

Rostabil Series

Antioxidants for polyurethanes

Operating in 17 countries, in 39 different locations, PCC SE currently employs over 3 300 people.



About us

The PCC Group is an international capital structure made up of dozens of companies operating in three major sectors of the economy: Chemicals, Energy and Logistics. The organisations within the PCC Group are both business units engaged in production activities and service companies operating simultaneously for the external market.

The PCC Group is centrally managed by the German company PCC SE and comprises more than 74 companies at 39 locations in 17 countries around the world. One of the key elements of PCC SE's strategy is the dynamic development of the chemicals business by exploiting

the potential of new market segments and diversifying the portfolio of raw materials and chemical formulations in line with current trends in various industries. Every day, our specialists work on the stable growth and development of their organisations, making the PCC Group stronger and building a solid business platform for all contractors interested in reliable and longterm cooperation.

| | | | | |
|---|---|--|--|---|
| PCC ROKITA SA PCC PCG OXYALKYLATES IRPC | PCC ROKITA SA | PCC ROKITA SA | PCC EXOL SA PCC CHEMAX INC PCC PCG OXYALKYLATES | PCC SYNTEZA |
| Polyols  | Chlorine  | Phosphorus  | Surfactants  | Alkylphenols  |
| <ul style="list-style-type: none"> • Polyether polyols • Polyester polyols • Prepolymers • Polyurethane Systems | <ul style="list-style-type: none"> • Chlorine • MCAA • Other Chlorine Downstream Product | <ul style="list-style-type: none"> • Phosphorus derivatives • Naphthalene derivatives • Polycarboxyethers (PCE) | <ul style="list-style-type: none"> • Anionic surfactants • Cationic surfactants • Nonionic surfactants • Amphoteric surfactants (betaines) • Chemical formulation | <ul style="list-style-type: none"> • Nonylphenol • Dodecylphenol • Tristyrylphenol |
| PCC CONSUMER PRODUCTS SA | PCC ROKITA SA | PCC INTERMODAL SA | PCC BAKKISILICON HF. | PCC SE |
| Consumer Products  | Energy  | Logistics  | Silicon  | Holding & Projects  |
| <ul style="list-style-type: none"> • Household & industrial Cleaners, Detergents and Personal Care Products | <ul style="list-style-type: none"> • Renewable Energy • Conventional Energy | <ul style="list-style-type: none"> • Intermodal transport • Road Haulage • Rail Transport | <ul style="list-style-type: none"> • Microsilica • Silicon Metal | <ul style="list-style-type: none"> • Portfolio Management • Project Development |

General information

Rostabil is a series of excellent phosphite-based post-treatment antioxidants for polyurethanes, which protect polyurethane foams against thermal decomposition. Since heat is the most frequent cause of interior browning, these types of additives help

to prevent scorching, especially in low-density comfort foams. In combination with other types of stabilisers, phosphites also contribute to reducing foam discolouration, which appears due to foam ageing.

Applications:

- comfort and high resilience PU foams for mattress fillings
- upholstered furniture

Features

- reduction of scorching in foams
- excellent protection against polymer degradation
- support for long-term colour stabilisation
- high performance at low loadings

Typical properties

| Product name | Chemical name | Appearance | Colour | Density (at 25°C) | Acid value | Refractive index | Phenol content |
|--------------|---------------|---------------|------------|-------------------|-----------------|------------------|-----------------|
| | | visual method | ASTM D1209 | EN ISO 2811 | in-house method | EN ISO 6320 | in-house method |
| | | — | Hazen | g/cm ³ | mgKOH/g | — | % (w/w) |

