Epoxy Curing Agents and Modifiers

AMICURE® IC-322 Curing Agent for Polyisocyanate Resin

DESCRIPTION

Amicure IC-322 curing agent is specifically designed for polyisocyanate resin. Preferred resins of choice are standard and low viscosity HDI trimer isocyanates for a range of industrial applications. Amicure IC-322 curing agent offers formulation latitude for use in high gloss and satin finish coatings. Clear and pigmented topcoats based on Amicure IC-322 curing agent offer high aesthetics and excellent UV durability.

Coatings based on Amicure IC-322 curing agent are recommended to be used in combination with a solvent-free epoxy primer. Working and drying times are accelerated under high humidity conditions.

ADVANTAGES

- Fast cure speed
- Satin finish coatings
- Coatings up to 500 µm in single pass
- Excellent surface appearance
- Low mix viscosity for improved handling
- Application by squeegee

APPLICATIONS

- Commercial and industrial flooring
- Satin finish topcoats

SHELF LIFE

At least 18 months from the date of manufacture in the original sealed container at ambient temperature. Store away from excessive heat and humidity in tightly closed containers.

STORAGE AND HANDLING

Refer to the Safety Data Sheet for Amicure IC-322 curing agent.

TABLE 1: TYPICAL PROPERTIES

Appearance	Light yellow liquid
Colour[1] (APHA)	≤215
Viscosity[2] @ 25°C (mPa.s)	50-250
Water Content[3] (wt %)	≤0.15
Specific Gravity @ 21°C	1.08
Equivalent Wt/{H}	405
Recommended Use Level[4] (PHR)	185-195

TABLE 2: TYPICAL HANDLING PROPERTIES[4] 25°C, 50% RH

Mix Viscosity[2] (mPa.s)	300-600
Working Pot Life[5] (min)	70-80
Thin Film Set Time[6] (h)	2.5
Persoz Hardness after 1 / 7 days (s)	40/170
Typical cure schedule	2-7 days

TABLE 3: TYPICAL HANDLING PROPERTIES[4] 5°C, 50% RH*

Thin Film Set Time[6] (h)	5.5
Persoz Hardness after 1 / 7 days (s)	15/130

TABLE 4: TYPICAL PERFORMANCE[4]

UV-A Resistance after 500 h (ΔE)	3.5
Impact Resistance Direct/Reverse (kg.cm)	>200/>200
Abrasion Resistance, CS17, 1000 cycli (mg loss)	50
Gloss (60°)	>90
Gloss with matting agent (60°)	40-45
Glass Transition Temperature[7] (°C)	40
Carbamation Resistance[8] (Scale 1-5, 5=best)	5

(1) ASTM D 1544
(2) Brookfield RVTD, spindle 4
(3) Karl Fisher Method
(4) With HDI Trimer, 22 wt% NCO, ca. 2,500 mPa.s at 25°C
(5) Time to viscosity build of 12 Pa.s at 25°C
(6) ASTM D 5895 - BK Drying Recorder, Phase 3
(7) Differential Scanning Calorimetry (DSC)
(8) ISO 2812 (wet patch method)

SUPPLEMENTARY DATA

POLYCARBAMIDE RESIN TECHNOLOGY - MODIFIED AMINE CURING AGENTS FOR POLYISOCYANATES:

The new polycarbamide resin technology offers a unique package for top coat application with Amicure IC-322 curing agent. Amicure curative based clear and pigmented coatings exhibit rapid property development, high UV stability and high aesthetics. Amicure IC-322 curing agent is specifically designed to deliver high gloss and satin coatings that can be applied up to 500 µm in a single pass, when cured with standard HDI trimer or biuret isocyanates.

An epoxy primer is recommended for best performance and longevity of the flooring system.

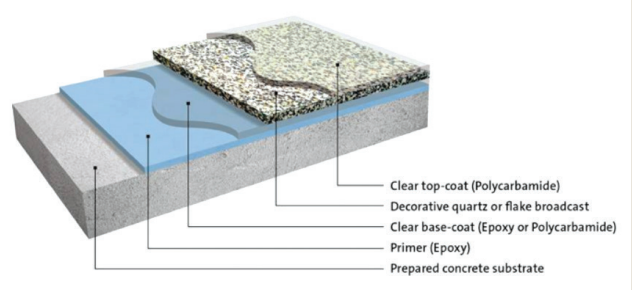

TABLE 5: AMICURE IC-322 CURING AGENT

Performance	Comparable Technology	Polycarbamide Property Characteristics
UV and light stability	2K Polyurethane	ΔE 3.5 after 500 h QUV-A
Abrasion, impact resistances and flexibility	2K Polyurethane	50 mg loss (CS17, 1kg, 1000 cycli); >200 kg.cm Direct and Reverse impact; 25% Tensile elongation at break
Film thickness	Methacrylate (MMA)	500 µm Clear coatings

