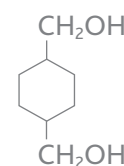


# Eastman CHDM-D

## Water-reducible, polyester-melamine cross-linked coating



Eastman CHDM-D

Enamel prepared from polyester resin WS-3-2C

### Features

- 57 wt% applied solids
- Excellent hardness
- Good detergent resistance
- Good stain resistance
- Good impact resistance

Table 1. WS-3-2C resin formulation

Component <sup>a</sup>	Equivalents	Moles	Weight
Eastman CHDM-D	7.12	3.56	518
Trimethylolpropane	1.40	0.47	63
Phthalic anhydride	4.17	2.09	309
Adipic acid	2.78	1.39	203
		Total charge	1,093
		Water loss	-72
		Yield	1,021

No catalyst required.

Nitrogen flow adequate to maintain <1% oxygen

<sup>a</sup>Raw material suppliers are listed on page 3.

Table 2. Process conditions and resin properties

Up-heat rate, degree/min, from 30° to 200°C (86° to 392°F)	2
Reaction time, hours @ 200°C	2
Final acid value, mg KOH/g resin	45–55
Molecular weight, vapor pressure osmometry	600–800
Suggested dilution, % NV (see resin viscosity table)	85
Gardner color, 85% NV	<1
Weight/volume, 24°C (75°F), kg/L	1.135
lb/U.S. gal	9.48
Final hydroxyl value	140–150

Table 3. Resin viscosity (Gardner scale)

Solvent <sup>a</sup>	Resin solids, wt%	
	85	80
Eastman <i>n</i> -butyl alcohol	Z <sub>5</sub> – Z <sub>6</sub>	Z – Z <sub>1</sub>
Eastman EB (ethylene glycol monobutyl ether)	Z <sub>7</sub>	Z <sub>3</sub> – Z <sub>4</sub>
Eastman DB (diethylene glycol monobutyl ether)	Z <sub>7</sub> – Z <sub>8</sub>	Z <sub>5</sub>

<sup>a</sup>Raw material suppliers are listed on page 3.

Table 4. Enamel composition

Component	Weight	Solids
<b>Grind<sup>a</sup></b>		
Resin WS-3-2C (85% NV)	258.0	219.3
Ti-Pure™ R-900 TiO <sub>2</sub>	256.3	256.3
Hexa(methoxymethyl)melamine	94.0	94.0
Dimethylethanolamine (DMEA)	18.1	—
Fluorosurfactant flow additive	3.1	0.3
<b>Letdown</b>		
Deminerlized water	354.0	—
Eastman <i>n</i> -butyl alcohol	16.5	—

<sup>a</sup>Raw material suppliers are listed on page 3.

Table 5. Enamel properties

Polyester/melamine ratio	70/30
Binder/pigment ratio	55/45
Nonvolatiles, wt%	57
Water/organic, wt%	82/18
pH	8.0–8.5
Viscosity, #4 Ford cup, s	55–60

**Table 6.** Cured film properties<sup>a,b</sup>

Cure temperature/time, °C/min	177/20
Gloss, 60°	93
20°	83
Impact resistance, N-m (in.-lb)	
Direct	15.8 (140)
Reverse	10.2 (90)
Pencil hardness	4H
Solvent resistance, MEK double rubs	200+
Scribed adhesion, % pass	100
1/8-in. conical mandrel flexibility (ASTM D522), % pass	100
Stain resistance (ASTM D3274)	5–10
Detergent resistance, <sup>c</sup> 1.5% standard detergent solution 240 h @ 74°C (165°F)	
60° gloss retention, %	100
Blisters, frequency/size	None
Salt spray resistance, 500 h	
60° gloss retention, %	100
Scribe creepage, mm (in.)	<0.8 (<1/32)
Blisters	None
Storage stability	
Initial: pH/viscosity, cP	8.3/320
After 500 h @ 120°F: pH/viscosity, cP	7.0/400

<sup>a</sup>Unprimed, zinc phosphatized, cold-rolled steel panels coated with 1–1½ mil (25.4–38.1 micron) films were used in these evaluations.

<sup>b</sup>Test methods are those commonly used in the polymers and coatings industry.

<sup>c</sup>Coatings were applied over an epoxy primer for detergent resistance tests.

**Table 7.** Raw material suppliers

Eastman CHDM-D	Eastman
Ethylene glycol monobutyl ether (Eastman EB solvent)	Eastman
Diethylene glycol monobutyl ether (Eastman DB solvent)	Eastman
Eastman <i>n</i> -butyl alcohol	Eastman
Ti-Pure™ R-900 TiO <sub>2</sub>	Chemours
Hexa(methoxymethyl)melamine	Cytec
Trimethylolpropane	GEO Specialty, Perstorp
Phthalic anhydride	Stepan, Koppers
Adipic acid	DuPont

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