Recommended Standard Specification

For

Synthetic Sewing Threads For Slings and Tie Downs

WSTDA-TH-1

$25.00

This recommended standard specification has been formulated as a guide for manufacturers and users of synthetic sewing threads for slings and tie downs. The existence of this recommended standard specification does not however prevent members of the Web Sling & Tie Down Association, Inc. and other manufacturers from manufacturing or selling products not conforming to this standard

FOREWORD

This Recommended Standard Specification applies to Synthetic Sewing Threads constructed from various synthetic fibers. This standard recommends construction as well as identification and testing of synthetic sewing threads used primarily in synthetic web slings, round slings and tie downs. In addition, it gives practical advice on selection and environmental considerations of these synthetic sewing threads.

The exclusion from this Recommended Standard Specification of synthetic sewing threads of different synthetic materials, and ratings is not intended to preclude their use and shall not be interpreted in this manner.

Synthetic sewing threads made from materials or construction other than those detailed in this Recommended Standard Specification shall be used in accordance with the recommendations of the thread manufacturer or qualified person. The specifications contained in this Recommended Standard Specification for Synthetic Sewing Threads for Slings and Tie Downs were compiled under the auspices of the Web Sling & Tie Down Association, Inc. This Recommended Standard Specification is intended to assist users in specifying the proper synthetic sewing thread for their particular requirements and to serve as a guide to the industry in the construction and use of synthetic sewing threads.

Safety is the paramount consideration involved in the use of any synthetic sewing thread. This standard does not purport to address all safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of the regulatory limitations prior to use. The appropriate synthetic sewing thread shall be selected by the user for their specific application.

MANDATORY AND ADVISORY RULES

Mandatory rules of this Recommended Standard Specification are characterized by the use of the word 'shall.' If a rule is of an advisory nature, it is indicated by the use of the word "should", or is stated as a recommendation.

WEB SLING & TIE DOWN ASSOCIATION, INC.

2105 Laurel Bush Road, Suite 200
Bel Air, Maryland 21015
Fax (443) 640-1031
Phone (443) 640-1070

Email: wstda@ksgroup.org
Website: www.wstda.com

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CHAPTER 1.0

TERMINOLOGY AND DEFINITIONS OF SYNTHETIC SEWING THREADS

SECTION 1.1 PURPOSE

1.1.1 This chapter provides a description of synthetic sewing threads and definitions that apply to such threads used for machine sewing of synthetic web slings, round slings and tie downs.

SECTION 1.2 DESCRIPTION

1.2.1 A slender, strong strand or cord, especially one designed for sewing. Most sewing threads are made by plying and twisting yarns. A wide variety of sewing threads are in use today, e.g., spun cotton & spun polyester, core-spun cotton with a polyester filament core, polyester & nylon filaments (often bonded), and monofilaments.

SECTION 1.3 DEFINITION OF TERMS

BONDED MONOCORD A sewing thread containing two or more plies joined together with resin, rubber, foam, or adhesive to form a single ply sewing thread.

BONDING AGENT A resin, rubber, foam, or adhesive for encapsulating a ply or sewing thread.

BRAIDED SOFT MULTICORD A sewing thread made by intertwining three or more plies to make a single strand.

DENIER A numbering system which expresses the weight in grams of a multi-filament yarn that is 9000 meters in length. Lower numbers represent finer sizes of filament yarn, and higher numbers represent coarser sizes of filament yarn.

HIGH TENACITY Higher than normal tensile strength with a range of 6.0 to 9.5 grams per denier as compared to regular tenacity of lower than 6.0 grams per denier.

MULTIFILAMENT A yarn consisting of many continuous filaments or strands, as opposed to a monofilament, which is one strand.

TWISTED BONDED MULTICORD A sewing thread made with a twisted soft cord and a bonding agent.

TWISTED SOFT MULTICORD A sewing thread made by twisting yarns and/or plies together to form plied yarns or cords.

CHAPTER 2.0

CONSTRUCTION OF SYNTHETIC SEWING THREAD

SECTION 2.1 PURPOSE

2.1.1 This chapter provides an outline of materials and construction characteristics of synthetic sewing threads.

SECTION 2.2 YARN

2.2.1 Nylon Yarn: The yarn used in the manufacturing of the thread shall be bright, high tenacity, heat and light resistant, continuous multi-filament nylon. Nylon 6.6 with a melting point of 254ºC (489ºF) is the preferred fiber; but nylon 6 with a melting point of 220ºC (428ºF) is acceptable.

2.2.2 Bonding Agent: The bonding agent used in Type II and Type III nylon thread shall be colorless polymer suitable to resist ply separation and enhance sewing performance.

2.2.3 Polyester Yarn: The yarn used in the manufacturing of the thread shall be bright, high tenacity continuous multi-filament polyester.

