TEGO® Care PSC 3

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

- 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
- Low usage concentration of 1.5 – 3.0 %

Personal Care

INCI Name (PCPC Name)

Polyglyceryl-3 Dicitrate/Stearate

Chemical and physical properties (not part of specifications)	
Form	pellets
HLB value	approx. 11

Properties

TEGO® Care PSC 3 is a non-ionic, PEG-free emulsifier that is completely based on renewable raw materials. TEGO® Care PSC 3 is based on glycerol, stearic acid and citric acid. In a first step, a polycondensation reaction of glycerol to polyglycerol-3 is carried out. Polyglycerol-3 is subsequently esterified with stearic acid and a substoichiometric amount of citric acid.

- TEGO® Care PSC 3 provides excellent stabilization for all types of classical O/W creams and lotions.
- TEGO® Care PSC 3 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 TEGO® Care PSC 3 is approx. 3.0 % in creams and 1.5 – 3.0 % in lotions.
- Typical oil phase contents of emulsions based on TEGO® Care PSC 3 are 20 – 35 % for creams and 10 – 25 % for lotions.
- TEGO® Care PSC 3 has been optimized to 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 3.0% TEGO® Care PSC 3 with 2.5 – 4.0 % consistency enhancers. Suitable combinations include TEGIN® M Pellets (Glyceryl Stearate) and TEGO® Alkanol 18 (Stearyl Alcohol) in a ratio of 70:30 or 50:50. In most O/W lotions, 2 – 3 % of TEGO® Care PSC 3 is already sufficient to obtain the desired viscosity and stability profile, without additional consistency enhancers.
- TEGO® Care PSC 3 can either be used in combination with polyacrylate-based thickeners or, in natural formulation types, without using polyacrylates.
- It is recommended to combine TEGO® Care PSC 3 with Xanthan Gum (0.2 % 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 – 0.2 % of TEGO® Carbomer 134 in creams and 0.1 – 0.3 % of TEGO® Carbomer 141 for lotions. As the amount of consistency enhancers can be reduced when using Carbomers, the overall sensory profile can change towards a lighter skin feel.
- TEGO® Care PSC 3 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 TEGO® Care PSC 3 can be adapted by altering the oil phase content, the consistency enhancer content, the polymer thickener content and the type of oils.
- TEGO® Care PSC 3 is particularly recommended for the formulation of face and body care products. As it is a natural based emulsifier, it also represents an interesting option for baby care products.
- Emulsions based on TEGO® Care PSC 3 in general have a good compatibility with active ingredients and UV filters.

Preparation

TEGO® Care PSC 3 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 Ceteareth-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.

It is recommended that thickeners, such as Carbomers or alkyl modified Carbomers, are dispersed in oil and then added to the emulsion. The dispersion of TEGO® Carbomer 141, TEGO® Carbomer 134 or TEGO® Carbomer 341 ER in oil (e. g. in mineral oil, ethylhexyl stearate; not in triglycerides) is added at 60 °C. Then, the emulsion is homogenized again.

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 - 3.0 % TEGO® Care PSC 3

Packaging

600 kg pallet (24 x 25 kg)

Hazardous goods classification

Information concerning

- classification and labelling according to regulations for transport and for dangerous substances
- protective measures for storage and handling
- measures in accidents and fires
- toxicity and ecological effects

is given in our material safety data sheets.

Guide Line Formulations

Natural Wellness Body Lotion F 11/10-16	
Phase A	
TEGO® Care PSC 3	3.00 %
TEGOSOFT® CT (Caprylic/Capric Triglyceride)	4.00 %
TEGOSOFT® OER (Oleyl Erucate)	3.00 %
Prunus Amygdalus Dulcis Oil	5.00 %
Phase B	
Water	80.50 %
Glycerin	3.00 %
Phase C	
Xanthan Gum (Keltrol CG-SFT, CP Kelco)	0.50 %
Phase D	
Sodium Hydroxide (10 % in water)	0.20 %
Phase E	
Benzyl Alcohol; Glycerin; Benzoic Acid; Sorbic Acid (Rokonsal BSB-N, ISP)	0.80 %
Phase Z	
Perfume	q. s.

