

8020 RAPI-PLY

Structural Component Manufacture Using 8020 Rapi-Ply Technology

Rapi-Ply materials consist of a layer of fibre reinforcement either side of a layer of resin film. Unlike conventional prepreg materials the fibre reinforcement remains dry and unimpregnated until the curing process. The dry fibres in the Rapi-Ply materials create an air-path for the material to breathe, and achieves excellent quality laminates from vacuum bag processing. Surfacing films are available to modify to the properties of the laminate surface.

8020 resin is a new generation of toughened Epoxy resin systems offering an excellent balance of mechanical properties. The resin system has been developed to offer long outlife, flexible cure schedules and high flow characteristics to ensure the fibre is fully impregnated during the moulding process.

CHARACTERISTICS

- ◆ Flexible low to medium cure schedules (70°C to 130 °C).
- ◆ High Strength and Toughness.
- ◆ Outstanding vacuum-only processing capability.
- ◆ No debulking required.
- ◆ Significantly reduced lay-up times (up to 75%) compared with traditional prepreg routes.
- ◆ Drapable & Conformable - Light tack for use on vertical surface*.
- ◆ Tg 128°C (DSC) after 30 minute cure at 120°C.
- ◆ 7 days useable outlife (20°C) – 12 months freezer storage life (-18°C).

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Issue Ref: PDS/RP8020/03
Issue Date: Dec 06

PRODUCT RANGE

The 8020 Rapi-Ply range includes:

- 8020 Rapi-Ply – Structural system
- 8020 Rapi-Ply SC – Incorporates a light weight syntactic core
- 8020 Rapi-Core – A low weight, low density core material
- 8020 Surface film – Modifies the properties of the laminate surface

All products including 8020 structural prepreg can be co-cured.

Please refer to individual product datasheets for further details.

8020 RECOMMENDED CURE TIMES

Cure temperature (°C)	Recommended cure time (hrs)
70	12
80	5.5
100	2
120	0.5

EXOTHERM

In certain circumstances, such as the production of thick section laminates, rapid heat up rates or highly insulating masters, 8020 Rapi-Ply can undergo exothermic heating leading to rapid temperature rise and component degradation in extreme cases.

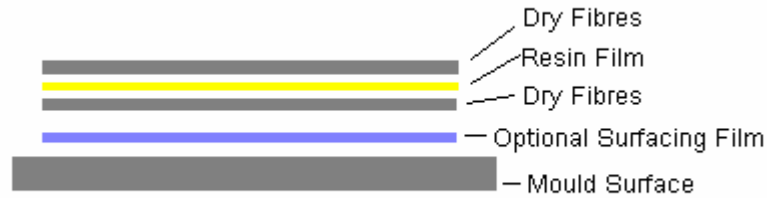
The risk of exotherm increases with lay-up thickness and increasing cure temperature. It is strongly recommended that trials, representative of all the relevant circumstances, are carried out by the user to allow a safe cure cycle to be specified.

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FORMAT

Rapi-Ply materials consist of a layer of fibre reinforcement either side of a layer of resin film and therefore has the appearance of a dry reinforcement:



Schematic of 1 ply of Rapi-Ply

Rapi-Ply is available in a wide range of high performance reinforcing fabrics, standard configurations include:

