



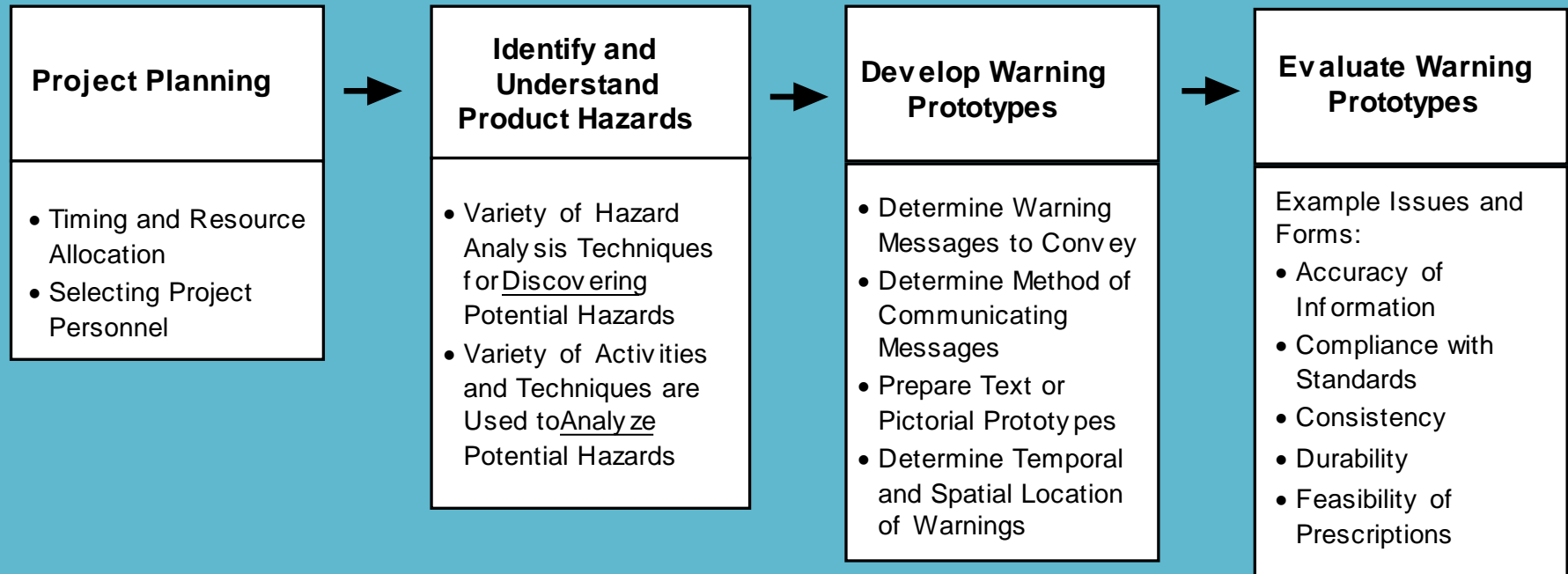
WEB SLING & TIE DOWN ASSOCIATION

Project Overview

- * WSTDA contracted with Applied Safety and Ergonomics, Inc. (ASE) to assist in the revision of labeling and bulletins for web slings, roundslings and tie downs.
- * After over 2 years of work, this project has been completed



Four-Stage Process for Labeling Development and Evaluation





WEB SLING & TIE DOWN ASSOCIATION

Phase 1: Project Planning

- * Kickoff meeting between WSTDA LRC members and ASE (Dr. Stephen Young, Elaine Wisniewski) to discuss project scope, timing and industry history.
- * ASE and WSTDA LRC had numerous meetings throughout the project, continually refining the work product



WEB SLING & TIE DOWN ASSOCIATION

Phase 2: Identify/Understand Product Hazards

- * ASE worked with the LRC to identify topics currently addressed on WSTDA labeling and bulletins, as well as labeling and other materials from existing sling and tie-down manufacturers
- * ASE developed web survey that queries LRC about current topics on labeling and bulletins
- * Dr. Young attended two-day Lift-It sling safety seminar in Los Angeles and conducted a survey for seminar attendees regarding impressions of current labeling topics



