ENDUREDGE MAX

Cyanate Ester

Technical Datasheet

NTC-425 Cyanate Ester Prepreg

Description

NTC-425 is a unique pure cyanate prepreg resin system that allows a lower temperature 275F (135C) initial cure that achieves ~80% cure conversion. The part can then be removed from the tool and post-cured free-standing for 4 hours to complete the process and achieving a final Tg in excess of 425F (220C).

Unlike legacy cyanate ester prepregs, the extended latency of our unique formulation provides an out-time of 90-100 days at typical shop temperatures (<75°F/24°C) allows the fabrication of larger structures without fear of going past published out-time limits.

The unique prepreg architecture creates engineered air release channels that allow trapped air to flow in the Z-direction. This feature allows structures to be produced using OOA processing without complicated and lengthy debulk and cure processes while providing similar results as autoclave curing.

The final product provides excellent mechanical properties and toughness, low moisture absorption, and low outgassing. NTC-425 is also an excellent choice for cryogenic applications or large structures that may require long periods of time layup.

Product Features

- Excellent Mechanical Properties
- Processes Autoclave or VBO
- 15 months in freezer (<32°F / 0°C)
- >90 d out-time at ambient storage conditions (<75°F/24°C)
- Excellent Mechanical Properties with Vacuum Bag Only processing
- Unique engineered air release channels allow excellent OOA processing

Neat Resin Properties

Density 1.20 g/cc

Dk = 2.68 ; Df = 0.008

Moisture Absorption: 1.2%

DRY Tg	ONSET °F (°C)	LOSS MODULUS °F (°C)	TAN DELTA °F (°C)
Post	435°F (224°C)	442°F (228°C)	473°F (245°C)
Standard	403°F (206°C)	419°F (215°C)	462°F (239°C)

WET Tg	ONSET °F (°C)	LOSS MODULUS °F (°C)	TAN DELTA °F (°C)
Post	399°F (204°C)	397°F (203°C)	442°F (228°C)
Standard	379°F (193°C)	381°F (194°C)	430°F (221°C)

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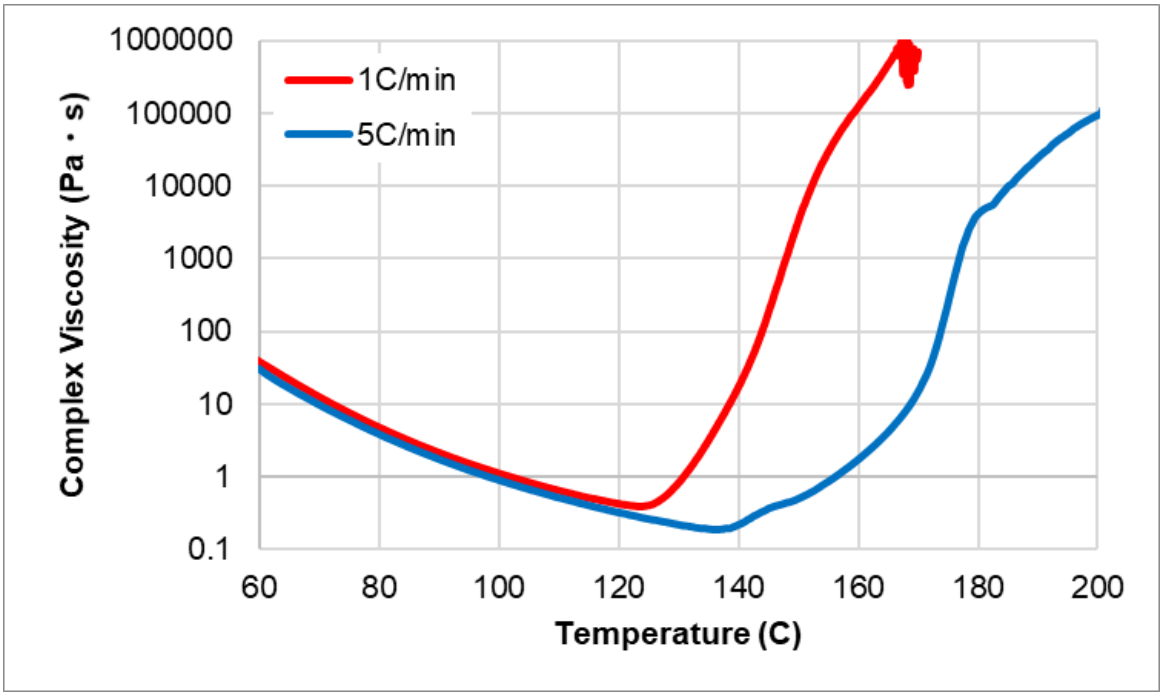
Prepreg Mechanical Properties in Uni-Directional Fibers