Preparation:

1. Heat phase A and B separately to 70 – 75 °C.
2. Add phase A to phase B with stirring[1)].
3. Homogenize.
4. Cool with gentle stirring.
5. Add phase C at 40 °C.
6. Homogenize for a short time.
7. Add phase D.
8. Add phase E and adjust pH to 5.0 – 5.5.

[1)] Important:
If phase A has to be charged into the vessel first, phase B must be added **without stirring**.

All-natural Face & Body Cream F 11/10-17	
Phase A	
TEGO® Care PSC 3	3.00 %
TEGIN® M Pellets (Glyceryl Stearate)	1.20 %
TEGO® Alkanol 18 (Stearyl Alcohol)	1.30 %
TEGOSOFT® OER (Oleyl Erucate)	5.00 %
TEGOSOFT® CT (Caprylic/Capric Triglyceride)	8.50 %
Persea Gratissima Oil	6.00 %
Phase B	
Water	67.00 %
Glycerin	3.00 %
Phase C	
Water	3.80 %
Xanthan Gum (Keltrol CG-SFT, CP Kelco)	0.20 %
Phase D	
Sodium Hydroxide (10 % in water)	0.20 %
Phase E	
Benzyl Alcohol; Glycerin; Benzoic Acid; Sorbic Acid (Rokonsal BSB-N, ISP)	0.80 %
Phase Z	
Perfume	q. s.

Preparation:

1. Heat phase A and B separately to 70 – 75 °C.
2. Add phase A to phase B with stirring[1)].
3. Homogenize.
4. Cool with gentle stirring and add phase C below 40 °C.
5. Add phase D.
6. Add phase E and adjust pH to 5.0 – 5.5.

[1)] Important:
If phase A has to be charged into the vessel first, phase B must be added **without stirring**.

High Caring O/W Natural Cream (35 % oil phase) F 21/10-10	
Phase A	
TEGO® Care PSC 3	3.00 %
TEGIN® M Pellets (Glyceryl Stearate)	2.00 %
TEGO® Alkanol 18 (Stearyl Alcohol)	1.00 %
TEGOSOFT® P (Isopropyl Palmitate)	8.00 %
TEGOSOFT® CT (Caprylic/Capric Triglyceride)	11.00 %
Prunus Amygdalus Dulcis Oil	10.00 %
Phase B	
Water	61.00 %
Glycerin	3.00 %
Phase C	
Sodium Hydroxide (10 % in water)	0.20 %
Phase D	
Benzyl Alcohol; Glycerin; Benzoic Acid; Sorbic Acid (Rokonsal BSB-N, ISP)	0.80 %
Phase Z	
Perfume	q. s.

Preparation:

1. Heat phase A and phase B separately to 70 – 75 °C.
2. Add phase A to phase B with stirring[1)].
3. Homogenize.
4. Cool with gentle stirring and add phase C below 40 °C.
5. Add phase D and adjust the pH to 5.0 – 5.5.

[1)] Important:
If phase A has to be charged into the vessel first, phase B must be added **without stirring**.

Natural Light O/W Lotion (10 % oil phase) MK 9/10-1	
Phase A	
TEGO® Care PSC 3	1.50 %
TEGIN® M Pellets (Glyceryl Stearate)	0.50 %
TEGO® Alkanol 18 (Stearyl Alcohol)	0.50 %
TEGOSOFT® CT (Caprylic/Capric Triglyceride)	4.50 %
TEGOSOFT® P (Isopropyl Palmitate)	3.00 %
Phase B	
Water	85.90 %
Glycerin	3.00 %
Phase C	
Xanthan Gum (Keltrol CG-SFT, CP Kelco)	0.20 %
Phase D	
Sodium Benzoate; Potassium Sorbate; Aqua (Euxyl K 712, Schülke GmbH)	0.90 %
Phase Z	
Perfume	q. s.