WEB SLING & TIE DOWN ASSOCIATION

Phase 3: Develop Warning Prototypes

- * Based on work performed in Phase 2, ASE and LRC determine messages to convey on revised labeling and bulletins
- * ASE developed text and/or pictorial prototypes, including layout and design
- * ASE developed draft prototype labeling and bulletins for web slings, roundslings, and tie downs



Phase 4: Evaluate Warning Prototypes

- * ASE and LRC identified a sample of product users.
- * Evaluation focussed on ease-of-reading and comprehension of labeling/bulletins.
- * Six focus-group meeting (each 90 minutes long) was conducted (two for web slings, two for roundslings, and two for tie downs)
- * Labeling and bulletins were revised per users comments at each stage



Final Labeling (Web Sling)

⚠ WARNING

Read and follow all use and safety information provided with this sling. Failure to do so may result in severe **INJURY** or **DEATH** due to sling failure and/or loss of load.



The following six points briefly summarize some important safety issues:

- 1 All users must be trained** in sling selection, use and inspection, hazards to personnel, environmental effects, and rigging practices.
- 2 Inspect sling for damage** before each use. A sling shall be removed from service if you see any of the conditions listed on the back of this label. If you have ANY doubts about the condition of a sling, do not use or repair it.
- 3 Protect sling from damage.** ALWAYS protect slings in contact with edges, corners, protrusions, or abrasive surfaces with materials of sufficient strength, thickness, and construction to prevent damage.
- 4 Do not exceed a sling's rated capacity.** Always consider the effect of sling angle and tension on the sling's rated capacity.
- 5 Do not stand on, under or near a load** with the sling under tension. All personnel should be alert to dangers of falling or uncontrolled loads, sling tension and the potential for snagging.
- 6 Maintain and store slings properly.** Slings should be protected from mechanical, chemical, and environmental damage.

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1. SLING USERS MUST BE TRAINED

This warning label **DOES NOT** contain all the information you need about sling safety. All sling users must be:

- trained in sling selection and inspection, hazards to personnel, environmental effects, and rigging practices
- knowledgeable about the safe and proper use and application of slings
- thoroughly familiar with the manufacturer's use and safety materials provided with each product
- aware of their responsibilities as outlined in all applicable standards and regulations

2. INSPECT SLING FOR DAMAGE

The entire web sling must be **inspected before each use** and it shall be **removed from service** if ANY of the following are detected:

- If sling identification tag is missing or not readable
- Holes, tears, cuts, snags or embedded materials
- Broken or worn stitches in the load bearing splices
- Knots in any part of the sling webbing
- Acid or alkali burns
- Melting, charring or weld spatters on any part of the web sling
- Excessive abrasive wear or crushed webbing
- Signs of ultraviolet (UV) light degradation
- Distortion, excessive pitting, corrosion or other damage to fitting(s)
- If provided, exposed red core yarn. However if damage is present and red yarns are not exposed **DO NOT USE** the sling
- Any conditions which cause doubt as to the strength of the web sling

To detect possible damage, perform a visual inspection and also feel along the entire length of the sling. Even damage that looks or feels "minor" can significantly degrade sling performance. If you have **ANY** doubts about the condition of a sling, **DO NOT USE IT.** Never attempt to repair a damaged sling (e.g., tie knots in the webbing, etc.).

3. PREVENT SLING DAMAGE

Synthetic slings can fail if damaged, abused, misused, overused, or improperly maintained. Avoid any action that could cause the types of damage listed in the previous section and take steps to prevent sling damage, including:

- **Web slings must ALWAYS be protected from being cut or damaged by corners, edges, protrusions or abrasive surfaces with protection sufficient for the intended purpose.**
- Do not drop or drag slings on the ground, floor or over abrasive surfaces.
- Do not pull slings from under loads when the load is resting on the sling—place blocks under load if feasible.
- Web slings shall not be twisted, shortened, lengthened, tied into knots or joined by knotting.
- Avoid twisting or kinking sling legs.
- Avoid exposing slings to damaging acids or alkalis.
- Never use or allow exposure to temperatures above 194°F (90°C) or below -40°F (-40°C).
- Center sling in the base or "bowl" of a hook to prevent "tip loading."
- Avoid using hooks, shackles or other hardware that have edges or surfaces that could damage sling
- Do not run/drive over slings with vehicle or other equipment.

