AIRTECH

INTERNATIONAL INC.

Toolmaster® Tooling Materials

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Section Guide

TOOLMASTER® TOOLING MATERIALS

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Data Sheet

CEP CARBON PREPREGS

Cyanate / epoxy tooling prepreg

DESCRIPTION

Airtech CEP prepregs are based on a unique cyanate / epoxy resin chemistry. This chemistry allows greater flexibility in curing. Airtech CEP prepregs cure at a lower temperature than competing BMI or benzoxazine prepregs.

CEP-G3 is a light weight tooling prepreg with a high glass transition temperature (Tg).

CEP-G12 is a heavy weight tooling prepreg with a high glass transition temperature (Tg).

BENEFITS

- High resin Tg means high service temperature and longer tool life.
- Low initial cure temperature option in comparison to other high temperature prepregs.
- Low moisture absorption of cure laminate reduces risk of porosity in parts.

TECHNICAL DATA

Physicals	CEP-G3	CEP-G12
Description	Light Weight	Heavy Weight
Fiber / Yarn Type	Carbon / 3K	Carbon / 12K
Weave Style	2 x 2 Twill	2 x 2 Twill
Fiber Areal Weight	5.7 oz/yd^2 (193 g/m^2)	19.0 oz/yd^2 (644 g/m^2)
Resin Content	37 +/- 3 %	37 +/- 3 %
Nominal Cured Ply Thickness	0.011 inch (0.28 mm)	0.026 inch (0.66 mm)
Service Temperature	450°F (232°C)	450°F (232°C)

Last updated : 2019-09-16

Catalog position : Toolmaster® Tooling materials

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Data Sheet

CEP CARBON PREPREGS

Cyanate / epoxy tooling prepreg

SHELF LIFE

18 months at 0°F (-17°C), 6 months at 41°F (5°C), and 20 days at room temperature from date of shipment when stored in original packaging.

SIZES

Product Reference	Width	Length	Minimum Order Quantity
CEP-G3, CEP-G12	50 inches (127 cm)	150 feet (45.7 m)	1 roll

• Roll lengths may vary +/- 5 % depending on stock availability.

CURE INSTRUCTIONS

Cure	Autoclave Vacuum / Pressure / Temperature	Dwell
1	Apply full vacuum at 28 inHg. Then apply pressure at 5 psi/min (0.3 bar/min) to a minimum of 80 psi (5.5 bar).	-
2	Heat at 2-6°F (1-3°C) / minute to 175°F (79°C).	Hold for 1 hr
3	Heat at 2-6°F (1-3°C) / minute to 200°F (93°C).	Hold for 1.5 hrs
4	Heat at 2-6°F (1-3°C) / minute to 354°F (179°C) +5/-0°F (+2.5/-0°C).	Hold for 4.5 hrs
5	Cool to 120°F (49°C) & vent pressure before releasing vacuum.	-

Alternative Cure	Autoclave Vacuum / Pressure / Temperature	Dwell
1	Apply full vacuum at 28 inHg. Then apply pressure at 5 psi/min (0.3 bar/min) to a minimum of 80 psi (5.5 bar).	-
2	Heat at 2-6°F (1-3°C) / minute to 175°F (79°C).	Hold for 1 hr
3	Heat at 2-6°F (1-3°C) / minute to 200°F (93°C).	Hold for 1.5 hrs
4	Heat at 2-6°F (1-3°C) / minute to 250°F (121°C) +5/-0°F (+2.5/-0°C).	Hold for 12 hrs
5	Cool at 2-6°F (1-3°C) / minute to 120°F (49°C) prior to removal.	-

Post Cure	Oven Temperature / Autoclave Temperature	Dwell
1	Place Toolmaster® tool in oven supporting as necessary.	-
2	Heat at 2-6°F (1-3°C) / minute to 200°F (93°C).	Hold for 1 hr
3	Heat at 2-6°F (1-3°C) / minute to 250°F (121°C).	Hold for 1 hr
4	Heat at 2-6°F (1-3°C) / minute to 297°F (147°C).	Hold for 1 hr
5	Heat at 2-6°F (1-3°C) / minute to 475°F (246°C).	Hold for 8 hrs
6	Cool at 2-6°F (1-3°C) / minute to 120°F (49°C) prior to removal.	-

NOTES

- Temperature measurements should be obtained with thermocouples, properly placed for accurate temperature readings. Program controller should follow lagging thermocouple for cure and post cure.
- Do not apply solvent to the mold surface prior to post cure.
- To avoid condensation, allow prepreg from freezer to warm to room temperature before using.

Last updated : 2019-09-16

Catalog position : Toolmaster® Tooling materials

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Data Sheet

LTC FIBERGLASS & CARBON PREPREGS

Low temperature curing epoxy tooling prepregs

DESCRIPTION

LTC prepregs offer a low temperature cure and high temperature use after post cure. LTC prepregs allow the use of lower cost master model materials.

LTC-F5500 is a light weight fiberglass/epoxy tooling prepreg used to produce molds with a low temperature initial cure and high temperature capabilities after post cure.

LTC-F5600 is a heavy weight fiberglass/epoxy tooling prepreg used to produce molds with a low temperature initial cure and high temperature capabilities after post cure.

LTC-G1400 is a light weight carbon/epoxy tooling prepreg used to produce molds with a low temperature initial cure and high temperature capabilities after post cure.

LTC-G1600 is a heavy weight carbon/epoxy tooling prepreg used to produce molds with a low temperature initial cure and high temperature capabilities after post cure.

BENEFITS

- Low initial cure temperature reduces thermal expansion of master model, improving mold accuracy.
- Lower cost, low temperature master model materials can be used.
- Good surface finish and low void content laminate for longer life molds and good part quality.

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Catalog position : Toolmaster® Tooling materials

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Data Sheet

LTC FIBERGLASS & CARBON PREPREGS

Low temperature curing epoxy tooling prepregs

TECHNICAL DATA FIBERGLASS

Physicals	LTC-F5500	LTC-F5600
Description	Light Weight	Heavy Weight
Fiber / Yarn Type	Fiberglass / E Glass	Fiberglass / E Glass
Weave Style	7500 / Plain Weave	7544 / 2 End Plain Weave
Fiber Areal Weight	9.6 oz/yd^2 (325 g/m^2)	18.2 oz/yd^2 (617 g/m^2)
Resin Content	45 +/- 3 %	37 +/- 3 %
Nominal Cured Ply Thickness	0.011 inch (0.28 mm)	0.019 inch (0.48 mm)
Service Temperature	356°F (180°C)	356°F (180°C)

TECHNICAL DATA CARBON

Physicals	LTC-G1400	LTC-G1600
Description	Light Weight	Heavy Weight
Fiber / Yarn Type	Carbon / 3K	Carbon / 12K
Weave Style	2 x 2 twill	2 x 2 twill
Fiber Areal Weight	5.7 oz/yd^2 (193 g/m^2)	19.0 oz/yd^2 (644 g/m^2)
Resin Content	40 +/- 3 %	37 +/- 3 %
Nominal Cured Ply Thickness	0.011 inch (0.28 mm)	0.026 inch (0.66 mm)
Service Temperature	356°F (180°C)	356°F (180°C)

SHELF LIFE

18 months at 0°F (-17°C), 5-7 days at room temperature from date of shipment when stored in original packaging.

SIZES

Product Reference	Width	Length	Minimum Order Quantity
LTC-F5500, LTC-F5600	38 inches (96.5 cm)	95 feet (29 m)	1 roll
LTC-G1400, LTC-G1600	50 inches (127 cm)	75 feet (23 m)	1 roll

• Roll lengths may vary +/- 5 % depending on stock availability.

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Data Sheet

LTC FIBERGLASS & CARBON PREPREGS

Low temperature curing epoxy tooling prepregs

CURE INSTRUCTIONS

Cure	Autoclave Vacuum / Pressure / Temperature	Dwell
1	Apply full vacuum at 28 inHg. Then apply pressure at 5 psi/min (0.3 bar/min) to a minimum of 25 psi (1.7 bar) with surface fill and a minimum of 80 psi (5.5 bar) without surface fill.	-
2	Heat to 120°F (49°C) at 2-6°F (1-3°C) / minute.	Hold for 2 hrs
3	Heat to 140°F (60°C) +10/-0 (+5/-0) at 2-6°F (1-3°C) / minute.	Hold for 12 hrs
4	Cool to 120°F (49°C) & vent pressure before release vacuum.	-

Post Cure	Oven Temperature / Autoclave Temperature	Dwell
1	Heat from room temperature to 200°F (93°C).	Hold for 1 hr
2	Heat at 2-6°F (1-3°C) / minute to 250°F (121°C).	Hold for 2 hrs
3	Heat at 2-6°F (1-3°C) / minute to 300°F (149°C).	Hold for 1 hr
4	Heat at 2-6°F (1-3°C) / minute to 350°F (177°C).	Hold for 1 hr
5	Heat at 2-6°F (1-3°C) / minute to 385°F (196°C).	Hold for 2 hrs
6	Cool at 2-6°F (1-3°C) / minute to 120°F (49°C) prior to removal.	-

NOTES

- Temperature measurements should be obtained from thermocouples, properly placed for accurate temperature readings. Program controller should follow lagging thermocouple for cure and post cure.
- Do not apply solvent to the mold surface prior to post cure.
- Contact Airtech for our Guide to Toolmaster® Tooling for complete information.
- To avoid condensation, allow prepreg from freezer to warm to room temperature before using.

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Data Sheet

LTC3 CARBON PREPREGS

Epoxy/carbon low temperature cure tooling prepregs

DESCRIPTION

LTC3 prepregs offer a low temperature cure and high temperature use after post cure. LTC prepregs allow the use of lower cost master model materials.

LTC3-G1400 is a light weight tooling prepreg with a low temperature for the manufacture of composite tooling laminates capable of high temperature use.