Preparation:

1. Heat phase A and phase B separately to 70 – 75 °C.
2. Add phase A to phase B with stirring[1)].
3. Homogenize.
4. Cool with gentle stirring.
5. Add phase C at 40 °C.
6. Homogenize for a short time.
7. Add phase D and adjust the pH to 5.0 – 5.5.

[1)] Important:
If phase A has to be charged into the vessel first, phase B must be added **without stirring**.

Rejuvenating Facial Cream F 11/10-9	
Phase A	
TEGO® Care PSC 3	3.00 %
TEGIN® M Pellets (Glyceryl Stearate)	1.50 %
TEGO® Alkanol 18 (Stearyl Alcohol)	1.00 %
TEGOSOFT® CT (Caprylic/Capric Triglyceride)	10.00 %
TEGOSOFT® OP (Ethylhexyl Palmitate)	7.50 %
TEGOSOFT® TIS (Triisostearin)	2.00 %
Phase B	
Water	70.10 %
HyaCare® 50 (Hydrolyzed Hyaluronic Acid)	0.10 %
Glycerin	3.00 %
Phase C	
TEGO® Carbomer 134 (Carbomer)	0.20 %
TEGOSOFT® OP (Ethylhexyl Palmitate)	0.80 %
Phase D	
Sodium Hydroxide (10 % in water)	q. s.
Phase E	
Phenoxyethanol; Methylparaben; Propylparaben; Ethylparaben (Phenonip XB, Clariant AG)	0.80 %
Phase Z	
Perfume	q. s.

Preparation:

1. Heat phase A and B separately to approx. 80 °C.
2. Add phase A to phase B with stirring[1)].
3. Homogenize.
4. Cool with gentle stirring to approx. 60 °C and add phase C.
5. Homogenize for a short time.
6. Cool with gentle stirring and add phase D and phase E below 40 °C.

[1)] Important:
If phase A has to be charged into the vessel first, phase B must be added **without stirring**.

Daily Skin Renewal Body Lotion FU 16/09-5	
Phase A	
TEGO® Care PSC 3	3.00 %
TEGOSOFT® CT (Caprylic/Capric Triglyceride)	5.00 %
TEGOSOFT® OP (Ethylhexyl Palmitate)	5.00 %
TEGOSOFT® E (PPG-15 Stearyl Ether)	2.00 %
Phytosphingosine SLC (Salicyloyl Phytosphingosine)	0.20 %
Phase B	
Water	80.00 %
Glycerin	3.00 %
Phase C	
TEGO® Carbomer 141 (Carbomer)	0.20 %
TEGOSOFT® OP (Ethylhexyl Palmitate)	0.80 %
Phase D	
Sodium Hydroxide (10 % in water)	q.s.
Phase E	
Dipropylene Glycol; Methylparaben; Ethylparaben; Aqua; Methylisothiazolinone (Microcare MEM, Thor GmbH)	0.80 %
Phase Z	
Perfume	q. s.

Preparation:

1. Heat phase A and B separately to approx. 80 °C.
2. Add phase A to phase B with stirring[1)].
3. Homogenize.
4. Cool with gentle stirring to approx. 60 °C and add phase C.
5. Homogenize for a short time.
6. Cool with gentle stirring and add phase D and phase E below 40 °C.

[1)] Important:
If phase A has to be charged into the vessel first, phase B must be added **without stirring**.