PROPERTY	METHOD	RESULT
Tensile Strength	ASTM D3039	589 ksi (4062 MPa)
Tensile Modulus	ASTM D3039	30.0 Msi (206.9 GPa)
Compressive Strength	ASTM D6641	190.7 ksi (1315 MPa)
Compressive Modulus	ASTM D6641	23.5 Msi (151.0 GPa)
Flexural Strength	ASTM D7264	146.4 ksi (1009.7 MPa)
Flexural Modulus	ASTM D7264	10.3 Msi (71.0 GPa)
Short Beam Shear	ASTM D2344	14.4 ksi (99.3 GPa)
Open Hole Compression	ASTM D6484	49.4 ksi (317.9 MPa)

Toray T-1100 fiber NTC-425 resin system autoclave cured following baseline cure profile at 80 psi
Normalized to 60% fiber content (except SBS)

Viscosities during Cure



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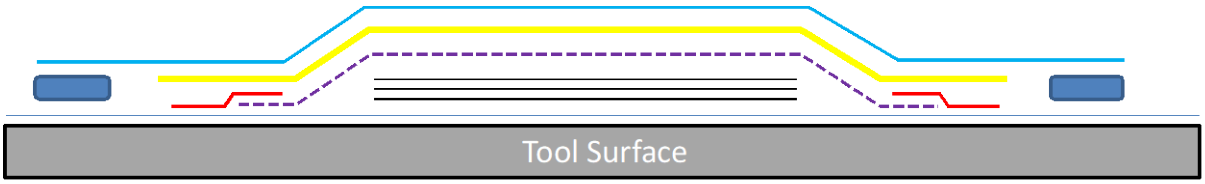
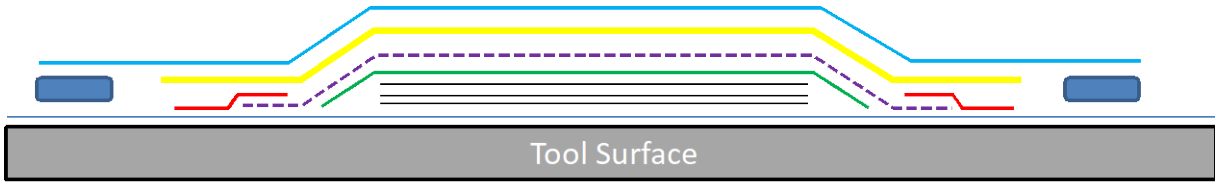
Layup option for standard bagging procedure



1. Release Agent (Marbocote 45Eco type)
2. NEXX Layup (up to 25 plies).
3. Teflon film + small holes (pattern no less than 10x10cm)
4. Sealant Tape (all around)
5. Breather (the thinner the better)
6. Rubber sealant (all around)
7. Vacuum Bag

Layup option for improve bag side. Use this when bag side has to be taken into consideration.