LTC3-G1600 is a heavy weight tooling prepreg with a low temperature cure for the manufacture of composite tooling laminates capable of high temperature use.

LTC3-G1800 is a heavier weight tooling prepreg used to produce molds with a low temperature cure. The heavy weight material is used to build laminate bulk faster thus reducing the number of plies required. Saving up to 30% labor time on standard laminates, plus cost savings.

BENEFITS

- Low initial cure temperature reduces thermal expansion of master model, improving mold accuracy.
- Lower cost, low temperature master model materials can be used.
- Good surface finish and low void content laminate for longer life molds and good part quality.

TECHNICAL DATA

Physicals	LTC3-G1400	LTC3-G1600	LTC3-G1800
Description	Light Weight	Heavy Weight	Heavy Weight
Fiber / Yarn Type	Carbon / 3K	Carbon / 12K	Carbon / 24K
Weave Style	2 x 2 twill	2 x 2 twill	2 x 2 twill
Fiber Areal Weight	5.7 oz/yd^2 (193 g/m^2)	19 oz/yd^2 (644 g/m^2)	28 oz/yd^2 (955 g/m^2)
Resin Content	40+/- 3 %	37 +/- 3 %	37 +/- 3 %
Nominal Cured Ply Thickness	0.012 in (0.30 mm)	0.026 in (0.66 mm)	0.037 in (0.95 mm)
Service Temperature	392°F (200°C)	392°F (200°C)	392°F (200°C)
Glass Transition Temperature	402°F (206°C) after post cure	402°F (206°C) after post cure	402°F (206°C) after post cure

SHELF LIFE

12 months at 0°F (-18°C) from date of shipment when stored in original packaging.

OUTLIFE

- Working time of 4 days at 68°F (20°C).
- Molding time of 5 days at 68°F (20°C).

SIZES

Product Reference	Width	Length	Minimum Order Quantity
LTC3-G1400	49 inches (125 cm)	65.6 feet (20 m)	1 roll
LTC3-G1600	49 inches (125 cm)	88.6 feet (27 m)	1 roll
LTC3-G1800	49 inches (125 cm)	52.5 feet (16 m)	1 roll

- Roll lengths may vary +/- 5 % depending on stock availability.

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Catalog position : Toolmaster® Tooling materials

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Data Sheet

LTC3 CARBON PREPREGS

Epoxy/carbon low temperature cure tooling prepregs

CURE INSTRUCTIONS

Cure	Autoclave Vacuum / Pressure / Temperature	Dwell
1	Apply full vacuum at 28 inHg. Pressurise autoclave to 100 psi (7 bars).	-
2	Heat at 3-5°F (2-4°C) / minute to 131°F (55°C).	Hold for 16 hrs
3	Cool to room temperature before removing vacuum and demoulding from master model.	-

Alternative Cure Cycles at 100 psi (7 Bars)	Autoclave Vacuum / Pressure / Temperature	Dwell
Option 1	Heat at 2°F (1°C) / minute to 105°F (41°C), cool to room temperature after dwell.	Hold for 60 hrs
Option 2	Heat at 2°F (1°C) / minute to 113°F (45°C), cool to room temperature after dwell.	Hold for 40 hrs
Option 3	Heat at 2°F (1°C) / minute to 120°F (49°C), cool to room temperature after dwell.	Hold for 30 hrs
Option 4	Heat at 2°F (1°C) / minute to 140°F (60°C), cool to room temperature after dwell.	Hold for 8 hrs
Option 5	Heat at 2°F (1°C) / minute to 158°F (70°C), cool to room temperature after dwell.	Hold for 4 hrs

Post Cure	Oven Temperature / Autoclave Temperature	Dwell
1	Heat at 68°F (22°C) / hour to 200°C, cool to room temperature after dwell.	Hold for 8 hrs

NOTES

- Temperature measurements should be obtained from thermocouples, properly placed for accurate temperature readings. Program controller should follow lagging thermocouple for cure and post cure.
- Do not apply solvent to the mold surface prior to post cure.
- Contact Airtech for our Guide to Toolmaster® Tooling for complete information.
- To avoid condensation, allow prepreg from freezer to warm to room temperature (<68°F (20°C)) before using.

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Data Sheet

TMFP FIBERGLASS & TMGP CARBON PREPREGS

Epoxy tooling prepregs

DESCRIPTION

Airtech TMFP & TMGP prepregs are proven tooling materials on long running programs. The initial 250°F (121°C) cure with an optional 200°F (93°C) cure offer a medium temperature cure, with long term high temperature performance.

TMFP 3100 is a light weight fiberglass/epoxy tooling prepreg used on the first and last plies.

TMFP 3200 is a heavy weight fiberglass/epoxy tooling prepreg used to produce molds with a medium temperature initial cure and high temperature capabilities after post cure.

TMGP 4000 is a light weight carbon/epoxy tooling prepreg used to produce molds with medium temperature initial cure and high temperature capabilities after post cure. TMGP 4000 can also be used to reinforce our Airpad rubber tooling, see Airpad data sheet in the Rubber Section.

TMGP 4100 is a medium weight carbon/epoxy tooling prepreg that can be used to produce molds with a medium temperature initial cure and high temperature capabilities after post cure. This product is also ideal for Airpad reinforcement.

TMGP 4200 is a heavy weight carbon/epoxy tooling prepreg that can be used to produce molds with a medium temperature initial cure and high temperature capabilities after post cure.

BENEFITS

- Toolmaster® composite molds match tool and part CTE improving part accuracy.
- Lower thermal mass than metallic tooling for shorter heat up time.
- Can also be used for reinforcing Airpad Rubber tooling.

Toolmaster® Tool built in 1987 and has manufactured over 900 parts.

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Catalog position : Toolmaster® Tooling materials

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Data Sheet

TMFP FIBERGLASS & TMGP CARBON PREPREGS

Epoxy tooling prepregs

TECHNICAL DATA FIBERGLASS

Physicals	TMFP 3100	TMFP 3200
Description	Light Weight	Heavy Weight
Fiber / Yarn Type	Fiberglass / E Glass	Fiberglass / E Glass
Weave Style	7500 / Plain Weave	7544 / 2 End Plain Weave
Fiber Areal Weight	9.6 oz/yd^2 (325 g/m^2)	18.2 oz/yd^2 (617 g/m^2)
Resin Content	45 +/- 3 %	37 +/- 3 %
Nominal Cured Ply Thickness	0.011 inch (0.28 mm)	0.019 inch (0.48 mm)
Service Temperature	400°F (204°C)	400°F (204°C)

TECHNICAL DATA CARBON

Physicals	TMGP 4000	TMGP 4100	TMGP 4200
Description	Light Weight	Medium Weight	Heavy Weight
Fiber / Yarn Type	Carbon / 3K	Carbon / 6K	Carbon / 12K
Weave Style	2 x 2 Twill	2 x 2 Twill	2 x 2 Twill
Fiber Areal Weight	5.7 oz/yd^2 (193 g/m^2)	10.5 oz/yd^2 (365 g/m^2)	19.0 oz/yd^2 (644 g/m^2)
Resin Content	47 +/- 3 %	42 +/- 3 %	37 +/- 3 %
Nominal Cured Ply Thickness	0.011 inch (0.28 mm)	0.014 inch (0.36 mm)	0.026 inch (0.66 mm)
Service Temperature	400°F (204°C)	400°F (204°C)	400°F (204°C)

SHELF LIFE

18 months at 0°F (-17°C), 6 months at 41°F (5°C), 40 days at room temperature from date of shipment when stored in original packaging.

SIZES

Product Reference	Width	Length	Minimum Order Quantity
TMFP 3100, TMFP 3200	38 inches (96.5 cm)	95 feet (29 m)	1 roll
TMGP 4000, TMGP 4100, TMGP 4200	50 inches (127 cm)	75 feet (22 m)	1 roll

• Roll lengths may vary +/- 5 % depending on stock availability.

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Data Sheet

TMFP FIBERGLASS & TMGP CARBON PREPREGS

Epoxy tooling prepregs

CURE INSTRUCTIONS

Cure	Autoclave Vacuum / Pressure / Temperature	Dwell
1	Apply full vacuum at 28 inHg. Then apply pressure at 5 psi/min (0.3 bar/min) to a minimum of 25 psi (1.7 bar) with surface fill and a minimum of 80 psi (5.5 bar) without surface fill.	-
2	Heat at 2-6°F (1-3°C) / minute to 160°F (71°C).	Hold for 2 hrs
3	Heat at 2-6°F (1-3°C) / minute to 200°F (93°C).	Hold for 1 hr
4	Heat at 2-6°F (1-3°C) / minute to 250°F (121°C).	Hold for 2 hrs
5	Cool to 120°F (49°C) & vent pressure before release vacuum.	-

Post Cure	Oven Temperature / Autoclave Temperature	Dwell
1	Place Toolmaster® tool in oven supporting as necessary.	-
2	Heat at 2-6°F (1-3°C) / minute to 250°F (121°C).	Hold for 1 hr
3	Heat at 2-6°F (1-3°C) / minute to 300°F (149°C).	Hold for 1 hr
4	Heat at 2-6°F (1-3°C) / minute to 350°F (177°C).	Hold for 1 hr
5	Heat at 2-6°F (1-3°C) / minute to 385°F (196°C).	Hold for 2 hrs
6	Cool at 2-6°F (1-3°C) / minute to 120°F (49°C) prior to removal.	-

Tools cured using 200°F (94°C) cure must use Alternative Post Cure cycle.

