Technical Information

# TEGO® Solve 55 / TEGO® Solve 90

## PEG-free solubilizers for essential oils and perfume oils

### Benefits at a glance

- Effective solubilization of essential and perfume oils in water based systems
- Fully based on renewable raw materials
- PEG-free
- Easy to handle, cold processable
- Very low impact on foaming
- Very mild cleansing properties and mitigating in surfactant solutions
- Excellent make-up removing properties
- Moisturizing benefits
- Suitable for AP/deo formulations with high content of aluminum chlorohydrate
- Very low influence on colour and odour of final formulation
- China IECIC listed INCI name for TEGO® Solve 90

### INCI (PCPC name)

**TEGO® Solve 55:** Polyglyceryl-3 Caprylate/Caprate/Succinate (and) Propylene Glycol

**TEGO® Solve 90:** Polyglyceryl-6 Caprylate (and) Polyglyceryl-4 Caprate

### Certificates

**TEGO® Solve 90:** Cosmos & Ecocert certification

**Chemical and physical properties (not part of specifications)**

| | |
|---|---|
| Appearance | Clear to turbid, colourless to slightly yellow liquids |
| CMC | Approx. 0.1 – 0.5 g/l |
| Surface tension at RT (0.5% TEGO® Solve 90 or 1.0% TEGO® Solve 55 in $H_2O$) | ~ 26 mN/m |
| HLB (experimental) | ~ 15 |
| Solvent in TEGO® Solve 55 | ~ 25% Propylene Glycol (100% natural based): |
| Solvent in TEGO® Solve 90 | ~ 10% water |

### Properties

TEGO® Solve 55 and TEGO® Solve 90 provide very good **solubilizing properties for essential oils** (e.g. Rosemary, Lavender or Lemongrass oil) as well as for perfume oils.

Figure 1 demonstrates their efficacy compared to PEG-40 Hydrogenated Castor Oil, a market standard solubilizer, and their superior efficacy compared to an existing PEG-free solubilizer (Polyglyceryl-4 Caprate).

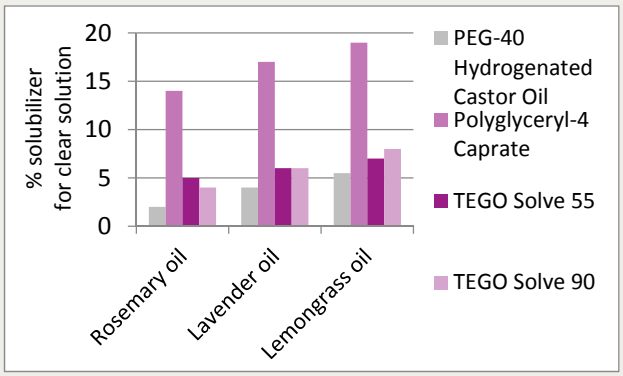


**Figure 1:** Solubilization of 1.0% essential oil in water

The solubilization performance of TEGO® Solve 55 and TEGO® Solve 90 are almost the same with just minor differences.

Figure 2 shows the **solubilizing efficacy** of TEGO® Solve 55 **for various perfume oils** in water. It is comparable with PEG-40 Hydrogenated Castor oil and outperforms the PEG-free benchmark. Very similar results are found for TEGO® Solve 90.

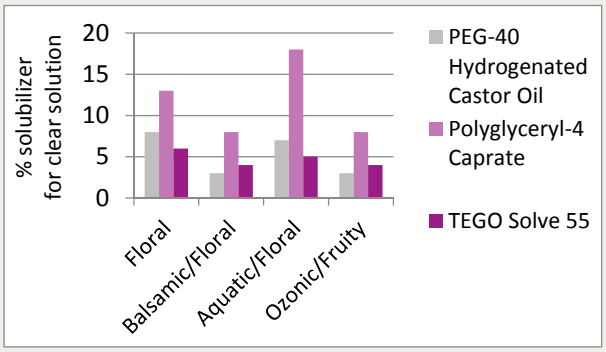


**Figure 2:** Solubilization of 1.0% perfume oil in water with TEGO® Solve 55

| | |
|---|---|
| Floral: | Freesia – Lily Of The Valley – Rose, in DPG |
| Balsamic/Floral: | Fruity – Aldehyde – Musk, in DPG |
| Aquatic/Floral: | Balsamic – Powdery – Sandalwood, in DPG |
| Ozonic/Fruity: | Citrus – Melon – Musk, in DPG |

(All perfumes from IFF Fragrance GmbH)

TEGO® Solve 55 and TEGO® Solve 90 are also **suitable for AP/Deo applications** with Aluminum Chlorohydrate (ACH). Figure 3 shows the solubilizing efficacy of TEGO® Solve 55 for different perfume oils in an AP/Deo roll-on formulation including 20% ACH. Depending on the perfume, TEGO® Solve 55 is able to outperform the standard PEG-40 Hydrogenated Castor Oil. Compared to the PEG-free benchmark, the efficacy is significant better.

