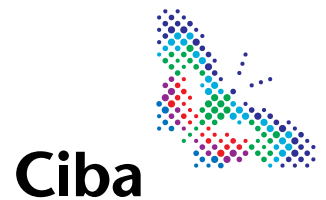


Ciba Specialty Chemicals



Ciba[®] TINUVIN[®] 5050

Ciba[®] TINUVIN[®] 5060

Ciba[®] TINUVIN[®] 5100

Ciba[®] TINUVIN[®] 5151

Ciba[®] TINUVIN[®] 5236

High-value light stabilizer range for Industrial and Decorative Coatings



Coating Effects

Value beyond chemistry

Ciba® CHIMASSORB®
Ciba® CINQUASIA®
Ciba® CROMOPHTAL®
Ciba® DAROCUR®
Ciba® DISPEX®
Ciba® GLASCOL®
Ciba® GRAPHITAN®
Ciba® EFKA®
Ciba® FILAMID®
Ciba® FILESTER®

Ciba® FILOFIN®
Ciba® HORNA®
Ciba® HORNACHROME®
Ciba® HORNATHERM
Ciba® IRGACOLOR®
Ciba® IRGACURE®
Ciba® IRGAFOS®
Ciba® IRGAGUARD®
Ciba® IRGALITE®
Ciba® IRGANOX®

Ciba® IRGAPHOR®
Ciba® IRGAPLASTOL®
Ciba® IRGAROL®
Ciba® IRGASPERSE®
Ciba® IRGAZIN®
Ciba® LIGNOSTAB®
Ciba® MICRANYL®
Ciba® MICROLEN®
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Ciba® ORASOL®
Ciba® RHEOVIS®
Ciba® TINOPAL®
Ciba® TINUVIN®
Ciba® UNISPERSE®
Ciba® UVITEX®
Ciba® VISCALEX®

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Introduction

Coatings subject to outdoor exposure are prone to property alteration and damage caused by environmental factors such as heat, light, humidity, pollutants etc. Among these, ultraviolet radiation emitted by the sun is one of the major factors contributing to coating degradation, caused by the photo-oxidative decay of binders and pigments. Photooxidation refers to a process where polymers undergo progressive chemical modification leading to loss of coating gloss, brittleness, cracking, yellowing or color change, increased water permeability and ultimately coating and in some cases substrate failure. The use of light stabilizers significantly retards photo-oxidative degradation. Appropriate use of hindered amine light stabilizers (HALS), and UV-Absorbers can dramatically improve the durability of coatings.

Ciba® TINUVIN® 5000 series: High-performance at low cost made easy

With its TINUVIN® 5000 series, Ciba Specialty Chemicals offers a range of liquid light stabilizers designed to address the need for improved weather resistance in a variety of industrial and decorative coatings. They consist of benzotriazole and triazine-based UV-Absorbers and HALS chosen to provide maximal performance to specific paint types and systems.

UV-Absorbers prevent the degradation of both coatings and substrates by filtering out the harmful UV energy of sunlight.

HALS stabilizers act as radical scavengers and inhibit the photo-oxidative breakdown reactions. Both work together synergistically to provide enhanced protection and prolonged coating durability.

High-performance, low cost, ease and simplicity of use are the main criteria for the selection and development of the TINUVIN® 5000 series.

Guidelines for using TINUVIN® 5000 light stabilizers

Binders influence to a large extent the compatibility of light stabilizers. It is essential to get a proper distribution of the stabilizers throughout the paint film to achieve maximum efficacy. The TINUVIN® 5000 series can be stirred into all types of coatings according to the guidelines of Table 1.

Dry Film Thicknesses (DFT) directly affect the amount of stabilizers needed, as the absorbance provided by the UV-A correlates with the film thickness. The following amounts are recommended to achieve proper stabilization (light stabilizers % are indicated on dry binder weight):

- 2 to 4% for coatings having DFT 30-40 µm and higher
- 4 to 6% for coatings having DFT 10-20 µm

Pigment Volume Concentrations also play a role when it comes to selecting a light stabilizer combination. Opaque coatings containing high levels of titanium dioxide already absorb or reflect strongly in the UV range, in this case a HALS like TINUVIN® 5100 is appropriate. In low-pigmented (transparent) coatings, with pigments prone to fading and with clear varnishes, a combination of UV-A and HALS is always needed. Table 2 indicates additive recommendations by product end uses.

Applications

- General industrial paints
- Metal finishes such as coatings for agricultural and construction equipments
- Coil coatings for exterior siding
- Heavy duty maintenance and marine coatings
- Coatings for plastics and glass
- Architectural and wood coatings
- Solventborne, waterborne and UV-curable systems

Recommendation by Binder and Media Category

Table 1

Resins	TINUVIN® 5050	TINUVIN® 5060	TINUVIN® 5151	TINUVIN® 5100	TINUVIN® 5236
	UV-A/HALS blends for varnishes and low pigmented systems			HALS for pigmented systems	UV-A blend for clear coatings
Conventional thermoset (Acrylic, alkyd or PES/melamine)	●	○		●	●
Acid-catalyzed paints (Acrylic and PES/melamine)		●		●	●
2 K-PUR systems (Acrylic or PES/NCO)	○		●	○	●
Waterborne systems (Acrylic dispersions, 2K-PUR)	○		●		
Waterborne systems (Alkyd emulsion)		●			○
Thermoplastic solventborne (Acrylics, acrylics/nitrocellulosic, vinylics)	○	●		●	●
Oxidative drying solventborne (Alkyds, phenolics)	○	●		●	●
UV-cured coatings (100% UV and waterborne UV systems)	●		○	●	●

