

**Recommended Standard Specification  
For  
Synthetic Webbing  
Used For Tie Downs  
WSTDA-T-4**



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\$25.00

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This Recommended Standard Specification has been formulated as a guide to users, manufacturers, industry and government to insure the proper design, testing and inspection of webbing used for Synthetic Web Tie Down Assemblies. 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.

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# FOREWORD

This Recommended Standard Specification applies to Nylon and Polyester synthetic webbing used in the manufacturing of synthetic web tie downs and recommends the construction, identification and marking of such webbings.

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

Synthetic webbing made from materials or construction other than those detailed in this Recommended Standard Specification shall be used in accordance with the recommendations of the webbing manufacturer, tie down fabricator or qualified person. The specifications contained in this Recommended Standard Specification for Synthetic Webbing used for Tie downs were formulated under the auspices of the Web Sling & Tie Down Association, Inc. This Recommended Standard Specification is intended to assist manufacturers of webbing and tie downs, to serve as a guide to governmental and other regulatory bodies responsible for the selection of webbing used in synthetic tie downs.

Safety is the paramount consideration involved in the use of any synthetic webbing for tie down purposes. This standard does not purport to address all safety concerns, if any, associated with the use of synthetic webbing or tie downs. 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 webbing shall be selected by the user for their specific applications. Users shall be knowledgeable about federal, state, provincial, local, and industry regulations applicable to synthetic web tie downs constructed of synthetic webbing.

## MANDATORY AND ADVISORY RULES

Mandatory rules 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 it is stated as a recommendation.

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# CHAPTER 1.0

## TERMINOLOGY AND DEFINITIONS

### SECTION 1.1 PURPOSE

- 1.1.1 This chapter provides a description and definitions of synthetic webbing for the purpose of securing cargo.

### SECTION 1.2 DESCRIPTION

#### 1.2.1 PURPOSE

This chapter covers requirements for Nylon and Polyester webbing used as the primary raw material for synthetic web tie downs.

#### 1.2.2 DESCRIPTION

Synthetic tie down webbing is a high-tenacity narrow fabric woven in a variety of weaves and principally used for tie downs that have to withstand tensile load.

### SECTION 1.3 DEFINITION OF TERMS

**ABRASION** - The mechanical wearing of the webbing surface resulting from frictional contact with other materials or objects.

**BINDER** - Yarn that is used to hold the two plies together in the tie down webbing.

**BREAKING STRENGTH** - The load in pounds or kilograms at which the webbing fails.

**CATCH CORD** - Yarn used to lock and prevent raveling of weft yarn on shuttleless weaving machinery.

**COATING** - A finish applied to the webbing to resist liquids, abrasion, environmental deterioration, etc.

**CREEP** - Delayed deformation that is time-dependent and is exhibited by material that is subjected to a continuing load. Delayed deformation may be recoverable or non-recoverable following removal of the applied load.

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

**ELONGATION** - The measurement of webbing stretch, expressed as a percentage of the original unloaded webbing length at a given applied load.

**FILLING** - The yarn running from selvedge to selvedge at right angles to the warp. Also referred to as weft and picks.

**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.

**NARROW FABRIC / WEBBING** - Any non-elastic woven fabric, 12 inches or less in width, having a selvedge on either side, except ribbon and seam binding.

**PICK** - The yarn running from selvedge to selvedge at right angles to the warp. Also referred to as weft and filling.

**RAVELING** - The process of undoing or separating the weave or knit of a fabric.

**SELVEDGE** - The narrow edge of a woven fabric that runs parallel to the warp and is made in a tighter construction to prevent raveling.

**SHUTTLE LOOM** - A weaving loom having a boat-shaped device usually made of wood with a metal tip that carries filling yarns through the shed in the weaving process.

**SHUTTLELESS LOOM** - A loom in which some device other than a shuttle is used for weft insertion.

**STUFFER** - A longitudinal load bearing yarn in webbing. Also, extra yarns running in the warp direction through a woven fabric to increase the fabric's strength and weight.

**SURFACE PLIES** - Exterior or outside face of a plied weave, sometimes referred to as back ply of the weave.

**SYNTHETIC FIBER** - Man-made fibers.

**SYSTEM 3 CATCH CORD** - Webbing is woven with the catch cord on the latch needle edge. Helps prevent raveling.

**SYSTEM 5 CATCH CORD** - Webbing is woven with a catch and lock cord on the latch needle edge. Best protection against raveling.

**TENSILE STRENGTH** - In general, the strength shown by a specimen subjected to tension as distinct from torsion, compression or shear.

**TIE DOWN ASSEMBLY** - A securement device made of synthetic webbing which could include various fittings and buckles. It is used to secure cargo. Also known as a Strap Assembly, Winch Strap Assembly or Ratchet Strap Assembly. Reference *Recommended Standard for Synthetic Web Tie Downs*, WSTDA-T-1.

**TREATED** - A chemical treatment or coating applied to the webbing, which offers some degree of protection against an environmental or mechanical hazard.

