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NCAMP Material Specification

*This specification is generated and maintained in accordance with NCAMP
Standard Operating Procedures, NSP 100*

Carbon Fiber Tow, 650 (4482) Tensile Strength, 33.5 (231) Tensile
Modulus

(for NMS 128/3 AS4 8552 Plain Weave)

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1. SCOPE:

1.1 Form:

This detail specification follows the section and table numbering scheme of the base specification NMS 818. It contains additional or superseding requirements. The base specification shall govern where no additional requirement is specified; in such cases, the applicable sections are omitted from this detail specification.

3 TECHNICAL REQUIREMENTS

3.2 Material

3.2.5 Splices

Splicing is not allowed for NT tow.

3.2.9 Storage Life

Storage life is 5 years (60 months) from the date of manufacture. Date of manufacture is listed in the certification of conformance. Purchaser is responsible for keeping track of the expiration date because it is not printed on the spool core or shrink wrap label. The fiber shall be stored in a clean and dry environment that is free from contamination at ambient temperatures less than 35°C or 95°F. Relative humidity control is not required.

3.2.10 Carbon Fiber Lot Definition

Carbon fibers formed during one essentially continuous, uninterrupted production run under the same steady-state process conditions. A fiber lot must contain 85% PAN from a single lot; blending is permitted from up to three additional PAN lots not to exceed 15% of the tows in the lot. An interruption in the process of up to 72 hours is permitted, provided that the production equipment settings are not modified or another material was not produced on the equipment during the interruption.

3.3 Properties

The carbon fiber tow product shall conform to the requirements of Table 1.

Table 1 – Carbon Fiber Tow Properties

Paragraph	Property	Requirements (see Note 1)	Test Method (see Note 2)
3.3.1	Tow Tensile Strength (ksi)	540 (min. lot average)	4.5.1
3.3.2	Tow Tensile Modulus (Msi)	31.0 to 35.0 (lot average)	4.5.1
3.3.3	Percent Elongation	1.5 (min. lot average)	4.5.1
3.3.4	Density (lbs/in ³)	0.0636 to 0.0658 (lot average)	4.5.2
3.3.5	Mass Per Unit Length (lb/in x 10 ⁻⁶)	11.4 to 12.1 (lot average)	4.5.3
3.3.6	Twist	NT 0.8 per inch maximum	Not required for lot acceptance
3.3.7	Sizing Content (wt. %)	0.8 to 1.2 (lot average)	4.5.5

Note 1: The doff average requirements currently in place stipulate that no doff average value shall be less than 90% of the minimum lot average requirement, or greater than 110% of the maximum lot average requirement (if applicable).

Note 2: Hexcel acceptance testing is to internal test methods per specification HS-CP-5000. Hexcel considers the test methods to provide results equivalent to the test methods in section 4.5.

3.4.4 Baseline Carbon Fiber Tow Data

Records shall be retained for ten years minimum.

4.4 Change Control Approval

Hexcel shall identify and obtain acceptance of changes in raw materials, basic methods of manufacture, geographic location, or processing parameters that require customer and/or regulatory authority approval in accordance with contract or regulatory requirements. Changes affecting processes, production equipment, tools and programs shall be documented. Procedures shall be available to control their implementation.

5.1 Identification on Spool

The inside core label shall have the following identifications:

- Fiber Type-sizing-filament
- Lot number
- Manufacturer
- Doff number

The outside shrink wrap shall have the following identifications:

- Fiber Type-sizing-filament
- Lot number
- Manufacturer
- Doff number
- Net weight of spool

5.2 Identification on Packaging

The container label shall have the following identifications:

- Fiber Type-sizing-filament
- Lot number
- Container Number

The shipping label shall have the following identifications:

- Shipping address
- Purchase order number
- Minimum and maximum spool weight in container
- Fiber Type-sizing-filament
- Lot number
- Net weight of container

QUALIFIED PRODUCTS LIST

Supplier Product Designation	Supplier Name, Location, and Line Number	Date Qualified	Specification Callout
HexTow™ AS4-GP 3k Sizing: 1% GP	Supplier Name: Hexcel Corporation Production Location: 6700 W 5400 S, West Valley City, UT 84118 Line Number: 5 Only	2/8/2013	NMS 818/9 Style NT, Grade 3k