2.2.4 Bonding Agent: The bonding agent used in Types II &and Type III polyester thread shall be colorless polymer suitable to resist ply separation and enhance sewing performance.

SECTION 2.3 CONSTRUCTION

2.3.1 The construction of the thread shall be as specified below and as specified in Tables 1 through 8 in Chapter 5.0 of this recommended standard for the applicable type and size.

2.3.2 Type I twisted soft multicord thread shall be of twisted multicord (ply) construction. Each of the individual plies shall be twisted initially with no less than the number of turns per inch (TPI) to be used in the final twist and in the opposite direction of the final twist. The final ply-twist shall be no less than the applicable minimum TPI as specified in Tables 1 & 3. Type I thread shall be unbonded with a soft finish.

2.3.3 Type II twisted bonded multicord thread shall have the same construction as Type I except that it shall be bonded.

2.3.4 Type III bonded monocord thread shall be of monocord construction, with component yarn(s) twisted in the final direction only. Type III thread shall be bonded.

2.3.5 Type IV braided soft multicord thread shall be of a braided construction.

2.3.6 Thread shall average not more than one yarn knot per four ounces in the single ply. There shall be no final ply knots (thread knots) since the put-up will be random weight or the thread will be lapped.

2.3.7 No chemical finishes shall be applied except those necessary to provide good sewing quality and as applicable for bonding (Types II & III). The percent by weight of bond and lubricant shall be as specified in Tables 1 thru 8.

2.3.8 The direction for the final twist shall be "Z", which is a left twist. A reverse or right twist thread is known as an "S" twist. If "S" twist thread is required, this must be clearly stated, otherwise the "Z" twist prevails when twist is not mentioned in the specification. Twist does not apply to braided thread.

2.3.9 Unless otherwise specified, the thread shall be put-up on a normal weight or length per holder basis on single head plastic tubes, cardboard tubes, or cones. Each holder shall have a label attached in such a manner as to remain in place and be clearly legible until all thread has been removed. Unless a mutual agreement between buyer and seller specifies other requirements, the labels shall be printed with the information as specified below:

Name of Manufacturer
Number Size
Color
Nominal Net Weight or Length
Fiber and Thread Type

2.3.10 The yarn (fiber) and color (shade) shall be as specified in the applicable end use specification, or purchase order; each type shall be identified on the label of each individual spool.

CHAPTER 3.0

STANDARD PROCEDURES FOR TESTING SYNTHETIC SEWING THREAD

Section 3.1 PURPOSE

3.1.1 This chapter provides an outline of several test procedures commonly used for testing synthetic sewing threads.

Section 3.2 TYPES OF TESTS

3.2.1 Strength and elongation testing - used to determine the breaking strength and elongation of sewing thread and yarns. Strength testing covers straight, loop and knot strength. Elongation testing covers loop and elongation at sewing force.

3.2.2 Twist testing - used to determine the amount and direction of twist.

3.2.3 Twist balance testing - used to determine the tendency of thread to twist on itself when held in loop form.

3.2.4 Diameter testing - used to determine thread diameter.

3.2.5 Length - Weight testing - used to determine length per pound or kilogram and thread length per holder.

3.2.6 Shrinkage testing - used to determine shrinkage due to boiling water and dry heat.

Section 3.3 TEST PROCEDURES

3.3.1 Thread manufacturers shall perform required testing in accordance with Federal Test Method Standard No. 191A and ASTM Designation: D204-02 as applicable.

3.3.2 Test specimens shall be from each actual production run.

3.3.3 The test machine shall be certified annually to ASTM E-4 or equivalent.

3.3.4 Test results shall be kept on file by the thread manufacturer.

3.3.5 The thread manufacturer or an independent testing laboratory shall perform the testing of synthetic sewing threads.

SECTION 3.4 CERTIFICATION

3.4.1 When certification is required, a certificate shall be issued describing the type, date and results of test by the company performing the test.

CHAPTER 4.0

RECOMMENDED OPERATING PRACTICES

SECTION 4.1 PURPOSE

4.1.1 The purpose of this chapter is to provide guidelines to buyers and sellers of synthetic sewing threads for proper selection and environmental considerations.

SECTION 4.2 PROPER SELECTION

4.2.1 Manufacturers of synthetic web slings, round slings and tie downs shall select a synthetic sewing thread having suitable characteristics and strength for their finished assembly and intended environment.

4.2.2 Manufacturers of synthetic sewing threads should be consulted to address needle size, thread selection and machine tensioning issues.

Section 4.3 ENVIRONMENTAL CONSIDERATIONS

4.3.1 Synthetic sewing should be stored in a cool, dry and dark place when not in use to prevent loss of strength through exposure to ultra-violet light.

