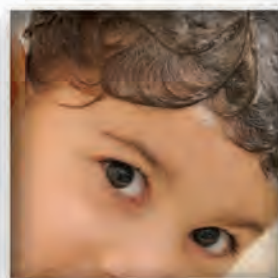
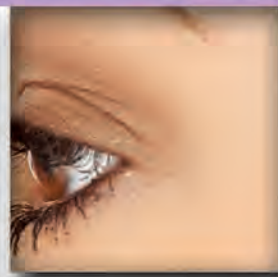


Personal Care Materials Selection Guide



PERSONAL CARE MATERIALS SELECTION GUIDE

For over 30 years NuSil has provided custom silicone to help make the world a more beautiful place by offering solutions to a variety of industries and thousands of customers. Our silicone chemists and technicians are dedicated to working with your team to develop a solution for each unique application.

Research and Development

NuSil's research and development services are most recognized for its custom development of silicone materials. Our well equipped laboratories are staffed with knowledgeable chemists and technicians who are experts in polymer formulation, chemical analysis, and physical testing of silicones. If a feature or test requirement is not performed, NuSil will work with you to custom develop testing parameters or incorporate testing procedures for your specific application.

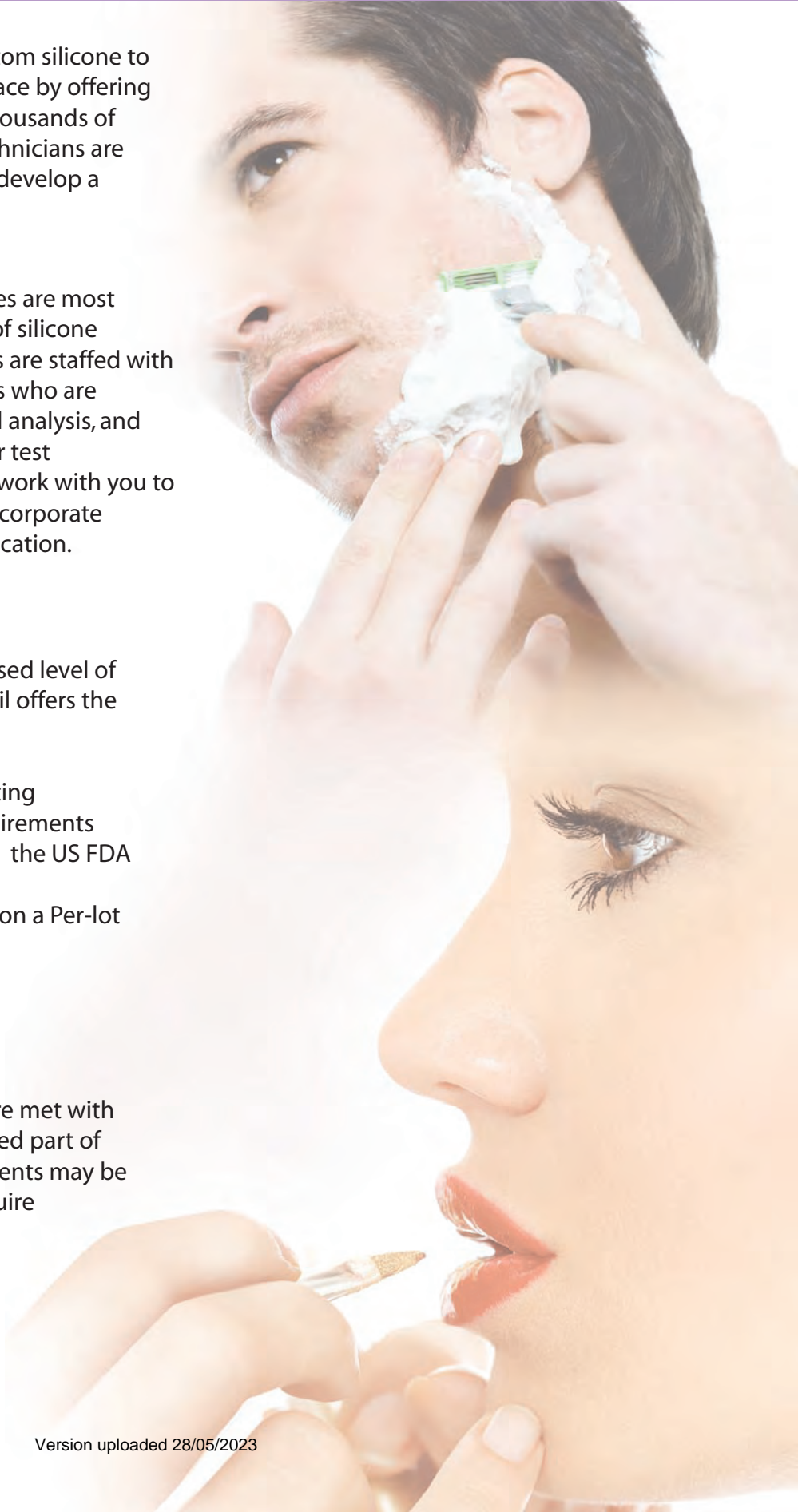
Regulatory Support

What differentiates NuSil is the unsurpassed level of regulatory support for our products. NuSil offers the following:

- Extensive Biocompatibility Testing
- Applicable ISO 10993 Test Requirements
- Master Access Files (MAFs) with the US FDA
- Trace Metal Analysis
- Cytotoxicity Testing Performed on a Per-lot Basis

Customer Service

All of our relationships with customers are met with respect and confidentiality. As an extended part of the services program, exclusivity agreements may be available to qualified customers that require proprietary, customized formulations.



Custom Compounding

NuSil has been directly incorporating custom ingredients in silicones as part of our exceptional service for over 10 years and is a demonstrated leader in manufacturing specialty ingredient delivery products.

