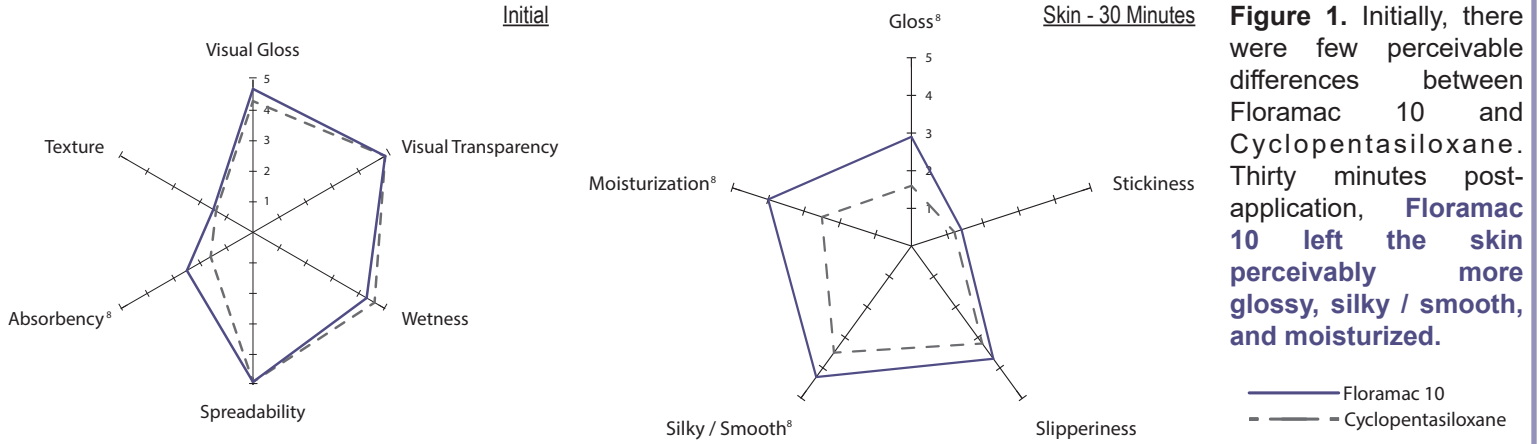
Table 1 displays the viscosity and refractive index of **Floramac 10** (or gelled **Floramac 10**) compared to silicones.

1. Cargill has not tested Floramac 10 in final OTC drug formulations. Compliance with FDA regulations is the responsibility of the customer.  
 2. Biodegradable according to OECD 301B.  
 3. Final Reports available upon request. Figures and Tables can be found on the next two pages of this document.  
 4. Gelled with 0.5% CAB-O-Sil M-5, INCI: Silica (Cabot).  
 5. Gelled with 5.0% Nomcort<sup>®</sup> SG, INCI: Glyceryl Tribehenate/Isostearate/Eicosadioate (Nisshin Oililio).  
 6. Gelled with 5.0% Nomcort<sup>®</sup> SG, INCI: Glyceryl Tribehenate/Isostearate/Eicosadioate (Nisshin Oililio); 2.0% Natrasorb<sup>®</sup> HFB, INCI: Aluminum Starch Octenylsuccinate (and) Acrylates Copolymer (and) Magnesium Carbonate (AkzoNobel Chemicals); and 5.0% Bentone Gel<sup>®</sup> GTCCV, INCI: Caprylic/Capric Triglyceride (and) Stearalkonium Hectorite (and) Propylene Carbonate (Elementis Specialties).  
 7. Gelled with 10.0% Nomcort<sup>®</sup> SG, INCI: Glyceryl Tribehenate/Isostearate/Eicosadioate (Nisshin Oililio); 2.0% Natrasorb<sup>®</sup> HFB, INCI: Aluminum Starch Octenylsuccinate (and) Acrylates Copolymer (and) Magnesium Carbonate (AkzoNobel Chemicals); 8.0% Bentone Gel<sup>®</sup> GTCCV, INCI: Caprylic/Capric Triglyceride (and) Stearalkonium Hectorite (and) Propylene Carbonate (Elementis Specialties), and 5.0% Glycerine 99.7% USP Kosher, INCI: Glycerin (Acme-Hardesty Co).

