

CRYSTIC[®] 2-301PA

Low Viscosity Low Exotherm LSE Orthophthalic Polyester Resin

Introduction

Crystic 2-301PA is an orthophthalic, low viscosity unsaturated polyester resin. It is supplied as a solution dissolved in monomeric styrene. It is pre-accelerated to give sufficient pot life for contact moulding using Andonox[®] KP9 at normal ambient temperatures. It has been formulated with a special colour change mechanism for indicating the correct addition of catalyst. It is suitable for a wide range of applications.

Applications

Crystic 2-301PA is designed for application by spray, roller or brush, for contact moulding. Its thixotropy will prevent draining when used on vertical or inclined surfaces with chopped strand mat. It requires only the addition of catalyst to start the curing reaction and is therefore ideal for long production runs under controlled workshop conditions. It has a low exotherm temperature, which allows laminates up to 3mm in thickness to be laid up in one operation without excessive heat being generated.

Crystic 2-301PA has been formulated to give a tough resilient laminate. It can be used with confidence in the construction of industrial and general-purpose mouldings.

Crystic 2-301PA is also available pigmented white.

Styrene Emission

In normal polyester resins most styrene evaporates from the liquid resin during the application phase, when the resin surface is being disturbed. Once this phase is complete, and the resin is left to cure undisturbed, the rate of styrene emission is appreciably reduced. With Crystic 2-301PA there is a reduction in the rate of styrene emission during application. Once this is complete styrene emission is dramatically reduced.

Formulation

Crystic 2-301PA is formulated for room temperature curing applications. It requires only addition of the correct amount of catalyst to start the curing reaction. The recommended formulation is given in Table 1.

Table 1: Formulations for room temperature curing of Crystic 2-301PA.

| Component | Parts by weight |
|---|-----------------|
| Crystic 2-301PA | 100 |
| Catalysts Andonox [®] KP9 or Norox [®] MEKP 925 H | 1.0-3.0 |

The catalyst must be stirred thoroughly into the resin shortly before use. 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 (15-30°C) before being formulated for use.

Crystic 2-301PA has a built in chemical colour change mechanism to indicate to operators that the catalyst has been incorporated into the resin. Table 2 shows how the colour changes with time.

Table 2: Catalyst colour indicator operation time for Crystic 2-301PA.

| Time after catalyst addition | Colour |
|------------------------------|--------|
| 0 minutes | Blue |
| 1-5 minutes | Green |
| 10-15 minutes | Pink |

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.

Pot Life

The temperature and the amount of Andonox[®] KP9 or Norox[®] MEKP 925 H catalysts control the gel time of the resin formulation and hence the pot life. This can be approximately determined from Table 3.

Table 3: Geltimes in minutes for Crystic 2-301PA.

■ = combination not recommended.

| Catalyst type | | Andonox [®] KP9 | | | Norox [®] MEKP 925 H | | |
|-------------------|------|--------------------------|------|------|-------------------------------|------|------|
| Catalyst addition | | 3.0% | 2.0% | 1.0% | 3.0% | 2.0% | 1.0% |
| Temperature | 35°C | ■ | 7 | 12 | 6 | 10 | 14 |
| | 25°C | ■ | 12 | 23 | 11 | 25 | 29 |
| | 15°C | 18 | 24 | ■ | ■ | ■ | ■ |

Crystic 2-301PA is formulated for use between 15°C and 25°C. It is recommended that workshop temperatures be maintained within this range.

At temperatures above 30°C, the gel time even at 1% Andonox[®] KP9 catalyst can be so short that there is insufficient working time to use up all the resin that has been mixed. If the resin has been applied by spray, it may start to gel before the laminate can be properly consolidated. In such cases, do not use less than 1% catalyst as this can cause undercure. Rather use Norox[®] MEKP-925 H. If using 1% Norox[®] MEKP-925 H catalyst still gives too short a working time, do not use less than this. Rather mix smaller quantities of resin at a time so that it can all be used within the working time available, or if spraying, apply smaller areas at a time.

At temperatures below 15°C, the curing reaction can be so slow that there is a high probability of undercure of the resin, even with over 3% Andonox[®] KP9 catalyst. Do not use more than 3% catalyst as that will not speed up the geltime appreciably or result in a faster cure; in fact it can further retard the cure. Rather warm up the resin and working area so that it is above 15°C.

Crystic 2-301PA is formulated for use under South African summer conditions. In colder weather, users should change to Crystic 1-30PA. This has the same physical properties as Crystic 2-301PA, but its gel and cure properties are adjusted for use in cooler conditions. It does not have low styrene emission. The use of low styrene emission resins is not recommended in cold conditions, and as the vapour pressure of styrene is lower at cold temperatures, it does not usually present a problem.

Pigments and Fillers

Crystic 2-301PA may be pigmented with up to 5 percent of Scott Bader pigment paste, although lesser amounts are normally sufficient in a laminating resin. Pigment pastes and fillers should be used with caution, as they are likely to have a significant effect on the storage stability, geltime and cure of the resin system, and the physical strength properties of the final product.

Post Curing

For most applications, where the moulded product will be used at ambient temperatures, satisfactory laminates can be produced without post curing at elevated temperatures, provided workshop temperatures are not below 20°C. For more critical applications, where optimum properties are required, or where the service temperature of the moulding will be above ambient temperature, post curing at elevated temperature is recommended.

The optimum temperature for Crystic 2-301PA is 80°C. After release from the mould, laminates should be allowed to mature for 24 hours at a workshop temperature of not less than 20°C. before being post cured. Place the part in an oven, suitably supported to prevent warping, and increase the temperature from ambient to 80°C in 10°C stages. Leave the moulding at 80°C for three hours, and then switch the oven off. Allow the moulding to cool slowly in the oven. Post-curing is most effective if it is carried out immediately after the 24-hour maturing period.

Liquid Properties

The most important typical liquid properties of Crystic 2-301PA are given in Table 4.

Table 4: Typical liquid properties of Crystic 2-301PA

| Property | Units | Nominal value |
|--|------------|---------------|
| Viscosity at 25°C: Brookfield RVT at 100rpm | centipoise | 350 |
| Thixotropic index | ratio | 2.0 |
| Specific Gravity at 25°C | | 1.08 |
| Acid Value | mgKOH/g | 22.2 |
| Volatile Content | % | 40 |
| Colour | visual | Blue |
| Stability at 25°C | months | 3 |
| Geltime at 25°C using 1% Andonox [®] KP9 catalyst | minutes | 23 |

Storage

Crystic 2-301PA 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 2-301PA 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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