Some typical incorporated ingredients are:

- Naturals
- Actives
- Antimicrobials
- Pigments
- Solvents

Manufacturing

NuSil offers more than a one-size-fits all approach. Whether your challenge requires large or small quantities, we promise accurate and precise silicone solutions. When your custom material is ready to scale up, NuSil can respond quickly and effectively.

All our materials are developed and qualified in our own ISO 9001 certified laboratories, ensuring consistent processes and standard across the globe. NuSil offers several manufacturing locations in the United States capable of producing batches from less than one kilogram to thousands of kilograms.

Corporate Headquarters Carpinteria, California

- 250,000 ft² Production Facility
- Advanced Research and Development Facility
- Center for Global Technical Sales and Support

FDA Registered Manufacturing Facility Bakersfield, California

- 58,000 ft² of Manufacturing Space
- Plan to Expand



Silicone Hybrid Technology

Silicones are consistently used across many industries such as aerospace and photonics to the healthcare industry for medical device and drug delivery applications. In the photonics industry high refractive index silicones are used to enhance brightness and light production in light emitting diodes (LED) as well as specialized optical applications such as intraocular lenses implanted into the human eye to restore clear vision. The same principals used to achieve benefits found in photonics and medical devices can be applied to cosmetic formulations. The breadth of crossover technology associated with silicones makes them an attractive ingredient for custom use in the personal care industry.