4.3.2 Chemically active environments can affect the strength and performance of synthetic sewing threads in varying degrees ranging from little to total degradation. The thread manufacturer should be consulted before any synthetic sewing thread is used or stored in chemically active environments.

4.3.2.1 **ACIDS**

4.3.2.1.1 Nylon is subject to degradation in acids, ranging from little to total degradation.

4.3.2.1.2 Polyester is resistant to many acids, but is subject to degradation ranging from little to moderate in some acids.

4.3.2.1.3 Each application shall be evaluated, taking in consideration the following:

i. Type of Acid
ii. Exposure Conditions
iii. Concentration
iv. Temperature

4.3.2.2 **ALKALIS**

4.3.2.2.1 Polyester is subject to degradation in alkalis, ranging from little to total degradation.

4.3.2.2.2 Nylon is resistant to many alkalis, but is subject to degradation ranging from little to moderate with some alkalis.

4.3.2.2.3 Each application shall be evaluated, taking into consideration the following:

i. Type of Alkali
ii. Exposure Conditions
iii. Concentration
iv. Temperature

CHAPTER 5.0

SYNTHETIC SEWING THREAD SPECIFICATIONS

TABLE 1
Nylon Type I - Twisted Soft Multicord

Ticket Size	Letter # Size	Ply	Final Twist (TPI Min.)	% by Wt. * Bond	% by Wt. * Lube	Yield Yd./Lb Min.	Min. Break Strength **Lbs**	%Elong** @Break
138	FF	3	5.0		5-15	2725	20	20-35
277	#4CORD	3	3.5		5-15	1350	40	20-35
415	#6 CORD	3	3.0		5-15	850	65	20-35
554	#8 CORD	3	2.5		5-15	625	80	20-35

TABLE 2
Nylon Type II - Twisted Bonded Multicord

Ticket Size	Letter # Size	Ply	Final Twist (TPI Min.)	% by Wt. * Bond	% by Wt. * Lube	Yield Yd./Lb Min.	Min. Break Strength **Lbs**	%Elong** @Break
138	FF	3	5.0	3-10	5-15	2450	20	20-35
277	#4 CORD	3	3.5	3-10	5-15	1225	40	20-35
415	#6 CORD	3	3.0	3-10	5-15	775	65	20-35
554	#8 CORD	3	2.5	3-10	5-IS	575	80	20-35

TABLE 3
Polyester Type I - Twisted Soft Multicord

Ticket Size	Letter # Size	Ply	Final Twist (TPI Min.)	% by Wt. * Bond	% by Wt. * Lube	Yield Yd./Lb Min.	Min. Break Strength **Lbs**	%Elong** @Break
138	FF	3	5.0		5-15	2600	18	13-28
277	#4 CORD	3	3.5		5-15	1300	36	13-28
415	#6CORD	3	3.0		5-15	900	54	13-28

TABLE 4
Polyester Type II - Twisted Bonded Multicord

Ticket Size	Letter # Size	Ply	Final Twist (TPI Min.)	% by Wt. * Bond	% by Wt. * Lube	Yield Yd./Lb Min.	Min. Break Strength **Lbs**	%Elong** @Break
69	F	3	6.0	3-10	5-15	5100	9	13-28
138	FF	3	5.0	3-10	5-15	2300	18	13-28
207	#3 CORD	3	4.0	3-10	5-15	1620	27	13-28
277	#4 CORD	3	3.5	3-10	5-15	1150	36	13-28
346	#5 CORD	3/4	3.5	3-10	5-15	1010	45	13-28
415	#6 CORD	3	3.5	3-10	5-15	810	54	13-28
554	#8 CORD	3	2.5	3-10	5-15	630	72	13-28

TABLE 5
Nylon Type III - Bonded Monocord

Number Size	Nominal*** Yarn Denier	% by Twist (TPI Min.)	% by Wt. * Bond	Wt. * Lube	Yield Yd./Lb Min.	Min.Brk Strength Lbs	%Elong** @Break
69	630	1.0 “Z”	3-10	5-15	5000	10	20-35
138	1260	1.0 “Z”	3-10	5-IS	2450	20	20-35
207	1890	1.0 “Z”	3-10	5-15	1600	30	20-35
277	2520	1.0 “Z”	3-10	5-15	1225	40	20-35
346	3150	1.0 “Z”	3-10	5-15	950	50	20-35
415	3780	1.0 “Z”	3-10	5-15	775	65	20-35
504	4410	1.0 “Z”	3-10	5-15	650	72	20-35
554	5040	1.0 “Z”	3-10	5-15	575	80	20-35