1. Release Agent (Marbocote 45Eco type)
2. NEXX Layup (up to 25 plies).
3. Peelply
4. Solid Teflon film + holes in pattern no closer than 10cm apart
5. Sealant Tape (all around)
6. Breather (the thinner the better)
7. Rubber sealant (all around)
8. Vacuum Bag

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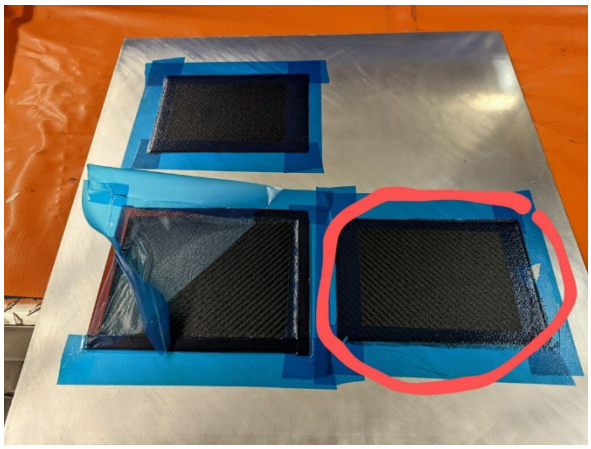
NTC-425 VBO Processing Guidelines

Two VBO layup options were performed using the NTC-425 Cyanate Ester Prepreg material.

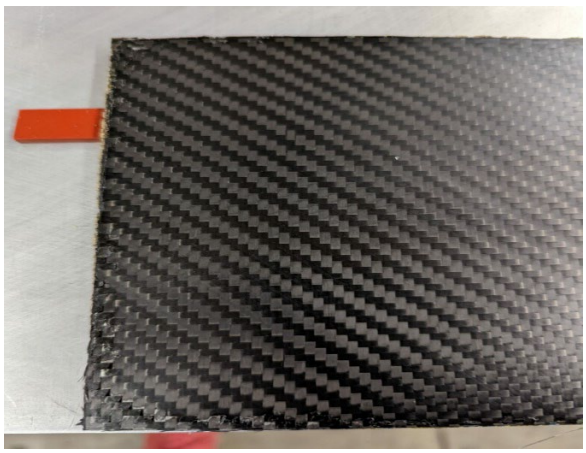
All laminates were 6 plies

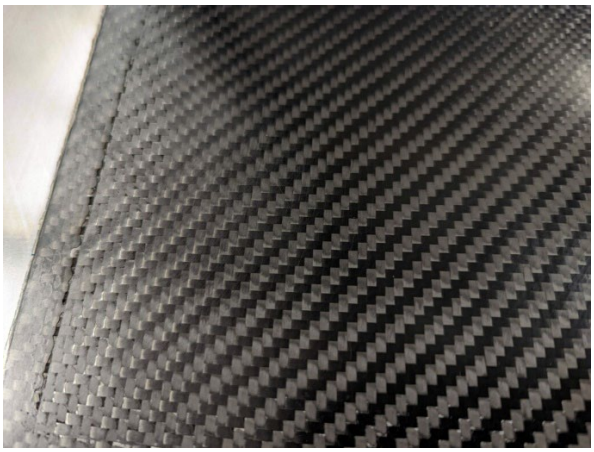
Option 1- layup 6 plies with Airtech Sildam 'dams' applied to the perimeter beneath the FEP (no perf)- 4 small holes using a diabetes finger prick tool (0.010"-0.015"dia)
Flashbreaker tape was applied tightly around the perimeter
Standard Bleed material and bagging procedure was followed

Option 2- Layup 6 plies- no dam- standard 'trapped' FEP (no perf) 4 small holes using a diabetes finger prick tool (0.010"-0.015"dia)
layup with flashbreaker tight against the perimeter of the laminate
standard bleed material and standard bagging procedure.