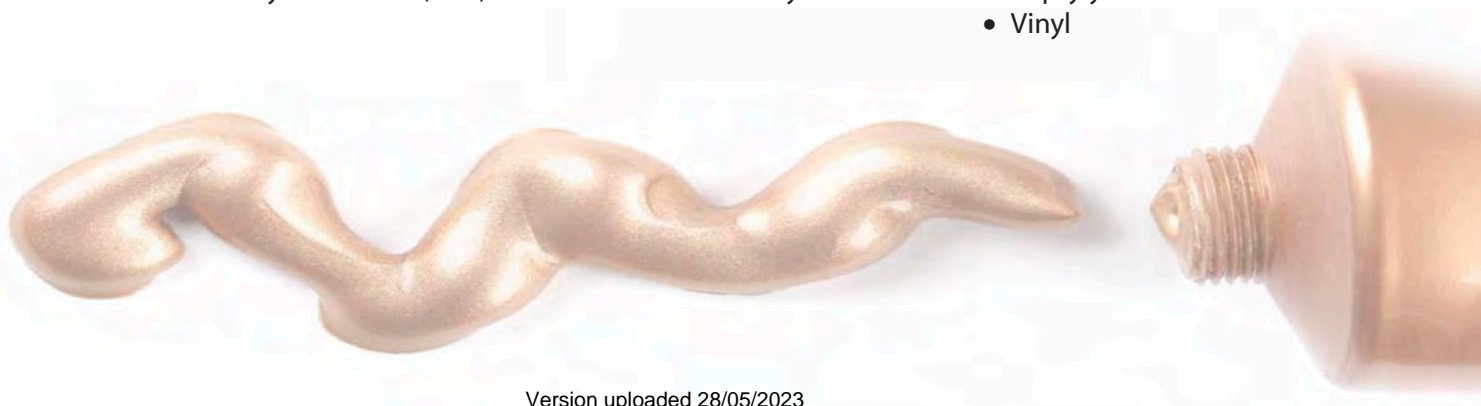
Custom Silicone Technology

Many properties can be selected by building functional polymers and copolymers to produce desirable properties and a natural feel.

Our silicone polymers can be built with various pendant groups to enhance properties and give formulators a wide range of custom options.

Typical Pendant Groups Include:

- Methyl
- Phenyl
- TriFluoropropyl
- (PPG)
- Lauryl
- Cetyl
- Stearyl
- Caprylyl
- Vinyl



Silicone Personal Care Options

Three distinct classes of silicone systems — siloxane polymers, siloxysilicates and silsequioxanes, and vinyl cross polymers, can be altered or incorporated with custom ingredients. These customizable options provide formulators with a broad range of benefits for general hair care, skin care, make-up, and sun care applications as described below.

Siloxane Polymers

Siloxane polymers are linear polymers of repeating Si-O units with organic pendant groups.

General Hair Care

- Manageability
- Smoothness
- Luster & Shine
- Conditioning

Skin Care

- Moisturize
- Slip & Extended Rub-in Application Enhancement
- Wrinkle Reduction

Liquid and Make-up

- Pigment Dispersal & Suspension
- Crème to Powder Effect

Sun Care

- Moisturize
- Wash & Transfer Resistance
- Increased SPF

Siloxysilicates and Silsequioxanes

Various reactive groups can be added to create specialty siloxysilicates. These materials come in a broad range of viscosities from 100 cps to crystalline solid.

General Hair Care

- Manageability
- Smoothness
- Softness

Fixative Hair Care

- Hold & Moisture Resistance
- Shine
- Comb-through

Vinyl Cross Polymers

Vinyl cross polymers are curable into compliant solids from which the tack can be adjusted for specific patch type delivery applications. Ingredients are typically compounded into the silicone prior to curing to the desired patch configuration.

Vinyl Cross Polymers in Cyclopentasiloxane

Other types of crosspolymer technologies more common to the Personal Care industry include the paste or cream type which is comprised of the crosspolymer solids suspended in a volatile fluid. These materials are often used to thicken formulations, as a carrier of encapsulants for various ingredients, and to add a silky benefit to a cosmetic formulation.

Cosmeceutical Delivery Systems (Patch or Paste)

- Topical Vitamin & Active Delivery

Skin Care

- Protection
- Moisturize
- Slip & Extended Rub-in Application Enhancement

Sun Care

- Impart Emollient Feel
- Water Resistance & Enhanced Sun Protection
- Suspend Pigments

