

# CRYSTIC<sup>®</sup> 489 and CRYSTIC<sup>®</sup> 489PA

## Introduction

Crystics 489 and 489PA are thixotropic, isophthalic polyester resins. When used with Crystic Gelcoat 65PA, they produce a matched performance system for moulding boat hulls with outstanding durability and superior blister resistance.

The outstanding wetting characteristics of Crystics 489 and 489PA give rapid impregnation with freedom from drainage. They are suitable for use with continuous rovings, carbon fibres and aramid fibres. Fully cured laminates made with Crystics 489 and 489PA have high mechanical and impact properties and excellent strength retention in wet environments at temperatures up to 40°C. The interlaminar adhesion properties of the resins ensure that no loss in strength occurs at the interface between layers, following any delay in lay-up. Crystics 489 and 489PA are tinted blue, to facilitate easier identification and removal of any air trapped in laminates.

## Approvals

Crystics 489 and 489PA are approved by Lloyd's Register of Shipping for use in the construction of craft under their survey, and by Det Norske Veritas. They also meet the requirements of B.S.3532:1990, Type B.

## Formulation

Crystics 489 and 489PA should be allowed to attain workshop temperature (18°C-20°C) before use. Crystic 489PA needs only the addition of a catalyst to start the curing reaction. The recommended catalyst is Catalyst M (or Butanox M50). The catalyst should be added at 1% or 2% into the resin and thoroughly dispersed, shortly before use.

Crystic 489 requires the addition of a catalyst and an accelerator to start the curing reaction.

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

The recommended catalyst is Catalyst M (or Butanox M50), which should be added at 2% into the resin, and thoroughly dispersed. Shortly before use, 4% of Accelerator E should be stirred into the catalysed resin.

The geltimes of Crystics 489 and 489PA can be approximately determined from Tables I and II:-

## Pot Life

**Table I - Crystic 489**

Parts of Accelerator E to 100 Parts Catalysed Resin	4.0
Pot life in minutes at 15°C	21
Pot life in minutes at 20°C	14
Pot life in minutes at 25°C	8

**Table II - Crystic 489PA**

Parts of Catalyst M to 100 Parts Resin	1.0	2.0
Pot life in minutes at 15°C	60	24
Pot life in minutes at 20°C	40	18
Pot life in minutes at 25°C	23	12

The resins, mould and workshop should all be at, or above, 15°C before curing is carried out.

## Additives

Since the addition of certain pigments, fillers or extra styrene may adversely affect the properties of Crystics 489 and 489PA, users are urged to seek the advice of our Technical Service Department before making any such additions.

### Post Curing

Satisfactory laminates for many applications can be made from Crystics 489 and 489PA by curing at workshop temperature (20°C). For optimum properties and long term performance, however, laminates should be post cured before being put into service. The laminate should be allowed to cure for 24 hours at 20°C and then be oven cured for 3 hours at 80°C or 16 hours at 40°C.

### Typical Properties

The following tables give typical properties of Crystics 489 and 489PA when tested in accordance with BS 2782.

Property		Liquid Resin	
		489	489PA
Appearance		Blue	Blue
Viscosity at 25°C 37.35 sec <sup>-1</sup>	poise	7.3	4.4
Viscosity at 25°C 4500 sec <sup>-1</sup>	poise	3.3	2.5
Specific Gravity at 25°C		1.10	1.11
Volatile Content	%	42	43
Acid Value	mg KOH/g	19	18
Stability in the dark at 20°C	months	6	3
Geltime at 25°C using 1% Catalyst M (or Butanox M50)	minutes	-	23
Geltime at 25°C using 2% Catalyst M and 4% Accelerator E	minutes	8	-
		Fully Cured* Resin (unfilled casting)	
Property		489	489PA
Barcol Hardness (Model GYZJ 934-1)		46	44
Deflection Temperature under load † (1.80 MPa)	°C	80	77
Water Absorption 24 hours at 23°C	mg	18	17
Tensile Strength	MPa	80	76
Tensile Modulus	MPa	3600	3500
Elongation at Break	%	4.3	4.0
Specific Gravity at 25°C		1.21	1.20
Volumetric Shrinkage	%	7.7	7.7

\* 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		C.S.M** Laminate	
		489	489PA
Glass Content	%	32.0	31.8
Tensile Strength	MPa	130	128
Tensile Modulus	MPa	7800	7700
Elongation at Break	%	2.0	2.1
Flexural Strength	MPa	214	212
Flexural Modulus	MPa	7500	7400

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

**Storage**

Crystics 489 and 489PA 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**

Crystics 489 and 489PA are supplied in 25kg and 200kg containers. Bulk supplies can be delivered by road tanker.

**Health & Safety**

Please see separate Material Safety Data Sheet.

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