Description	Rapi-Ply Construction	Width	Moulded thickness
Carbon fabrics			
8020 RP 101	HS Carbon 300 g/m ² 2/2 twill 6K 43% / HS Carbon 300 g/m ² 2/2 twill 6K 43%	1.0m	0.76mm
8020 RP 102	HS Carbon 300 g/m ² 2/2 twill 6K 43% / HS Carbon 285 g/m ² 2/2 twill 12K 43%	1.0m	0.78mm
Glass fabrics			
8020 RP 201	E Glass 390 g/m ² 2/2 twill 35% / E Glass 390 g/m ² 2/2 twill 35%	1.0m	0.7mm
8020 RP 202	E Glass 300 g/m ² 8HS 35% / E Glass 300 g/m ² 8HS 35%	1.0m	0.55mm
8020 RP 203	E Glass 600 g/m ² PW WR 35% / E Glass 600 g/m ² PW WR 35%	1.0m or 1.2m	1.1 mm
8020 RP 204	E Glass 450 g/m ² ±45° 35% / E Glass 450 g/m ² ±45° 35%	1.27m	0.88 mm
8020 RP 205	E Glass 600 g/m ² 8HS 35% / E Glass 600 g/m ² 8HS 35%	1.20m	1.02 mm
8020 RP 206	E Glass 280 g/m ² PW WR 35% / E Glass 280 g/m ² PW WR 35%	1.00m	0.48 mm

All materials are supplied on a roll length of 20lm

*All materials are supplied with a light tack for use on vertical surfaces with the exception of RP202 and RP205 which are supplied tack-free.

The standard resin system is pigmented black.

PROCESSING

Following removal from the freezer, allow the Rapi-Ply to reach room temperature before opening the polythene bag, to avoid moisture condensation. Typically, the thaw time for a full roll of material from storage at -18°C will be 4 to 6 hours.

If a surface ply is required, this should be applied directly to the tool face prior to lay-up of Rapi-Ply (refer to Surface Film datasheet).

Cut patterns to size and lay up the laminate in line with design instructions taking care not to distort the Rapi-Ply.

Note: It is important that dry glass tows are inserted at approx 0.5m intervals between plies of Rapi-Ply and at the front and back surfaces to provide an air evacuation path out of the laminate into the breather.

De-bulking of the laminates should not be necessary under normal circumstances.

Use of a non-perforated release film on the Rapi-Ply surface trimmed to within 25-30mm of Rapi-Ply edge is recommended for the cure.

Rapi-ply can be successfully cured by either vacuum-only or autoclave moulding processes.

POSTCURE

In applications demanding maximum temperature or environmental resistance e.g. 120°C service temperature, it is essential to develop the glass transition temperature to the maximum level by a suitable postcure.

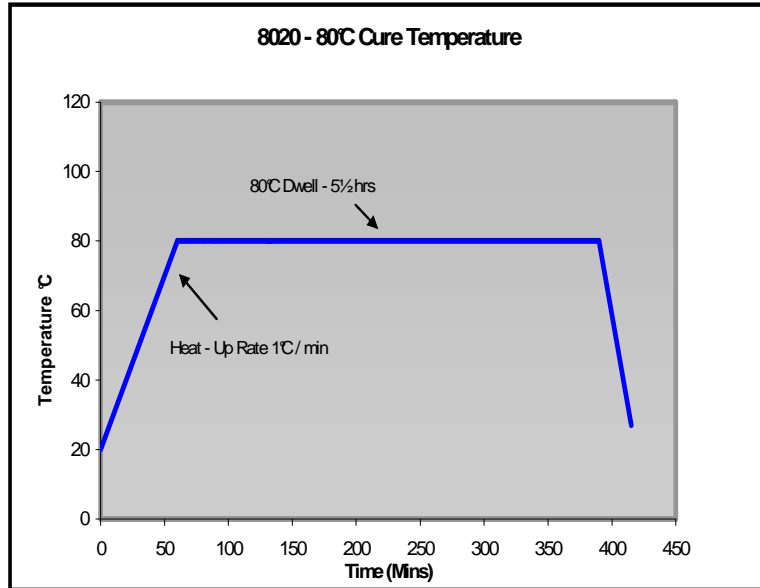
Ramp from initial cure temperature to 120°C at 20°C /hr and hold for 30 minutes minimum, this postcure will result in a Tg of approximately 128°C.

Laminates may be postcured unsupported unless the size, shape and laminate thickness would allow excessive distortion under self-weight.

