

# CRYSTIC<sup>®</sup> 272E

## Isophthalic Polyester Resin for Use in Hot Climates

### Introduction

Crystic 272E is an isophthalic polyester resin designed for use in hot climates.

### Applications

Crystic 272E was developed for high performance applications such as pipes, tanks and ducting. It is a versatile resin suitable for use in filament winding, pultrusion, centrifugal moulding or contact moulding processes.

### Features and Benefits

The excellent storage stability of Crystic 272E facilitates its transportation to hot climates, and its handling characteristics are suited to use in ambient temperatures up to 35°C. Crystic 272E has outstanding wetting characteristics with a range of reinforcements and is particularly suitable for use with continuous rovings, carbon fibres and aramid fibres. Fully cured mouldings made with Crystic 272E have high mechanical strength and excellent strength retention in wet environments at temperatures up to 60°C.

### Approvals

Crystic 272E is approved by Lloyd's Register of Shipping for use in the construction of craft under their survey.

### Formulation

Crystic 272E can be used in hot, heat assisted and cold curing formulations by using the following recommended catalyst systems.

- Catalyst Powder B (or Lucidol CHSO) for hot curing
- Catalyst Powder B (or Lucidol CHSO) and Cumene Hydroperoxide (80%) for heat assisted curing
- Catalyst M (or Butanox M50) or Catalyst O (or Interlox SA3) for cold curing

### Hot Curing

Catalyst Powder B should be added at 2% and thoroughly dispersed in the resin. The catalysed mix will remain usable for approximately 5 days at workshop temperature (20°C to 25°C). Cure will take place between 80°C and 140°C, but for most applications, 120°C will be satisfactory. Approximate setting times are shown in the table below.

Temperature	Setting Time in Minutes
80°C	8
100°C	4
120°C	2

### Heat Assisted Curing

Catalyst Powder B and Cumene Hydroperoxide should be added at 1% and thoroughly dispersed in the resin. Shortly before use, the correct amount (1% - 4%) of Accelerator E should be stirred into the resin. This mix will remain usable at workshop temperature (20°C - 25°C) for 6 to 24 hours. Gelation will take place at 60°C and above, making this formulation particularly suitable for winding and drawing applications, which require a long pot life.

### Cold Curing

Crystic 272E should be allowed to attain workshop temperature (18°C - 25°C) before use. It requires the addition of a catalyst and an accelerator to start the curing reaction.

The recommended accelerator is Accelerator E which must be thoroughly dispersed in the resin. This mix will remain usable for approximately one month at ambient temperature (25°C). Shortly before use, the catalyst should be added. The recommended catalyst is Catalyst M (or Butanox M50) which should be added at 2% into the accelerated resin mix, and thoroughly dispersed. For low taint applications, the catalyst should be Catalyst O (or Interlox LA3), also at a 2% addition. It should be noted that resin which has been accelerated for several days may have a shorter pot life than freshly accelerated resin.

N.B. Catalyst and accelerator must not be mixed directly together as they can react with explosive violence.

**Pot Life** The amount of Accelerator E can be approximately determined from the table below.

<b>Parts of Accelerator E to 100 Parts Resin. Catalysed with 2% Catalyst M</b>	<b>1.0</b>	<b>2.0</b>	<b>3.0</b>	<b>4.0</b>
Pot life in Minutes at 20°C	48	34	27	22
Pot life in Minutes at 25°C	36	25	21	18
Pot life in Minutes at 30°C	24	20	17	15

The resin and the workshop should be at, or above, 20°C before curing is carried out.

#### Additives

Crystic 272E may be pigmented by the addition of up to 5% Crystic Pigment Paste. The addition of certain pigments, fillers or extra styrene may adversely affect the food taint, toxicity and chemical resistant properties of Crystic 272E. Customers should therefore satisfy themselves that any additions made Will give the performance required.

#### Chemical Resistance

A useful guide to the chemical resistance of Crystic 272E laminates in over 200 chemical environments can be obtained by referring to Crystic 272 in the current edition of Technical Leaflet 145.3 - Safe Chemical Containment.

#### Typical Properties

The following tables give typical properties of Crystic 272E when tested in accordance with BS 2782.

<b>Property</b>		<b>Liquid Resin</b>
Appearance		Yellowish
Viscosity at 25°C 37.35 sec <sup>-1</sup>	poise	3.5
Specific Gravity at 25°C		1.10
Volatile Content	%	40
Acid Value	Mg KOH/g	18
Stability at 20°C		6
Geltime at 25°C using 2% Catalyst M (Butanox M50) and 4% Accelerator E	Minutes	18
<b>Property</b>		<b>Fully *Cured Resin (unfilled casting)</b>
Barcol Hardness (Model GYZJ 934-1)		44
Deflection Temperature under load † (1.80 MPa)	°C	78
Water Absorption 24 hrs at 23°C	mg	18
Tensile Strength	MPa	79
Tensile Modulus	MPa	3400
Elongation at Break	%	4.5
Specific Gravity at 25°C		1.2
Volume Contraction	%	8.3
Refractive Index n <sup>20</sup>		1.570

\*Curing schedule - 24 hrs at 20°C, 3 hrs at 80°C

†Curing schedule - 24 hrs at 20°C, 5 hrs at 80°C, 3 hrs at 120°C

Property		CSM** Laminate
Glass Content	%	34
Tensile Strength	MPa	132
Tensile Modulus	MPa	8200
Elongation at Break	%	2.0
Flexural Strength	MPa	193
Flexural Modulus	MPa	6400

\*\* Made with 4 layers 450 g/m<sup>2</sup> PB CSM  
Curing schedule - 24 hrs 20°C 16 hrs 40°C

### Post Curing

Satisfactory laminates for many applications can be made with Crystic 272E by curing at workshop temperature (20°C). However, for optimum chemical, water and heat resistant properties, heat assisted and cold cured laminates must be post cured before being put into service. Mouldings should be allowed to cure for 24 hours at 20°C and then be oven cured for 3 hours at 80°C. Post curing is not normally necessary for heat cured laminates provided that the moulding cycle is adequate.

For low taint applications, mouldings should be allowed to cure for 24 hours at 20°C and then be oven cured for 3 hours at 85°C. This should be followed by wet-steam cleaning for at least one hour. If the moulding is of a suitable shape, it can be filled with hot water (80°C) for two hours instead of steam cleaning. The water should contain a perfume detergent, and several batches of clean water should be used for rinsing.

### Storage

Crystic 272E should be stored in the dark in suitable closed containers. It is recommended that the storage temperature should be less than 20°C where practical, but should not exceed 30°C. Ideally, containers should be opened only immediately prior to use.

### Packaging

Crystic 272E is supplied in 225kg steel containers. For transportation purposes, Crystic 272E is Class 3.3 in the IMCO code and UN No 1866; ADR No 3I (c). Packing Group 3; Tremcard No 30G35.

### Health and Safety

Please see separate Materials Safety Data Sheet.

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