**UNTREATED** - Webbing without any additional chemical treatment or coating.

**WARP** - The set of yarn in all woven fabrics that run lengthwise and parallel to the selvedge and is interwoven with the filling.

**WEFT** - The yarn running from selvedge to selvedge at right angles to the warp. Also referred to as filling and picks.

**YARN** - The fibers used to make the webbing.

## CHAPTER 2.0

### CONSTRUCTION OF SYNTHETIC TIE DOWN WEBBING

#### SECTION 2.1 PURPOSE

- 2.1.1 This chapter provides an outline of materials and construction characteristics of synthetic tie down webbing.

#### SECTION 2.2 MATERIALS

##### 2.2.1 NYLON YARN

The yarn used in the manufacture of the webbing shall be bright, high tenacity, heat and light resistant, continuous multifilament nylon. Yarn may include either Nylon 6 with a minimum melting point of 428° F (220° C) or Nylon 6.6 with a minimum melting point of 489° F (254° C).

##### 2.2.2 POLYESTER YARN

The yarn used in the manufacturing of the webbing shall be high tenacity, continuous multifilament polyester with a minimum melting point of 489° F (254° C)

#### SECTION 2.3 CONSTRUCTION

##### 2.3.1 DESIGN CONSIDERATIONS

Shall include, but not be limited to, the following:

- a. Breaking Strength
- b. Elongation
- c. Abrasion
- d. Environment

Polyester webbing is typically used in systems where low elongation and low creep are desirable. Polyester's higher density allows thinner webbing than nylon (at equal strength). Polyester webbing has better natural resistance to moisture than nylon, although some over coatings allow approximately equal performance of both types. Polyester is generally more resistant to acids than nylon.

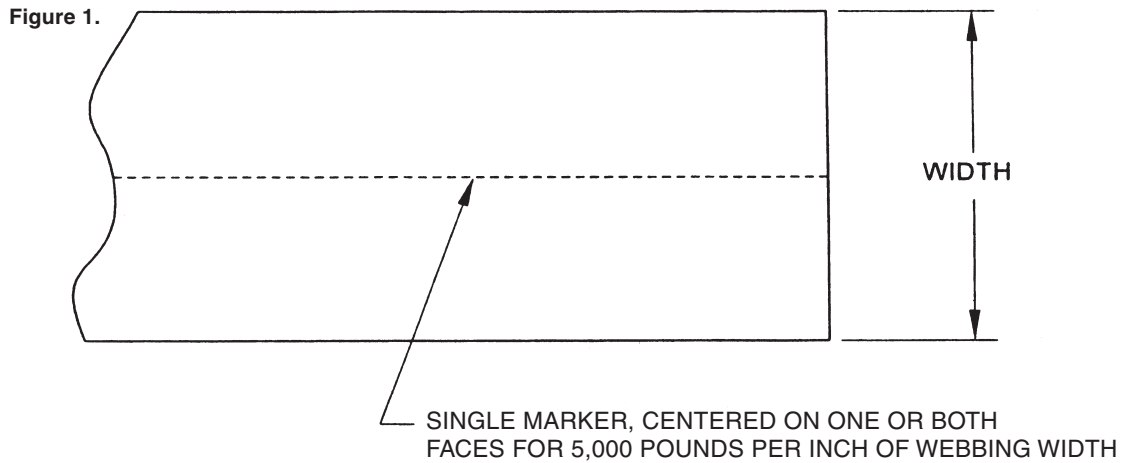
Nylon webbing is also used in many applications where shock absorption properties are important because nylon webbing has higher elongation than polyester webbing of the same construction and strength. Nylon webbing has better natural abrasion resistance properties than polyester webbing, although some over coatings allow approximately equal performance of both types. Nylon is generally more resistant to most alkalis than polyester.

- 2.3.2 Webbing may be woven using a stuffer weave construction technique.

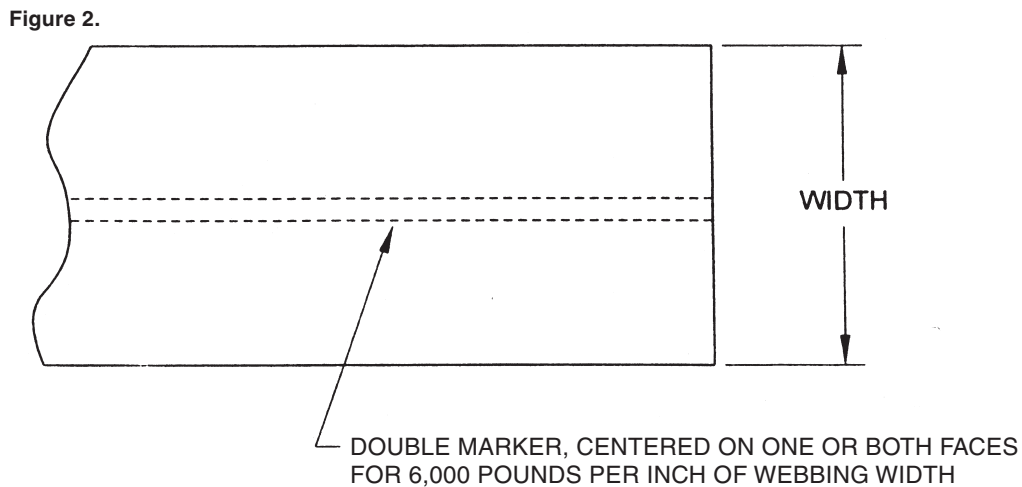
- 2.3.3 Webbing may be woven on a shuttle or shuttleless loom.