4. USE SLING SAFELY

A competent and qualified sling user must consider all risk factors prior to lifting a load. User must:

- determine the weight of the load and its center-of-gravity (CG)

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- select a sling and hardware having suitable characteristics for the type, size and weight of the load, the type of hitch, and the environment
- consult the manufacturer's rated capacity tag and/or other materials to determine the reduction in capacity due to sling configuration and angle
- avoid accelerating or decelerating the load too quickly (i.e., "shock loading")
- control the lift and load to prevent slipping, sliding, and/or loss of the load

Use this sling for lifting loads only.

- **NEVER** use a sling for towing purposes.
- **NEVER** use a sling to pull on stuck objects.

5. BE ALERT WHEN LIFTING LOADS

When using slings, all personnel must be alert to potential risks:

- Always stand clear of a lifted load and never be under, on or near a suspended load.
- No part of the body should be placed between the sling and load, or between the sling and lifting hook.
- Personnel must be alert to the potential for the sling to become snagged during lifting—never use a web sling to pull on objects in a snagged or constrained condition.

6. SLING CARE AND STORAGE

When slings are not in use, they should be stored in a cool, dry and dark location. Slings should also be stored in an area free from environmental or mechanical sources of damage, such as weld spatter, splinters from grinding/machining, heat sources, UV or chemical exposure, etc.

Slings should be kept clean and free of dirt, grime, and foreign materials. Mild soap and water can be used to clean slings, but be sure to let the sling dry completely before placing back in storage or use.

If you want more information about Web Sling safety, contact WSTDa to obtain copies of the Synthetic Web Sling Safety Bulletin—a companion document to this labeling.

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www.wstda.com — (443) 640-1070





WEB SLINGING & TIE DOWN ASSOCIATION

Final Bulletin (Web Sling)

Synthetic Web Sling Safety Bulletin

WARNING



This bulletin contains important safety information about the use of synthetic web slings. However, it **DOES NOT** contain all the information you need to know about handling, lifting, and manipulating materials and loads safely. Slings are only one part of a lifting system and it is your responsibility to consider all risk factors prior to using any rigging device or product. Failure to do this may result in severe **INJURY** or **DEATH** due to sling failure and/or loss of load.

- All users must be trained in sling selection, use and inspection.** Users should be trained in the use of slings, and rigging practices.
- Inspect sling for damage before each use.** If the sling is damaged, remove it from service.
- Protect sling from damage.** AIGS® protect slings in contact with edges, corners, protrusions, or abrasive surfaces with materials of sufficient strength, thickness, and construction to prevent damage.
- Do not exceed a sling's rated capacity.** Always consider the effect of sling angle and tension on the sling's rated capacity.
- Do not stand on, under or near a load with the sling under tension.** All personnel should be alert to changes of falling and/or uncontrolled loads, sling tension and the potential for slipping.
- Maintain and store slings properly.** Slings should be stored in a clean, dry, well-ventilated area, and be protected from mechanical, chemical, and environmental damage.

1. All Sling Users Must Be Trained and Knowledgeable
All web sling users must be trained on the proper use of web slings. The American Society of Mechanical Engineers standard for sling safety (ASME B30.9) states:
"Significant webbing sling users shall be trained in the selection, inspection, condition to personnel, effects of the environment, and rigging practices as covered in Chapter 9."
OSHA Guidelines on Safe Sling Use (29 CFR 1910.186) states that a "qualified person" is one:
"Who, by possession of recognized degrees or certificates of professional standing in an occupational field, or who, by extensive knowledge, training, and experience, has demonstrated the ability to solve or realize problems relating to the subject matter at hand."
It is important that all sling users be knowledgeable about the safe and proper use and application of slings and be thoroughly familiar with the manufacturer's use and safety manuals provided with each product. In addition, all sling users need to be aware of their responsibilities as defined in all applicable standards and regulations.

2. What to do if you identify damage in a sling
If you identify ANY of these types of damage in a sling, remove it from service immediately even if the damage is not visible or not as extensive as shown in the pictures in Table 2. Slings that are removed from service must be destroyed and removed completely available unless they can be repaired and proof tested by the sling manufacturer or other qualified person. You should never ignore sling damage or attempt to perform temporary field repairs of damaged slings (i.e., be torn in the webbing, etc.).