Alternative Cure	Autoclave Vacuum / Pressure / Temperature	Dwell
1	Apply full vacuum at 28 inHg. Then apply pressure at 5 psi/min (0.3 bar/min) to a minimum of 25 psi (1.7 bar) with surface fill and a minimum of 80 psi (5.5 bar) without surface fill.	-
2	Heat at 2-6°F (1-3°C) / minute to 150°F (66°C).	Hold for 1 hr
3	Heat at 2-6°F (1-3°C) / minute to 200 - 210°F (93 - 99°C).	Hold for 4 hrs
4	Cool to 120°F (49°C) & vent pressure before release vacuum.	-

Alternative Post Cure	Oven Temperature / Autoclave Temperature 200°F (94°C) Cure	Dwell
1	Place Toolmaster® tool in oven supporting as necessary.	-
2	Heat at 2-6°F (1-3°C) / minute to 150°F (66°C).	Hold for 1 hr
3	Heat at 2-6°F (1-3°C) / minute to 200°F (93°C).	Hold for 1 hr
4	Heat at 2-4°F (1-2°C) / minute to 275°F (135°C).	Hold for 1 hr
5	Heat at 2-4°F (1-2°C) / minute to 350 - 375°F (177 - 191°C).	Hold for 2 hrs
6	Cool to 120°F (49°C) & vent pressure before release vacuum.	-

NOTES

- Temperature measurements should be obtained with thermocouples, properly placed for accurate temperature readings. Program controller should follow lagging thermocouple for cure and post cure.
- Do not apply solvent to the mold surface prior to post cure.
- Contact Airtech for our Guide to Toolmaster® Tooling for complete information.
- To avoid condensation, allow prepreg from freezer to warm to room temperature before using.

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Catalog position : Toolmaster® Tooling materials

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Data Sheet

BETA PREPREG

High stability room temperature storage tooling system

DESCRIPTION

Beta Prepregs are based on Benzoxazine resin chemistry taking advantage of the latest resin and toughening technology to provide outstanding ease of use and performance. Beta Prepregs are stable for a minimum of six months at room temperature. Beta Prepreg has exceptionally low resin shrinkage during cure and develops a very high glass transition temperature.

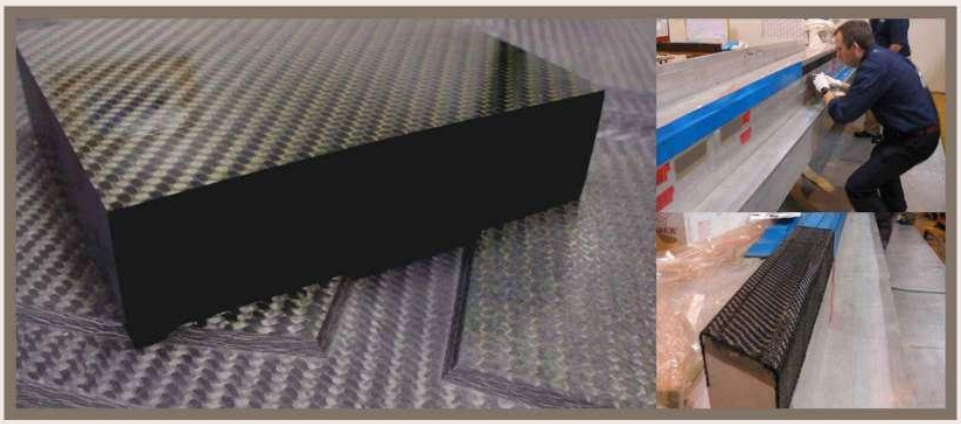
TMBG-3 is a light weight Beta Carbon Prepreg for surface plies.

TMBG-6 is a medium weight Beta Carbon Prepreg used for cauls and tools that are post machined.

TMBG-12 is a heavy weight Beta Carbon Prepreg used in conjunction with TMBG-3 or by itself for tools that are post machined.

BENEFITS

- Longer prepreg out-life reduces time spent batching prepreg from the freezer, allows limit-free tool fabrication schedules with smaller groups of workers and saves on freezer storage costs.
- Tougher tool laminate ensures longer tool life and reduced remanufacture costs.
- Lower resin shrinkage improves surface finish and reduces need for finishing.
- Laminates are easily machined to high dimensional tolerances on large tools with simpler molded shapes.
- Low moisture absorption eliminates tool drying after storage and reduces risk of surface porosity in parts.
- Lighter weight tools in comparison to metallic tooling.
- Faster heat up rates than metal tools for faster curing cycles.



TECHNICAL DATA

Physicals	TMBG-3	TMBG-6	TMBG-12
Description	Light Weight	Medium Weight	Heavy Weight
Fiber / Yarn Type	Carbon / 3K	Carbon / 6K	Carbon / 12K
Weave Style	2 x 2 Twill	2 x 2 Twill	2 x 2 Twill
Fiber Areal Weight	5.7 oz/yd^2 (193 g/m^2)	10.5 oz/yd^2 (365 g/m^2)	19.0 oz/yd^2 (644 g/m^2)
Resin Content	37 +/- 3 %	37 +/- 3 %	37 +/- 3 %
Nominal Cured Ply Thickness	0.011 inch (0.28 mm)	0.014 inch (0.36 mm)	0.026 inch (0.66 mm)
Service Temperature	425°F (218°C)	425°F (218°C)	425°F (218°C)
Glass Transition Temperature	484°F (251°C)	484°F (251°C)	484°F (251°C)
Resin Shrinkage	< 0.2 %	< 0.2 %	< 0.2 %

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Data Sheet

BETA PREPREG

High stability room temperature storage tooling system

SHELF LIFE

6 months at 72°F (22°C), 18 months at 0°F (-17°C) from date of shipment when stored in original packaging.

SIZES

Product Reference	Width	Length	Minimum Order Quantity
TMBG-3, TMBG-6	50 inches (127 cm)	150 feet (45.7 m)	1 roll
TMBG-12	50 inches (127 cm)	75 feet (22.8 m)	1 roll

• Roll lengths may vary +/- 5 % pending stock availability.

CURE INSTRUCTIONS

Cure	Autoclave Vacuum / Pressure / Temperature 1/4 inch (6mm) Laminates	Dwell
1	Apply full vacuum at 28 inHg. Then apply pressure to a minimum of 80 psi (5.5 bar) and vent to atmosphere when pressure exceeds 15 psi (1 bar).	-
2	Heat at 1-3°F (0.5-1.5°C) / minute until lagging thermocouple reaches 320 +/- 5°F (160 +/- 3°C).	Hold for 1 hr
3	Heat at 1-3°F (0.5-1.5°C) / minute to 365 +/- 5°F (185 +/- 3°C).	Hold for 3 hrs
4	Cool 2-6°F (1-3°C) / minute to below 120°F (49°C) before dumping pressure and removing from autoclave.	-

Post Cure	Oven Temperature / Autoclave Temperature 365°F (185°C) Tool Use	Dwell
1	Place Toolmaster® tool in oven supporting as necessary	-
2	Heat at 5°F (3°C) / minute to 200°F (92°C).	Hold for 1 hr
3	Heat at 2-4°F (1-2°C) / minute to 250°F (120°C).	Hold for 1 hr
4	Heat at 2-4°F (1-2°C) / minute to 350°F (177°C).	Hold for 1 hr
5	Heat at 2-4°F (1-2°C) / minute to 425°F (218°C).	Hold for 4 hrs
6	Cool at 2-6°F (1-3°C) / minute to below 120°F (49°C).	-

POST MACHINING

Beta Prepreg Laminates

• TMBG-6 Prepreg is recommended for laminate construction where laminate post machining is required.
• PCD (Polycrystalline Diamond) cutting tools are recommended for post machining of TMBG-6 laminates. Contact Airtech technical support for further information.

NOTES

• Temperature measurements should be obtained with thermocouples, properly placed for accurate temperature readings. Program controller should follow lagging thermocouple for cure and post cure.
• Contact Airtech to see our Beta Prepreg Fabrication Guide.
• To avoid condensation, allow prepreg from freezer to warm to room temperature before using.

Last updated : 2019-11-27

Catalog position : Toolmaster® Tooling materials

AIRTECH INTERNATIONAL INC.

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Data Sheet

BETA TX670 DISCO PREPREG

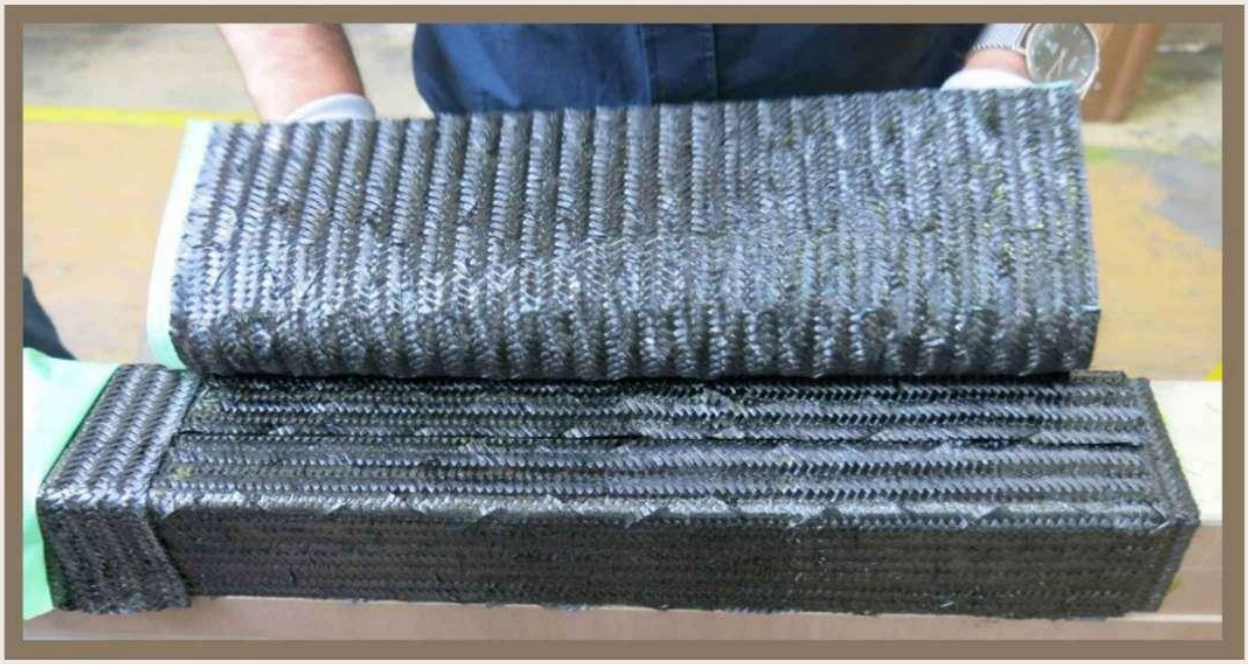
High stability room temperature storage tooling system

DESCRIPTION

Beta TX670 DISCO is a prepreg sold in sheet format. This special format allows for simpler and faster layups. Beta TX670 DISCO Prepreg has a 0°,+/-60° orientation, is quasi-isotropic within each ply, and comes with an engineered cut pattern that improves drapability.