- 2.3.4 Webbing woven on a shuttleless loom shall be woven with selvedge construction utilizing a System 3 or 5 (or other suitable means as determined by the manufacturer) catch cord on the woven edge.

- 2.3.5 Webbing shall be certifiable as to tensile strength and have uniform thickness and width, and have selvages.
- 2.3.6 Webbing shall be woven from a synthetic yarn that is heat and light resistant.
- 2.3.7 All webbing cut pieces shall be sealed by heat, or other suitable means to prevent raveling.
- 2.3.8 Markers shall be used to indicate strength rating of webbing as shown in Figures 1 and 2. A clearly discernible, single line marker (either solid or broken), centered on at least one face of the webbing shall indicate a minimum breaking strength of 5000 lbs. per inch of webbing width. See Figure 1.



A clearly discernible double line marker (either solid or broken), centered on at least one face of the webbing shall indicate a minimum breaking strength of 6000 lbs. per inch of webbing width. See Figure 2.



(Webbing commonly used to secure cargo that will be transported inside a closed vehicle, such as a cargo van, shall be exempt from this requirement.)

## **SECTION 2.4 COATINGS**

- 2.4.1 Synthetic tie down webbing may be coated with suitable materials that will impart desirable characteristics such as:
- a. Abrasion resistance
  - b. Moisture resistance
  - c. Sealing to prevent penetration of foreign particles and matter
  - d. Increased coefficient of friction
  - e. Ultraviolet light resistance

## **CHAPTER 3.0**

### **STANDARD PROCEDURES FOR TESTING SYNTHETIC WEBBING**

#### **SECTION 3.1 PURPOSE**

- 3.1.1 This chapter provides standard procedures for testing synthetic webbing used for tie downs.

#### **SECTION 3.2 TYPES OF TESTS**

##### **3.2.1 DESTRUCTIVE TEST**

A test of the webbing for the purpose of verifying the breaking strength.

##### **3.2.2 ABRASION TEST**

A test of the webbing to determine resistance to abrasion.

##### **3.2.3 ELONGATION TEST**

A test to determine the elongation of the webbing under load.

##### **3.2.4 OTHER TESTS**

If additional tests are required, they shall be specified by the purchaser.

#### **SECTION 3.3 TEST PROCEDURES**

- 3.3.1 Webbing shall be tested in accordance with ASTM D6775-02e1, the standard test method for breaking strength and elongation of textile webbing, or the Federal Test Method Standard Number 191A, Method 4108.
- 3.3.2 Test specimens shall be from each actual production run.
- 3.3.3 The test machine shall be certified annually to ASTM E4 or equivalent.
- 3.3.4 The results shall be kept on file by the webbing manufacturer.
- 3.3.5 The webbing manufacturer or an independent testing laboratory shall perform the testing of synthetic webbing for tie downs.

## **CHAPTER 4.0**

### **RECOMMENDED OPERATING PRACTICES**

#### **SECTION 4.1 PURPOSE**

- 4.1.1 The purpose of this chapter is to provide guidelines for the care, use and inspection of synthetic webbing

#### **SECTION 4.2 ENVIRONMENTAL CONSIDERATIONS**

- 4.2.1 Webbing should be stored in a cool, dry and dark location.
- 4.2.2 Environments in which synthetic webbing Tie Down assemblies are continuously exposed to ultraviolet light can affect the strength of Synthetic Webbing in varying degrees, ranging from slight to total degradation.
- 4.2.3 Polyester and nylon webbing shall not be used at temperatures in excess of 194 degrees F (90 degrees C) or below minus 40 degrees F (-40 degrees C).

#### **SECTION 4.3 INSPECTION**

- 4.3.1 Webbing shall be inspected by the purchaser for the following conditions:
- a. Width
  - b. Thickness
  - c. Manufacturing Flaws
  - d. Surface Markers
  - e. Certificate of Conformance to Requirements
    - 1. Strength
    - 2. Material

#### **SECTION 4.4 INSPECTION RECORDS**

- 4.4.1 Purchasers should establish material inspection records.

#### **SECTION 4.5 REPAIR OF TIE DOWN WEBBING**

- 4.5.1 No repairs of webbing shall be permitted.

# 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                    |
| Synthetic Web Tie Downs         | WSTDA-T-2-PS (pocket sized)  |

## 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:

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