Balancing & Smoothing Face Cream SG 5/11-2 SPF 30 high UVA	
Phase A	
TEGO® Care PSC 3	3.00 %
TEGIN® M Pellets (Glyceryl Stearate)	1.00 %
TEGO® Alkanol 1618 (Cetearyl Alcohol)	0.50 %
TEGOSOFT® OS (Ethylhexyl Stearate)	5.00 %
TEGOSOFT® TN (C_{12-15} Alkyl Benzoate)	5.00 %
TEGOSOFT® OER (Oleyl Erucate)	2.00 %
TEGOSOFT® MM (Myristyl Myristate)	1.00 %
Diethylamino Hydroxybenzoyl Hexyl Benzoate (Uvinul A Plus, BASF SE)	4.00 %
Octocrylene	2.00 %
Ethylhexyl Triazone (Uvinul T 150, BASF SE)	3.00 %
Phase B	
TEGO® Sun T 805 (Titanium Dioxide; Trimethoxycaprylyl-silane)	2.00 %
Xanthan Gum	0.40 %
Phase C	
Glycerin	2.00 %
Water	65.40 %
TEGO® Cosmo LSG (Hydrolyzed Sclerotium Gum)	0.20 %
Phase D	
HyaCare® Filler CL (Aqua; Ethylhexyl Stearate; Sodium Hyaluronate Crosspolymer; Polyglyceryl-4 Diisostearate/Polyhydroxystearate/Sebacate; Sodium Isostearate)	2.50 %
Phase E	
Phenoxyethanol; Methylparaben; Propylparaben; Ethylparaben (Phenonip XB, Clariant AG)	1.00 %

Preparation:

1. Heat phase A and phase C separately to 80 °C.
2. Add phase B to phase A and disperse the pigment.
3. Add phase A/B to phase C with stirring[1)].
4. Homogenize.
5. Cool with gentle stirring and add phase D below 40 °C.
6. Cool with gentle stirring and add phase E below 30 °C.

[1)] Important:
If phase A has to be charged into the vessel first, phase B must be added **without stirring**.

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Evonik Industries AG Goldschmidtstraße 100 45127 Essen, Germany
P.O. BOX 45116 Essen PHONE +49 201 173-2854 FAX +49 201 173-1828
personal-care@evonik.com www.evonik.com/personal-care

EVONIK INDUSTRIES

Edition 10
15 February 2012
Mat. Number 209702

TEGO® Care PSC 3

Product data record

1. General information

1.1 Manufacturer/Supplier

Evonik Industries AG
Business Line Personal Care
Goldschmidtstrasse 100
D-45127 Essen / Germany
Phone: +49 (201) 173-2524
Fax: +49 (201) 173-1828
personal-care@evonik.com
http://www.evonik.com/personal-care

1.2 Product Description

1.2.1 Raw material category

O/W Emulsifier

1.2.2 Ingredients according to INCI

Polyglyceryl-3 Dicitrate/Stearate

1.2.3 Composition

Components	Source	Ratio
Polyglyceryl-3 Dicitrate/Stearate	vegetable	100 %

1.2.4 Solvents, preservatives and other additives

Ingredient	CAS No.	EINECS / EC No.	content [%]	Function
no additives				

No components which are listed in Annex II of the Regulation (EC) No 1223/2009 and its modifications and updates are added to and are not to be expected in the above mentioned product due to the raw materials used and the production process.

2. Information on production process

General description of production process:
Conversion of polyglycerol with fatty acids and citric acid

The product is not irradiated.

TEGO® Care PSC 3 is produced in the strictest absence of any animal derived material of any type.

Origin of vegetable starting material: palm

GMO-Status:
The item does not contain ingredients that might have been derived from GM sources
However max 0.9 % cross-contamination is possible. Any protein or DNA is not present.
Consequently the product will be PCR negative when tested.

2.1 By products

		method
Residual solvents	not applicable	
Residual monomers	not applicable	
Free amines	not applicable	
Nitrosamines	not applicable	
Monochloroacetic acid	not applicable	Chromatography
Dichloroacetic acid	not applicable	Chromatography
1,4-Dioxane	not applicable	
Pesticides	meets the valid regulatory requirements for limits on agricultural pesticides	
Heavy metals (Cu; Pb; Sn; Pt; Pd; Hg; As; Cd; Ni)	max. 20 ppm	AAS-ICP
Hg; As; Cd; Ni respective	max. 1 ppm	AAS-ICP
Latex	not to be expected in the product due to the raw materials used and the production process	
VOC	< 3 % according to SR (Swiss Right) 814.018	

2.2 CMR (Carcinogenic, Mutagenic or Reprotoxic)

The use in cosmetic products of substances classified as CMR substances, of category 1A or 1B or 2 under Part 3 of Annex VI to Regulation (EC) No 1272/2008 shall be prohibited.

