
CYMEL[®] 325 resin

CYMEL 325 resin is a new type of highly methylated melamine-formaldehyde resin which does not require strong acid catalyst for fast cure response. CYMEL 325 resin is reactive with hydroxyl amide and carboxyl group containing polymers. The weight loss of CYMEL 325 resin during the baking process is significantly less than that of partially methylated melamine-formaldehyde resins. The baking volatiles from CYMEL 325 resin contain very low levels of formaldehyde. The lower weight loss of CYMEL 325 resin crosslinked coatings also results in less tendency to blister at higher film thickness.

CYMEL 325 resin requires only weak acid catalysis for cure; a low acid number in the backbone resin is sufficient. The cure reaction additionally can be catalyzed with weak organic acids or inorganic acids such as maleic, citric, phosphoric or alkyl phosphoric acids, low levels of p-toluene sulfonic acid or CYGAT[®] 14040 catalyst.

CYMEL 325 resin will self-condense like a partially methylated resin. Higher film hardness may, therefore, be obtained by raising the level of amino crosslinking agent. The high reaction rate of CYMEL 325 resin at lower temperature reduces the chance of evaporation of low molecular weight resin components. CYMEL 325 resin should, therefore, be very suitable for applications where "smoking" of the baking exhaust is a problem.

Compared to partially methylated melamine-formaldehyde resins, CYMEL 325 resin has shown, in some water-reducible coatings, improved humidity and salt-spray resistance.

CYMEL 325 resin is FDA approved under section 121.2514 and 121.2526.

¹ Product of Cytec Industries Inc.

ADVANTAGES

- Fast cure response
- Reduced weight loss
- Low free-formaldehyde
- Less blistering
- No strong acid catalyst required
- No smoking
- Higher resistance properties

APPLICATION AREAS

- Automotive enamels
- General purpose enamels
- Coil coating
- High solids coatings
- Water-borne coatings

TYPICAL PROPERTIES

Non-volatile, ² %	80 ± 2
Volume solids, %	72 ± 2
Solvent	Isobutanol
Viscosity, (Gardner-Holdt), 25°C	X-Z ₁
Color, Gardner 1963	1
Pounds per gallon, approx	9.3
Pounds per gallon, resin solids	10.3
Specific gravity, solution	1.12
Specific gravity, resin solids	1.24
Methylol content	Low
Free formaldehyde, % max	1.0

² Foil method, 45 minutes at 45°C

SOLUBILITY

CYMEL 325 resin is completely soluble in most alcohols, polyols, ketones, esters, glycol ethers and chlorinated solvents; partially soluble in water and aromatic hydrocarbons. CYMEL 325 resin is insoluble in aliphatic hydrocarbons.

COMPATIBILITY

CYMEL 325 resin has good compatibility with most film formers including short and medium oil alkyd resins, polyester resins, acrylics, epoxies and cellulose. CYMEL 325 resin has excellent compatibility in water-reducible acrylic and polyester systems.

FORMULATIONS

Use in Water-Reducible Finishes

CYMEL 325 resin is compatible with most water-reducible acrylic, polyester and alkyd resins. For most applications an acid catalyst is not required. The following data illustrates the use of CYMEL 325 resin in an acrylic based, water-reducible, spray enamel:

	Pounds/100 gallons (approx)
Rutile titanium dioxide	183.1
XC-4005 ¹ resin	91.8
Dimethyl ethanol amine	7.9
Disperse on 3 roll mill, and add:	
XC-4005 resin	92.0
CYMEL 325 resin	114.9
Dimethyl ethanol amine	9.0
Demineralized water	<u>485.0</u>
	983.7
Resin ratios, weight %:	
XC-4005 resin	60.0
CYMEL 325 resin	40.0
Neutralization, % of carboxyl groups	<u>70</u>

Solvent composition, % by volume:

Dimethyl ethanol amine	3.24
Butanol	9.62
Isobutanol	4.86
Water	<u>82.28</u>
	100.00

¹ Product of Cytec Industries Inc.