BENEFITS

- Discontinuous sheets reduce layup effort and improve conformability.
- Quasi-isotropic within each ply, providing simpler and faster layup.
- Will produce consistent laminate thickness for even heat-up and meeting design targets.
- Exceptionally long out-life at room temperature of 6 months.
- Has outstanding toughness, high glass transition temperature, and stability at high temperatures.
- Exceptionally low shrinkage improves tool surface quality and reduces residual laminate stresses.
- Excellent surface finish and vacuum integrity after machining.
- Very low moisture absorption in comparison to epoxy tools.



TECHNICAL DATA

Physicals	Beta TX670 DISCO
Fiber / Yarn Type	Carbon / 24K
Weave Style	Triaxial 0°, +/-60°
Fiber Areal Weight	19.8 oz/yd^2 (670 g/m^2)
Resin Content	37 +/- 3 %
Nominal Cured Ply Thickness	0.026 inch (0.66 mm)
Service Temperature	425°F (218°C)
Glass Transition Temperature	484°F (251°C)
Shrinkage	< 0.2 %

Last updated : 2018-10-29

Catalog position : Toolmaster® Tooling materials

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Data Sheet

BETA TX670 DISCO PREPREG

High stability room temperature storage tooling system

SHELF LIFE

6 months at 77°F (25°C) or 18 months at 0°F (-17°C) from date of shipment when stored in original packaging

SIZES

Product Reference	Width	Length	Minimum Order Quantity
Beta TX670 DISCO	24 +/- 0.5 inch (60 +/- 1.3 cm)	24 +/- 0.5 inch (60 +/- 1.3 cm)	1 box (24 sheets per box)

CURE INSTRUCTIONS

Cure	Autoclave Vacuum / Pressure / Temperature 1/4 inch (6mm) Laminates	Dwell
1	Apply full vacuum at 28 inHg. Then apply pressure to a minimum of 80 psi (5.5 bar) and vent to atmosphere when pressure exceeds 15 psi (1 bar).	-
2	Heat at 1-3°F (0.5-1.5°C) / minute until lagging thermocouple reaches 320 +/- 5°F (160 +/- 3°C).	Hold for 1 hr
3	Heat at 1-3°F (0.5-1.5°C) / minute to 365 +/- 5°F (185 +/- 3°C).	Hold for 3 hrs
4	Cool 2-6°F (1-3°C) / minute to below 120°F (49°C) before dumping pressure and removing from autoclave.	-

Post Cure	Oven Temperature / Autoclave Temperature 365°F (185°C) Tool Use	Dwell
1	Place Toolmaster® tool in oven supporting as necessary	-
2	Heat at 5°F (3°C) / minute to 200°F (92°C).	Hold for 1 hr
3	Heat at 2-4°F (1-2°C) / minute to 250°F (120°C).	Hold for 1 hr
4	Heat at 2-4°F (1-2°C) / minute to 350°F (177°C).	Hold for 1 hr
5	Heat at 2-4°F (1-2°C) / minute to 425°F (218°C).	Hold for 4 hrs
6	Cool at 2-6°F (1-3°C) / minute to below 120°F (49°C).	-

POST MACHINING

Beta Prepreg Laminates

- PCD (Polycrystalline Diamond) cutting tools are recommended for post machining of Beta TX670 DISCO laminates. Contact Airtech technical support for further information.

NOTES

- Temperature measurements should be obtained with thermocouples, properly placed for accurate temperature readings. Program controller should follow lagging thermocouple for cure and post cure.
- To avoid condensation, allow prepreg from freezer to warm to room temperature before using.
- Beta TX670 Prepreg is also available in 48 inches (122 cm) wide format without the cut pattern. Contact Airtech for more information.

Last updated : 2018-10-29

Catalog position : Toolmaster® Tooling materials

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Data Sheet

OOA BETA PREPREG

High performance tooling prepreg system

DESCRIPTION

OOA Beta Prepreg is a new benzoxazine formulation that allows autoclave and out of autoclave (OOA) processing. **OOA Beta Prepreg** offers long term storage at room temperature. **OOA Beta Prepreg** has low resin shrinkage during cure and has a high glass transition temperature.

OOA Beta Prepreg TMBG-3 is a light weight prepreg for surface plies.

OOA Beta Prepreg TMBG-6 is a medium weight prepreg used for cauls and tools that are post machined.

OOA Beta Prepreg TMBG-12 is a heavy weight prepreg that can be used in conjunction with the two prepregs above or alone for tools that are post machined.

BENEFITS

- OOA Beta Prepregs can be processed outside of the autoclave.
- Longer prepreg outlife allows for easy shipping and less time spent shuttling material in and out freezers and more time spent on actually fabricating the mold.
- Outstanding toughness for long life in the composite shop environment.
- Low resin shrinkage improves surface finish and reduces need for finishing.
- Low moisture absorption eliminates tool drying after storage and reduces risk of porosity in parts.

TECHNICAL DATA

Physicals	TMBG-3	TMBG-6	TMBG-12
Description	Light Weight	Medium Weight	Heavy Weight
Fiber / Yarn Type	Carbon / 3K	Carbon / 6K	Carbon / 12K
Weave Style	2 x 2 Twill	2 x 2 Twill	2 x 2 Twill
Fiber Areal Weight	5.7 oz/yd^2 (193 g/m^2)	10.5 oz/yd^2 (365 g/m^2)	19.0 oz/yd^2 (644 g/m^2)
Resin Content	37 +/- 3 %	37 +/- 3 %	37 +/- 3 %
Nominal Cured Ply Thickness	0.011 inch (0.28 mm)	0.014 inch (0.36 mm)	0.026 inch (0.66 mm)
Service Temperature	425°F (218°C)	425°F (218°C)	425°F (218°C)
Glass Transition Temperature	450°F (232°C)	450°F (232°C)	450°F (232°C)
Shrinkage	< 0.2 %	< 0.2 %	< 0.2 %

SHELF LIFE

6 months at 72°F (22°C), 18 months at 0°F (-17°C) from date of shipment when stored in original packaging.

SIZES

Product Reference	Width	Length	Minimum Order Quantity
OOA TMBG-3, OOA TMBG-6	50 inches (127 cm)	150 feet (45.7 m)	1 roll
OOA TMBG-12	50 inches (127 cm)	75 feet (22.8 m)	1 roll

- Roll lengths may vary +/- 5 % pending stock availability.

Last updated : 2019-05-10

Catalog position : Toolmaster® Tooling materials

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Data Sheet

OOA BETA PREPREG

High performance tooling prepreg system

BAGGING INSTRUCTIONS FOR DEBULKING AND CURING

DEBULK 1st Ply

- Apply a 2 inch (5.08 cm) wide strip of Teflease® MG2 tape around perimeter of the laminate.
- Apply Release Ease® 234 TFP-1 over entire laminate to edge.
- Cover with Wrightlon® 5200 0.002 inch (50 µm) release film to ¼ inch (6 mm) beyond edge of laminate, seal edge with Tefelease® MG2.
- Perforate using a small diameter pin on approximately 5 inch (127 mm) centers in a grid pattern.
- Cover with Airweave® N4 as breather. Ultraweave® 606 is an alternate.
- Apply Airtech vacuum bag, apply full vacuum for 30 minutes.
- In oven heat at 5° per minute to 290°F + 5 (143°C + 3). Hold for 40 minutes, with vacuum. Cool to room temperature under full vacuum, remove bagging materials.

DEBULK

- Apply a 2 inch (5.08 cm) wide strip of Teflease® MG2 tape around the perimeter of the laminate.
- Apply Release Ease® 234 TFP over entire laminate surface to edge on model face.
- Apply 2 inch (5.08 cm) wide strip of Teflease® MG2 tape over the edge and down to the model surface with no bridging.
- Place an edge dam around the perimeter to the height of the laminate – Sildam / Airpad / Airdam.
- Cover with Wrightlon® 5200 0.002 inch (50 µm) release film to ¼ inch (6 mm) beyond edge of laminate.
- Perforate using a small diameter pin on approximately 5 inch (127 mm) centers in a grid pattern.
- Cover with Airweave® N4 as breather. Ultraweave® 606 is an alternate.
- Apply Airtech vacuum bag, apply 10 in hg vacuum for 10 minutes.

CURE

- Apply a 2 inch (5.08 cm) wide strip of Teflease® MG2 tape around the entire perimeter of the laminate.
- Apply Release Ease® 234 TFP over entire laminate surface to the edge on model face.
- Apply 2 inch (5.08 cm) wide strip of Teflease® MG2 tape over the edge and down to the model surface with no bridging
- Place an edge dam around the perimeter to the height of the laminate – Sildam / Airpad / Airdam.
- Apply Airdam 1 against the outside edge of the Dam.
- Cover with Wrightlon® 5200 0.002 inch (50 µm) release film to ¼ inch (6 mm) beyond edge of laminate.
- Perforate using a small diameter pin on approximately 5 inch (127 mm) centers in a grid pattern.
- Cover with Airweave® N4 as breather. Ultraweave® 606 is an alternate.
- Apply Airtech vacuum bag, leak check under full vacuum. Ensure the bagged assembly does not leak more than 2 in Hg in 10 minutes.
- Hold under full vacuum for 2 hours and proceed to oven cure.

