

**Tenax<sup>®</sup> - J HTS40 E13 3K 200tex**  
**HTS40 E13 6K 400tex**  
**HTS40 E13 12K 800tex**  
**Tenax<sup>®</sup> - E HTS40 F13 12K 800tex**  
**HTS40 F13 24K 1600tex**

**HTS40** is a family of high strength/standard modulus aerospace grade carbon fibers made in Japan (E13-sized products) and Germany (F13-sized product) for use as reinforcement in high performance composites. These fibers are produced from poly-acrylonitrile (PAN) precursor and are surface treated to promote adhesion to organic matrix polymers. Sizing materials are designed to aid in handling.

The -J HTS40 E13 3K/6K and the -E HTS40 F13 12K fibers have been qualified to the NMS 818 dry fiber specification. This allows manufacturers to call out an industry standard, PCD-controlled, aerospace-grade carbon fiber without the expense of writing and maintaining their own in-house specifications.

Typical Fiber Properties		Inch-Pound	SI
Tensile strength	3K E13 (EP03)	610 ksi	4205 MPa
	6K E13	630 ksi	4345 MPa
	12K E13	620 ksi	4275 MPa
	12K/24K F13 (F301)	670 ksi	4620 MPa
Tensile modulus*	3K/6K/12K E13 <sup>(1)</sup>	34.3 Msi	237 GPa
	12K/24K F13 <sup>(2)</sup>	34.7 Msi	239 GPa
Elongation*	3K E13 <sup>(1)</sup>	1.78%	
	6K E13 <sup>(1)</sup>	1.82%	
	12K E13 <sup>(1)</sup>	1.80%	
	12K/24K F13 <sup>(2)</sup>	1.80%	
Density		0.064 lb/in <sup>3</sup>	1.76 g/cc
Yield/Linear density (with sizing)	3K E13 (EP03)	2456 yd/lb	202 tex (g/km)
	6K E13	1222 yd/lb	406 tex
	12K E13	612 yd/lb	810 tex
	12K F13 (F301)	620 yd/lb	800 tex
	24K F13	310 yd/lb	1600 tex
Sizing level w/w	3K/6K/12K E13 (EP03)	1.30%	
	12K/24K F13 (F301)	1.00%	
<b><u>Yarn / Tow Characteristics</u></b>			
Filament Diameter		7.0 x 10 <sup>-6</sup> m	
Twist		Never Twisted	
Equivalent Yarn Cross Section	3K	1.79 x 10 <sup>-4</sup> in <sup>2</sup> (0.115 mm <sup>2</sup> ) Nominal	
	6K	3.58 x 10 <sup>-4</sup> in <sup>2</sup> (0.231 mm <sup>2</sup> ) Nominal	
	12K	7.16 x 10 <sup>-4</sup> in <sup>2</sup> (0.462 mm <sup>2</sup> ) Nominal	
	24K	1.43 x 10 <sup>-4</sup> in <sup>2</sup> (0.924 mm <sup>2</sup> ) Nominal	

\* Toho Tenax Impregnated Strand Test Method. Based on <sup>(1)</sup> JIS R7601 or <sup>(2)</sup> DIN 29965

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RECOMMENDED STORAGE AND SHELF LIFE

A HTS Carbon Fiber Properties

Filament tensile strength, modulus of elasticity, coefficient of expansion, electric and thermal conductivities and yield are inherent properties of the HTS fiber and have indefinite shelf life.

B. HTS Carbon Fiber Processing

Typically, the original processing characteristics of E13 (EP01) and F13 (F301) sized yarn will be essentially constant for at least one year from date of delivery. The product should be stored indoors. The recommended storage conditions are 40°F-77°F (5°C-25°C) and less than 50 percent RH. Direct exposure to sunlight or rain should be avoided. The shrink wrap should not be removed until immediately prior to use.

If the roving is stored at high temperatures and/or high humidity conditions, it may become difficult to process. Roving that stiffens during storage should still be useable. However, a thorough evaluation of the processing characteristics (e.g., resin wet out, spreadability) relative to the customer's operation is strongly recommended.

STANDARD PACKAGING AND SPOOL BUILD

Spool designation	"A"		"B"		"Z"		"H"	
	Inch-Pound	Metric	Inch-Pound	Metric	Inch-Pound	Metric	Inch-Pound	Metric
Net Weight	2.2 lb	(1 kg)	4.41 lb	(2 kg)	< 2.2 lb	(< 1 kg)	8.82 lb	(4 kg)
Tube Length	11.0 in	(27.9 cm)	11.0 in	(27.9 cm)	11.0 in	(27.9 cm)	11.0 in	(27.9 cm)
Tube I.D.	3.0 in	(7.6 cm)	3.0 in	(7.6 cm)	3.0 in	(7.6 cm)	3.0 in	(7.6 cm)
Tube weight	6.0 oz	(170g)	6.0 oz	(170g)	6.0 oz	(170g)	6.0 oz	(170g)
Stroke	10.0 in	(25.4 cm)	10.0 in	(25.4 cm)	10.0 in	(25.4 cm)	10.0 in	(25.4 cm)
Outside dia. (OD)	4.75±0.2 in	(12.1±0.5 cm)	5.0±0.25 in	(12.7±0.6 cm)	Varies		6.4±0.3 in	(16.3±0.8 cm)
<b>Pallet Type</b>	<b>Carton</b>		<b>Carton</b>		<b>Carton</b>		<b>Carton</b>	
Nominal length	5400 yd	(4938 m)	5400 yd	(4938 m)	Non-metered		5400 yd	(4938 m)
No. spools per carton	20		12		Varies		6	
Carton weight	44.1 lb	20 kg	52.9 lb	24 kg	Varies		52.9 lb	24 kg
Carton dimensions (LxWxH)	24.8 x 20.1 x 11.6 in	63 x 51 x 29.5 cm	Same		Same		21.7 x 14.6 x 11.6 in	55 x 37 x 29 cm
Pallet dimensions (LxWxH)	40.6 x 50.8 x 41.5 in	103 x 129 x 105 cm	Same		Same		44.9 x 31.9 x 37.2 in	114 x 81 x 94 cm
Approx. Pallet weight	529 lb	240 kg	635 lb	288 kg	Varies		635 lb	288 kg

Notes:

- "A" spool is standard for 3K, "B" spool for 6K and "H" spool for 12K/24K. "Z" spool is un-metered.
- 12-14 cartons per pallet. Height of pallet not included in dimensions. The pallet size may be changed without notice.

AMERICAS  
Toho Tenax America, Inc  
121 Cardiff Valley Road  
Rockwood, TN 37854-4134  
Tel (800) 252-3001 or (865) 354-8408  
West Coast - (949) 474-3278 Ext 25  
<http://www.tohotenaxamerica.com>

ASIA  
Toho Tenax Co. Ltd.  
Kasumigaseki Common Gate West Tower  
3-2-1 Kasumigaseki, Chiyoda-ku  
Tokyo 100-8585 Japan  
Tel +81 (3) 3506-6506  
<http://www.tohotenax.com>

EUROPE  
Toho Tenax Europe GmbH  
Kasinostraße 19-21  
Wuppertal 42103  
Germany  
Tel +49 (202) 322339  
<http://www.tohotenax-eu.com>

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