

Avimid® S

Avimid® S is a high temperature cross linked polyimide composite with wet service capability up to 550°F (287°C) and dry service capability up to 630°F (332°C). Avimid® S has excellent thermo-oxidative stability and has been formulated to be tougher a polyimide composite than industry standard polyimide composite offering.

Avimid® S was formulated to be a non-MDA, high temperature composite that would allow the use of typical safety/health procedures and personal protection equipment (PPE). It can be compression molded into low void parts to meet demanding aerospace requirements

Avimid® S is solution impregnated on a variety of fibers and fabrics that result in prepregs that retain their tack and drape for up to 6 days out time at 72°F (22°C). Standard carbon fiber reinforced prepregs are with an 8-harness stain weave (fiber areal weight = 372 gsm) using Thornel®T650-35-3k HTS high temperature sized fiber.

Typical applications for Avimid® S include aircraft turbine engine components such as vanes, ducts, cases and aero-structures requiring high temperature performance above 450°F (232°C).

Features and Benefits

- Excellent thermo-oxidative stability
- Non-MDA polyimide resin system
- Post curable Tg as high as 800°F (427°C)
- Wet service performance up to 550°F (288°C); Dry Service performance is 630°F(332°C) and above
- Tough, micro-crack resistant system
- Autoclave or compression mold-able
- Low and favourable dielectric properties
- Developed for turbine and high temperature aero- structures

CHARACTERISTICS

Table 1 | Physical Properties for Avimid® S (8HS T650-35-3K reinforced fabric prepreg)

Property	Minimum	Maximum
Resin Solids, wt%	35	39
Volatiles, wt%	14	16
Tg, °F (°C) (Dry)	640 (338)	700 (370)
FAW, gsm	365	379
Wt. Loss after TOS conditioning, wt%		1.89*
Shelf Life	365 days at or below -10°F (-23°C) from date of manufacture	
Shop Life	6 days at or below 72°F (22°C)	

- TOS - GE Method E50TF534 CL-A 120 hours at 625°F, 150 psi air flow rate = 187 l/hour



Table 2 | Product Availability

Carrier	
Roll Width	50 inches (1250 mm)
Roll Length	20 lin. yds [BB1]

PROPERTIES
Table 3 | Mechanical Properties of Avimid® S (8HS T650-35-3K reinforced fabric prepreg)

Properties	Test Conditions	Value	Test Method
Warp Tensile Strength, ksi (MPa)	73°F (23°C) Dry	140 (965)	ASTM D 3039
Warp Tensile Modulus, msi (GPa)	73°F (23°C) Dry	10.5 (72.4)	ASTM D 3039
Warp 4-Point Flex strength, ksi (MPa)	73°F (23°C) Dry	174 (1200)	ASTM D 6272
Warp 4- Point Flex Modulus, msi (GPa)	73°F (23°C) Dry	10.5 (72.4)	ASTM D 6272

Table 4 | Compressive Performance of Avimid® S (8-HS T650-35-3K reinforced fabric prepreg)

Property	Test Temperature,	Pre-Conditioning	Value	Test Method
Warp Compression Strength, ksi (MPa)	73°F (23°C)	Dry	94 (648)	GE T50 TF532
Warp Compression Modulus, msi (GPa)	73°F (23°C)	Dry	8.6 (59.3)	GE T50 TF532
Strain to failure	73°F (23°C)	Dry	1.22	GE T50 TF532
Warp Compression Strength, ksi (MPa)	73°F (23°C)	TOS	79 (545)	GE T50 TF532
Warp Compression Modulus, msi (GPa)	73°F (23°C)	TOS	8.1 (55.8)	GE T50 TF532
Strain to Failure	73°F (23°C)	TOS	1.28	GE T50 TF532
Warp Compression Strength, ksi (MPa)	550°F (288°C)	Dry	55 (379)	GE T50 TF532
Warp Compression Modulus, msi (GPa)	550°F (288°C)	Dry	8.4 (57.9)	GE T50 TF532
Strain to Failure, %	550°F (288°C)	Dry	0.7	GE T50 TF532

DRY – Samples dried for 16 –24 hours before TOS conditioning and testing

TOS – GE Method E50TF534 CL A 120 hours at 625°F, 150 psi air flow rate = 187 l/hour



Table 5: Mechanical Performance after heat aging at 482°F (250°C) for 1000 hours

<i>Test</i>	<i>Method</i>	<i>Lay-up</i>	<i>Condition</i>	<i>Unit</i>	<i>Value</i>	<i>% Retain</i>
Inter-laminar Shear Strength	ASTM-D2344	[(90/0)]5s	RTA	ksi	12.1	NA
Compression Strength Warp	ASTM D6641	[(90/0)]5s	RTA	ksi	103.2	110
Compression Modulus Warp	ASTM D6641	[(90/0)]5s	RTA	msi	9.2	107
Tensile Strength Warp	ASTM D3039	[(90/0)]5s	RTA	ksi	143.2	102
Tensile Modulus Warp	ASTM D3039	[(90/0)]5s	RTA	msi	10.0	95
Strain to Failure	ASTM D3039	[(90/0)]5s	RTA	%	1.34	105

- Panels isothermally aged for 1000 hours at 482°F (250°C)
- Specimens tested at room temperature ambient conditions



PROCESSING

Guidelines for Thawing Out

On removal of sealed prepreg from 0°F (-18°C) storage, ensure that the material is allowed to thaw fully to room temperature prior to unsealing. This avoids condensation. Typically a 60 yd (55m) roll of prepreg requires about 8-12 hours to thaw.

Recommended Cure Cycles:

Autoclave Cure Cycle
(one step)

Apply low vacuum, 3 in Hg (0.0 MPa) maximum.
 Heat from 73°F (22°C) to 210°F (100°C) at 1°F - 2°F (0.5°C - 1°C)/minute.
 Hold at 210°F (100°C) for 60 minutes.
 Heat from 210°F (100°C) to 608°F (320°C) at 2°F - 3°F (1°C - 1.5°C)/minute.
 At 350°F, apply 26 -30" Hg vacuum
 At 580°F, apply 200 psi (1.38 MPa) pressure at 10 psi/min (vent vacuum optional after 50 psi (0.34 MPa))
 Hold at 608°F (320°C) for 60 minutes.
 Heat from 608°F (320°C) to 700°F (370°C) at 2°F (1°C)/minute
 Hold at 700°F (370°C) for 120 minutes under full pressure.
 Cool under pressure below 300°F (150°C) at 3°F - 5°F (1.5°C - 2.5°C)/minute.

Recommended Consumables

The table below provides a list of consumable processing materials recommended for use with Avimid® S.

Table 6 | Processing Materials [BB2]

Sealant Tape	Airtech A8003G
Release Film	Release coated polyimide
Release Fabric	Airtech Release Ease 234 TFNP
Breather/Bleeder Fabric	Style 7781 & 120 glass fabric
Peel Ply	Airtech Release Ease 234TMP
Bagging Film	Kapton® 200HN
Adhesive Tape	

HEALTH & SAFETY

Please refer to the product SDS for safe handling, personal protective equipment recommendations and disposal considerations.