FILM PROPERTIES*

Baked 20 minutes at temperature-	250°F/ 121°C	300°F/ 149°C
Dry film thickness, mils	0.9	0.8
Gloss, 60°	93	92
Gloss, 20°	74	68
Hardness, Knoop, KHN ₂₅	16.9	19.6
Hardness, pencil	2H-3H	2H-3H
Impact resistance, reverse, in-lbs	<10	<10
MEK double rubs, passes	200+	200+
Salt spray resistance—		
After 290 hours exposure:		
Creepage, inches	<1/16	<1/16
Adhesion, taped	pass	pass
Blistering	8F	None
Gloss retention, 60°, %	95	96
After 500 hours exposure:		
Creepage, inches	1/8	1/16
Adhesion, taped	pass	pass
Blistering	7MD	None
Gloss retention, 60°, %	94	92

* One coat sprayed on Bonderite 100² treated cold rolled steel panels.

² Product of Oxymetal Finishing Corporation, Parker Division

USE IN COIL COATING FINISHES

CYMEL 325 resin is useful in polyester and acrylic resin coil coating systems, where a minimum amount of weight loss and a high build without the danger of solvent popping during cure is desirable. Since CYMEL 325 resin does self-condense to some extent, some sacrifice in flexibility should be expected. CYMEL 325 resin is therefore recommended for prefinished metal applications where shorter dwell times or lower temperature cures are required and postforming is not of a critical nature. The following formulation for a White, High Gloss, Coil Coating Enamel illustrates this application of CYMEL 325 resin:

White High Gloss Coil Coating Enamel No. 955

	Pounds/100 gallon
Titanium dioxide	338.5
CYPLEX® ¹ 1531 resin	224.9
Solvesso ² 150 solvent	75.0
Disperse on sand mill, and add:	
CYPLEX 1531 resin	252.2
CYMEL 325 resin	93.9
Butyrate ³ EAB-551.2 (25% solution)	57.1
Cellosolve acetate ⁴	4.8
Isophorone	7.7
Solvesso 150 solvent	35.6
Butanol	9.1
Total non-volatile-65.0%	1098.8

*Composition of EAB-551.2 solution:

EAB-551.2	25.0%
Cellosolve Acetate	18.6%
Butanol	18.6%
Solvesso 150	37.8%

¹ Product of Cytec Industries Inc.

² Product of Exxon Company

³ Product of Eastman Chemical Products.

⁴ Product of Union Carbide Corp.

Typical film properties obtained with White Coil Coating Enamel No. 955 when applied to Alodine 1200S⁵ treated aluminum test panels and cured on the following schedules:

Oven temperature, °F(°C)	550(288)	500(260)	450(232)	500(260)
Dwell time, seconds	30	45	60	30
Peak metal temperature, °F(°C)	430(221)	435(224)	420(216)	400(204)
Dry film thickness, mils	0.9	1.0	1.0	1.0
Color, Photovolt, blue filter, reflectance, %	88	86	87	87
Gloss, 60°	90	92	94	94
Gloss, 20°	73	77	75	80
Hardness, pencil	F-H	F-H	F-H	F-H
Hardness, Knoop, KHN ₂₅	17.1	18.6	17.3	15.2
Impact resistance, reverse, inch-pounds	10	10	10	10-20
T-Bend test, passes	T-4	T-4	T-4	T-3
MEK resistance, double rubs, passes	200+	200+	200+	200+
Adhesion, cross-hatched and taped, %	100	100	100	100
Overbaked 60 seconds at 500°F(260°C)-				
Peak metal temperature, °F(°C)	480(249)	480(249)	480(249)	480(249)
Color retention, %	95	98	99	98
Gloss retention, 60°, %	99	99	100	98
Gloss retention, 20°, %	96	97	100	94

⁵ Product of Amchem Products, Inc.

HEALTH AND SAFETY INFORMATION

Direct contact with this material can cause eye irritation and may cause skin irritation. Overexposure to formaldehyde and isobutanol vapor from this product may cause eye and respiratory tract irritation. Read the Cytec Industries Inc. Material Safety Data Sheet (MSDS) on this product for detailed safety and handling information.

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