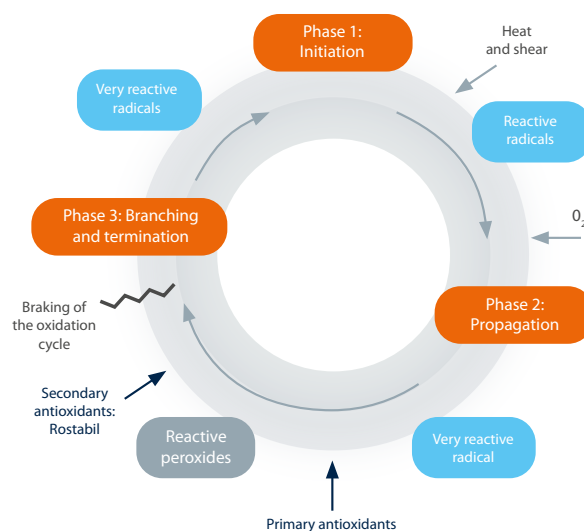
Alkyl phosphites

| | | | | | | | |
|----------------------|--------------------------|-------------------------------|---------|-------|---------|--------|---------|
| Rostabil TDP | triisodecyl phosphite | colourless, homogenous liquid | max 50 | 0.887 | max 0.1 | 1.4547 | max 0.1 |
| Rostabil TTDP | triisotridecyl phosphite | colourless, homogenous liquid | max 100 | 0.884 | max 0.2 | 1.4630 | max 0.1 |

Alkyl-aryl phosphites

| | | | | | | | |
|----------------------|-----------------------------|-------------------------------|---------|-------|---------|--------|-------|
| Rostabil DDPP | disodecyl phenyl phosphite | colourless, homogenous liquid | max 100 | 0.947 | max 0.1 | 1.4817 | max 1 |
| Rostabil DPDP | isodecyl diphenyl phosphite | colourless, homogenous liquid | max 100 | 1.030 | max 0.1 | 1.5214 | max 1 |

A combination of primary and secondary antioxidants is usually applied to maximise the protection against oxidative degradation. Both classes of antioxidants perform different roles in inhibiting oxidation. Primary antioxidants are known as radical scavengers. They quickly react with free radicals during the propagation phase, reducing the effects of degradation by creating more stable radicals. Secondary antioxidants perform a complementary action by reacting with peroxides, which develop when the polymer encounters oxygen. This reaction stops the degradation cycle and prevents the propagation of other undesirable reactions.



Preventing foam discolouration

PU foams show a strong tendency to age rapidly, which leads to yellowing. The addition of antioxidants helps to slow down these negative processes. The table below presents the recommended doses of Rostabil products to delay foam discolouration*. These recommendations are based on CIELAB Colour Space colour

measurements. The foams were stored indoors (21°C, 50–55% humidity) and exposed to daylight for 7 days.

Rostabil DDPP is recommended as the most effective solution for this purpose.

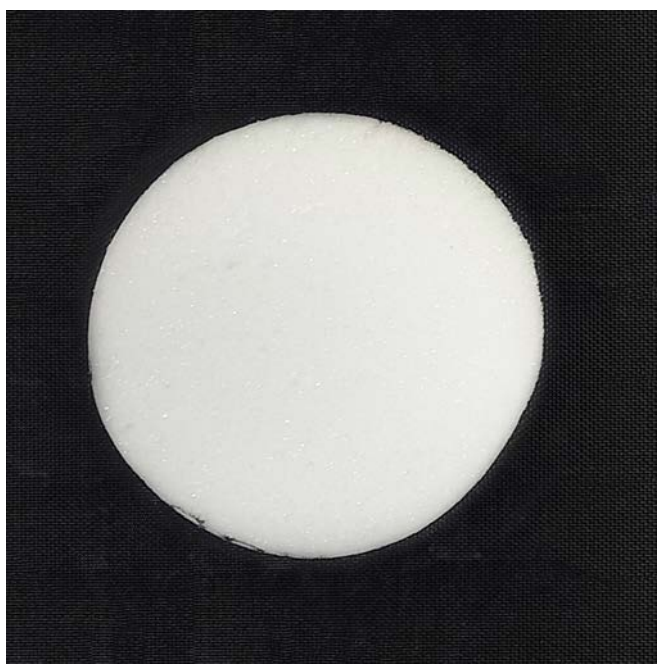
* do not observe significant colour losing if $\Delta E < 3.5$