AMICURE IC-322 CURING AGENT COMPARED WITH AMICURE IC-221 AND IC-321 CURING AGENT

Polycarbamide resins can provide excellent low temperature cure and a rapid return to service. Amicure IC-322 curing agent facilitates a lower initial mixed viscosity along with similar working time to Amicure IC-321 curing agent. The return to service is however faster than Amicure IC-321 curing agent.

FORMULATION GUIDELINES

The following recommendations are offered to streamline further technical work with polycarbamide resin technology.

TABLE 6: FORMULATION GUIDELINES AND TROUBLE SHOOTING

Stoichiometry
Ensure the appropriate stoichiometry of polyisocyanate resin is used with Amicure IC curing agent. Recommended is to start with a stoichiometry index of 1.05 (isocyanate to amine)
Coating haziness related binder components
Use the recommended standard HDI trimer polyisocyanate resin (eg Vestanat HT 2500/100)
Alternatively, lower viscosity HDI trimers may be used (eg Vestanat HT2500 LV) as well as solvent-based HDI trimers (eg Vestanat HT2500E)
Addition of other components such as polyols, diluents, modifiers and/or other amines could cause incompatibility or effect working time
Coating haziness related to air release agent, defoamer, leveling additive or dispersing additive
Tego Airex 931 (Evonik)
Tego Wet 250 and 260 (Evonik)
Disperbyk 103 (BYK Chemie)
Use of solvents
Solvent are optional and can be added to reduce viscosity and increase pot-life. Recommended solvents include hydrocarbon and ester-based materials such as: t-butyl acetate, para-chlorobenzotrifluoride, dimethyl carbonate, hydrocarbon solvent (Aromatic 100) or xylene
When using solvent(s), care should be taken to review solvent entrapment during cure. Minimize solvent entrainment by applying thin film coating (<250 µm)
Use of matting agent
Acematt can be added to reduce gloss and create a matt surface
Use air release agent / defoamer, see recommendations above
Mix at slow speed to avoid air entrapment
The fumed silica can settle in time, always stir mixture before use

TRADEMARK REFERENCE

Evonik Industries GmbH	Amicure® Curing Agent Anquamine® Curing Agent Vestanat®, Acematt®, Tego®
BASF	Tinuvin®

AMICURE® IC-322 Curing Agent for Polyisocyanate Resin

STARTING POINT FORMULATIONS

AMICURE IC-322 CURING AGENT CLEAR HIGH GLOSS TOPCOAT

PART A	Parts by Weight	Supplier
(1) HDI Trimer Isocyanate (22 wt% NCO)	100	Evonik
PART B		
(2) Amicure IC-322 curing agent	187	Evonik
(3) Tinuvin 292/1130 (1:1)	2	BASF
(4) Airex 931	2	Evonik
TOTAL PARTS	**291**	

APPLICATION INSTRUCTION

Mix Part A and B under slow or medium speed for 2-3 minutes taking care not to introduce excessive air and moisture. Once thoroughly mixed, pour material on to substrate, spread by squeegee or trowel and back roll for proper leveling as required, taking care not to excessively roll.

Amicure IC-322 is fully compatible with Amicure IC-221 and IC-321 and can be combined in the formulation to modify reactivity.

AMICURE IC-322 CURING AGENT CLEAR SATIN TOPCOAT

PART A	Parts by Weight	Supplier
(1) HDI Trimer Isocyanate (22 wt% NCO)	100	Evonik
PART B		
(2) Amicure IC-322 curing agent	187	Evonik
(3) Tinuvin 292/1130 (1:1)	2	BASF
(4) Airex 931	2	Evonik
(5) Disperbyk 103	3	BYK Chemie
(6) Molecular Sieve A3	2	
(7) Acematt 3600	36	Evonik
TOTAL PARTS	**332**	

DIRECTIONS FOR PREPARING AMICURE IC-322 SATIN FORMULATIONS

- Charge Amicure IC-322 to a container and set-up mixer with a paddle stirrer
- Charge components 3-6 under low shear mixing
- Charge matting agent slowly while continue to stir at low speed. Minimize air and moisture entrainment while mixing.
- When homogenous, stop the stirring and pour the material into a sealed container. Leave for at least 24 hours before application.

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