CURE INSTRUCTIONS

Cure	Autoclave 100 psi or Vacuum Only 1/4 inch (6mm) Laminates	Dwell
1	Apply full vacuum at 26 inHg.	-
2	Ramp up 3-5°F (2-4°C) / minute to 290°F (143°C).	Hold for 2 hrs
3	Ramp at 3-5°F (2-4°C) /minute to 350°F (177°C).	Hold for 3 hrs
4	Cool down at 2-5°F (1-3°C) /minute to 150°F (65°C) before removing from oven.	-

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Data Sheet

OOA BETA PREPREG

High performance tooling prepreg system

POST CURE INSTRUCTIONS

Post Cure	Oven Temperature 365°F (185°C) Tool Use	Dwell
1	Place Toolmaster® tool in oven supporting as necessary	-
2	Heat at 5°F (3°C) / minute to 200°F (92°C).	Hold for 1 hr
3	Heat at 2-4°F (1-2°C) / minute to 250°F (120°C).	Hold for 1 hr
4	Heat at 2-4°F (1-2°C) / minute to 350°F (177°C).	Hold for 1 hr
5	Heat at 2-4°F (1-2°C) / minute to 425°F (218°C).	Hold for 4 hrs
6	Cool at 2-6°F (1-3°C) / minute to below 120°F (49°C).	-

POST MACHINING

- PCD (Polycrystalline Diamond) cutting tools are recommended for post machining of TMBG OOA laminates. Contact Airtech technical support for further information.

NOTES

- Temperature measurements should be obtained with thermocouples, properly placed for accurate temperature readings. Program controller should follow lagging thermocouple for cure and post cure.
- Contact Airtech to see our Beta Prepreg Fabrication Guide.
- To avoid condensation, allow prepreg from freezer to warm to room temperature before using.

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Data Sheet

TMR 2001A / TMH 2001B

High temperature laminating resin for room temperature cure

DESCRIPTION

TMR 2001 is a two part lightly filled high temperature epoxy laminating system. TMR 2001 has improved workability vs. standard laminating systems and provides long working time for fabrication of larger and more complicated tools. TMR 2001 has very high heat resistance and will provide long term service in oven and autoclave applications. TMR 2001A and TMH 2001B are considered a low hazard potential safety system and does not contain any regulated or restricted raw materials. TMR 2001A and TMH 2001B do not contain VCHD, MDA or any aniline derivatives.

BENEFITS

- Low initial cure temperature reduces thermal expansion of master model, improving mold accuracy.
- Lower cost, low temperature master model materials can be used.
- Out of autoclave cure process avoids size limitation.

TECHNICAL DATA

Material type	Epoxy laminating system
Color	Black : Amber (A : B)
Mix ratio by weight	100 : 9 (A : B)
Gel time	3-4 hours (100 g at 72°F or 22°C)
Viscosity (mixed)	5200 cps
Density	1.4 g/cm^3
Service temperature	400°F (204°C)
Flexural strength	44,200 psi (304.7 MPa) at 77°F (25°C) 17,170 psi (118.4 MPa) at 350°F (177°C)
Shelf life	18 months from date of shipment when stored at 72°F (22°C)

SIZES

Packaging Part A	Packaging Part B	Weight Part A	Weight Part B
1 gallon	1 pint	9 lbs (4.08 kg)	1 lb (0.45 kg)
5 gallons	2 - 1 quart	40 lbs (18.14 kg)	1.9 lbs (0.85 kg) / each
1 drum	5 gallons	450 lbs (204.12 kg)	41 lbs (18.60 kg)

APPLICATION

Cure schedule with unsupported post cure:

- Cure on the pattern for 36 to 48 hours at room temperature (minimum 72°F or 22°C) under vacuum bag.
- Remove from the pattern.
- Post cure for 3 hours at 150°F (66°C), 3 hours at 250°F (121°C), 3 hours at 350°F (177°C) and 3 hours at 375°F (191°C).
- Laminate should be post cured a minimum of 25°F (14°C) over the expected service temperature for three hours. Material may be post cured up to 425°F (218°C) to facilitate higher temperature cures.

NOTES

- Part A resins and part B hardeners are sold individually by US measurement container size shown above and are grouped for proper mix ratio. Volume per container will vary depending on product weight shown above. Metric conversions shown for container size above are for reference purposes only.
- The maximum use temperature is dependent upon the duration at maximum temperature and is process specific, Airtech recommends testing prior to use.

Last updated : 2019-05-03

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Data Sheet

TMSF 5001A / TMH 5001B

Surface fill

DESCRIPTION

TMSF 5001A and TMH 5001B is a black graphite filled surface coat resin designed to be used with our TMR 2001 high temperature epoxy laminating resin. The resin and hardener are of the low toxicity category, as they do not contain VCHD or MDA. TMSF 5001 is a thixotropic paste that yields a smooth mixed viscosity for easy application and minimum sag on vertical surfaces. TMSF 5001 is easy to scribe and resists stress cracking in oven and autoclave applications.

BENEFITS

- High quality pinhole free surfaces achieved without high pressure curing.
- Longer life achievable with robust tooling surface.
- Can be maintained more easily without damage to laminates.

TECHNICAL DATA

Material type	Graphite filled surface coat
Color	Black : Amber (A : B)
Mix ratio by weight	100 : 14 (A : B)
Gel time	2-3 hours (100 g at 72°F or 22°C)
Service temperature	400°F (204°C)
Shelf life	18 months from date of shipment when stored at 72°F (22°C)

SIZES

Packaging Part A	Packaging Part B	Weight Part A	Weight Part B
1 quart	1/2 pint	2.75 lbs (1.25 kg)	0.4 lbs (0.181 kg)
1 gallon	1 quart	11 lbs (4.99 kg)	1.6 lbs (0.726 kg)
5 gallons	1 gallon	55 lbs (24.95 kg)	7.75 lbs (3.52 kg)

APPLICATION

- The surface coat should be applied thinly with a cut down brush, ensuring even coverage and no build up of thickness in corners. Surface coverage when applied thinly is approximately 30 g/ft^2 (323 g/m^2).

NOTES

- Part A resins and Part B hardeners are sold individually by US measurement container size shown above and are grouped for proper mix ratio. Volume per container will vary depending on product weight shown above. Metric conversions shown for container size above are for reference purposes only.
- The maximum use temperature is dependent upon the duration at maximum temperature and is process specific, Airtech recommends testing prior to use.

Last updated : 2019-05-10

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Data Sheet

TMSF 5005A / TMH 5005B

Hard surface fill

DESCRIPTION

TMSF 5005A and TMH 5005B is a black silicon-carbide filled surface coat resin designed to be used with our TMR 2001 high temperature epoxy laminating resin and all our infusion resin systems. The resin and hardener are of the low toxicity category, as they do not contain VCHD or MDA. TMSF 5005 is a thixotropic paste that yields a smooth mixed viscosity for easy application and minimum sag on vertical surfaces. TMSF 5005 is extremely hard and will be difficult to sand after cure. Because of the small amount of hardener used with this product, take extra care to ensure a complete and thorough mix.

BENEFITS

- High quality pinhole free surfaces achieved without high pressure curing.
- Much longer life achievable with harder tooling surface.
- Easy to apply on large surfaces due to long working time.

TECHNICAL DATA

Material type	Silicon-carbide filled surface coat
Color	Black : Amber (A : B)
Mix ratio by weight	100 : 10 (A : B)
Gel time	8-10 hours (100 g at 72°F or 22°C)
Service temperature	400°F (204°C)
Shelf life	18 months from date of shipment when stored at 72° F (22°C)

SIZES

Packaging Part A	Packaging Part B	Weight Part A	Weight Part B
1 quart	1/2 pint	2.75 lbs (1.25 kg)	0.31 lbs (0.14 kg)
1 gallon	1 pint	11 lbs (4.99 kg)	1.14 lbs (0.52 kg)

APPLICATION

The surface coat should be applied thinly with a cut down brush, ensuring even coverage and no build up of thickness in corners. Surface coverage when applied thinly is approximately 30g/ft^2 (323g/m^2).

Please note that part A resins and part B hardeners are sold individually by US measurement container size shown above and are grouped for proper mix ratio. Volume per container will vary depending on product weight shown above. Metric conversions shown for container size above are for reference purposes only.

NOTES

- The maximum use temperature is dependent upon the duration at maximum temperature and is process specific, Airtech recommends testing prior to use.

Last updated : 2019-06-10

Catalog position : Toolmaster® Tooling materials

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Data Sheet

AIRFILL 2

High temperature quick setting filler paste

DESCRIPTION

Airfill 2 is a high temperature polyester quick setting filler paste that can stand up to 450°F (232°C). Airfill 2 is typically used for pattern work, temporary mold repairs, trim and drill tools, assembly fixtures, and gel-coat repairs. The thixotropic flow behavior of Airfill 2 allows an easy application and good coverage.

BENEFITS

- Ideal for urgent repairs due to short cure time.
- Variable mix options are available.
- Works well on molds for cures up to 450°F (232°C).

TECHNICAL DATA

Material type	Polyester
Colors	Black : White (A:B) / Black : Black (A:B) / Gray : White (A:B)
Mix ratio by weight	100 : 1 (A : B)
Pot life 1	7-15 minutes (100 g at 72°F or 22°C)
Mix ratio by weight	100 : 2 (A : B)
Pot life 2	5 minutes (100 g at 72°F or 22°C)
Maximum use temperature	450°F (232°C)
Hardness	90 Shore D
Shelf life	12 months from date of shipment when stored in original packaging at 72°F (22°C)

SIZES

Packaging	Nominal Content Weight Part A (Can)	Nominal Content Weight Part B (Tube)
1 quart kit	2.70 lbs (1.22 kg)	1 oz (0.0284 kg)
1 gallon kit	12.75 lbs (5.78 kg)	4 oz (0.1136 kg)

APPLICATION

- Please note that a slight color change at high temperature is normal.
- Ingredients may separate during long term storage, mix thoroughly before use.

