

CRYSTIC[®] 2-406PA

Low Styrene Emission, Low Exotherm Polyester Resin

Introduction

Crystic 2-406PA is a pre-accelerated, thixotropic orthophthalic unsaturated polyester resin, with low styrene emission. Its rapid impregnation of glass fibre reinforcements, and low exotherm temperature, make it ideal for multi-layer laminates, in spray or hand lay applications.

Crystic 2-406PA exhibits reduced exothermic heat on curing. This makes it suitable for the construction of thicker laminates where exothermic heat build up may distort the moulding or cause excessive shrinkage.

During the laminating phase, styrene emissions from Crystic 2-406PA are considerably reduced compared with a normal resin. Levels significantly lower than current or proposed legislation can be attained. This reduction in styrene emission is achieved with no loss of interlaminar adhesion. Scott Bader (Pty) Ltd does not recommend the use of low styrene emission resins for laminating in cold environments (below 20°C). For such conditions, Crystic 2-406PA is recommended.

Applications

Crystic 2-406PA is recommended for the manufacture of boat hulls, vehicle bodies and industrial mouldings.

Approvals

Crystic 2-406PA is approved by Lloyd's Register of Shipping for use in the construction of craft under their survey.

Formulation

Crystic 2-406PA 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 2-406PA requires only the addition of a catalyst to start the curing reaction. The recommended catalyst for normal conditions is Norox[®] KP9. Catalyst Norox MEKP-925H will increase the pot life under hot conditions. The catalyst should be thoroughly incorporated into the resin, with a low shear mechanical stirrer where possible.

Crystic 2-406PA is formulated for room temperature curing applications. It requires only addition of the correct amount of catalyst to start the curing reaction. The recommended formulations are given in Table 1:

Table 1: Recommended formulations for room temperature curing of Crystic 2-406PA.

Component	Parts by weight
Crystic 2-406PA	100
Catalysts Norox KP9 or Norox MEKP-925H	1 to 3

Pot Life

The ambient temperature and the amount of catalyst Norox KP9 or Norox MEKP-925H control the gel time of the formulation. This can be approximately determined from Table 2, which shows the gel times of various formulations of Crystic 2-406PA.

Table 2: Gelttime in minutes for Crystic 2-406PA.

■ = combination not recommended.

Catalyst type		Norox KP9				Norox MEKP-925H		
Catalyst addition		2.5%	2.0%	1.5%	1.0%	2.0%	1.5%	1.0%
Temperature	35°C	■	■	■	11	9	12	19
	25°C	■	13	17	22.5	■	■	■
	15°C	17	19	28	■	■	■	■

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.

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.

Additives

The addition of certain pigments, fillers or extra styrene may adversely affect the properties of Crystic 2-406PA. Users should seek advice from our Technical Service Department before making any additions.

Post Curing

Satisfactory laminates for many applications can be made from Crystic 2-406PA 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 Crystic 2-406PA when tested in accordance with BS 2782.

Table 3: Typical properties of liquid Crystic 2-406PA.

Property	Units	Nominal value
Appearance		Pinkish mauve
Viscosity @ 25°C 37.35 sec ⁻¹	cPs	550
Thixotropic index		2.0
Specific Gravity @ 25°C		1.10
Volatile Content	%	35
Acid Value	mg KOH/g	18.5
Stability in the dark @ 20°C	months	3
Gelttime @ 25°C using 1% Norox KP9 catalyst	minutes	22.5

Table 4: Typical properties of Crystic 2-406PA fully cured* resin (unfilled casting)

Property	Units	Nominal value
Barcol Hardness (Model GYZJ 934-1)		45
Deflection Temperature under load † (1.80 MPa)	°C	62
Water Absorption 24 hours at 23°C	mg	14
Tensile Strength	mPa	54
Tensile Modulus	mPa	3700
Elongation at Break	%	1.7
Specific Gravity @ 25°C		1.20
Volumetric Shrinkage	%	8.35

* Curing Schedule - 24 hrs @ 20°C, 3 hrs @ 80°C

† Curing Schedule - 24 hrs @ 20°C, 5 hrs @ 80°C, 3 hrs @ 120°C

Table 5: Typical interfacial properties of a Crystic 2-406PA chopped strand mat laminate

Property	Units	Test Method	Normal *	Resin-rich**
Unnotched Charpy impact strength	kJ/m ²	ISO 179	72	70
Single lap shear strength	MPa	BS 4994 Appendix C	3.8	3.9
Short beam shear strength	MPa	BS 2782 Method 341A	22 (18.6†)	21 (19.4†)
Fracture surface energy	J/m ²	Scott Bader Test	350	300

* 24hrs delay between 2 lay-ups of 2 x 450 g/m² chopped strand mat

** 2 x 450 g/m² CSM. Allowed to gel. Then 700 g/m² pure resin interface. Then 24hrs delay. Then 2 x 450 g/m² CSM.

† Data obtained using 5 days delay instead of 24hrs

Storage

Crystic 2-406PA 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.

Packaging

Crystic 2-406PA 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.

Technical Leaflet No 102.22SA

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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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