TABLE 6
Polyester Type III Bonded Monocord

Number Size	Nominal*** Yarn Denier	% by Twist (TPI Min.)	% by Wt. * Bond	Wt. * Lube	Yield Yd./Lb Min.	Min.Brk Strength Lbs	%Elong** @Break
69	660	1.0 “Z”	3-10	5-15	5100	9	20-35
138	1320	1.0 “Z”	3-10	5-15	2300	18	20-35
207	1980	1.0 “Z”	3-10	5-15	1620	27	20-35
277	2520	1.0 “Z”	3-10	5-15	1150	36	20-35
346	3300	1.0 “Z”	3-10	5-15	1010	45	20-35
415	3900	1.0 “Z”	3-10	5-15	810	54	20-35
554	5400	1.0 “Z”	3-10	5-15	630	72	20-35

TABLE 7
Nylon Type IV Braided Soft Multicord

Number Size	Nominal*** Yarn Denier	% by Twist (TPI Min.)	% by Wt. * Bond	Wt. * Lube	Yield Yd./Lb Min.	Min.Brk Strength Lbs	%Elong** @Break
346	2720			5-15	1375	38	20-35
415	3360			5-15	1100	50	20-35
462	4200			5-15	900	73	20-35
554	5040			5-15	759	80	20-35

TABLE 8
Polyester Type IV Braided Soft Multicord

Number Size	Nominal*** Yarn Denier	% by Twist (TPI Min.)	% by Wt. * Bond	Wt. * Lube	Yield Yd./Lb Min.	Min.Brk Strength Lbs	%Elong** @Break
346	2800			5-15	1350	40	20-35
415	3520			5-15	1070	50	20-35
554	5600			5-15	640	70	20-35
690	6720			5-15	490	85	20-35

* Weight for Bond and Lube is based on the dry weight of the thread (without bond and lube)

** Elongation at Break could be higher on colored thread

*** Nominal Yarn Denier is approximate; other constructions can be used provided that all other parts of the specification are adhered to.

OTHER WEB SLING & TIE DOWN ASSOCIATION PUBLICATIONS

Recommended Standard Specifications:

Printed Books

Synthetic Web Slings	WSTDA-WS-1
Synthetic Polyester Roundslings	WSTDA-RS-1
Webbing for Synthetic Web Slings	WSTDA-WB-1
Sewing Threads for Slings & Tie Downs	WSTDA-TH-1
Synthetic Web Tie Downs	WSTDA-T-1
Winches Used With Web Tie Downs	WSTDA-T-3
Synthetic Webbing Used for Tie Downs	WSTDA-T-4
All Standards In A Three-Ring Binder	WSTDA-ASB-2006

Recommended Standard Specifications:

PDF Files On CD

Synthetic Web Slings	WSTDA-SCD-WS-1
Synthetic Polyester Roundslings	WSTDA-SCD-RS-1
Webbing for Synthetic Web Slings	WSTDA-SCD-WB-1
Sewing Threads for Slings & Tie Downs	WSTDA-SCD-TH-1
Synthetic Web Tie Downs	WSTDA-SCD-T-1
Winches Used With Web Tie Downs	WSTDA-SCD-T-3
Synthetic Webbing Used for Tie Downs	WSTDA-SCD-T-4
All Standards CD - (All above on one CD)	WSTDA-ASCD-2006

Operating & Inspection Manuals

Synthetic Web Slings	WSTDA-WS-2
Synthetic Web Slings	WSTDA-WS-PS-2 (pocket sized)
Synthetic Polyester Roundslings	WSTDA-RS-2
Synthetic Polyester Roundslings	WSTDA-RS-2-PS (pocket sized)
Synthetic Web Tie Downs	WSTDA-T-2

Video

Synthetic Web Sling Care & Inspection	WSTDA-WSV-1-VHS
Synthetic Web Sling Care & Inspection	WSTDA-WSV-1-CD

Illustrated Wall Chart

Inspection of Web Slings & Round Slings	WSTDA-WSWC-1

UV Degradation Reports

Summary Report UV Degradation	WSTDA-UV-Sling-2003
UV Degradation Mini Manual	WSTDA-UV-MM-2005
UV Degradation Report	WSTDA-UVDR-1981 (Revised 2005)

Training CD-Rom

North America Cargo Securement Standard	WSTDA-CD-TP-2003

Fabric Warning Labels

Nylon Web Slings	WSTDA-SW-02-N
Polyester Web Slings	WSTDA-SW-02-P
Tie Downs	WSTDA-TW-02
Round Slings	WSTDA-RSW-03

Paper Warning Sheets

Synthetic Web Slings	WSTDA-WSWS-02
Polyester Roundslings	WSTDA-RSWS-04
Tie Downs	WSTDA-TWS-97

For ordering information and prices, contact the association office or visit our website:

Web Sling & Tie Down Association, Inc.
2105 Laurel Bush Road, Suite 200
Bel Air, Maryland 21015
Phone (443) 640-1070
Fax (443) 640-1031
Email: wstda@ksgroup.org
Web Site: www.wstda.com