NOTES

- The maximum use temperature is dependent upon the duration at maximum temperature and is process specific, Airtech recommends testing prior to use.

Last updated : 2019-07-09

Catalog position : Toolmaster® Tooling materials

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Data Sheet

CARBON AND FIBERGLASS FABRICS

Fabrics for resin infusion and standard laminate tooling

Product name	Yarn type	Weaving style	Weight	Thickness	Roll sizes
TMGC 6000	3K Carbon	Plain	5.7 oz/yd^2 (198 g/m^2)	0.012 in (0.30 mm)	50 in x 100 yd (127 cm x 91.4 m)
TMGC 6002T	3K Carbon	2x2 twill	5.7 oz/yd^2 (198 g/m^2)	0.012 in (0.30 mm)	50 in x 100 yd (127 cm x 91.4 m)
TMGC 6001	6K Carbon	2x2 twill	10.5 oz/yd^2 (340 g/m^2)	0.025 in (0.64 mm)	50 in x 100 yd (127 cm x 91.4 m)
TMGC 6003	12K Carbon	2x2 twill	19 oz/yd^2 (644 g/m^2)	0.035 in (0.89 mm)	50 in x 100 yd (127 cm x 91.4 m)
TMFC 7500	Fiberglass	Plain	9.6 oz/yd^2 (325 g/m^2)	0.011 in (0.28 mm)	38 in x 125 yd (97 cm x 114.3 m)
TMFC 7544	Fiberglass	2 end plain	18.2 oz/yd^2 (617 g/m^2)	0.022 in (0.56 mm)	38 in x 125 yd (97 cm x 114.3 m)
TMFC 7587	Fiberglass	Mock Leno	20.1 oz/yd^2 (681.5 g/m^2)	0.027 in (0.69 mm)	38 in x 80 yd (97 cm x 73.1 m)

NOTES

- Other weights available upon request.
- Minimum order quantity required.

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Data Sheet

TMSFR 5100A / TMSFHR 5100B

Surface coat with reflow for our prepreg tooling systems

DESCRIPTION

TMSFR 5100A and TMSFHR 5100B is a two part surface coat that can be used with our standard curing TMGP and TMFP prepregs or our low temperature curing LTC prepregs. The surface coat will eliminate surface pitting, provide a protective layer to prevent fiber damage and provide a smooth surface for applying scribe lines.

TECHNICAL DATA

Material type	Epoxy filled surface coat
Color	Black : Amber (A : B)
Mix ratio by weight	100 : 12 (A : B)
Pot life	16 hours
Service temperature	400 °F (204 °C)
Shelf life	18 months from date of shipment when stored at 72° F (22 °C)

SIZES

Packaging Part A	Packgaing Part B	Weight Part A	Weight Part B
1 quart	1 pint	2 lbs (0.91 kg)	0.3 lbs (0.14 kg)
1 gallon	1 quart	12 lbs (5.44 kg)	1.5 lbs (0.68 kg)

APPLICATION

The surface coat should be applied thinly with a cut down brush, ensuring even coverage and no build up of thickness in corners. Surface coverage when applied thinly is approximately 30g/ft^2 (323g/m^2).

Please note that part A resins and part B hardeners are sold individually by US measurement container size shown above and are grouped for proper mix ratio. Volume per container will vary depending on product weight shown above. Metric conversions shown for container size above are for reference purposes only.

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Data Sheet

MASTERBAR® 400

High temperature carbon fiber/ epoxy structural tubes

DESCRIPTION

Masterbar® 400's are hollow carbon fiber/ epoxy tubes used as back-up structures and assembly fixtures. They are ideally suited for use with Toolmaster® graphite tooling prepregs and laminating resins. The advantages of using Masterbar® 400: lighter and less costly tools, more efficient airflow in autoclave or oven, faster and more even heat up rates, continuous as well as initial cost savings.

BENEFITS

- Stabilize tooling effectively and easily with Masterbar® and Masterflex assemblies.
- Shorter cures with faster heat up rates due to better airflow.
- Lower cost tooling projects with simpler back up structures.

TECHNICAL DATA

Material type	Carbon fiber/ epoxy
Coef. of thermal expansion	1.4×10^{-6} in/in/°F^{-1} (2.5×10^{-6} cm/cm/°C^{-1})
Service temperature	400°F (204°C)

SIZES

Wall Thickness	Width	Height	Length
0.125 inch (0.32 cm)	2 inches (5.08 cm)	2 inches (5.08 cm)	12 feet (3.66 m)
0.125 inch (0.32 cm)	3 inches (7.62 cm)	3 inches (7.62 cm)	12 feet (3.66 m)
0.250 inch (0.64 cm)	4 inches (10.16 cm)	4 inches (10.16 cm)	12 feet (3.66 m)

APPLICATION

- Masterbar® 400 replaces costly "egg crating" with honeycomb or solid laminate boards.
- Masterbar® 400 can be bonded together using our TMR 2001 resin and/ or held in place using mechanical fasteners.
- Assemblies can be easily joined by using our composite tube fittings (C.T.F.'s) also found in this section.

NOTES

- Custom lengths are available for special order. Minimums may apply.
- Tubes must be post-cured at use temperature before use.
- The maximum use temperature is dependent upon the duration at maximum temperature and is process specific, Airtech recommends testing prior to use.

Last updated : 2019-11-20

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Data Sheet

MASTERBAR® 300

High temperature fiberglass/ epoxy structural tubes

DESCRIPTION

Masterbar® 300's are hollow fiberglass/ epoxy tubes used as back-up structures and assembly fixtures. They are ideally suited for use with Toolmaster® fiberglass tooling prepregs and laminating resins. The advantages of using Masterbar® 300: lighter and less costly tools, more efficient airflow in autoclave or oven, faster and more even heat up rates, continuous as well as initial cost savings.

BENEFITS

- Stabilize tooling effectively and easily with Masterbar® and Masterflex assemblies.
- Shorter cures with faster heat up rates due to better airflow.
- Lower cost tooling projects with simpler back up structures.

TECHNICAL DATA

Material type	Fiberglass/ Epoxy
Coef. of thermal expansion	4.7 x10^{-6} in/in/°F^{-1} (8.46 x10^{-6} cm/cm/°C^{-1})
Service temperature	400°F (204°C)

SIZES

Wall Thickness	Width	Height	Length
0.125 inch (0.32 cm)	2 inches (5.08 cm)	2 inches (5.08 cm)	12 feet (3.66 m)
0.125 inch (0.32 cm)	3 inches (7.62 cm)	3 inches (7.62 cm)	12 feet (3.66 m)
0.250 inch (0.64 cm)	4 inches (10.16 cm)	4 inches (10.16 cm)	12 feet (3.66 m)

- Custom lengths are available for special order. Minimums may apply.

APPLICATION

- Masterbar® 300 replaces costly "egg crating" with honeycomb or solid laminate boards.
- Masterbar® 300 can be bonded together using our TMR 2001 resin and/ or held in place using mechanical fasteners.
- Assemblies can be easily joined by using our composite tube fittings (C.T.F.'s) also found in this section.

NOTES

- Tubes must be post-cured at use temperature before use.
- The maximum use temperature is dependent upon the duration at maximum temperature and is process specific, Airtech recommends testing prior to use.

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MASTERBAR® COMPOSITE TUBE FITTING

DESCRIPTION

Masterbar® Composite Tube Fittings (C.T.F.'s) are used in conjunction with Masterbar® structural tubes where the square tubes intersect and also in areas where the mold face skin attaches to the back-up structures. C.T.F.'s are also ideally suited for light weight composite assembly fixtures and gauges. C.T.F.'s are mechanically fastened and bonded to the Masterbar® providing superior dimensional stability. C.T.F.'s further simplify assembly of the back-up structure and reduce labor cost. These patented fittings are fabricated from Toolmaster® epoxy tooling prepreg and are available in high temperature graphite and fiberglass. There are different configurations of fittings to accommodate most assembly requirements.

BENEFITS

- Stabilize tooling effectively and easily with Masterbar® and Masterflex assemblies.
- Shorter cures with faster heat up rates due to better airflow.
- Lower cost tooling projects with simpler back up structures.

TECHNICAL DATA

Material type	Fiberglass/ Epoxy (Masterbar® 300) or Graphite/ Epoxy (Masterbar® 400)
Service temperature	400°F (204°C)

SIZES

Thickness	Width	Height
0.12 inch (0.30 cm)	2 inches (5.08 cm)	2 inches (5.08 cm)
0.12 inch (0.30 cm)	3 inches (7.62 cm)	3 inches (7.62 cm)
0.25 inch (0.63 cm)	4 inches (10.16 cm)	4 inches (10.16 cm)

APPLICATION

- Sale and use of the product covered by US Patent n° 5100255.
- Fittings should be post cured with the back-up structure.
- Masterbar® 400 and Masterbar® 300 angles also available for corner reinforcement.
- Other thicknesses are available on request.
- Ask for our brochure to see different types of single parts or see our online catalogue: www.airtechintl.com.

Part Number description code (please use this code when placing order):
- **Masterbar® 300 CTF - XX - X** (Masterbar® 300 CTF = High temperature fiberglass/ epoxy tube fitting, XX = Fitting style, X = Masterbar® size in inch)
- **Masterbar® 400 CTF - XX - X** (Masterbar® 400 CTF = High temperature graphite/ epoxy tube fitting, XX = Fitting style, X = Masterbar® size in inch)

NOTES

- The maximum use temperature is dependent upon the duration at maximum temperature and is process specific, Airtech recommends testing prior to use.