## Consumer Perception:

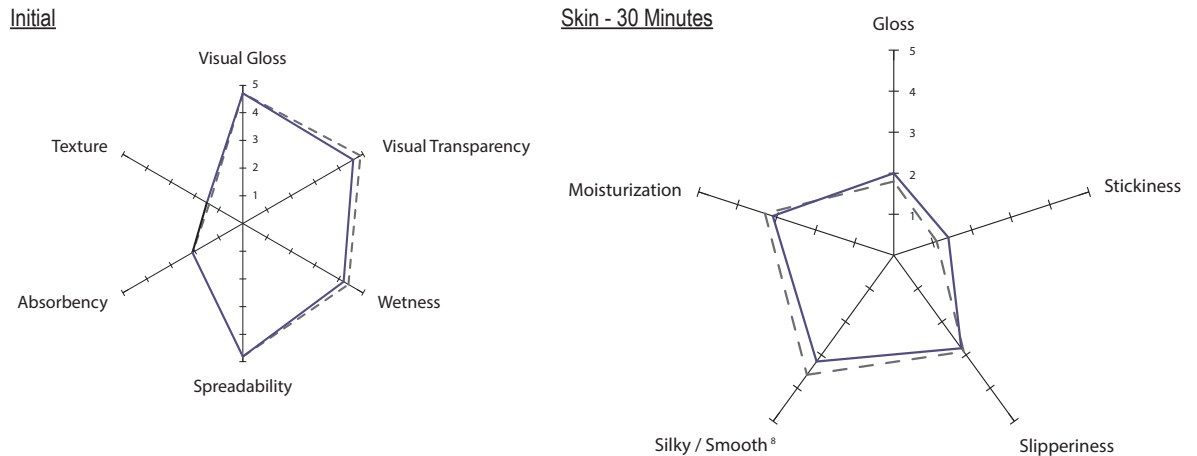
Each silicone / silicone replacement pair (as listed in Table 1), was compared by consumers (n=27) in a blinded fashion on a 1-5 scale for initial product evaluations and skin feel (30 minutes post-application) observations. The higher the score, the more the listed attribute was perceived by consumers (e.g. a score of 5 for moisturization indicates very moisturized skin, whereas a score of 1 indicates dry skin). For the texture attribute, a higher score indicates a thicker silicone or silicone replacement. The results for each pair appear below in Figures 1-5.

### Figure 1. Floramac 10 vs. Cyclopentasiloxane

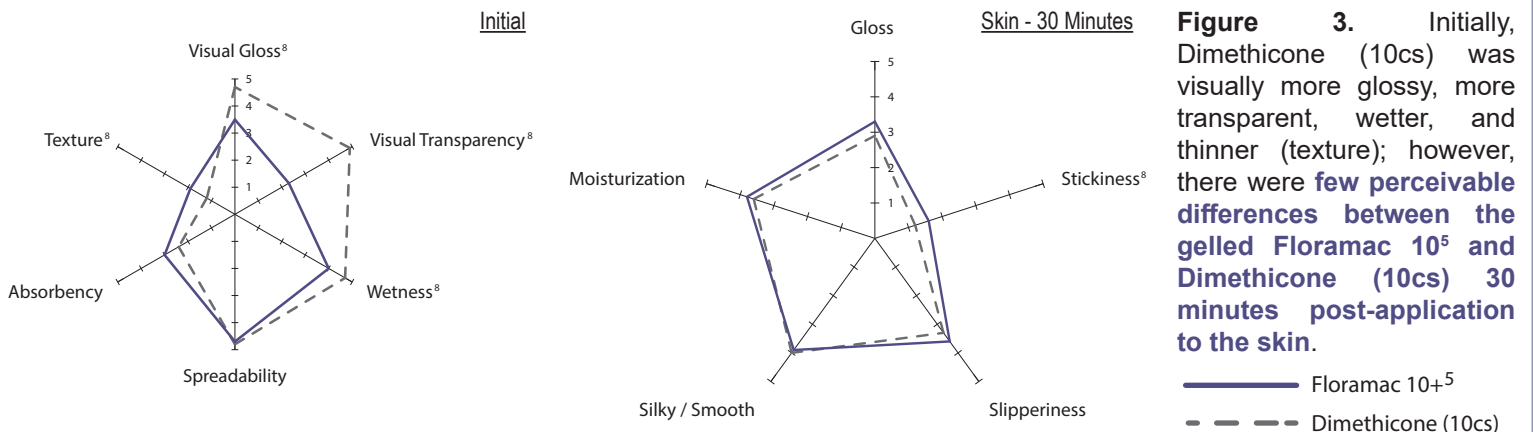


### Figure 2. Floramac 10+<sup>4</sup> vs. Dimethicone (5cs)

**Figure 2.** Both initially and 30 minutes post-application, there were **few perceivable differences between the gelled Floramac 10<sup>4</sup> and Dimethicone (5cs).**

