

NTPT THINPREG™ 402 DATA SHEET

INTRODUCTION

ThinPreg™ 402 is a resin system suitable for manufacture of unidirectional prepreg material.

ThinPreg™ 402 is a versatile system that is used most often with carbon fibre, but can also be impregnated into a wide range of reinforcing fibres including quartz, glass, aramid fibre etc. ThinPreg™ 402 features a high Tg (180°C) capability with additional toughening, and has been designed to be a good all-round product in terms of mechanical strength and processability.

ThinPreg™ 402 is best used with an autoclave molding process with a with a recommended cure cycle at 135°C/275°F, and between 3 to 7 atmospheres of pressure. ThinPreg™ 402 is especially suited to low fibre areal weight products (FAW), from 15gsm to 300gsm, and is typically supplied with a resin content ranging from 32 to 42% by weight.

FEATURES

- Wide range of Fiber Areal Weight, including extremely light tapes
- Toughened epoxy resin system
- High Tg system
- High homogeneity material
- Out life of 60 days at 21°C (70°F)

BENEFITS

- Possibilities of optimizing the composite structure design with the right material at the right place
- High mechanical properties
- Ideal for high temperature applications (up to 180°C)
- Outstanding thickness & fiber/resin ratio consistency
- Possibility of making large and/or complex parts with long processing time before curing

Light weight prepreg tapes (<75gsm) should be handled carefully.

For parts larger than 1m² (1.2sq yd), North Thin Ply Technology strongly recommends to use a complex made of ThinPreg™ 402 laid down with an Automated Tape Laydown system as shown above.

This solution minimizes mold dressing time and thus total cycle time, ensures an accurate lay down of every single piece of tape, in every designed direction and eliminates human errors.

INSTRUCTIONS FOR USE

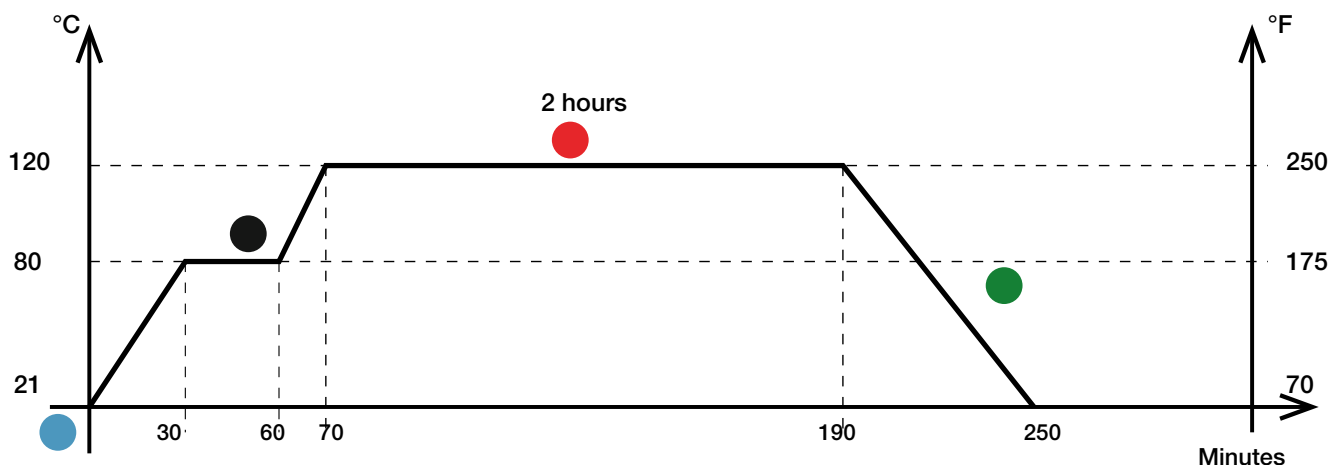
Curing cycle

There are two possible curing cycles to reach ThinPreg™ 402 best performance:

Curing Cycle 1: Standard autoclave curing. This cure cycle has been used by many users of TP 402 and found to give satisfactory composite properties.

Curing Cycle 2: Enhanced properties autoclave curing. This is a higher temperature curing option that further cross links the epoxy matrix potentially leading to a higher Tg matrix and a higher strength matrix.

Curing Cycle 1: Standard autoclave curing



Dress ThinPreg™ 402 in the mold and cover the laminate with vacuum bag. Apply vacuum progressively and place the mold and laminate in the autoclave. Do not hesitate to let the laminate under vacuum for several hours before heating up. Then ramp up the temperature of the autoclave to 80°C (180°F) at maximum 2°C/minute.