Last updated : 2019-11-27

Catalog position : Toolmaster® Tooling materials

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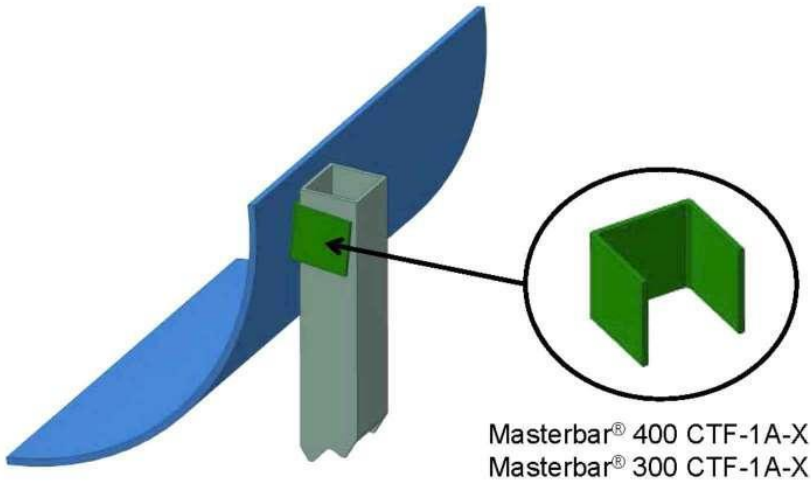
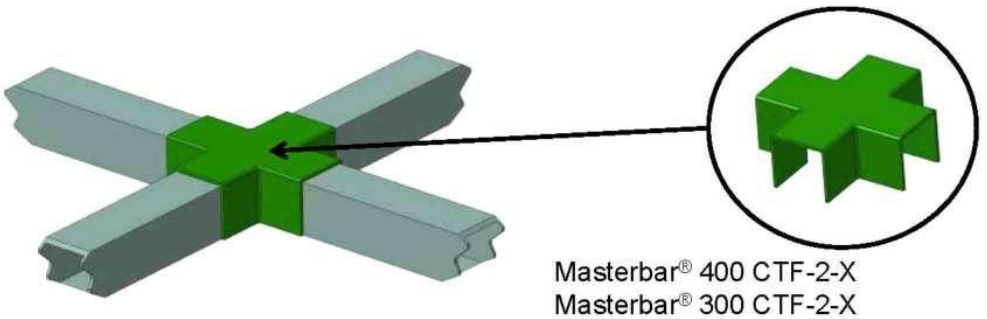
Data Sheet

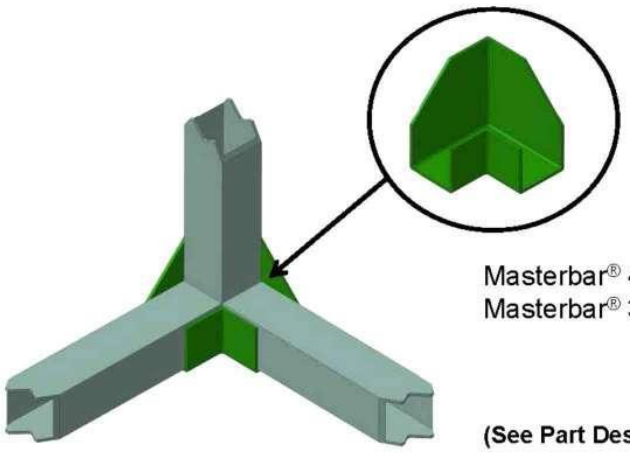
MASTERBAR® COMPOSITE TUBE FITTING



Masterbar® 400 CTF-1A-X
Masterbar® 300 CTF-1A-X



Masterbar® 400 CTF-2-X
Masterbar® 300 CTF-2-X



Masterbar® 400 CTF-3-X
Masterbar® 300 CTF-3-X

(See Part Description Code to complete X)

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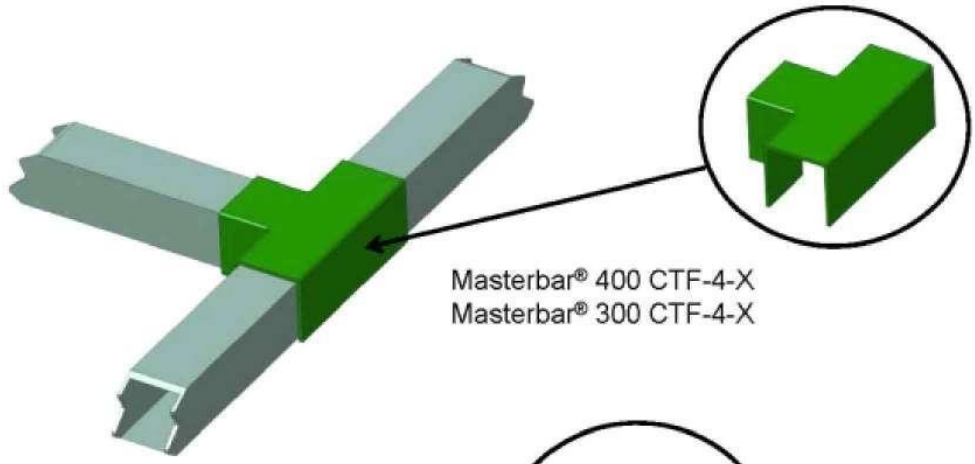
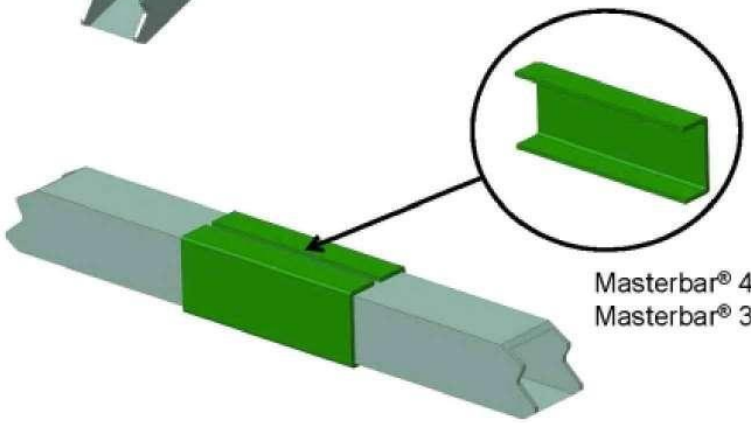
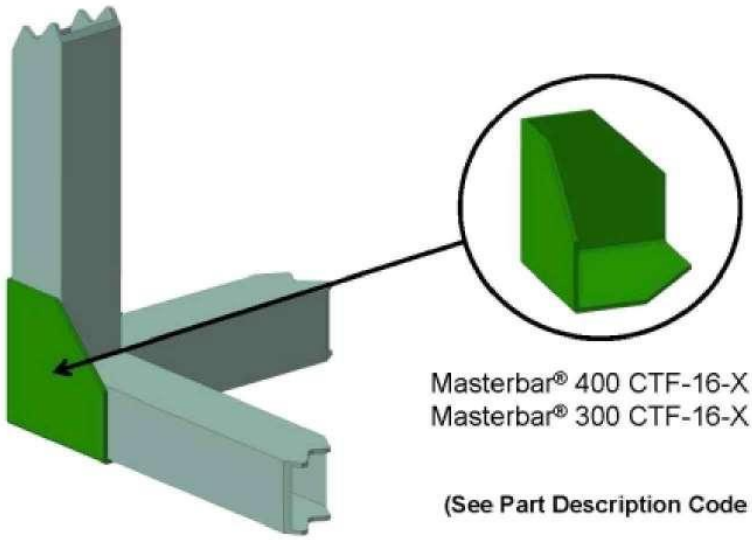
MASTERBAR® COMPOSITE TUBE FITTING



Masterbar® 400 CTF-4-X
Masterbar® 300 CTF-4-X



Masterbar® 400 CTF-14-X
Masterbar® 300 CTF-14-X



Masterbar® 400 CTF-16-X
Masterbar® 300 CTF-16-X

(See Part Description Code to complete X)

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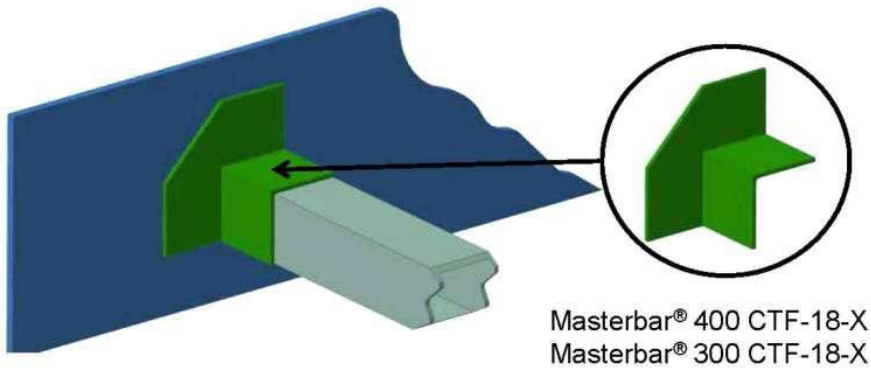
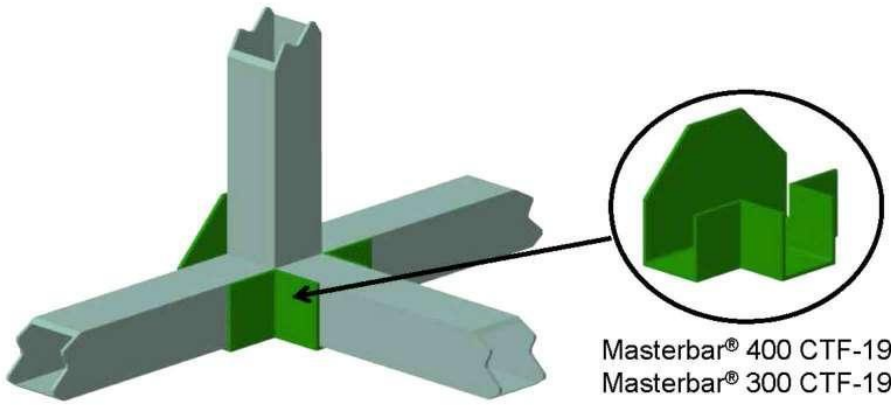
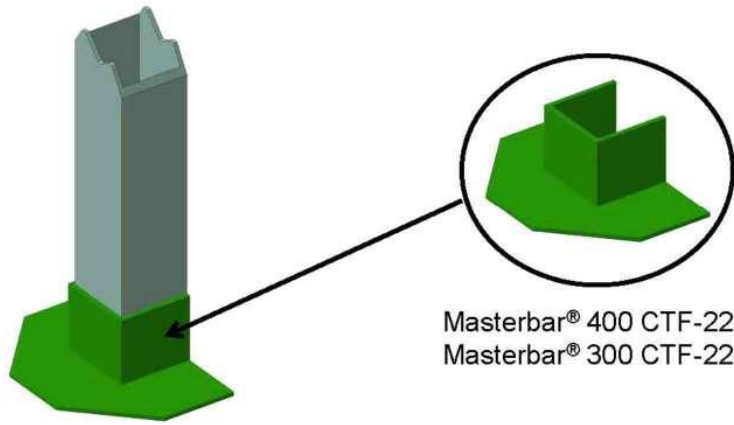
MASTERBAR® COMPOSITE TUBE FITTING



