Epoxy Curing Agents and Modifiers

Imidazole Curing Agents for Epoxy Resins

IMIDAZOLE	CHEMICAL STRUCTURE	MOLECULAR WEIGHT	APPEARANCE	STORAGE LIFE (YEARS)	MELTING POINT ºF/ºC	REC PHR	SOLUBILITY IN LIQUID EPOXY @ ºF/ºC	POT LIFE[1]
Curezol* 2E4MZ		110	Pale yellow liquid > 5000 cps	3	—	1-4	77 25	9 h
Curezol 1B2MZ		172	Pale yellow liquid 20-40 cps	3	—	1-8	77 25	10 h
Curezol 2PZ		144	Pale pink powder	3	279-293 137-145	1-4	> 293 > 145	21 h
Curezol 2P4MZ		158	White powder	3	325-360 163-182	3-6	NA	3 days
Curezol C17Z		306	White powder	3	187-196 86-91	3-5	> 203 > 95	6 days
Curezol 2MZ Azine		219	Fine white powder	3	477-484 247-251	3-7	> 248 > 120	30-40 days
Curezol 2PHZ-S		204	Yellow-pink powder	3	415-491[5] 213-255	5-10	> 248 > 120	110 days
Curezol 2MA-OK		384	White powder	3	482 250	5	> 248 > 120	6-12 mon

1 With liquid epoxy resin (EEW = 190)
2 Time required for 200g mass to gel
3 Time required for < 0.5g mass to gel on hot plate
4 Glass transition temperature by Thermal Mechanical Analysis (TMA)
5 Decomposes releasing formaldehyde above MP 6
6 Heat deflection temperature (HDT) to ASTM D648 at 264 psi after curing 7 days at 25ºC only for room temperature curing systems. Longer cure times and particularly higher temperature post-cures yield much higher values. Results given for elevated-temperature (ET) curing systems are based on various ET cure schedules.

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IMIDAZOLE	GEL TIME[1,2]			TYPICAL CURE SCHEDULE[1]	GLASS TRANSITION TEMP, °F/°C	COMMENTS/APPLICATIONS
	70°C	100°C	150°C			
Curezol* 2E4MZ	33 min	4 min	70 sec	1.5 hr @ 176 °F/80°C + 4 hr @ 302 °F/150°C	313[6] 156	Accelerator for dicyandiamide, anhydride and phenolic curing agents in filament winding, electrical laminates, powder coatings, molding powders and structural adhesives. When used as a curing agent, post cures of 200°C in silica flour filled formulations produce heat deflection temperatures of 200-300°C.
Curezol 1B2MZ	27 min	5 min	35 min	1.5 hr @ 176 °F/80°C + 4 hr @ 302 °F/150°C	310[6] 154	Low-viscosity accelerator for anhydride curing agents used in casting, potting and encapsulation in electrical and electronic applications.
Curezol 2PZ	—	17 min	80 sec	1.3 hr @ 176 °F/80°C + 4 hr @ 302 °F/150°C	316[6] 158	Accelerator for dicyandiamide, anhydride and phenolic curing agents used in electrical laminates, molding compounds and potting compounds.
Curezol 2P4MZ	NA	NA	4 min	1.5 hr @ 176 °F/80°C + 4 hr @ 302 °F/150°C	309[6]	Accelerator for dicyandiamide, anhydride and phenolic curing agents. Used in solder mask inks, adhesives and electronic molding compound applications.
Curezol C17Z	17.5 hr	13 min	4 min	1.5 hr @ 176 °F/80°C + 4 hr @ 302 °F/150°C	312[6] 156	Accelerator for dicyandiamide, anhydride and phenolic curing agents. Offers good latency with rapid reaction at elevated temperatures. Used in structural adhesives, molding powders, powder coatings and structural laminates.
Curezol 2MZ Azine	10 hr	30 min	90 sec	2 hr @ 212 °F/100°C + 4 hr @ 302 °F/150°C	313[6] 156	Accelerator for dicyandiamide and anhydride curing agents. Used in electronic applications such as solder- resistant inks and insulating powders as well as structural adhesives.
Curezol 2PHZ-S	—	—	7.9 min	2 hr @ 212 °F/100°C + 4 hr @ 302 °F/150°C	313[6] 156	Accelerator for dicyandiamide or anhydride curing agents. Also used as an intermediate in the manufacture of curing agents by reaction through methylol groups.
Curezol 2MA-OK	—	108 min	100 sec	2 hr @ 212 °F/100°C + 4 hr @ 302 °F/150°C	293 145	Accelerator for dicyandiamide, anhydride and phenolic curing agents. Best combination of latency and low- temperature cure. Must be compounded at < 40°C to keep water of crystallization and to maintain latency. Used in electrical and electronic insulation and solder resists.

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* Curezol is a registered trademark of Shikoku Chemical Corporation. Evonik distributes Curezol products in the United States.

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