Stabilize the temperature at 80°C (180°F) for approximately 30 minutes so as to let the resin flow and fully impregnate the laminate. Then ramp up the temperature again at maximum 2°C/min to reach 120°C (248°F).

Stabilize the temperature for 2 hours at 120°C (248°F)

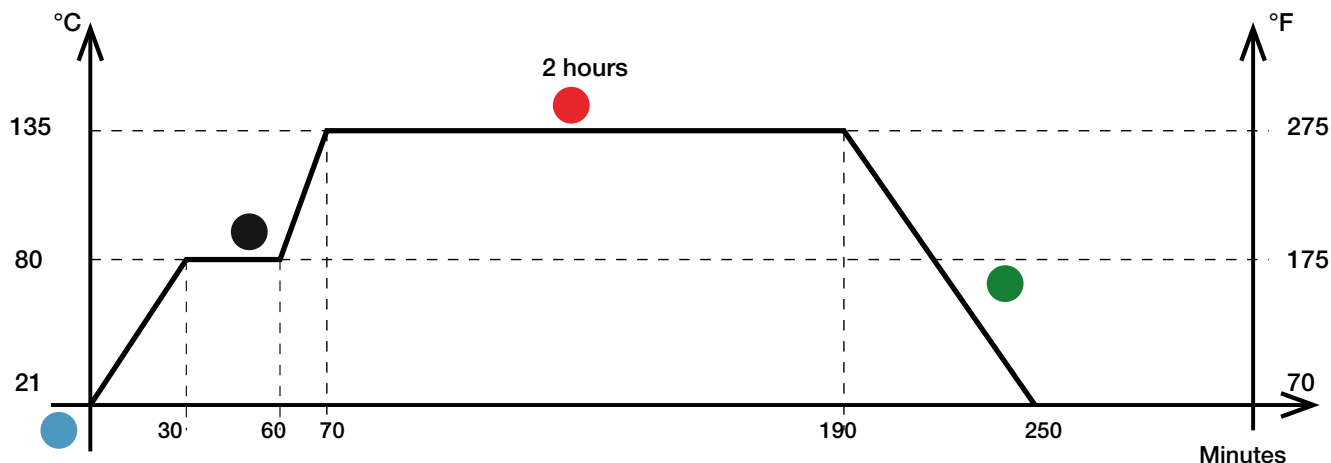
Cool down at maximum 2°C/min to reach room temperature. Keep the vacuum during cooling down and release after complete curing cycle.

Post curing: To reach ThinPreg™ 402 maximum Tg, another plateau of 2 hours at 160°C (320°F) should be added before the cooling down described in step 4. Another possibility is to post-cure for 2 hours at 160°C (320°F) once the composite part has been de-molded.

INSTRUCTIONS FOR USE

Curing cycle

Curing Cycle 2: Enhanced Properties Autoclave Curing



● Apply ThinPreg™ 402 in the mold and cover the laminate with vacuum bag. Apply vacuum progressively and place the mold and laminate in the autoclave. Do not hesitate to leave the laminate under vacuum for several hours before heating up. Then ramp up the temperature of the autoclave to 80°C (180°F) at maximum 2°C/minute.

● Stabilize the temperature at 80°C (180°F) for approximately 30 minutes so as to let the resin flow and fully impregnate the laminate. Then ramp up the temperature again at maximum 2°C/min to reach 135°C (275°F).

● Stabilize the temperature for 2 hours at 135°C (275°F).

● Cool down at maximum 2°C/min to reach room temperature. Keep the vacuum during cooling down and release after complete curing cycle.

Post curing: To reach ThinPreg™ 402 maximum Tg, another plateau of 2 hours at 160°C (320°F) should be added before the cooling down described in step 4. Another possibility is to post-cure for 2 hours at 160°C (320°F) once the composite part has been de-molded.

Note: The user should, in every case, check that the proposed cure cycle yields the properties that the user is looking for as the resin cross linking reaction can be influenced by many factors e.g. part size, ramp rate, temperature, cure time, etc. A common method of checking the proposed cure is to manufacture and assess representative test panels prior to committing the materials and process to the actual part build.