Lipstick

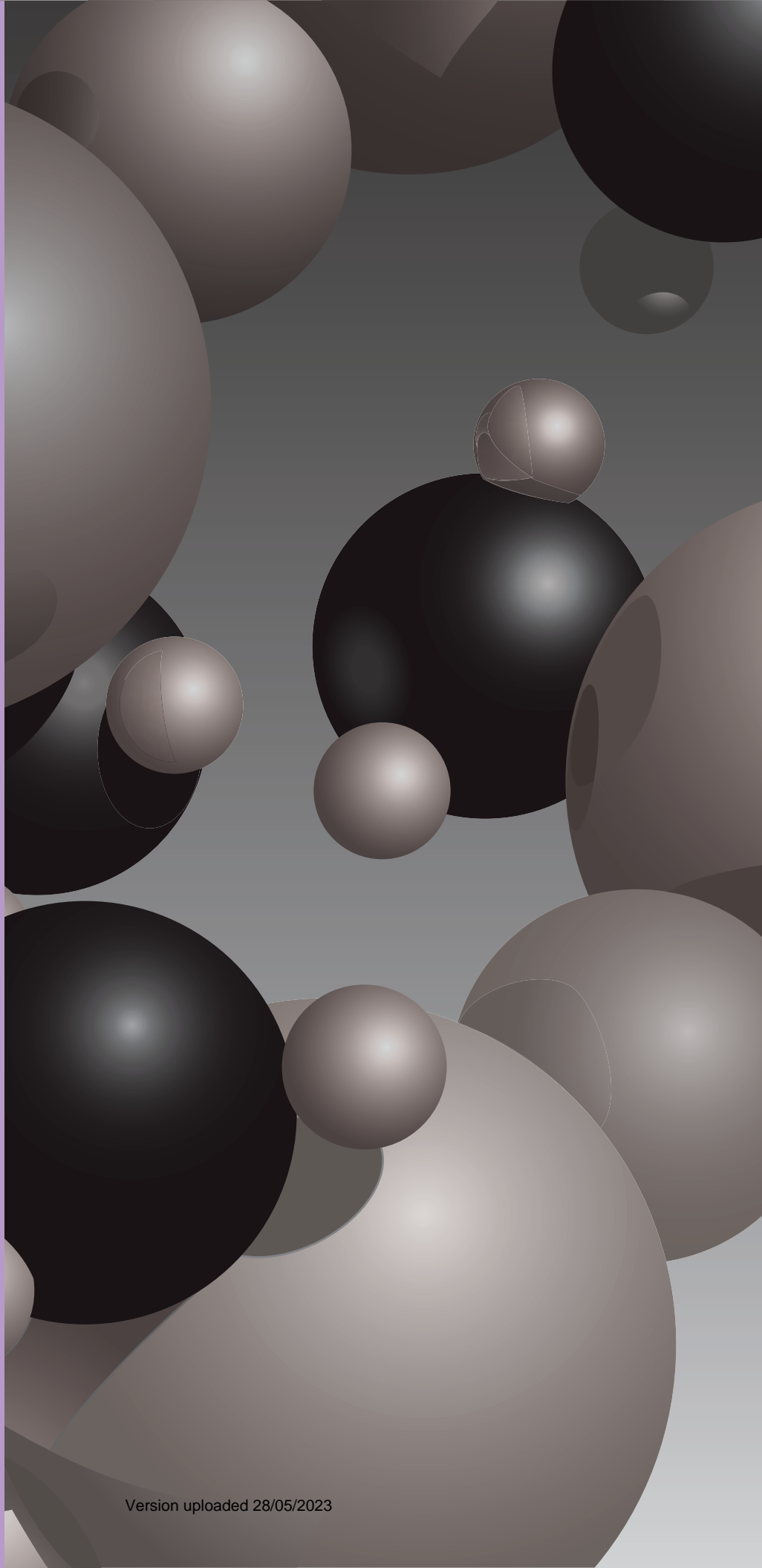
- Wash & Transfer Resistance
- Shine & Gloss
- Suspend Pigments