Cure Profile: Pull full Vac 25"-30" Hg
Ambient: 15 minutes
Ramp to 150F @ 5-7F / minute and hold for 30 minutes
Ramp to 225F @ 5-7F / minute and hold for 3 hours
Ramp to 275F @ 5-7F / minute and hold for 5 hours
Ramp to 356F @ 5-7F / minute and hold for 3 hours
Final Tg 420-430F





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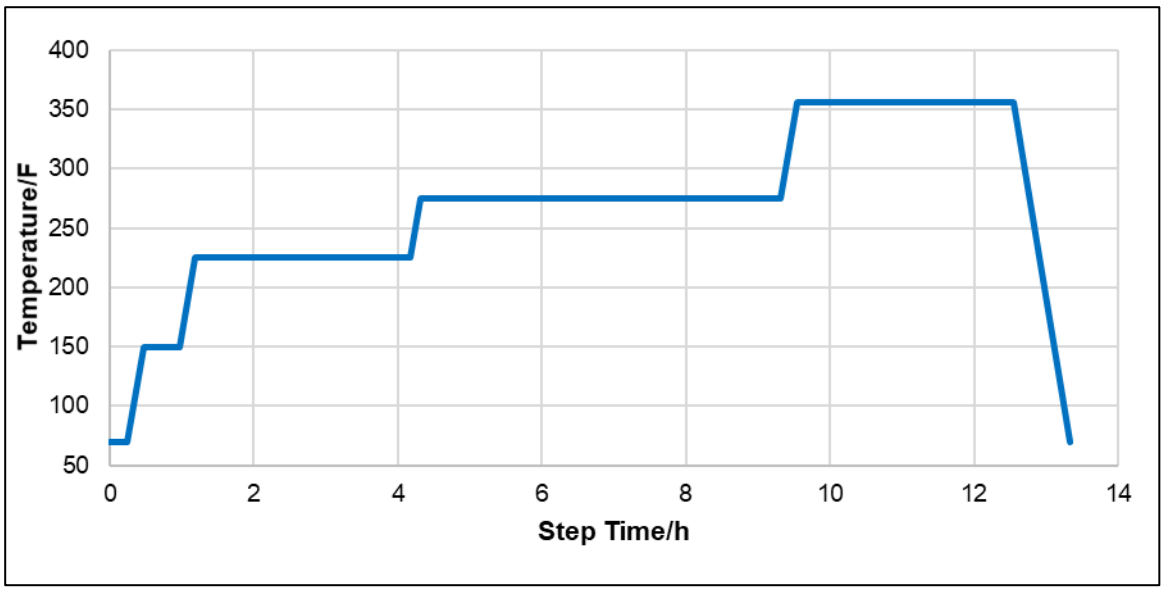
Baseline Oven Cure Process



CYANATE PREPREG, ADHESIVE, AND RESIN GUIDELINES AND HANDLING PROCEDURES

The following guidelines are provided to our customers to assure that best practices are used to attain the best results from NEXX Technology's cyanate products. Keep in mind that these procedures represent best practices for all composite prepreg and adhesive materials.

FREEZER STORAGE

Freezer storage below 32°F up to 15 months

MOISTURE ABSORPTION AND SENSITIVITY

While very resistant to moisture absorption after cure, cyanates can be adversely affected by moisture uptake prior to cure. Care should be taken to ensure that storage bags are completely sealed prior to entering and exiting the frozen storage area. A dessicant pack should be placed inside the sealed bag or inside the core of the roll. The material should be used in a controlled humidity environment in order to prevent moisture absorption prior to cure. Trapped moisture will be released during cure and may cause defects.

HANDLING MATERIALS

When handling any prepreg materials, always wear clean, powder-free latex gloves. This assures that no hand oils are transferred to the prepreg and/or composite during processing. The presence of oils in the part could lead to problems in both mechanical and electrical performance of the part. This also guards against dermatitis that may occur with some users.

USE OF HONEYCOMB AND FOAM CORE MATERIALS

When using nonmetallic honeycomb and foam core materials for sandwich structures, the materials should always be dried in an oven prior to lay-up to drive off any moisture that may be in the core. The core should be cooled in the presence of a desiccant to avoid moisture uptake. Following drying, it is always best to use the material as soon as possible. Recommended core dry time/temp: 121°C (250°F) for 3-4 hours.

CONTACT INFORMATION

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