

# > FM<sup>®</sup> 475 BMI SYNTACTIC CORE

TECHNICAL DATA SHEET



## DESCRIPTION

FM<sup>®</sup> 475 is a BMI syntactic core material which is reinforced with hollow glass micro-balloons. FM 475 syntactic core is designed as a cost and/or weight saving alternative in the manufacture of thin [below 0.20 inches (5.1 mm) thick], stiffness critical composite panels.

FM 475 syntactic core is based on CYCOM<sup>®</sup> 5250-4 resin chemistry to provide a high temperature capability with a service rating up to 425°F (218°C). It is compatible with CYCOM 5250-4 prepreg and other BMI resin systems. FM 475 will co-cure with these composites without the use of an adhesive film.

Standard FM 475 is supplied with a 104 glass scrim as a carrier, which improves handling characteristics in addition to increasing the material's flexural strength. Alternate carriers such as carbon, glass or Kevlar<sup>®</sup> mat can be provided upon request. FM 475 is supplied in sheet or roll form between two layers of release paper.

## FEATURES & BENEFITS

- Based on CYCOM 5250-4 bismaleimide resin chemistry
- Service temperature from -67 to 400°F (-55 to 204°C)
- Less than 3% volatiles evolved during cure
- Can be co-cured with BMI prepreg and adhesive systems
- Good tack and pliability
- Can be supplied at various film thicknesses

## SUGGESTED APPLICATIONS

- Thin composite panels where weight, cost and/or stiffness are critical

## CHARACTERISTICS

Table 1 | Product Description

|  |   |
|--|---|
| <b>Cured density, lb/ft<sup>3</sup> (kg/m<sup>3</sup>)</b> | 40 ± 2 (640 ± 30)   |
| <b>Nominal thickness, in (mm)</b>                          | 0.030 (0.76 mm)   |
| <b>Color</b>   | Yellow  |
| <b>Carrier</b>   | 104 glass   |
| <b>Gel Time</b>  | 20 – 30 minutes at 350°F (177°C)                                  |
| <b>Volatiles</b>   | 3% maximum [(60 minutes at 350°F (177°C))]                        |
| <b>Tg, TMA</b>   | 500°F (260°C)   |
| <b>Flexibility</b>   | Pliable, drapeable, good tack at 75°F (24°C)                      |
| <b>Shop life</b>   | 21 days at or below 75°F (24°C)                                   |
| <b>Shelf life</b>  | 12 months from date of shipment at recommended storage conditions |
| <b>Recommended storage</b>                                 | Store at or below 0°F (-18°C)                                     |

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### PROPERTIES

Table 2 | Mechanical Performance

| Test Condition  | Test Temperature<br>°F (°C)                            | Results<br>psi (MPa) |              |
|---|--|----------------------|--------------|
| Flatwise tensile  | -67 (-55)  | 1700 (11.7)          |              |
|   | 75 (24)  | 1800 (12.4)          |              |
|   | 350 (177)  | 1750 (12.1)          |              |
| Flatwise tensile after 30 days at 160°F (71°C), 100% RH | 350 (177)  | 1050 (7.2)           |              |
| Block compression                                       | -67 (-55)  | 16000 (110)          |              |
|   | 75 (24)  | 16500 (114)          |              |
|   | 350 (177)  | 11000 (76)           |              |
| Block compression after fluid exposure                  |  |                      |              |
|   | 90 days in Jet A fuel at 75°F (24°C)                   | 75 (24)              | 13500 (93.2) |
|   | 90 days in hydraulic fluid at 75°F (24°C) MIL-H-5606   | 75 (24)              | 12200 (91.1) |
|   | 30 days in 5% salt solution at 95°F (35°C)             | 75 (24)              | 10500 (72.5) |
|   | 90 days in lubricating oil at 290°F (143°C) MIL-L-7808 | 75 (24)              | 15000 (103)  |
|   | 7 days in MEK at 75°F (24°C)                           | 75 (24)              | 15100 (104)  |
| 30 days in anti-icing fluid at 32°F (0°C)               | 75 (24)  | 13700 (94.5)         |              |

### Materials and Procedures

#### 1. Flatwise Tensile

Specimens were prepared from three plies of 5250-4 6K, 5HS BMI prepreg with FM 475 BMI foam. The lay-up orientation was [0/45/0/1 ply foam/0/45/0]

#### 2. Block Compression Strength

The block compression tests were performed according to ASTM D-695 on 15 ply specimens cut to 1 inch (25.4 mm) high by 0.5 inch (12.7 mm) wide. The nominal thickness was 0.26 inches (6.6 mm). The blocks were compressed in the 1 inch direction in a sub-press as described in ASTM D-695, figure 1.

#### 3. Cure Cycle

- Apply full vacuum to bag for 12 hours before beginning cure cycle
- Apply 5 psi (0.03 MPa) pressure and maintain full vacuum prior to heat up
- Heat from ambient to 250°F (121°C) with a heat-up rate of 1 – 5°F (0.5 – 2.8°C) per minute. At 150°F (65°C) increase autoclave pressure to 20 psi (0.14 MPa) and release vacuum.
- Dwell at 250°F (121°C) for 45 minutes
- Increase pressure to 85 psi (0.59 MPa). Heat from 250°F (121°C) to 365°F (185°C) with a heat-up rate of 1 – 5°F (0.5 – 2.8°C) per minute.
- Dwell at 365°F (185°C) for 360 minutes
- Cool down at a rate of 1 – 5°F (0.5 – 2.8°C) per minute
- Release pressure when part temperature is 140°F (60°C) or less

#### 4. Post Cure Cycle

- Free-standing post cure in circulating air oven
- Heat from ambient to 440°F (226°C) with a heat-up rate of 1 – 5°F (0.5 – 2.8°C) per minute
- Dwell at 440°F (226°C) for 360 minutes
- Cool down at a rate of 1 – 5°F (0.5 – 2.8°C) per minute. Do not remove part from oven until the part temperature is 140°F (60°C) or less

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## APPLICATION NOTES

### Cure Cycle

The recommended cure cycle for FM 475 syntactic core is as follows. Refer to previous page for details.

- Cure 6 hours at 360°F (182°C) with 85 psi (0.59 MPa) pressure
- Free standing post cure for 6 hours at 440°F (227°C)

## HANDLING AND SAFETY

Cytec Engineered Materials recommends wearing clean, impervious gloves when working with BMI resin systems to reduce skin contact and to avoid contamination of the product.

Materials Safety Data Sheets (MSDS) and product labels are available upon request and can be obtained from any Cytec Engineered Materials Office.

## DISPOSAL OF SCRAP MATERIAL

Disposal of scrap material should be in accordance with local, state, and federal regulations.

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