PERSONAL CARE MATERIALS SELECTION GUIDE

| PRODUCT NUMBER | COMMENTS | WORK TIME | CURE TIME/ TEMP °C | VISCOSITY | SPECIFIC GRAVITY @25 °C | REFRACTIVE INDEX 589 nm | VOLATILITY | FLASH POINT °F / °C | APPEARANCE | INCI DESIGNATION |
|---|---|-----------|--------------------|---------------------------|-------------------------|-------------------------|------------|---------------------|--------------------|--|
| DIMETHICONES | | | | | | | | | | |
| PCM-7901 | Hair & Skin Care Applications as a Component to Add Moisture and Shine | - | - | 350 cP | 0.97 | 1.403 | - | 600°F / 315 °C | Clear Liquid | Dimethicone |
| PCM-7901 | Hair & Skin Care Applications as a Component to Add Moisture and Shine | - | - | 1,000 cP | 0.97 | 1.403 | - | 600°F / 315 °C | Clear Liquid | Dimethicone |
| PCM-7901 | Hair & Skin Care Applications as a Component to Add Moisture and Shine | - | - | 12,500 cP | 0.97 | 1.403 | - | 600°F / 315 °C | Clear Liquid | Dimethicone |
| PCM-7902 | Hair & Skin Care Applications as a Component to Add Moisture and Shine | - | - | 10cP | 0.97 | 1.403 | 2% max | 600°F / 315 °C | Clear Liquid | Dimethicone |
| PCM-7902 | Hair & Skin Care Applications as a Component to Add Moisture and Shine | - | - | 20cP | 0.97 | 1.403 | 2% max | 600°F / 315 °C | Clear Liquid | Dimethicone |
| PCM-7902 | Hair & Skin Care Applications as a Component to Add Moisture and Shine | - | - | 50cP | 0.97 | 1.403 | 2% max | 600°F / 315 °C | Clear Liquid | Dimethicone |
| PCM-7902 | Hair & Skin Care Applications as a Component to Add Moisture and Shine | - | - | 100cP | 0.97 | 1.403 | 2% max | 600°F / 315 °C | Clear Liquid | Dimethicone |
| PCM-7902 | Hair & Skin Care Applications as a Component to Add Moisture and Shine | - | - | 350 cP | 0.97 | 1.403 | 2% max | 600°F / 315 °C | Clear Liquid | Dimethicone |
| PCM-7902 | Hair & Skin Care Applications as a Component to Add Moisture and Shine | - | - | 1,000 cP | 0.97 | 1.403 | 2% max | 600°F / 315 °C | Clear Liquid | Dimethicone |
| PCM-7902 | Hair & Skin Care Applications as a Component to Add Moisture and Shine | - | - | 12,500 cP | 0.97 | 1.403 | 2% max | 600°F / 315 °C | Clear Liquid | Dimethicone |
| PCM-7902 | Hair & Skin Care Applications as a Component to Add Moisture and Shine | - | - | 60,000cP | 0.97 | 1.403 | 2% max | 600°F / 315 °C | Clear Liquid | Dimethicone |
| TRIFLUOROPROPYLMETHICONES | | | | | | | | | | |
| PCM-7905 | 100 mole% Fluorinated Copolymer. May be Considered as a Component for Preventing Transference in Color Applications | - | - | 350 cP | 1.25 | 1.38 | 0.20% | >275°F / >135°C | Clear Liquid | Trifluoropropylmethicone |
| PCM-7905 | 100 mole% Fluorinated Copolymer. May be Considered as a Component for Preventing Transference in Color Applications | - | - | 1,000 cP | 1.27 | 1.38 | - | >275°F / >135°C | Clear Liquid | Trifluoropropylmethicone |
| PCM-7905 | 100 mole% Fluorinated Copolymer. May be Considered as a Component for Preventing Transference in Color Applications | - | - | 12,500 cP | - | 1.38 | - | >275°F / >135°C | Clear Liquid | Trifluoropropylmethicone |
| TRIFLUOROPROPYLTRIMETHICONES | | | | | | | | | | |
| PCM-7906 | 20 mole % Fluorinated Copolymer. May be Considered for Preventing Transference in Color Applications | - | - | 350 cP | 1.05 | 1.395 | 0.1% | >275°F / >135°C | Clear to Amber | Trifluoropropyltrimethicone |
| PCM-7906 | 20 mole % Fluorinated Copolymer. May be Considered for Preventing Transference in Color Applications | - | - | 1,000 cP | - | 1.395 | 0.1% | >275°F / >135°C | Clear to Amber | Trifluoropropyltrimethicone |
| PCM-7906 | 20 mole % Fluorinated Copolymer. May be Considered for Preventing Transference in Color Applications | - | - | 12,500 cP | - | 1.395 | 0.1% | >275°F / >135°C | Clear to Amber | Trifluoropropyltrimethicone |