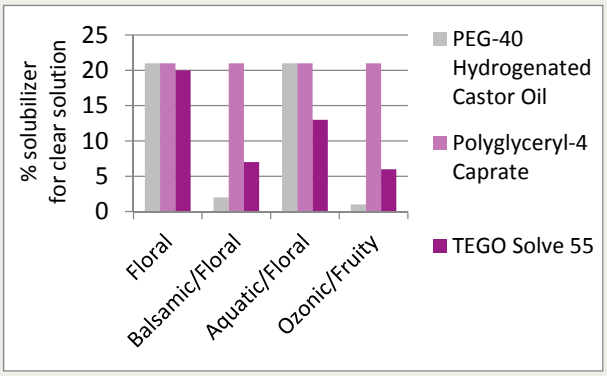


**Figure 3:** Solubilization of 1.0% perfume oil in deo roll-on including 20% ACH

TEGO® Solve 55 and TEGO® Solve 90 are able to **efficiently remove make-up**. This was tested in comparison to common solubilizers, which are already used for this application.

Figure 4 indicates the make-up removal efficacy, tested with an internal standard method. A long lasting make-up was applied with a defined thickness on frosted Polymethylmethacrylate (PMMA) plates.

After a defined time of drying, the make-up was removed in a standardized way by using cotton pads soaked with defined amounts of the test product.

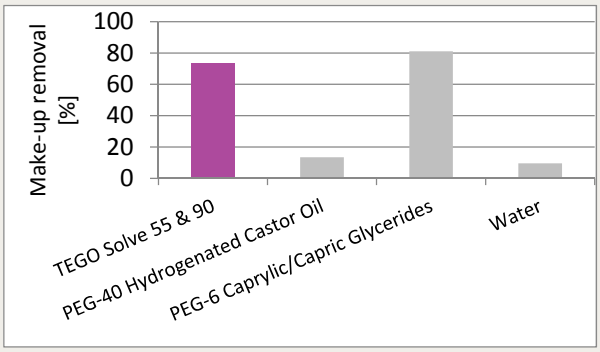


**Figure 4:** Make-up removal test results –3% in water

TEGO® Solve 55 and TEGO® Solve 90 are **ultra-mild surfactants** according to RBC tests and show mildness improvement in surfactant solutions. They can give good skin feel properties and act as humectants to provide **moisturizing benefits** (Corneometer studies).

TEGO® Solve 55 and TEGO® Solve 90 are **low foaming in water**, so pre-mixes with perfume or essential oils and water can easily be prepared. In surfactant mixtures no effect on the foaming properties has been observed.

Furthermore, TEGO® Solve 55 and TEGO® Solve 90 show almost no influence on the odor or color of the final formulations and just have a **low influence on the viscosity of surfactant formulas**.

TEGO® Solve 55 and TEGO® Solve 90 are completely based on renewable raw materials.

## Application

TEGO® Solve 55 and TEGO® Solve 90 can be used in e.g.:

- Oil baths
- Make-up remover, “micellar water”
- Facial cleansers
- Perfumes and tonics
- AP/Deo formulations
- Wet wipes
- Hair and body shampoos

## Suggested usage concentration

1.0 – 25.0% TEGO® Solve 55/TEGO® Solve 90

## Processing

The necessary amount of any solubilizer is highly dependent on oil quality, solubilizer quality, water hardness, pH, temperature, formulation composition and processing method (e.g. speed of water phase addition).

Processing at room temperature is easily possible with TEGO® Solve 55 and TEGO® Solve 90.

Best results for solubilization:

- Blend the oil with TEGO® Solve 55 or TEGO® Solve 90
- Add water or surfactant mixture very slowly initially (later on it can be added faster)

Combination with TEGO® Solve 61 is recommended for perfumes based on or solubilized with fatty oils (e.g. soy bean oil). This can lead to a higher efficacy: therefore mix the suitable solubilizer with the respective oils and water beforehand and then mix.

Recommended pH range: approx. 4 – 7.

## Storage

Under storage the products tend to get turbid. This is a typical behavior and indicates no loss in application behavior or performance. In case of some small precipitate, the products should be homogenized at ~30 °C.

TEGO® Solve 90 should be stored at temperatures below 30 °C.

## 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

### Micellar water, PEG-free
### UL 5803/15

| | |
|---|---|
| TEGO® Solve 55 | 2.00% |
| Perfume | 0.05% |
| Water | Ad 100.00% |
| TEGO® Betain 810 (Capryl/Capramidopropyl Betaine) | 1.30% |
| TEGO® Natural Betaine (Betaine) | 2.00% |
| Hexylene Glycol | 1.40% |
| Glycerine | 1.00% |
| Preservative | q. s. |

### Preparation

Mix the ingredients in the given order.

