

CRYSTIC[®] 489PA

Isophthalic Polyester Resin for Matched Performance

Introduction

Crystic 489PA is one of a new generation of pre-accelerated, thixotropic, contact moulding, unsaturated isophthalic polyester resins for boatbuilding. It is supplied as a solution dissolved in monomeric styrene. The resin was specifically developed for use with Crystic[®] Gelcoat LS88PA to meet the need for a matched performance isophthalic gelcoat/laminating resin system for moulding boat hulls with outstanding durability and performance.

Applications

The use of matched performance isophthalic resin/gelcoat systems has been shown by long term immersion in water, both in laboratory and in service, to significantly improve the resistance of GRP to blistering, caused by the osmotic process. The handling characteristics of Crystic 489PA have been designed to give rapid impregnation, freedom from drainage and adequate pot life for normal boatbuilding techniques. Fully cured boat hulls and mouldings made with Crystic 489PA have high mechanical performance with excellent strength retention in wet environments at temperatures up to 40°C, and exhibit high impact resistance as a result of the high elongation to break of the resin. Good interlaminar adhesion is a vital requirement for the structural integrity of a GRP laminate. Great care has therefore been taken in the design of Crystic 489PA to ensure that no loss in strength occurs at the interface between layers when a delay has occurred in lay-up.

Approvals

Crystic[®] 489PA is approved by Lloyd's Register of Shipping for use in the construction of craft under their survey.

Formulation


Crystic[®] 489PA should be allowed to attain workshop temperature (18°C - 20°C) before use. Stir well by hand, or with a low shear mixer to avoid aeration, and then allow to stand to regain thixotropy. Crystic 489PA requires only the addition of a catalyst to start the curing reaction. The recommended catalyst is Norox[®] KP9 and this should be added at 1-3% into the resin. Catalyst Norox[®] MEKP-925 H will increase the pot life. The catalyst should be thoroughly incorporated into the resin, with a low shear mechanical stirrer where possible. Table 1 shows the recommended formulation.







Table 1: Recommended formulation for Crystic 489PA.

Component	Parts by weight
Crystic 489PA	100
Catalyst Norox KP9 or Norox MEKP-925 H	1 to 3

Pot Life

The ambient temperature and the type and amount of MEKP catalyst control the gel time of the formulation. This can be approximately determined from Table 2.

Table 2: Gel times of Crystic 489PA at varying catalyst levels  = Combination not recommended.

Catalyst type		Norox KP9			Norox MEKP-925 H		
		1%	2%	3%	1%	2%	3%
Temperature	15°C		27	24			
	25°C	23	11	9	38	14	10
	35°C	10	5		16	6	

Curing should not be carried out at temperatures below 15°C. Scott Bader (Pty) Ltd. will not be liable for problems caused by use at lower temperatures than recommended. The resin must be allowed to attain workshop temperature before being formulated for use. 20°C is recommended.

When a longer gel time is required, Catalyst O should be used instead of Catalyst M.

N.B. Peroxide catalysts are highly reactive and may decompose with explosive violence, or cause fires, if they come into contact with flammable materials, metals or accelerators. For this reason they must never be stored in metal containers or be mixed directly with accelerators.

Laminating

Crystic 489PA has been designed for use with the hand lay-up technique. Although it can be used without modification in certain types of spray equipment, higher levels of styrene emission must be expected during spraying.

At a mould temperature of 18-20°C, Crystic Gelcoat 65PA will be sufficiently cured for lamination to commence approximately 1 hour after application. Commencement of lamination can be delayed, provided the surface remains uncontaminated for up to 8 hours at 18-20°C. If users wish to delay the commencement of lamination further, they are advised to carry out their own tests to ensure adequate adhesion will be obtained.

Additives

Since addition of certain pigments, fillers or extra styrene may interfere with the properties of Crystic 489PA, users are urged to seek the advice of our Technical Service Department before making any such additions. Other suitably formulated resins are available if special properties eg. reduced fire hazard, are required.

Post Curing

Satisfactory laminates for many applications can be made from Crystic 489PA by curing at workshop temperature (20°C). When optimum properties and long term performance are required however, the laminate should be post cured. After release from the mould, laminates should be allowed to mature for 24 hours at workshop temperature (20°C). They should then be post cured for a minimum of three hours at 80°C, although a longer period of a lower temperature (eg. 40°C) will also develop satisfactory properties for marine applications. The post cure is most effective if it is carried out immediately after the 24 hour maturing period.

Typical Properties

Typical Properties of Crystic 489PA, tested to BS2782:1980, are given in Tables 3 & 4.

Table 3: Typical properties of liquid Crystic 489PA.

Property	Units	Typical value
Viscosity at 25°C (Ferranti shear rate 37.35 sec ⁻¹) (Ferranti shear rate 4500 sec ⁻¹)	centipoise	430 250
Specific Gravity at 25°C		1.11
Acid Value	MgKOH/g	19
Volatile Content	%	40
Appearance		Mauve
Stability in the dark at 20°C	months	3
Gel time at 25°C using 1 % Norox KP9 catalyst	minutes	23

Table 4: Typical properties of post-cured Crystic # 489PA (unfilled casting)

Property	Units	Typical value
Barcol hardness (Model GYZJ 934-1)		40
Water absorption 24h at 23°C	mg	18
Deflection temperature under load (1.81 Mpa)	°C	75
Specific gravity at 25°C		1.2
Elongation at break*	%	3.5
Tensile strength	Mpa+	75
Tensile modulus	Mpa	3200
Volumetric shrinkage	%	7.7



Test methods as in BS 2782

The curing schedule was 24h at 20°C followed by 3h at 80°C, except in determining deflection temperature, where the schedule was 24h at 20°C, 5h at 80°C, 3h at 120°C.

* Filtered resin, void-free casting.

+ 1 Mpa = 1 MN/m² = IN/mm² and is approximately 145 lbf/in² or 10.2 kgf/cm².

Storage

Crystic 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. Where they have to be stored outside, it is recommended that drums be kept in a horizontal position to avoid the possible ingress of water. Wherever possible, containers should be stored under cover.

Packaging

Crystic 489PA is supplied in 25kg kegs, 225kg drums, and 1125kg intermediate bulk containers. Bulk supplies can be delivered by road tanker.

Health and Safety

Please see the applicable Material Safety Data Sheets, depending on the curing system used.

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Before you use this information, kindly verify that this data sheet is the latest version.

All information is given in good faith but without warranty. We cannot accept responsibility or liability for any damage, loss or patent infringement resulting from the use of this information.

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