- primary recommendation
- possible alternative

Recommendation by Applications

Table 2

Resins	TINUVIN® 5050	TINUVIN® 5060	TINUVIN® 5151	TINUVIN® 5100	TINUVIN® 5236
	UV-A/HALS blends for varnishes and low pigmented systems			HALS for pigmented systems	UV-A blend for clear coatings
Paints and varnishes for plastics (floor tiles, films, sheets)	○	●		●	●
Composites, gel coats, adhesives	○	●		●	●
Wood coatings, solventborne alkyds	○	●		●	●
Wood varnishes & stains, waterborne alkyds		●			○
Waterborne coating systems (Acrylic dispersions, 2K-PUR)	○		●		
Metal finishes (Acid catalyzed alkyd and polyester/melamine)	○	●		●	●
Heavy duty maintenance (marine, civil engineering, non-acid catalyzed systems)	●		○	●	●
Concrete, ceramic and glass coatings	●			●	●
Consumer products (Vinyl protectors, floor polishes)	○	●		●	●

TINUVIN® 5151 for water borne and TINUVIN® 5050, TINUVIN® 5060, TINUVIN® 5100 and TINUVIN® 5236 for solventborne systems

- primary recommendation
- possible alternative

Performance in Wood coatings

Solventborne alkyd gloss varnish (2 coats applied by brush over a colorless fungicidal pretreatment)
Exposure: 24 months, 45° North, Sidney (Australia).



Without light stabilizers



5% Benzophenone UV-A



3% TINUVIN® 5060

Solventborne alkyd gloss varnish (2 coats applied by brush over a colorless fungicidal pretreatment)
Exposure: 32 months, 45° North, Sidney (Australia).



Without light stabilizers



5% TINUVIN® 1130



2.5% TINUVIN® 5236
+0.5% TINUVIN® 5100

Waterborne semi-gloss wood stain based on acrylic dispersion, with and without pretreatment with LIGNOSTAB® 1198 (aqueous solution). Accelerated test with QUVA-340 (5/1) during 2400 hours.



Without light stabilizers



3% TINUVIN® 5151
In top clear coat



3% TINUVIN® 5151 over
2% LIGNOSTAB® 1198
pretreatment

Coil coatings

Top coat, based on TPA-PVDF,
Dry film thickness 25 µm, over PES primer.
Exposure: 51 months Florida, 5° South



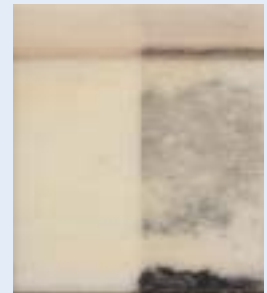
Without light stabilizers



3% TINUVIN® 5151

Plastic coatings

WB acrylic-PU varnish on PC panels,
Dry film thickness 20 µm.
Exposure: 40 months Florida, 5° South

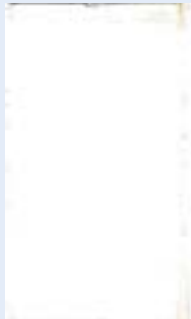
Without stabilizers
(delamination)2% TINUVIN® 5060
+3% TINUVIN® 1130

Coil coatings

Top coat, based on PVC plastisol
Dry film thickness 125 µm over PES primer
Exposure: 72 months Florida, 5° South



Without stabilizers

1% TINUVIN® 5100
(on binder solids)

Stoving enamel

Top coat, alkyd-mel; initial 60° Gloss: 96
Dry film thickness 40 µm over PES primer
Exposure: 24 months Florida, 5° South

Without stabilizers
Gloss: 6, Delta E: 2.92% TINUVIN® 5100
Gloss: 78, Delta E: 0.7

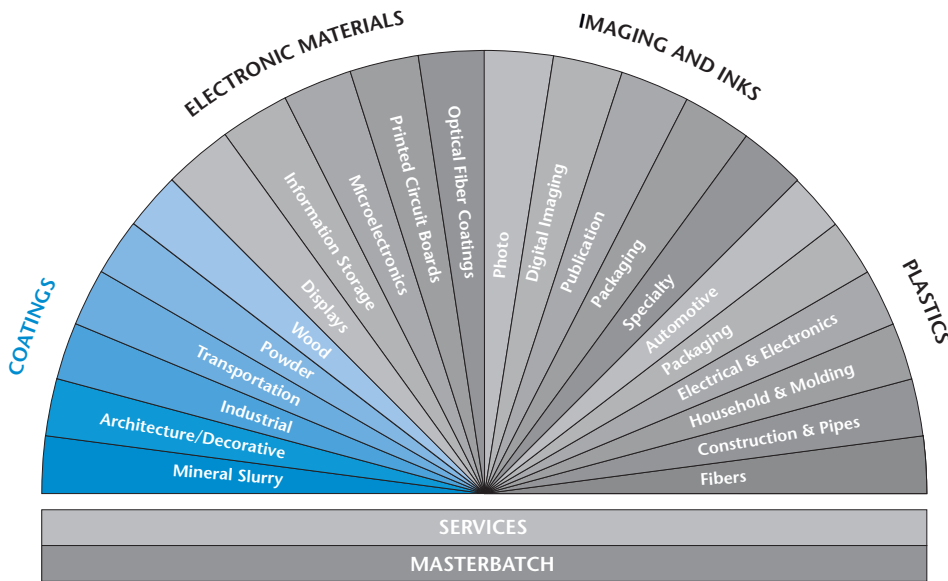
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Ciba Specialty Chemicals Worldwide

We do business in more than 120 countries and have sales representatives and technical expertise available for our customers around the world.

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