| PCM-7907 | 60 mole % Fluorinated Copolymer. May be Considered for Preventing Transference in Color Applications | - | - | 350 cP | 1.21 | 1.383 | 0.2% | >275°F / >135°C | Clear to Amber | Trifluoropropyltrimethicone |
| PCM-7907 | 60 mole % Fluorinated Copolymer. May be Considered for Preventing Transference in Color Applications | - | - | 1,000 cP | 1.22 | 1.383 | 0.2% | >275°F / >135°C | Clear to Amber | Trifluoropropyltrimethicone |
| PCM-7907 | 60 mole % Fluorinated Copolymer. May be Considered for Preventing Transference in Color Applications | - | - | 12,500 cP | - | 1.383 | 0.2% | >275°F / >135°C | Clear to Amber | Trifluoropropyltrimethicone |
| DIPHENYLDIMETHICONES | | | | | | | | | | |
| PCM-7904 | High Refractive Dimethicone. May be Considered as a Component to Enhance Shine and Increase Damage Protection | - | - | 350 cP | 1.01 | 1.429 | 4% max | 600°F / 315 °C | Translucent | Bisphenyl Dimethicone |
| PCM-7904 | High Refractive Dimethicone. May be Considered as a Component to Enhance Shine and Increase Damage Protection | - | - | 1,000 cP | 1.01 | 1.429 | 4% max | 600°F / 315 °C | Translucent | Bisphenyl Dimethicone |
| PCM-7904 | High Refractive Dimethicone. May be Considered as a Component to Enhance Shine and Increase Damage Protection | - | - | 12,500 cP | 1.01 | 1.429 | 4% max | 600°F / 315 °C | Translucent | Bisphenyl Dimethicone |
| PCM-7916 | 30 mole % Diphenylsiloxane Endblocked w/ Reactive Vinyl Groups | - | - | 575 cSt | 1.08 | 1.52 | 0.2% | >275°F / >135°C | Translucent | Diphenyl Dimethicone |
| PCM-7917 | 18 mole % Diphenylsiloxane Endblocked w/ Reactive Vinyl Groups | - | - | 1500 cSt | 1.04 | 1.46 | <0.1% | >275°F / >135°C | Translucent | Diphenyl Dimethicone |
| AMINOPROPYL DIPHENYLDIMETHICONES | | | | | | | | | | |
| PCM-7918 | High Refractive Index & High Viscosity 50 mole % Diphenylsiloxane | - | - | 65,000 cP | 1.13 | 1.55 | 1.12% | >275°F / >135°C | White to Yellow | Amopropyl Bisphenyl Dimethicone Co-Polymer |
| SILICONE CO-POLYMER | | | | | | | | | | |
| PCM-7919 | Silicone Co-Polymer, May be Considered to Help Wetting in a Wide Range of Cosmetic Applications | - | - | 1,500 cP | 1.04 | - | - | >63 C | Colorless to Amber | PEG/PPG-18/18 Dimethicone |
| VINYL CROSS-POLYMERS | | | | | | | | | | |
| PCM-7926 | Durometer (Type A): 20, Tensile Strength 550 psi, Elongation 500% | 3 m | 15 m / 150 | A: 21,000 cP/B: 16,500 cP | 1.07 | - | - | >275°F / >135°C | Translucent | Vinyl Cross-Polymer |
| PCM-7927 | Durometer (Type A): 17, Tensile Strength 675 psi, Elongation 575%, Tear Strength 30 ppi | 25 m | 15 m / 150 | A: 23,000 cP/B: 18,000 cP | - | - | - | >275°F / >135°C | Translucent | Vinyl Cross-Polymer |
| PCM-7931 | Penetration 10 mm * | >24 h | 1 h / 100 | 535 cP | 0.97 | - | - | >275°F / >135°C | Translucent | Vinyl Cross-Polymer |
| PCM-7932 | Penetration can be formulated to specific requirements | - | 5 h / 140 | 1,000 cP | 0.97 | - | - | >284°F / >140°C | Translucent | Vinyl Cross-Polymer |
| PCM-7933 | Penetration 3 mm * | 45 m | 30 m / 140 | A: 10,000 cP/B: 6,000 cP | 0.97 | - | - | >275°F / >135°C | Translucent | Vinyl Cross-Polymer |
| SILICONE ELASTOMER BLEND | | | | | | | | | | |
| PCM-7908 | 15% Dimethicone dispersed in cyclopentasiloxane (D5) | - | - | 30,000 cP | 0.96 | - | - | - | Translucent | Cyclopentasiloxane Dimethicone Cross-Polymer |
| PCM-7914 | 12% Solid gel dispersed in cyclopentasiloxane (D5) | - | - | 600,000 cP | 0.94 | - | - | - | Translucent | Cyclopentasiloxane & Dimethicone |

h = hour m = minutes

** ALL PRODUCTS ARE 100% SILICONE AND CONTAIN NO ACTIVES. **





Polymer Systems Technology Limited

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