Further Information:
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:342:0059:0209:en:PDF

Some of the CMR substances listed in Annex VI to Regulation (EC) No 1272/2008 are used as starting materials for the production of our cosmetic raw materials.
Some of the CMR substances mentioned below and listed in Annex VI to Regulation (EC) No 1272/2008 are used as starting materials for the production of our cosmetic raw materials and

may require California reporting under Proposition 65 or the Safe Cosmetics Act, SB 484.

CMR substance	Starting material	max. concentration	method
Ethylene Oxide	no		
Propylene Oxide	no		
Octamethylcyclotetrasiloxane (D4)	no		
2-Ethylhexanoic Acid	no		
n-Hexane	no		
Methyl Chloride	no		
Dimethyl Sulphate	no		

2.3 "Allergens" according to the Regulation (EC) No 1223/2009

The presence of substances, the mention of which is required under the column 'Other' in Annex III, shall be indicated in the list of ingredients in addition to the terms parfum or aroma.

The cosmetic raw materials and the cosmetic actives supplied by Evonik Personal Care are manufactured without the use of perfumes and fragrances. An analytical proof for the absence in traces of the substances to be mentioned in addition to the terms parfum or aroma is not performed in cosmetic raw materials, which are chemically produced.

None of these substances have been intentionally added to our cosmetic raw materials or are formed during the manufacturing process according to our knowledge of the chemistry.

2.4 Food Ingredients listed in Annex IIIa of Commission Directive 2007/86/EC.

None of these substances have been intentionally added to our cosmetic raw materials or are formed during the manufacturing process according to our knowledge of the chemistry.

3. Microbiological status

Total Viable Count	max. 100 cfu/g
Pathogens	absent/g

4. Shelf life / storage conditions

24 months after production (unopened original packaging)

5. Regulatory Status

5.1 Customs tariff number 34021300

5.2 Regulatory status (chemical regulations)

Europe

Components	REACH status	CAS No.	EINECS / EC No.
Polyglyceryl-3 Dicitrate/Stearate	Polymer	1208985-39-0	Polymer

Other countries

Country		yes / no	Remark
Australia	AICS:	no	
China	IECSC:	yes	up to 120 tons/year
Canada	DSL: NDSL:	no	but notified by Evonik Goldschmidt Canada for <10000 Kg/a

In the following countries the relevant authorities currently do not require pre-market approval for cosmetic raw materials:

Brazil, Japan, South Korea, Philippines, USA

5.2.1 Regulatory status (cosmetic regulation)

Country		yes / no	Remark
China	SFDA:	no	
Japan	JSQI:	no	

6. Toxicology and Ecotoxicology

Refer to summary of ecotoxicological and toxicological data

7. Certificates

none	

Evonik Industries AG

Product Line Personal Care
Goldschmidtstrasse 100
D-45127 Essen
Phone: + 49 (201) 173-2524
Fax: + 49 (201) 173-1828
personal-care@evonik.com
http://www.evonik.com/personal-care

Product specification

TEGO CARE PSC 3

Substance No:	209702
Spec.Code:	S00: STANDARD
Version:	1
Version from:	23.02.2010
Print-out date:	02.08.2011

Insp. Characteristic	Method	Limits	Unit	
Colour to Gardner	GM_0140_01	< = 5,0	Gardner	X
Acid Value	GM_0010_01	< = 5,0	mg KOH/g	X
Saponification Value	GM_0030_01	130 - 160	mg KOH/g	X
Melting Point	GM_0150_01		°C	X

Print on inspection document:
X = Actual measured value reported.
C = 'Conforms' is printed as characteristic value.

This print-out is valid unsigned.