Table 1. Web sling inspection

The entire web sling must be inspected before each use and it shall be removed from service if ANY of the following are identified:

- Any identification tag is missing or not readable or missing. **DO NOT** use web slings until you are absolutely sure of what you are doing. Remember when it comes to using web slings, lack of skill, knowledge and care can result in severe **INJURY** or **DEATH** to you and others.
- **2. Slings Must Be Regularly and Properly Inspected**
Even seemingly "minor" damage to a web sling can significantly reduce its rated capacity and increase the chance that the sling will fail during use. For example, one sling manufacturer has shown that a 10° pinch smaller than the one shown in Table 2 caused a sling to break under load at almost half its rated capacity. Therefore, it is very important that web slings are regularly and properly inspected. If you are not sure whether a sling is damaged, **DO NOT USE IT!**

2c. How often to inspect slings?

A three stage procedure is recommended to help ensure that web slings are inspected with appropriate frequency:

- **Initial Inspection**—whenever a sling is initially received, it must be inspected by a designated person to help ensure that the correct web sling has been received and is undamaged, and that the web sling meets applicable requirements. In its intended use.
- **Frequent Inspection**—in normal service conditions, web slings must be inspected by the sling user or other designated person each day or at the sling's being used. In severe service applications the inspection must be performed before each use.

Periodic Inspection—every sling must be inspected periodically by a qualified and designated person. In order to reduce the potential of inspection, the periodic inspection should be performed by someone other than the individual that most commonly performs the frequent inspection. The frequency of periodic inspections is based on the sling's actual or expected frequency of use, severity of service conditions, the nature of the work performed with the sling, and experience gained during the inspection of other slings used in similar circumstances. General guidelines for the frequency of periodic inspections are:

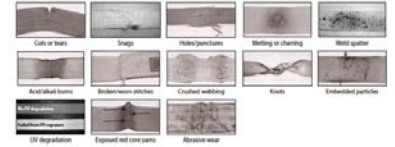
- Normal service—once every 3 to 6 months
- Severe service—monthly to quarterly
- Special service—as recommended by a qualified person

Periodic inspection intervals must not exceed one year. Written records are not required for frequent inspections, but OSHA 1910.186 and ASME B30.9 require that a written record of the most recent periodic inspection be maintained. See WSDA 101-1 for more information about definitions of Normal, Severe, and Special service conditions.

3. Slings Must Be Adequately Protected From Damage

3a. Avoid environmental degradation
Environmental factors such as exposure to sunlight, dirt or grime, acids, alkalis, and critical changes in temperature and humidity, can result in an accelerated deterioration of web slings. The rate of the deterioration will vary with the level of exposure to these conditions, and with the thickness of the sling material. For example, single limb slings will generally degrade more slowly with this exposure than multiple limb slings. Web slings that are used outdoors regularly should be periodically removed from service within a period of 2 to 6 years. All web slings that are exposed to these conditions should be highly inspected during these inspections.

Table 2. Types of damage you should look for in web slings



Visible indications of such deterioration can include the following:

- Fading of webbing color
- Deterioration of the sling length
- Reduction in elasticity and strength of the sling material due to an exposure to sunlight, often evident by an increase in elongation or damage to the surface part of the sling
- Breakage or damage to yarn fibers, often evident by a fuzzy appearance of the web
- Softening of the web, which has become particularly evident when web slings are exposed to outdoor conditions without being used, or regularly tensioned.

3b. Avoid actions that cause damage to slings

You should always avoid any action that causes the types of damage identified in the previous section of this Safety Bulletin, including (but not limited to):

- Drugging or dragging slings on the ground, floor or over abrasive surfaces
- Pulling slings from under loads when the load is resting on the sling—place blocks under load if feasible
- Attempting to adjust sling using methods not approved by the sling manufacturer or qualified person
- Tearing, linking, or breaking the sling
- Exposing slings to damaging acids or alkalis
- Exposing slings to sources of heat damage or avoid contact using slings of allowing exposure to temperatures above 100° F (37° C) to 400° F (204° C)
- "Ice loading" of a sling on a load instead of connecting to the base or "heel" of the load
- Using blocks, chafers or other hardware that have sharp or rough surfaces that could damage slings
- Running slings over slings with a vehicle or other equipment

Synthetic slings are affected by some chemicals ranging from mild to total degradation. Thus, temperature and composition factors affect the degradation. For specific applications, consult the manufacturer. In addition, water absorption can decrease the strength of nylon web slings by as much as 10-15% (its strength returns when the sling dries completely). For specific applications, consult the manufacturer.