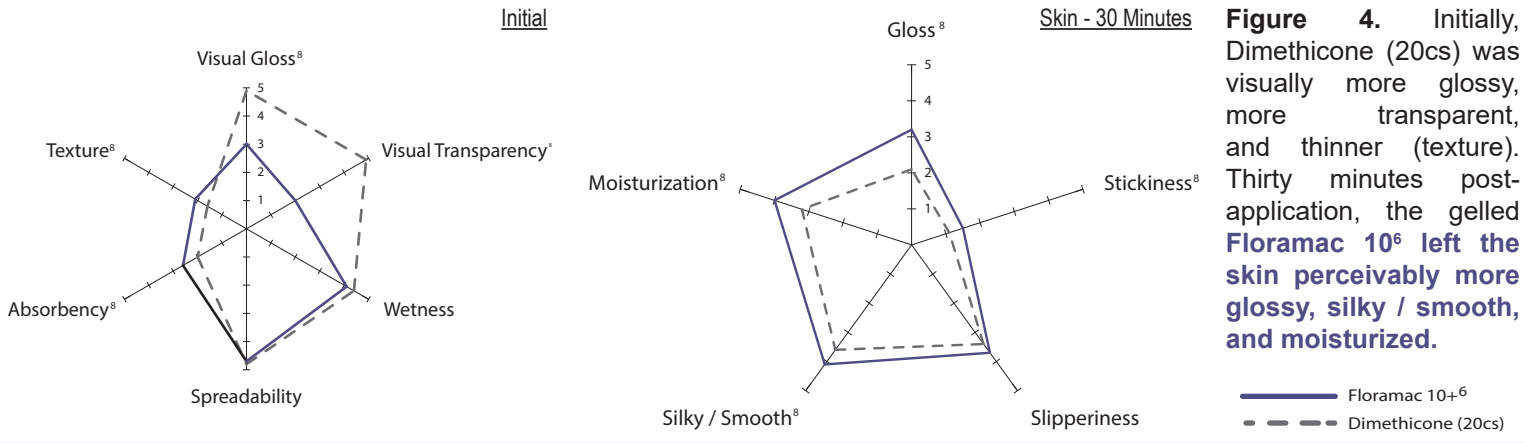


### Figure 3. Floramac 10+<sup>5</sup> vs. Dimethicone (10cs)



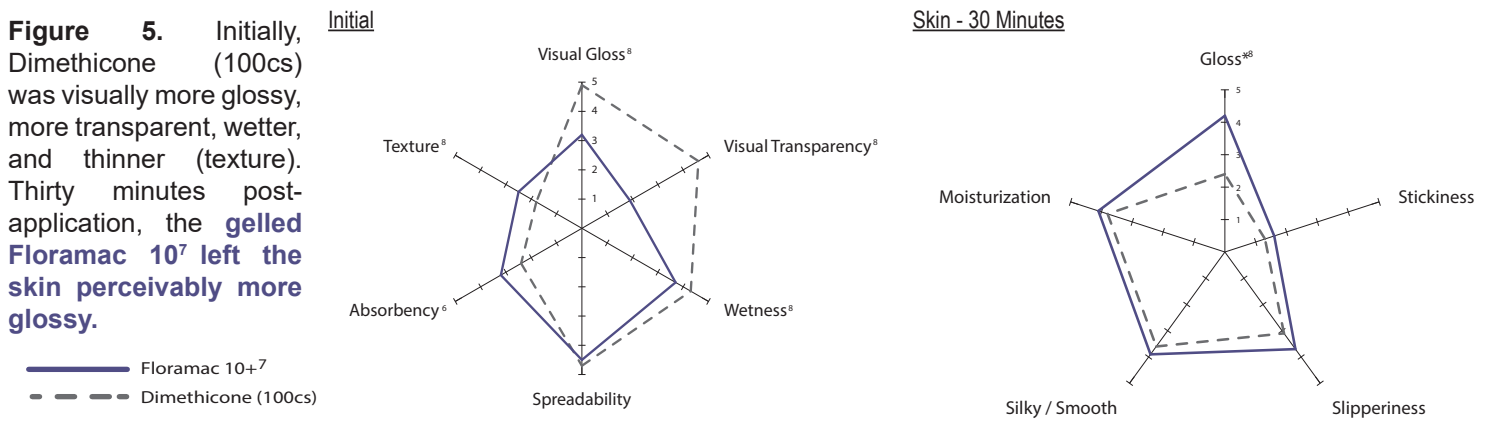
8. p<0.05 between test articles.

