CRYSTIC® 344A

Halogen and Antimony Free Fire Retardant Polyester Resin

Introduction
Crystic 344A is a polyester resin, containing styrene and methyl methacrylate. It is designed to be used as a filled system, in the manufacture of fire retardant laminates.

Applications
Crystic 344A was developed primarily for use in rolling stock applications. It is, however, suitable for internal applications in other areas of the land transport, marine and building industries where a very high degree of fire resistance and exceptionally low smoke and toxic gas generation is required.

Features and Benefits
Crystic 344A is a halogen and antimony free laminating resin. It can also be applied using established resin spray equipment. It combines minimal burning characteristics with exceptionally low smoke and toxic gas generation.

Whilst the use of a gelcoat will reduce the fire resistance of Crystic 344A laminates, a smooth, resin rich surface can be obtained by the use of a surfacing tissue, and this will not detract from its fire performance characteristics.

Approvals
Fully cured laminates moulded with Crystic 344A using the specified formulation below, can achieve the following criteria:-

British Standards
BS 476 Part 6: 1989 - i and I indices less than 6 and 12 respectively.
BS 476 Part 7: 1997 - Class 1/0.
The system meets the requirements of Section E15 of the Building Regulations 1985, for a Class 0 structure.

BS 6853 1999: Interior Vertical Surface (Table 2) - Category 1a.

Epiradiateur (NFP 92, 501; NFF 16-101) - M1, F0.

International Marine Organisation (IMO Certification)
MSC 61(67), Annex 1, Pt2 (Smoke and toxicity test) – achieves full criteria for bulkhead, wall and ceiling linings. A653(16):1996, amended by MSC 61(67): Annex 1, Pt5, (Surface flammability) meets all criteria given in IMO document, and can therefore be considered to have low flame spread in compliance with the International Convention for the Safety of Life at Sea, 1974.

Formulation
Crystic 344A should be allowed to attain workshop temperature (18 °C – 20 °C) before use. Immediately prior to use, Crystic 344A Filler should be thoroughly dispersed into the resin at a ratio of 300 parts by weight Crystic 344A Filler to 100 parts by weight Crystic 344A, using a mechanical stirrer.

Example pot lives are shown in the table below:

Crystic 344A Resin	100 g	100 g	100 g	100 g
Crystic 344A Filler	300 g	300 g	300 g	300 g
Accelerator G	8 ml	6 ml	4 ml	2 ml
Butanox M50	4 ml	4 ml	4 ml	4 ml
Potlife at 25 °C	29 minutes	35 minutes	39 minutes	61 minutes

These results were measured using small samples sizes. The geltime will be reduced when bulk quantities are mixed. It is the customer's responsibility to ensure that a high quality laminate can be produced before the material begins to gel.

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

Handling Characteristics

The highly filled nature of Crystic 344A means that it cannot be used in conjunction with powder bound chopped strand mat. Only emulsion bound mat or woven glass reinforcements should be used. Slightly modified laminating techniques may also be necessary, due to 'air drying' effects created by evaporation of methyl methacrylate during lamination. The resin must be thoroughly worked into the reinforcement using a stippling action, and consolidation should be carried out simultaneously and carefully, using thin fin rollers, preferably nylon or PTFE.

A resin/filler to glass ratio of ~ 4 to 1 is recommended. A glass content of approximately 20 % by weight should be achieved using hand laminating methods.

Additives

The addition of pigment pastes, or additives other than those referred to in this data sheet, is not recommended, as this could adversely affect the fire properties of Crystic 344A.

Typical Properties

The following tables give typical properties of Crystic 344A when tested in accordance with BS 2782.

Property		**Liquid Resin**
Appearance		Brown
Viscosity at 25 °C	poise	< 0.2
Specific Gravity at 25 °C		1.0
Stability at 20 °C	months	3
Geltime at 25 °C using 2 % Butanox M50 (or equivalent)	minutes	25
Property		**Fully Cured[*] Resin (filled casting, 300 phr filler)**
Barcol Hardness (Model GYZJ 934 -1)		54
Deflection temperature under Load[†] (1.80 MPa)	°C	69.4
Water absorption 24 hours at 23 °C	mg	11.0
Tensile strength	MPa	75.9
Tensile modulus	MPa	11270
Elongation at Break at 20 °C	%	1.8
Specific Gravity at 25 °C		1.7

[*]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		**CSM[**] Laminate**
Glass Content	%	21.0
Tensile strength	MPa	69.4
Tensile modulus	MPa	12861
Elongation at break	%	2.0
Flexural Strength	Mpa	146.8
Flexural Modulus	Mpa	9983
Notched Izod impact	kJ/m^2	52.5
Charpy Impact	kJ/m^2	40.0

[**]Made with 4 layers 450 gm^{-2} EB CSM
Curing Schedule – 24 hrs at 20 °C, 3 hrs at 80 °C

Post Curing

Satisfactory fire retardant laminates for many applications can be made with filled Crystic 344A by curing at workshop temperature (20 °C). However, for optimum mechanical and fire retardant properties, mouldings should be post cured before being put into service. The mouldings should be allowed to cure for 24 hours at 20 °C, then be oven cured for a minimum of 3 hours at 80 °C or 16 hours at 40 °C.

Storage

Crystic 344A should be stored in the dark in suitable closed containers. It is recommended that the storage temperature should not exceed 20 °C where practical, but should not exceed 30 °C. Ideally, containers should be opened only immediately prior to use.

Crystic 344A should be stored in the original packaging in dry conditions.

Packaging

Crystic 344A is supplied in 25kg, 200kg and 1 tonne containers. Bulk supplies can be delivered by road tanker.

Health & Safety

Please see separate Material Safety Data Sheet.

Version 2 : February 2013

SCOTT BADER COMPANY LIMITED

Wollaston, Wellingborough, Northamptonshire, NN29 7RL
Telephone: +44 (0) 1933 663100
Facsimile: +44 (0) 1933 666623
www.scottbader.com