### Remarks

Clear, water-thin solution. pH = 5.0.
3-in-1: cleanses, removes make-up, soothes.
Removes even waterproof eye make-up.
Application with a cotton pad. No rinsing required.

### Micellar water for gentle and efficient make-up removal, PEG-free
### BK 484/2

| | |
|---|---|
| TEGO® Solve 90 | 1.00% |
| Perfume Pink Grapefruit (IFF Fragrance GmbH) | 0.05% |
| TEGO® Betain 810 (Capryl/Capramidopropyl Betaine) | 1.30% |
| TEGO® Solve 61 (Polygylceryl-6 Caprylate; Polyglyceryl-3 Cocoate; Polyglyceryl-4 Caprate; Polyglyceryl-6 Ricinoleate) | 1.00% |
| Water | Ad 100.00% |
| TEGO® Natural Betaine (Betaine) | 2.00% |
| Glycerine | 1.00% |
| Preservative | q. s. |

### Preparation

Mix the ingredients in the given order.

## Remarks

Clear, water-thin solution. pH = 5.0.
3-in-1: cleanses, removes make-up, soothes.
Removes even waterproof eye make-up.
Application with a cotton pad. No rinsing required.

### Clear Deo roll-on, PEG- & Ethanol-free
### WP 513/4

| | |
|---|---|
| **Phase A** | |
| TEGO® Solve 55 | 2.00% |
| Perfume Spicy Herbs (IFF Fragrance GmbH) | 0.20% |
| **Phase B** | |
| Water | Ad 100.00% |
| Hydroxyethyl Cellulose | 1.00% |
| **Phase C** | |
| Aluminum Chlorohydrate (50% solution) | 40.00% |
| Preservative | q. s. |

## Preparation

Prepare phase B with warm water (~45 °C) and stir well before adding phase C to it.

Prepare phase A and slowly add the premixed phases B – C. Mix well.

## Remarks

pH = 4.0. Viscosity (Brookfield, 25 °C):
~3750 mPas. Under prolonged storage at 40 °C the formulation could get turbid at 40 °C, but gets clear again at RT.

### Moisturizing, clear wet-wipe liquid, PEG-free
### UW 1263/2

| | |
|---|---|
| **Phase A** | |
| TEGO® Solve 61 (Polygylceryl-6 Caprylate; Polyglyceryl-3 Cocoate; Polyglyceryl-4 Caprate; Polyglyceryl-6 Ricinoleate) | 1.50% |
| Caprylic/Capric Triglyceride | 0.20% |
| **Phase B** | |
| TEGO® Solve 55 | 0.40% |
| Perfume Sky (IFF Fragrance GmbH) | 0.10% |
| **Phase C** | |
| Water | Ad 100.00% |
| Propylene Glycol | 3.00% |
| ABIL® ME 45 (Silicone Quaternium-22; Polyglyceryl-3 Caprate; Dipropylene Glycol; Cocamidopropyl Betaine) | 0.50% |
| **Phase Z** | |
| Preservative, Citric Acid | q. s. |

## Preparation

Premix phases A and B separately. Add B to A and mix.

Slowly add the premixed phase C and stir for approx. 30 min. Add preservative and adjust the pH with Citric Acid.

## Remarks

pH = 5.5.

A 10/17



**Evonik Nutrition & Care GmbH**
Goldschmidtstraße 100
45127 Essen, Germany
PO Box, 45116 Essen, Germany
Phone +49 201 173 2546
Fax +49 201 173 712546
personal-care@evonik.com
**www.evonik.com/personal-care**

EVONIK
POWER TO CREATE

## Product specification

**Material** TEGO SOLVE 90
**Spec.Code** K00 STANDARD

**Evonik Nutrition & Care GmbH**
Personal Care Business Line
Goldschmidtstrasse 100
45127 Essen
Phone: +49 (201) 173-2524
Fax: +49 (201) 173-1828
http://www.evonik.com/personal-care
personal-care@evonik.com

| Inspection Characteristics | Method | Limits | Units | Z |
|---|---|---|---|---|
| Colour to Gardner | GM_0140_01 | <= 4.0 | Gardner | X |
| Acid Value | GM_0010_01 | <= 5.0 | mg KOH/g | X |
| Saponification Value | GM_0030_01 | 38.0 - 50.0 | mg KOH/g | X |
| Appearance 25°C | GM_0170_00 | OK | | X |
| Water Content | GM_0080_01 | 9.0 - 11.0 | % | X |

| | |
|---|---|
| Appearance 25°C | OK |

Report on inspection certificate: X = specific/actual value, C = unspecific value/conformity, T = not reported

Appearance 25°C: clear to turbid, yellowish liquid

This product only starting with an E in the batch
number is certified according to the rules set out by the
RSPO, Supply Chain Mass balance (MB).
RSPO Certification RSPO-V-14-13553.