**Figure 4. Floramac 10+<sup>6</sup> vs. Dimethicone (20cs)**



**Figure 4.** Initially, Dimethicone (20cs) was visually more glossy, more transparent, and thinner (texture). Thirty minutes post-application, the gelled Floramac 10<sup>6</sup> left the skin perceptibly more glossy, silky / smooth, and moisturized.

**Figure 5. Floramac 10+<sup>7</sup> vs. Dimethicone (100cs)**

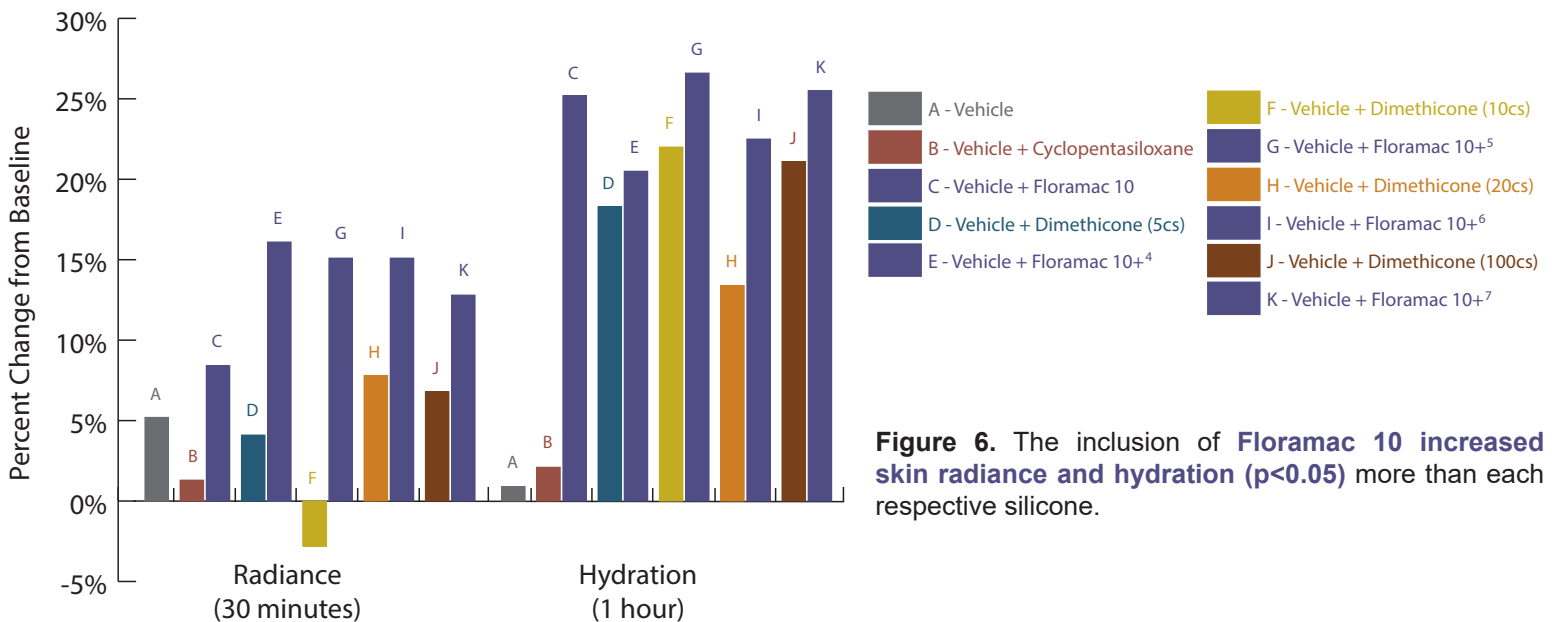


**Figure 5.** Initially, Dimethicone (100cs) was visually more glossy, more transparent, wetter, and thinner (texture). Thirty minutes post-application, the gelled Floramac 10<sup>7</sup> left the skin perceptibly more glossy.

**Increased Skin Radiance and Hydration:**

Each silicone / silicone replacement pair (as listed in Table 1) loaded at 5% in a simple o/w emulsion was compared for skin radiance (i.e. gloss) and hydration<sup>9</sup> in a vehicle-controlled, randomized, double-blind clinical study (n=15). The results for each pair appear below in Figure 6.