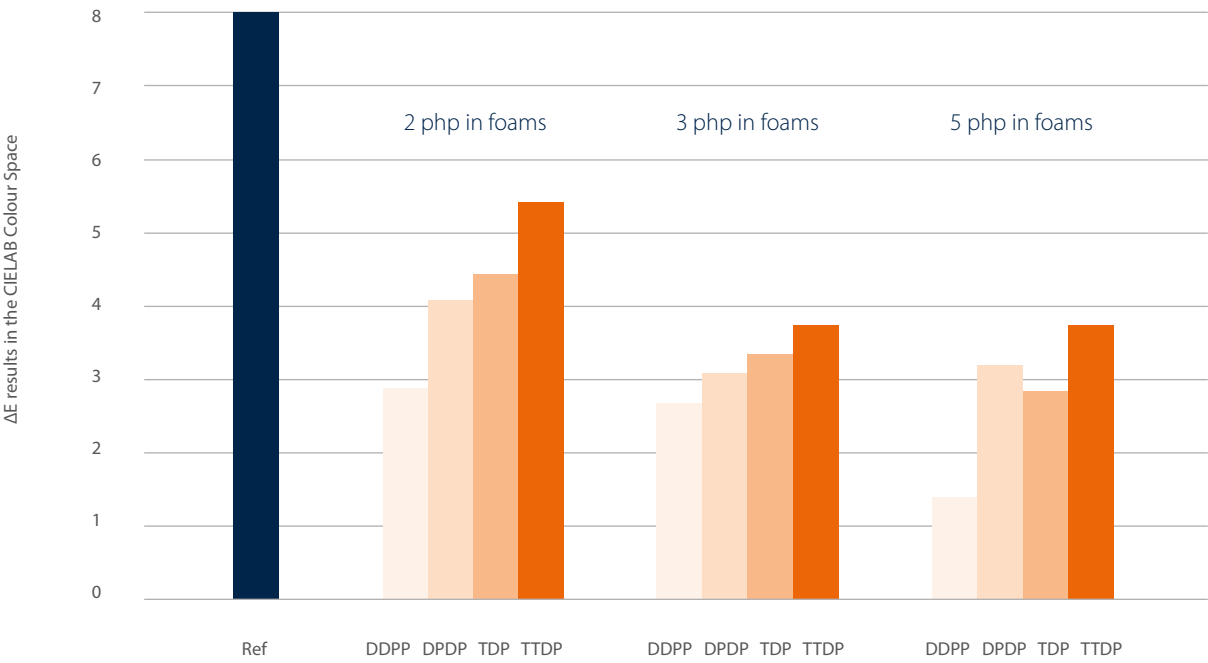
| Product name | Recommended dosages | ΔE results after 7 days |
|---------------|---------------------|---------------------------------|
| Rostabil DDPP | 2 php | 2.9 |
| Rostabil DPDP | 3 php | 3.1 |
| Rostabil TDP | 3 php | 3.3 |
| Rostabil TTDP | 5 php | 2.9 |

Foam without Rostabil,
exposed to daylight by 7 days



Foam containing 2 php Rostabil DDPP,
exposed to daylight by 7 days





Graph 1. Foam colour results after 7 days, depending on different Rostabil concentrations.



Preventing scorching

Since chemical reactions release heat during polyurethane slabstock foaming processes, antioxidants are frequently used in formulations to prevent the heat's negative impact. Rostabil products support other types of antioxidants by boosting their efficiency and ensuring the long service life of materials. Due to its outstanding performance, this product range is also an excellent choice for other materials that require colour protection.

The pictures below demonstrate the performance of **Rostabil TDP** combined with Antioxidant 1010, one of the most common primary phenolic antioxidants. The foams underwent high-temperature curing to induce scorching. Even a small dose of Rostabil TDP enhances the performance of the primary antioxidant, providing improved scorching resistance.

0.3% antioxidant 1010



0.3% antioxidant 1010 + 2% Rostabil TDP





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The information in the catalogue is believed to be accurate and compiled to the best of our knowledge; however, it should be considered as introductory only. Detailed information about our products is available in TDS and MSDS.

The suggestions for product applications are based on our best knowledge.

The responsibility for the use of products in conformity or otherwise with the suggested application, and for determining product suitability for the user's own purposes rests with the user.

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