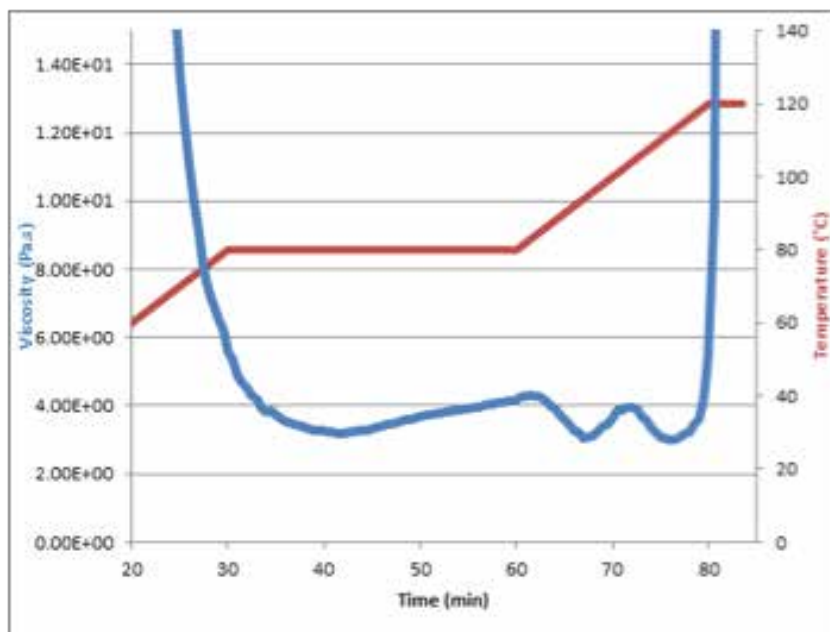
Please contact NTPT Customer Care Team for further specific information relating to this point.

TYPICAL CHARACTERISTICS

Cured Matrix Properties (after the above mentioned Enhanced Curing Cycle has been applied without postcuring)	International System of Units	American System	Test Method
Density	1.21 g/cm ³	75.5 lb/ft ³	ISO 1183 - 3
Color	Light beige		/
Tensile modulus	3440 MPa	404 Ksi	ISO 527 - 2
Tensile strength	62 MPa	4.3 Ksi	ISO 527 - 2
Elongation at break	2.57%		ISO 527 - 2
Flexural modulus (mean value)	3570 MPa	442 Ksi	ISO 178
Flexural strength (mean value)	148 MPa	8.2 Ksi	ISO 178
Strain at maximum load (mean value)	6.2%		ISO 178
Maximum Tg after post-cure	>185°C	>365°F	
Water absorption (boiling water)	0.28%		ISO 62
Heat deflection temperature	131°C	268°F	ISO 75 - 2
Fracture toughness K1C	0.78 MPa.m ^{1/2}	0.70ksi.in ^{1/2}	ISO 13586

ThinPreg™ 402 is very well suited to use in ultra-light UD tapes laid to make multi-axial prepreg preforms. For example, a quasi-isotropic preform made of 4 plies T800 18gsm enables significant weight saving in automotive body panels while providing a good surface finish. ThinPreg™ 402 is also used in combination with high strength carbon fibers and/or PBO fibers (like Zylon®) for impact structures.

Resin viscosity profile:





GENERAL INFORMATION

Storage

ThinPreg™ 402 should be stored at -18°C (0°F) to reach the maximum shelf life of 24 months. At 21°C (70°F), the out life is 60 days.

Packaging

ThinPreg™ 402 is wound into 300 mm (11.8 inches) wide rolls on a 76 mm (3 inches) inner diameter cardboard tube. ThinPreg™ 402 is supported on a bottom silicon paper. The standard roll length is 150 linear meters (164 yards).

Health and safety

ThinPreg™ 402 contains epoxy resins which can cause allergic reaction. When uncured, ThinPreg™ 402 should be handled with appropriate gloves. When cured, a composite laminate made of ThinPreg™ 402 should be cut, drilled or machined in a room equipped with an exhaust ventilation and filtration system, by operators wearing protective clothing and masks. Refer to Material Safety Data Sheet for further information.

Notice and disclaimer

The Company strongly recommends that Customers make test panels and conduct appropriate testing of any goods or materials supplied by the Company to ensure that they are suitable for the Customer's planned application. Such testing should include testing under conditions as close as possible to those to which the final component may be subjected. The Company specifically excludes any warranty of fitness for purpose of the goods other than as set out in writing by the Company.

All advice, instruction or recommendation is given in good faith but the Company only warrants that advice in writing is given with reasonable skill and care. No further duty or responsibility is accepted by the Company. All advice is given subject to the Terms and Conditions of sale (the Conditions) which are available on request from the Company.

The Company reserves the right to change specifications and prices without notice and Customers should satisfy themselves that information relied on by the Customer is that which is currently published by the Company on its website. Any queries may be addressed to the Technical Services Department.

NTPT continuously reviews and updates its literature. Please ensure that you have the current version, by contacting your NTPT sales contact and quoting the revision number.

Contact

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