

Technical Information

dermofeel® NC MB

A natural cost-efficient O/W emulsifier with excellent performance.

Intended use

O/W emulsifier

Benefits at a glance

- Completely based on natural raw materials
- Suitable for all types of cosmetic O/W emulsions, including natural formulations
- Forms stable emulsions between pH 3.5 and 8.5
- Applicable for "natural" preservation systems
- No polyacrylate-based thickeners needed for stabilization
- Usage concentration of 1.5 – 5.0%

INCI (PCPC name)

Polyglyceryl-3 Distearate; Glyceryl Stearate Citrate

Chemical and physical properties (not part of specifications)

Form	pellets
HLB value	approx. 11

Properties

- **dermofeel® NC MB** is a non-ionic, PEG-free emulsifier that is completely based on renewable raw materials. It is based on Polyglyceryl-3 Distearate and Glyceryl Stearate Citrate. For Polyglyceryl-3 Distearate a poly-condensation reaction of glycerol to poly-glycerol-3 is carried out in the first step. Polyglycerol-3 is subsequently esterified with stearic acid. For Glyceryl Stearate Citrate, glycerol is esterified with stearic acid and citric acid.
- **dermofeel® NC MB** provides excellent stabilization for all types of classical O/W creams and lotions.
- It is suitable for the formulation of O/W creams and lotions with all types of cosmetic oils at a pH of 3.5 to 8.5.
- The recommended usage concentration of **dermofeel® NC MB** is approx. 2.5–5.0% in creams and 1.5 – 3.0% in lotions.
- Typical oil phase contents of emulsions based on **dermofeel® NC MB** are 15 – 45% for creams and 10 – 25% for lotions.
- It is also possible to formulate systems with high oil content (e.g. 50%) based on **dermofeel® NC MB**.
- The composition of **dermofeel® NC MB** has been optimized to come as close as possible to the application properties of TEGO® Care PSC 3 MB (Polyglyceryl-3 Dicitrate/Stearate)
- **dermofeel® NC MB** can build up viscosity (by forming lamellar structures) in cosmetic emulsions, together with consistency enhancers like Glyceryl Stearate, Stearyl Alcohol or Stearic Acid.
- Typical combinations for O/W creams are 2.5 – 5.0% **dermofeel® NC MB** with 2.5 – 4.0% consistency enhancers. Suitable combinations include TEGIN® M Pellets MB (Glyceryl Stearate) and TEGO® Alkanol 1618 (Cetearyl Alcohol) in a ratio of 70:30 or 50:50. In most O/W lotions, 2 – 3% of **dermofeel® NC MB** are already sufficient to obtain the desired viscosity and stability profile, without additional consistency enhancers.
- If a light sensory profile should be obtained, it is also possible to formulate with **dermofeel® NC MB** without using additional consistency enhancers. If furthermore no polymeric thickeners are added, the emulsifier use level has to be increased to approx. 3 – 5% depending on the targeted emulsion viscosity.

- The emulsifier can either be used in combination with polyacrylate-based thickeners or with natural polymeric thickeners such as Xanthan Gum. It is recommended to combine **dermofeel® NC MB** with Xanthan Gum (0.1% to 0.5% for creams and 0.3 to 0.5% for lotions) in order to optimize the texture and stability of the emulsions. In order to avoid a negative impact on the lamellar structures formed by the emulsifier and consistency enhancers, it is recommended to add Xanthan Gum below 40 °C to the emulsions.
- The addition of Carbomers can provide further benefits in terms of flexibility, stability and texture. It is recommended to use 0.1 – 0.3% of Carbomers depending on the specific application. As the amount of consistency enhancers can be reduced when using Carbomers, the overall sensory profile can change towards a lighter skin feel.
- **dermofeel® NC MB** is suitable for systems preserved with natural preservatives such as organic acids (e. g. Benzoic Acid and Sorbic Acid). When using organic acids for the preservation, it is recommended to add them below 40 °C to the emulsion. In order to prevent partial crystallization of the organic acids, it is recommended that the necessary amount of Sodium Hydroxide to neutralize those acids be incorporated in the emulsion prior to adding such natural preservatives. After addition of the acids, it is recommended to adjust to a final pH of 5.0 – 5.5.
- In general, the sensory profile of O/W emulsions based on **dermofeel® NC MB** can be adapted by altering the oil phase content, the consistency enhancer content, the polymer thickener content and the type of oils.
- **dermofeel® NC MB** is particularly recommended for the formulation of face and body care products.
- Emulsions based on **dermofeel® NC MB** in general have a good compatibility with active ingredients and UV filters.

In vivo moisturization study

Based on polyglycerol, **dermofeel® NC MB** provides moisturization properties.

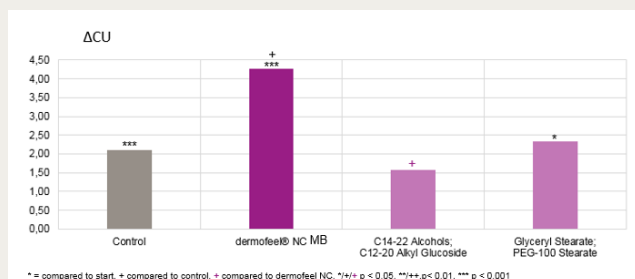


Fig. 1: Test results of *in vivo* short term moisturization study.