**Figure 6. Skin Radiance and Hydration**



**Figure 6.** The inclusion of Floramac 10 increased skin radiance and hydration (p<0.05) more than each respective silicone.

<sup>9</sup> Skin radiance (i.e. gloss) and hydration measurements were captured using the Glossmeter GL 200 and Corneometer CM 825, respectively; both instruments are products of Courage+Khazaka (Köln, Germany).

## Conclusions:

**Floramac 10** can be used to mimic silicones with a viscosity of  $\leq 100\text{cP}$ . Although physical properties and initial observations of the neat ingredients vary between **Floramac 10** and the respective silicones, skin-feel as perceived by the consumer was very similar.

The most notable differences between the silicone alternatives and silicones were that **Floramac 10** produced greater skin hydration, gloss, and silkiness / smoothness as perceived by consumers, and increased skin radiance and skin hydration of an o/w emulsion when measured bioinstrumentally.

## Formula: Clear, Silicone-Free Under Eye Rejuvenator<sup>10</sup>

This clear under eye rejuvenating stick is silicone-free and provides hydration which aids in the appearance of healthy, radiant skin. **Floramac 10** contributes dry emolliency and high spread aesthetics often associated with low viscosity silicones. This formula was carefully designed to maximize the beneficial properties of enhanced skin elasticity and firmness from L22, while incorporating the proven skin hydration synergy between Floraesters K-100 Jojoba with glycerin and butylene glycol.

Phase	Trade/Common Name	INCI Name	Manufacturer	% wt./wt.
A	<b>Floramac 10</b>	<b>Ethyl Macadamiate</b>	<b>Floratech</b>	<b>67.30</b>
	AJK-OD2046 <sup>11</sup>	Octyl Dodecanol (and) Dibutyl Lauroyl Glutamide (and) Dibutyl Ethylhexanoyl Glutamide	Kokyu Alcohol Kogyo Co., LTD.	20.00
B	<b>Floramac 10</b>	<b>Ethyl Macadamiate</b>	<b>Floratech</b>	<b>q.s.</b>
	<b>Floraesters K-100® Jojoba</b>	<b>Hydrolyzed Jojoba Esters (and) Jojoba Esters (and) Water (Aqua)</b>	<b>Floratech</b>	<b>1.00</b>
	1,3 BG	Butylene Glycol	Nexeo Solutions	1.50
	Glycerine 99.7% USP Kosher	Glycerin	Acme-Hardesty Co.	0.30
	Ceramide II CQ	Ceramide NG	Soliance-Givaudan	0.10
	Covi-Ox® T 70 C	Tocopherol	BASF Corporation	0.05
	<b>L22®</b>	<b>Jojoba Oil/Macadamia Seed Oil Esters (and) Squalene (and) Phytosteryl Macadamiate (and) Phytosterols (and) Tocopherol</b>	<b>Floratech</b>	<b>1.50</b>
C	Preservative <sup>12</sup>	-----	-----	q.s.
			<b>Total</b>	<b>100.00</b>

### Procedure:

1. Mix the ingredients of Phase A at 105-110°C with moderate propeller agitation.
2. In a separate vessel, mix the Floraesters K-100 Jojoba, 1,3-BG, and Glycerine 99.7% USP Kosher of Phase B at room temperature.
3. Add the Floramac 10 of Phase B to the mixture and begin heating to 80-85°C. Keep mixing until a gel forms. Add the remaining ingredients of Phase B and continue mixing until uniform, while maintaining a temperature of 80-85°C.
4. Begin cooling Phase A to 80-85°C.
5. Add Phase B to Phase A at 80-85°C.
6. Cool Phase AB to 75-80°C, then add Phase C with moderate propeller agitation.
7. Pour into container at 75-80°C.

### Formula Properties:

Property	Result
Dropping Point	91 - 95°C
Penetration	272 - 371 dmm



Floramac 10

Ingredient Information  
24/7 Online

**iLabel®**  
[www.floratech.com/info](http://www.floratech.com/info)

10. INCI/Trade names must be verified with each manufacturer.

11. 80.0% Eutanol G (BASF Corporation), 12.0% GP-1 (Ajinomoto Co. Inc.), and 8.0% EB-21 (Ajinomoto Co. Inc.) can be pre-mixed and used as an alternative to the AJK-OD2046.

12. Preservative: Sensiva® SC 50 [INCI: Ethylhexyl Glycerin] supplied by Schülke Inc.