

# Ceramic Textiles and Composites

## 3M™ Nextel™ Sewing Thread

Nextel™ 312 and 440 Sewing Threads are high temperature machine sewable threads made from continuous Nextel Alumina-Boria-Silica Fibers.

Nextel 312 sewing threads offer superior high temperature resistance to 2012°F (1100°C). The Nextel 440 threads are resistant to 2500°F (1307°C). Both are ideal for sewing Nextel textiles and other high temperature fabrics.

The Nextel 312 and 440 sewing threads are a combination of ceramic fibers and rayon fibers. The rayon fibers impart resiliency and abrasion resistance to the threads to improve sewability.

The rayon is heat fugitive, i.e., the fibers decompose at temperatures above approximately 572°F (300°C). The amount of rayon in the thread is about 10 percent by weight.



### Typical Sewing Thread Properties

Style	Diameter		Approximate Yield		Sized Strength				Heat Cleaned Strength			
					Breaking		Knot		Breaking		Knot	
	inch	(mm)	yd/lb	m/kg	lbs	(kg)	lbs	(kg)	lbs	(kg)	lbs	(kg)
Nextel 312												
AT-21	0.019	(0,48)	1570	(3160)	27	(8,2)	5	(2,3)	10	(4,5)	3	(1,4)
AT-30	0.028	(0,71)	810	(1630)	47	(21,3)	14	(6,4)	15	(6,8)	8	(3,6)
Nextel 440												
BT-30	0.029	(0,74)	710	(1430)	44	(20,0)	6	(2,7)	25	(11,3)	6	(2,7)

#### 312 Fiber Properties:

Composition –Alumina-Boria-Silica  
 Density (non-porous) - .0975 lb/in<sup>3</sup> (2,70 gm/cc)  
 Tensile Strength –250x10<sup>3</sup> psi (1720 mN/m<sup>2</sup>)  
 Continuous Use Temperature - 2200°F (1240°C)  
 Short Term Use Temperature - 2600°F (1427°C)  
 Melt Temperature - 3272°F (1800°C)  
 Other Characteristics –Non-oxidizing, non-hygroscopic, essentially chemically resistant, low thermal conductivity, good abrasion resistance.

#### 440 Fiber Properties:

Composition –Alumina-Boria-Silica  
 Density (non-porous) - .1085 lb/in<sup>3</sup> (3,05 gm/cc)  
 Tensile Strength –300x10<sup>3</sup> psi (2070 mN/m<sup>2</sup>)  
 Continuous Use Temperature - 2500°F (1370°C)  
 Short Use Temperature - 3000°F (1704°C)  
 Melt Temperature - 3272°F (1800°C)  
 Other Characteristics –Non-oxidizing, non-hygroscopic, essentially chemically resistant, low thermal conductivity, good abrasion resistance.

# Instructions for Machine Sewing 3M™Nextel™ Sewing Thread

Nextel 312 and 440 Ceramic Fiber Sewing Thread is a machine sewable thread used for fabricating high temperature sewn parts. The following should assist you in machine setup.

## Recommended Sewing Machines

Singer, 7 Class 31, 33, 34, and 97-Adler, 7 Class 104, 105, 204, 205 Consew, 733R.

The above are all shuttle bobbin machines capable of handling very large threads without machine modification. Large rotary hook machines have been used to sew Nextel thread, but they are not recommended. They require modification, and the rotary hook action can cause damage to the thread and reduce seam strengths.

## Thread Lubrication

These Nextel sewing threads are precoated with an organic lubricant and needs no soaking or further lubrication on the machine. Adding lubricants such as silicone, PTFE, or soap may damage the high temperature properties of the thread.

**Note:** The coating on Nextel 312 and 440 sewing thread may decompose to hazardous by-products when heated. Heat Processing to remove coatings must be done with local exhaust ventilation, e.g., a hood which provides a minimum capture velocity of 150 feet (45,72 m) per minute. See our Nextel Heat Cleaning Instructions and our Health Safety Bulletin for more information.

## Machine Setup and Operation

### Needle, Size 21-30

A size 26 is the preferred needle size for Style BT-28 and BT-32. This size allows the thread to pass through the needle eye and slot with a minimum of damage.

### Thread Tension

Upper (needle side) tension should be measured after the tension device just before the take-up arm. For most fabric-to-fabric sewing, this tension should be 0,4 to 0,7 kg. A setting of 0,6 kg is recommended as a starting point.

The lower (bobbin side) tension should be measured coming out of the thread plate. For most fabric-to-fabric sewing, this tension should be 0,4 to 0,7 kg. A setting of 0,4 kg is recommended as a starting point.

## IMPORTANT NOTICE TO PURCHASER

All statements, technical information and recommendations contained in this brochure are based upon tests conducted with 3M approved equipment and are believed to be reliable. However, the accuracy or completeness of the tests is not guaranteed. THE FOLLOWING IS MADE IN LIEU OF ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE: The seller's and manufacturer's only obligation will be to replace the quantity of the product proved to be defective. Neither the seller nor 3M will be liable for any injury, loss or damage, direct or consequential, arising out of the use of or the inability to use the product. Before using, the user must determine the suitability of the product for his or her intended use.

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## Preferred Stitch

Federal Standard Stitch Type 301 lock is recommended. Using this stitch type with an unbalanced bobbin tension, which allows the bobbin thread and stitch junction to remain on the bobbin side of the fabric surface, is suggested for fabric-to-fabric sewing. When quilting or sewing multiple layer parts, a buried stitch may be desired.

## Stitch Length

3.7 to 7.0 stitches per inch is recommended. More stitches per inch may damage both thread and fabric and result in an excessive number of thread breaks.

## Foot Pressure

The standard medium-range adjustment on the pressure foot assembly on 7-class machines for fabric-to-fabric sewing is usually sufficient. If the pressure is too low, slipping will occur and a short stitch length and abrasion to the fabric will be noticed. An overly high foot pressure will crush and break the fibers in the Nextel fabric.

When sewing multiple layers or quilted parts, pressure on the foot may need adjusting depending on the part requirements.

## Speed

If the above recommendations for machine, type, tensions, needle size and adjustments are followed, an operating speed of 550 stitches per minute should be attained. Slower speeds may be necessary if the thread is being sewn through many layers of fabric or thick blankets. Also, during initial machine setup, slower speeds will be required while adjusting tensions.

## Deburring

All nicks, burrs, and sharp edges must be removed from the thread guides, tension devices, spring arm, take-up arm, needle guide, needle eye, throat plate, feed dog and hook. Any of these parts which show a worn groove must be replaced. Emery cord and emery paper may be used for this work.

## For ordering contact:

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