Masterbar® 400 CTF-18-X
Masterbar® 300 CTF-18-X



Masterbar® 400 CTF-19-X
Masterbar® 300 CTF-19-X



Masterbar® 400 CTF-22-X
Masterbar® 300 CTF-22-X

(See Part Description Code to complete X)

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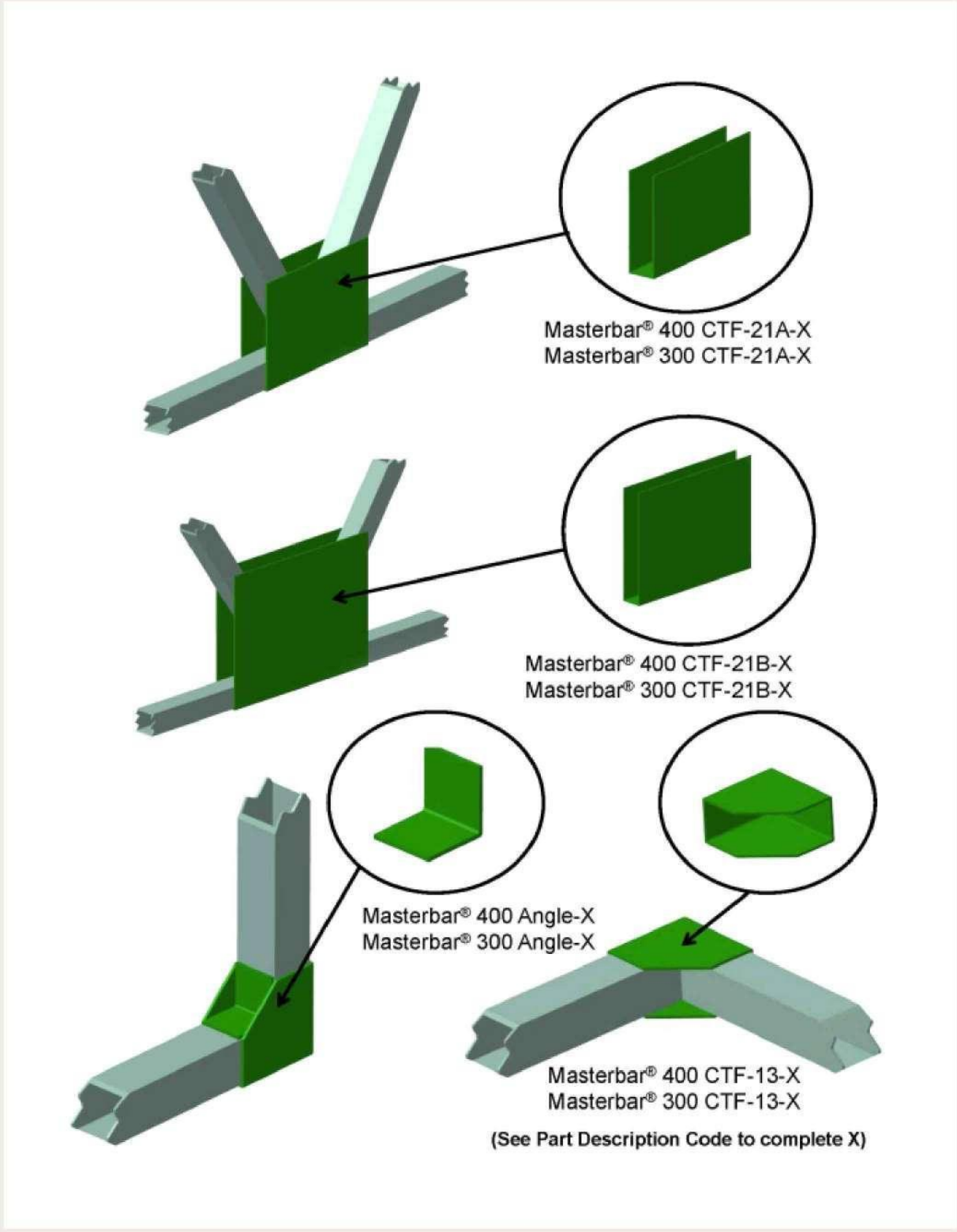
Data Sheet

MASTERBAR® COMPOSITE TUBE FITTING



Last updated : 2019-11-27

Catalog position : Toolmaster® Tooling materials

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Data Sheet

MASTERFLEX "S" SERIES

Flexible spiral square tube

DESCRIPTION

The Masterflex "S" series is a flexible spiral square tube used as a reinforcing hat section stiffener on the backside of the tool face. Masterflex stiffens the tool face to avoid dimensional stability problems. This is achieved by overlaying our tooling prepreg or wet lay-up plies over the Masterflex. They are constructed of spirally woven pre-stiffened carbon or fiberglass cloth and are easily conformable to the mold configuration.

TECHNICAL DATA

Material type: Fiberglass (F) or Graphite (G)

SIZES

Product reference	Width	Height	Length
MSG22 / MSF22	2 inches (5.08 cm)	2 inches (5.08 cm)	4 feet (1.22 m)
MSG32 / MSF32	2 inches (5.08 cm)	3 inches (7.62 cm)	4 feet (1.22 m)
MSF42 / MSG42	2 inches (5.08 cm)	4 inches (10.16 cm)	4 feet (1.22 m)

NOTES

> Other sizes available on special request. Minimum quantities may apply.
> Minimum order on stock sizes is 4 feet (1.22 m).

Last updated : 2016-02-04

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Data Sheet

TB-G48 & TB-F48

High temperature carbon/epoxy & fibreglass/epoxy tooling boards

DESCRIPTION

Toolmaster® TB-G48 and Toolmaster® TB-F48 are high temperature solid laminate tooling boards fabricated from high quality woven fabric and epoxy resin. Tooling boards are fabricated with easily removable release ply on each side to provide surfaces suitable for bonding.

BENEFITS

- Superior laminate quality due to improved manufacturing technology.
- Laminate quality allows defect-free waterjet cutting.
- Novel epoxy chemistry provides outstanding Tg.

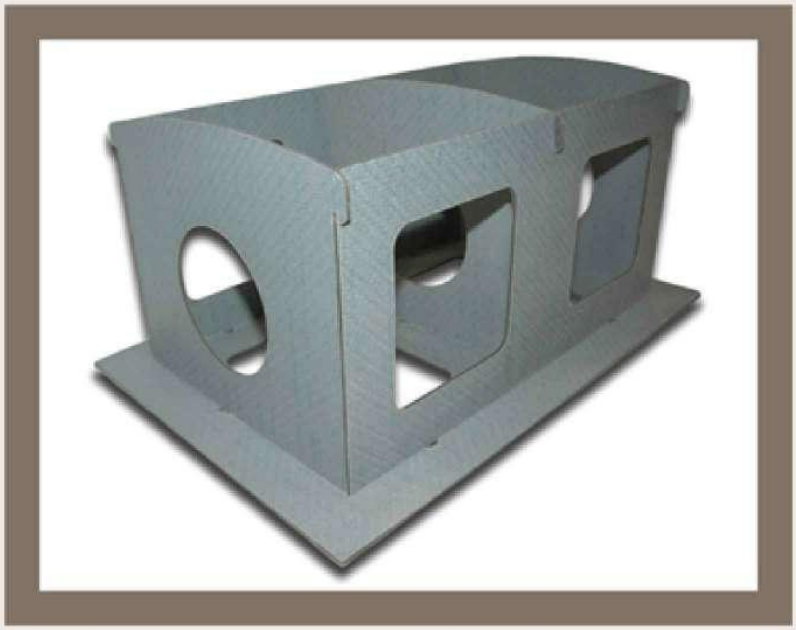
TECHNICAL DATA

Material type	Carbon/ Epoxy (TB-G48) or Fibreglass/ Epoxy (TB-F48)
Service temperature	425°F (218°C)
Glass transition temperature by DMA	425°F (218°C)

SIZES

Thickness	Width	Length
6,35 mm (1/4 inch)	1,22 m (4 feet)	2,44 m (8 feet)

- Other sizes available on request. Minimum order may apply to non-stock items.



APPLICATION

Uses:

- Lay-up mold back-up structures, stiffening ribs, assembly & bonding fixture, and shop aides.

NOTES

- The maximum use temperature is dependent upon the duration at maximum temperature and is process specific, Airtech recommends testing prior to use.

Last updated : 2018-01-15

Catalog position : Toolmaster® Tooling materials