TYPICAL CURE PROFILES

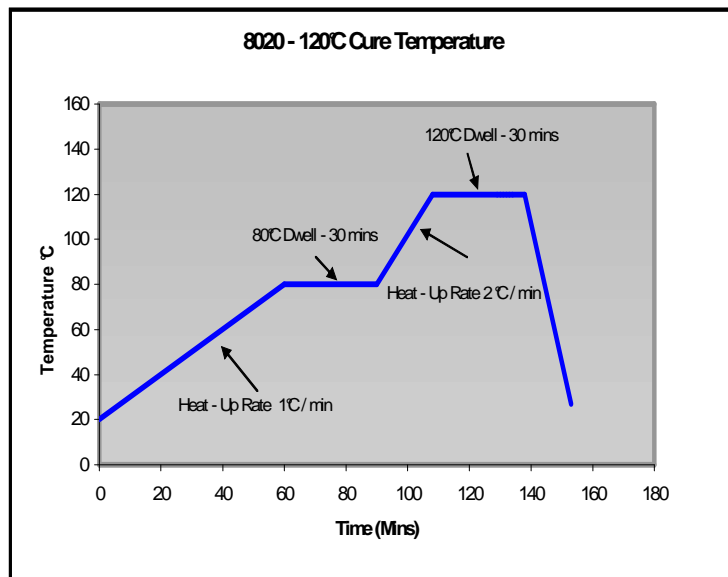
80°C Cure Temperature
1.0°C / minute ramp to 80°C
5½ hours dwell @ 80°C

Total Time: 6½ hours



120°C Cure Temperature
1.0°C / minute ramp to 80°C
30 minute dwell @ 80°C
2.0°C / minute ramp to 120°C
30 minute dwell @ 120°C

Total Time: 2hours 20 minutes



RESIN MATRIX PROPERTIES

Density	1.21 g/cm ³ at 23°C
Tg after 30mins at 120°C (DSC)	128 °C

TYPICAL LAMINATE PROPERTIES (at Room Temperature)

T300 (6K) 300g/m² 2/2 twill carbon 0/90° configuration woven laminates, cured 5½ hrs at 80°C, results normalised to 55% Vf.

Flexural Strength	980 MPa
Flexural Modulus	62 GPa
Apparent ILSS	66 MPa

STORAGE

The Rapi-Ply should be supported at either end so that the material does not initiate premature resin flow through the fabric.

The self-impregnation of Rapi-ply will occur over a period of time at ambient temperature (20°C) and this can compromise its ability to generate high quality laminates as the air breathing properties decrease. Self-impregnation will vary from product to product but at ambient temperature (20°C) self-impregnation will occur in approximately 1 week.

Out life of resin is 30 days ambient temperature (20°C).

Refrigerated storage life is 12 months at -18°C

HANDLING SAFETY

Although Rapi-Ply may offer improved health & safety compared with traditional prepregs 8020 Rapi-Ply does contain epoxy resin, which can cause allergic reactions by skin contact. Avoid prolonged or repeated contact with skin – wear disposable nitrile gloves.

Wash the skin thoroughly with soap and water or resin removing cream after handling. Do not use solvents for cleaning skin.

Care should be taken when handling dry fibres while handling material to prevent contact with skin and to control the egress of fibres into the workplace. Carbon fibre is electrically conductive and electrical equipment should be protected from carbon fibres and dust.

Amber Composites Ltd produces a separate full Material Safety Data Sheet for this product. Please ensure that you have the correct MSDS's to hand for the materials you are using before commencing work.

FURTHER INFORMATION - PROCESSING DETAILS

Please contact our Technical Sales Engineer or Technical Service Department for further details.

This is not a specification. The information given in this data sheet in relation to the performance, storage and other characteristics of the product is based on results gained from experience and tests and is believed to be accurate. Given, however, that conditions of use and storage will vary, Amber Composites will not be liable for any loss or damage resulting from reliance upon such information. The purchaser is recommended to carry out his own tests to establish the suitability of the product for its particular purpose. The use of the product in certain processes may require third party consent.