

Fact Sheet Cyclic Polysiloxanes

Cyclic Polysiloxanes namely D4, D5 and D6

This factsheet covers three Silicone polymers, namely D4, D5 and D6. Silicone polymers are also called siloxanes and can best be described as hybrid substances between organic and inorganic chemistry. Cyclic siloxanes can be used as liquids in many different applications, but within the EU cyclic siloxanes are used mostly as precursors during the synthesis of polydimethylsiloxane (PDMS) and other silicone oils. This is the usual reason for their presence as impurities in silicone-products. PDMS has the much desired water-repellency and is the most commonly used siloxane. All three cyclic substances can be present in PDMS and in various other silicone oils from where they do slowly evaporate at room temperature. D4 evaporates faster compared to D6, which is the slowest and most persistent one within this group.

Classification of these cyclic Polysiloxanes

The three polysiloxanes, have been classified as substances of very high concern (SVHCs) under the EU's REACH legislation and these added to the candidate list in 2018. The three siloxanes are classified as persistent, bio-accumulative and toxic (PBT) which would have been sufficient to include them, but they are even very persistent and very bio-accumulative (vPvB) at the same time.

Example:

EU Harmonized classification of D4:

- Toxic to reproduction (category code: 2)
- Chronic aquatic toxicity (category code: 4)

Hazard statement codes:

- H361f Suspected of damaging fertility,
- H413: May cause long lasting harmful effects to aquatic life

Uses of cyclic polysiloxanes

In textile-chemical formulations used as base-fluids and solvers (replacing VOCs):

- carrying agents
- wetting agents
- auxiliaries for fibre extrusion

Impurities may occur in:

- silicone softeners and finishes,
- printing pastes
- silicone coatings

Good to know in case you trace cyclic polysiloxanes in your waste-water:

Outside EU, siloxanes are still widely used in personal care products and medicinal products such as antiperspirants, skin creams and -lotions, suntan-lotions, bath oils and hair-care products, medicinal lice treatments and also in room sprays

They are also used as gloss on photo-paper.

- It is possible to trace polysiloxanes in textile products, particularly when they were used in thicker layers such as in coatings. However, due to their tendency to evaporate their quantification may or may not be possible.

Components/materials:

- Polyester padding and down/feather fillings
- Plastic or rubber material
- further types of fabrics and yarns

Secondary auxiliaries:

- Machinery cleaning agents

CAS No.	Substance
556-67-2	D4 (Octamethylcyclotetrasiloxane)
541-02-6	D5 (Decamethylcyclopentasiloxane)
540-97-6	D6 (Dodecamethylcyclohexasiloxane)

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Recommendation for using silicone compounds:

- Check with your chemical suppliers, in how far there are residues of D4, D5 or D6 present in the chemical products or if any remainders can be expected on the textile products. Within the EU, your chemicals supplier will automatically inform you within the SDS and would try to consider your use.
- If the concentration of D4, D5 or D6 on your product or article exceeds 0.1% (w/w), you are obliged to communicate this to your EU-customers including the name of the substance, and - when marketing directly to the consumer - to label the articles accordingly.
- Another option would be to ask your chemicals supplier for safer alternatives and look for chemical products that do not contain these siloxanes.

Recommendation for importers of siloxane-finished textile products:

- Check whether D4, D5 or D6 are present on the product or article in concentrations exceeding 0.1% (w/w)
 - If so, you are obliged to provide this information to consumers upon request within 45 days.
- As soon as your import exceeds 1 tonne/year (even if hidden in articles) you must also a) label the products and b) inform ECHA.