Test parameters: test formulations: control (untreated skin) + 3 O/W emulsions with different emulsifiers; number of panelists: 19; test area: inner forearm; size of test area: 5 cm²; amount of test formulation: 20 mg (4 mg/cm²); measurement device: Corneometer CM 825; measurement time points: start, 2h after application.

Figure 1 shows the increase of corneometer units as indicator for skin moisturization two hours after application of the formulation based on **dermofeel® NC MB** in comparison to C14–22 Alcohols; C12–20 Alkyl Glucoside and to untreated control. **dermofeel® NC MB** provides also higher moisturization properties compared to Glyceryl Stearate; PEG–100 Stearate.

Preparation

dermofeel® NC MB belongs to the group of the so-called lipid emulsifiers. As lipid emulsifiers are optimized to form lamellar structures in O/W emulsions, they have a lower HLB compared to classical ethoxylated emulsifiers such as PEG–100 Stearate or Cetareth–25. Therefore, some adjustments in the production process might be necessary.

It is recommended to avoid the addition of the hot water phase into the hot oil phase while stirring. This “inverse” processing is likely to lead to the formation of a W/O emulsion (recognizable by high viscosity). During the cooling process, this emulsion converts to an unstable oil-in-water emulsion with a large particle size.

For the preparation of creams and lotions, the oil and water phases should be heated separately to 70 to 80 °C. It is suggested to add the hot oil phase to the hot water phase while stirring. The coarsely dispersed pre-emulsion is then homogenized.

If the above mentioned processing is not possible, the hot water phase should be added to the hot oil phase without stirring (to avoid the building of the water-in-oil form) and start afterwards with the homogenization. During the homogenization process the homogenizer must be placed in the water phase to ensure that the oil phase will be incorporated into the water phase.

During cooling, a constant horizontal and vertical movement of the emulsion has to be ensured. The viscosity of the liquid emulsion increases to a creamy consistency, as the consistency enhancers solidify.

Perfume, temperature-sensitive substances or electrolyte-containing ingredients, such as LACTIL®, are added at 35 – 40 °C.

Phenoxyethanol-containing preservatives should be incorporated at this temperature, as well. Since phenoxyethanol is an amphiphilic molecule it can interfere with the emulsification process when added directly to the oil or water phase.

It is also suggested to add natural preservatives, such as Benzoic Acid or Sorbic Acid, at temperatures below 40 °C.

Neutralization of the emulsion is done at approx. 35 °C.

The particle size of the dispersed oil droplets for emulsions with long-term stability is approx. 1 to 8 µm. More coarsely dispersed emulsions tend to separate.

Recommended usage concentration

1.5 – 5.0% **dermofeel® NC MB**

Hazardous goods classification

Information concerning

- classification and labelling according to regulations for transport of chemicals
- protective measures for storage and handling
- measures in case of accidents and fire
- toxicological and ecotoxicological effects

is given in our safety data sheets.

Guideline formulations

All Natural Cream (CHN BR 90-5-5C)

Phase A

dermofeel® NC MB	5.00%
TEGOSOFT® OER MB (Oleyl Erucate)	3.00%
TEGOSOFT® MM MB (Myristyl Myristate)	2.00%
TEGOSOFT® P (Isopropyl Palmitate)	7.00%
Prunus Amygdalus Dulcis (Sweet Almond) Oil	3.00%
Tocopheryl Acetate*	0.50%

Phase B

Water	76.50%
Glycerin	3.00%

Phase Z

Perfume*, preservative*	q.s.
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Preparation

1. Heat phase A and B separately to approx. 80 °C.
2. Add phase A to phase B with stirring.
3. Homogenize.
4. Cool with gentle stirring and add phase C below 40 °C.

Remarks

Viscosity: ~ 27 Pa.s (Brookfield RV DV-I, sp. 93, 10 rpm)

pH: 4.0 – 4.5

Microbiological safety: challenge test not performed

Natural content c_n (incl. water, ISO 16128): 79.7%
Natural origin content c_{no} (incl. water, ISO 16128): 99.0%

*Not considered for calculation of c_n and c_{no}

Lotion (CHN BR 90-1-1)

Phase A

dermofeel® NC MB	2.00%
TEGOSOFT® CT (Caprylic/Capric Triglyceride)	6.50%
TEGOSOFT® OP (Ethylhexyl Palmitate)	6.50%

Phase B

Water	78.60%
Glycerin	3.00%
TEGO® Carbomer 141 (Carbomer)	0.20%
TEGO® Cosmo C 100 (Creatine)	0.50%
TEGO® Natural Betaine (Betaine)	1.50%

Phase C

Triethanolamine (78%)	0.20%
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Phase D

SK-INFLUX® (Ceramide NP; Ceramide AP; Ceramide EOP; Phytosphingosine; Cholesterol; Sodium Lauroyl Lactylate; Carbomer; Xanthan Gum)	1.00%
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Phase Z

Preservative ¹ , Perfume	q.s.
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Preparation

1. Add TEGO® Carbomer 141 into water phase with gentle stirring.
2. Heat phase A and B separately to approx. 85 °C.
3. Add phase A to phase B with stirring. Then homogenize with 20000 rpm, 90 sec.
4. Cool down below 60 °C with stirring and add phase C.
5. Cool down to 40 °C. Add phase D.

