

Product Data Sheet

DYHARD® CU-Line

DYHARD® PIN DYHARD® CAAB

DYHARD® PIN + DYHARD® CAAB represent a matt curing agent system for low gloss epoxy and epoxy-polyester hybrid powder coatings. With its ideal cure properties in both powder coating systems, high quality finishes with a very good color stability are obtained.

DESCRIPTION

It is well known in the powder coating industry that a cure system consisting of a combination of an imidazoline plus an organic acid will give a matt, or semi-matt, surface finish. DYHARD® PIN + DYHARD® CAAB is such a combination of imidazoline plus acid. By varying the amount of curing system, or the ratio between DYHARD® PIN and DYHARD® CAAB, a wide range of gloss finishes can be obtained.

The lowest gloss is obtained when a blend ratio of 45% DYHARD® PIN + 55% DYHARD® CAAB is being used. Gloss levels down to 16 %, measured at 60° angle, are achievable in pure epoxy powder coatings and 19% in hybrid systems.

Typical total curing agent amounts are 2 – 3 % of the formulation, depending on the EEW of the epoxy resin. These amounts are generally 50% of the amount needed with competitive systems, and thus a commercial advantage can be achieved as well.

Furthermore a cure system based on DYHARD® PIN + DYHARD® CAAB has a very good color stability and lower over-bake yellowing compared to competitive systems.

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ADVANTAGES

- Very good color stability
- Low degree in over-bake yellowing
- Low dosage rate compared to competitive materials
- Gloss level in pure epoxy resin (EEW = 910): 16 % (60° angle)
- Gloss level in epoxy-polyester hybrid resin (EEW = 620, HEW = 1602): 19 % (60° angle)

TYPICAL APPLICATIONS

DYHARD® PIN + DYHARD® CAAB are used as a matt curing agent system for epoxy and epoxy-polyester hybrid powder coating formulations with a matt finish. Typical applications are either decorative indoor applications such as ceiling lights, door latches, ornamental and fancy battens or even functional applications for automotive parts.

SPECIFICATIONS

DYHARD® PIN

Appearance	White to off-white flakes
Melting point	min. 98 °C
Benzonitrile content	max. 0.05 %

DYHARD® CAAB

Appearance	White powder
Active content	min. 97.8 %
Water content	max. 0.3 %
Anti caking agent content	max. 1.2 %

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FORMULATION EXAMPLES for pure epoxy systems

The formulation examples below refer to a typical basic epoxy powder coating formulation. Depending on the used resins, fillers and additives, the results and properties may change significantly.

The results show that the best curing temperature for low gloss application is 180 °C in accordance with the best mechanical performance. At 160 °C the cross-linked network is not fully established; at 200 °C however, the coating starts getting brittle.

D.E.R. 664UE (EEW = 890)	46.9 %		
DYHARD® PIN	1.2 %		
DYHARD® CAAB	1.5 %		
Additives*	50.4 %		
Total	100 %		
Curing	160 °C/15 min	180 °C/15 min	200 °C/15 min
Thickness [µm]	90	75	90
Gloss (60°) [%]	21	16	13
Brightness	101	100	100
Yellowness	-5	-2.2	-1.5
Erichsen cupping [mm]	3	5	2.4
Ball impact test [inch*lbs]	20	70	20
Conical mandrel bend test [mm]	15	7	13
Cross cut-test	2	0 - 1	0 - 1
<i>Measured by DYHARD® laboratories – AlzChem</i>			

DYHARD® by AlzChem, D.E.R. 664UE by Olin

***Additives:** Araldite 2874: Flow-Agent by Huntsman (EEW = 805 g/mol) = 2.4 %,
Lanco-Wax PE 1500 F: Polyethylene wax by Lubrizol = 1.0 %,
Kronos 2160: Titanium dioxide by Kronos = 31 %,
Durcal 5: Calcium carbonate by Omya = 16 %

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FORMULATION EXAMPLES for epoxy-polyester hybrid systems

The formulation examples below refer to a typical epoxy-polyester hybrid powder coating formulation with a high epoxy content (60%). Depending on the used resins, fillers and additives the results and properties may change significantly.

The results show that the best curing temperature for low gloss application is 180 °C in accordance with the best mechanical performance. For the lowest gloss eminently important is a high epoxy resin content.

	Epoxy : Polyester = 60 : 40	
D.E.R. 662E (EEW = 610)	37.3 %	
Albester 2660 (HEW = 1602)	25.1 %	
DYHARD® PIN	1.0 %	
DYHARD® CAAB	1.2 %	
Additives*	35.4 %	
Total	100 %	
Curing	160 °C/25 min	180 °C/15 min
Thickness [µm]	70	60
Gloss (60°) [%]	21	19
Brightness	101	102
Yellowness	-5.5	-4.1
Erichsen cupping [mm]	5.5	8
Ball impact test [inch*lbs]	<20	50
Conical mandrel bend test [mm]	>30	<5
Cross cut-test	0	0
<i>measured by DYHARD® laboratories – AlzChem</i>		

DYHARD® by AlzChem, D.E.R. 662E: Epoxy resin by Olin
 Albester 2660: Carboxylic Polyester-Resin by Hexion, Acid value 35 mg KOH/g
 *Additives: Lanco-Wax PE 1500 F: Polyethylene wax by Lubrizol = 1.2 %,
 Modaflow-Powder III by Allnex = 0.6 %,
 Kronos 2160: Titanium dioxide by Kronos = 22.6 %,
 Durcal 5: Calcium carbonate by Omya = 11 %

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HEALTH & SAFETY PRECAUTIONS

The usual precautions for handling chemicals must be observed. DYHARD® PIN is classified as harmful. DYHARD® CAAB is not labelled. Avoid contact with eyes, skin and clothing. Ensure sufficient ventilation. In particular the general threshold level for fine dust must be observed. For additional health and safety information please refer to the actual Material Safety Data Sheet.

PACKAGING & STORAGE

DYHARD® PIN is available in 25 kg cartons.
DYHARD® CAAB is available in 15 kg cartons.
Alternative packaging can be made available on request.

Long storage and humidity may result in caking. Keep tightly closed. Storage time from date of delivery is recommended not to exceed 6 months.

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CONTACT

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