This document is computer printed and therefore valid without signature.



The Standard Test Methods can be obtained from specialized publishers. Evonik's test methods are available on request.

Edition 2
29 September 2017
Mat. Number 59410

# TEGO® Solve 90

## Product data record

## 1. General information

### 1.1 Manufacturer/Supplier

Evonik Nutrition & Care GmbH
Personal Care Business Line
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** Solubilizer

**1.2.2 Ingredients according to INCI**

Polyglyceryl-6 Caprylate (and) Polyglyceryl-4 Caprate

**1.2.3 Composition**

| Components | Source | Ratio |
|---|---|---|
| Polyglyceryl-6 Caprylate | vegetable | approx. 45 % |
| Polyglyceryl-4 Caprate | vegetable | approx. 45 % |
| Water | | approx. 10 % |

This composition information serves for information of our customers only.
It is neither relevant for the composition listing according to Regulation (EC) No 1223/2009, nor does it reflect the chemical composition according to the different chemical regulations in the world which is disclosed in the table "information on ingredients/hazardous components" in the relevant parts of the respective (Material) Safety Data Sheets.

**1.2.4 Solvents, preservatives and other additives**

| | CAS No. | EINECS / EC No. | content | Function |
|---|---|---|---|---|
| Water | 7732-18-5 | 231-791-2 | approx. 10 % | solvent |

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:
Esterification of fatty acids with polyglycerol.

The product is not irradiated.

TEGO® Solve 90 is produced in the strictest absence of any animal derived material of any type.

Origin of vegetable starting material: rapeseed oil, palm kernel oil

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 |
|---|---|---|
| 1,4-Dioxane | not applicable | |
| Residual solvents | not applicable | |
| Monochloroacetic acid | not applicable | |
| Dichloroacetic acid | not applicable | |
| Free amines | not applicable | |
| Nitrosamines | not applicable | |
| Pesticides | meets the valid regulatory requirements for limits on agricultural pesticides | |
| Total heavy metals | max. 20 ppm | AAS-ICP |
| As, Cd, Co, Cr, Hg, Ni, Pb, Sb | Each < 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 mentioned below and listed in Annex VI to Regulation (EC) No 1272/2008 are used as starting materials or solvents for the production of our cosmetic raw materials and may require reporting under California Proposition 65 or the Safe Cosmetics Act, SB 484.

The presence of these prohibited substances has to be seen as non-intended. It is stemming from impurities of the starting materials or the manufacturing process which is technically unavoidable in good manufacturing practice.

| 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 mentioning 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 II of Regulation (EU) No 1169/2011

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 |

*Pathogens are: Enterobacteria, Pseudomonas, Enterococci, Candida albicans, Staphylococci

## 4. Shelf life / storage conditions

24 months after production (unopened original packaging)

## 5. Regulatory Status

### 5.1 Customs tariff number 34029010

### 5.2 Regulatory status (chemical regulations)

Europe

| Components | REACH status | CAS No. | EINECS / EC No |
|---|---|---|---|
| Polyglyceryl-6 Caprylate | Polymer | 108777-93-1 | Polymer |
| Polyglyceryl-4 Caprate | Polymer | 74504-65-7 | Polymer |

Other countries

| Country | | yes / no | Remark |
|---|---|---|---|
| Polyglyceryl-6 Caprylate | | | |
| Australia | AICS: | no | |
| China | IECSC: | yes | |
| Canada | DSL:<br>NDSL: | no<br>no | but notified by Evonik Canada Inc. for up to 10 t/year, CAS No. is on the revised ICL list |
| Taiwan | TCSI: | yes | |
| Polyglyceryl-4 Caprate | | | |
| Australia | AICS: | no | |
| China | IECSC: | yes | |
| Canada | DSL:<br>NDSL: | no<br>no | but notified by Evonik Canada Inc. for up to 10 t/year, CAS No. is on the revised ICL list |
| Taiwan | TCSI: | yes | |

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 |
|---|---|---|---|
| Polyglyceryl-6 Caprylate | | | |
| China | CFDA: | yes | |
| Japan | JSQI: | no | |
| Polyglyceryl-4 Caprate | | | |
| China | CFDA: | yes | |
| Japan | JSQI: | no | |

## 6. Toxicology and Ecotoxicology

Refer to summary of ecotoxicological and toxicological data

## 7. Packaging

800 kg (4 x 200 kg drum) on a CP3 pallet