Remarks

Viscosity: ~ 5 Pa.s (Brookfield RV DV-I, sp. 5, 10 rpm)

pH: 6.0 – 6.5

¹Formulation was tested on stability with 0.7% Phenoxyethanol; Ethylhexylglycerin (Euxyl PE9010, Schuelke & Mayr GmbH)

Microbiological safety: challenge test not performed

Natural Cream Gel (FU 18/17-2)

Phase A

dermofeel® NC MB	3.00%
TEGOSOFT® DC MB (Decyl Cocoate)	5.00%
dermofeel® sensolv MB (Isoamyl Laurate)	5.00%
dermofeel® GMCY MB (Glyceryl Caprylate)	0.30%
TEGO® Feel C 10 (Cellulose)	1.00%

Phase B

Water	67.70%
Glycerin	3.00%
Propylene Glycol*	3.00%
TEGO® Natural Betaine (Betaine)	3.00%
Mica (Submica E, Sensient)*	5.00%

Phase C

Xanthan Gum (Keltrol CG-SFT, CP Kelco)*	0.50%
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Phase D

dermosoft® 1388 eco (Glycerin; Aqua; Sodium Levulinate; Sodium Anisate)	3.50%
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Phase E

Citric Acid	q.s.
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Phase Z

Perfume	q.s.
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Preparation

1. Heat phase A and B separately to 75 °C.
2. Add phase A to phase B with stirring.
3. Homogenize.
4. Cool down to 50 °C while stirring and add phase C.
5. Homogenize for a short time.
6. Cool down to 30 °C while stirring and add phase D.
7. Homogenize for a short time.
8. Adjust pH with phase E to 5.0 – 5.5 and stir until uniform.

Remarks

Viscosity: ~ 40 Pa.s (Brookfield RV DV-I, spindle 93, 10 rpm)

Microbiological safety: challenge test passed

Natural content c_n (incl. water, ISO 16128): 79.6%

Natural origin content c_{no} (incl. water, ISO 16128): 100%

*Not considered for calculation of c_n and c_{no}

Tone-up Cream (CHN BR 90-2-4-1)

Phase A

dermofeel® NC MB	3.50%
TEGO® Alkanol 1618 (Cetearyl Alcohol)	1.50%
TEGOSOFT® DEC (Diethylhexyl Carbonate)	3.00%
TEGOSOFT® CT (Caprylic/Capric Triglyceride)	2.00%
ABIL® Wax 9801 (Cetyl Dimethicone)	1.00%
ABIL® 350 (Dimethicone)	1.00%
Cyclopentasiloxane, Cyclohexasiloxane (Dow Corning 345 Fluid, Dow Corning) ¹	8.00%
Titanium Dioxide; Silica (Sunsil-Tin natural white, Sunjin)	2.50%
Titanium Dioxide; Triethoxycaprylyl-silane (TiO ₂ , CR-50 AS, K.S. Pearl)	1.00%

Phase B

Water	68.40%
Glycerin	3.00%
TEGO® Natural Betaine (Betaine)	2.00%
Propylene Glycol	2.00%
Xanthan Gum (Keltrol CG-SFT, CP Kelco)	0.10%

Phase C

Sodium Acrylate/Sodium Acryloyldimethyl Taurate Copolymer; Isohexadecane; Polysorbate 80 (Simulgel EG, Seppic)	0.30%
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Phase Z

Preservative ¹ , Perfume	q. s.
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Preparation

1. Disperse TiO₂ into oil with Ultra T 25 (13800 rpm, 3 min).
2. Heat both phase A and phase B to 85°C.
3. Add phase A into B with stirring. Then homogenize for a short while
4. Add phase C into A/B, homogenize for a short while (10000 rpm, 1 min).
5. Cool down to 40 °C. Add phase D and stir until uniform.

Remarks

Viscosity: ~ 25 Pa.s (Brookfield RV DV-I, sp. 93, 10 rpm)
pH: 6.0 – 7.0

Microbiological safety: challenge test passed

¹This formulation contains cyclic silicones (D5 od D6) in relevant concentrations (> 0.1%). Within the European Union and other European countries there will be new regulations shortly in place. Only 0.1% of each compound will be allowed in consumer products. Therefore this formulation is not anymore suitable for the European market.”

A 03/19

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Evonik Nutrition & Care GmbH
Goldschmidtstraße 100
45127 Essen, Germany
Phone +49 201 173 2546
Fax +49 201 173 712546
personal-care@evonik.com
www.evonik.com/personal-care