3c. Safeguard slings with sufficient protection

Synthetic web slings are damaged, stretched or cut as tension and compression between the sling, the connection points and the load develops. Surfaces in contact with the sling do not have

to be very abrasive or have "tear" sharp edges in order to cause the conditions for sling failure. Therefore, **web slings must ALWAYS be protected from being cut or damaged by corners, edges, protrusions or abrasive surfaces with protection sufficient for the intended purpose.**

There are a variety of ways to protect slings from such damage. A qualified person might select and use appropriate engineered protection devices—commonly available products (e.g., chafers, wear pads, edge-edges, body caps, corner protectors, etc.) specifically designed to protect slings from damage. A qualified person might also design and construct their own methods of protection so long as the sling is adequately protected from and/or kept off of the damaging rigging surface. Regardless of the particular method chosen, the goal is to ensure that the sling remains its ability to securely lift the load while avoiding contact with sharp or abrasive surfaces under load. A qualified person must carefully consider the most appropriate means to accomplish this goal. The protection used should not be makeshift (i.e., welding and using makeshift, work gloves, or other such items based solely on convenience or availability).

Regardless of the approach taken, a qualified person must ensure that the protection method chosen is appropriate for the types of damage to which the sling will be exposed. For instance, some protection methods (abrasion resistance) that offers virtually no protection against cuts, "tear" "blow" damage in a non-impact setting, may be necessary to demonstrate the suitability of the protection devices. After each "tear" "blow" protection device and the sling need to be inspected for damage and suitability. You should know in mind that protection is "not perfect" and should always operate within the specified limits of the sling and its accessories (i.e., fixtures, hardware, protection, etc.)

4. Always Use Sling Properly

When lifting loads, a trained, qualified and knowledgeable user must take into account the factors and issues identified in this bulletin, as well as considering any other relevant factors not addressed here by this Bulletin. Among the factors related specifically to web slings, users must perform several activities, including that are listed below discussed in the following subsections.

Table 3. Issues/Factors to Consider

Categories	Issues/Factors to Consider
Environment	Wind Weather Temperature Humidity
Load	Attachment point integrity Load capacity Load distribution and equipment Center of gravity (CG) Clearance to surrounding obstacles Maximum allowed operating loads Dynamic forces and other unexpected loads Risks of lift or allowable load
Equipment/Load	General stability Underground installations Coordination loads Dampening surfaces/edges Structural stability (load/fit) Equipment inspection Remove a check load point
Rigging	Stability protection Sling selection to achieve the angle and tension Sling angle and tension
Personnel	Clearance of unnecessary personnel Signals, Visual, audible, etc. File all plan and meeting log (check requirements)

Another important consideration is the sling-to-load angle—the angle between a horizontal line and the sling leg in a body. This angle is very important and can have a dramatic effect on the rated capacity of the sling. When the sling-to-load angle increases, the load on each leg increases. This principle applies to a number of conditions, including when one sling is used to lift an angle and when a hooker hitch or multi-legged bridle sling is used. Table 4 provides information about increased tension as a function of sling-to-load angle assuming equally loaded sling legs. Sling angles less than 30 degrees are not recommended. Similarly, when the angle of a choker is less than 120 degrees, the sling choker hitch capacity decreases. To determine the actual sling capacity at a given angle, multiply the sling capacity rating for a choker hitch by the appropriate reduction factor determined from Table 4.

4. Do not misuse the sling
Avoid accelerating or decelerating the load too quickly (i.e., "shock loading"). Do not use slings to pull on objects or engaged objects and do not use slings for towing purposes. A web sling should only be used for lifting loads.

5. Make Sure All Personnel are Clear of Loads and Alert to Risks

Users are advised for all of the factors/issues discussed in the Safety Bulletin, slings can still get away. Therefore, all personnel must stand clear of load loads and never be under, on, near, suspended loads.
When using slings, no part of the body should be placed between the sling and load, or between the sling and lifting hook. In addition, personnel must be alert to the potential for the sling to become engaged during a lift. Never use a web sling to pull on objects in a payload or constrained condition.

6. Properly Store and Maintain Slings

In order to prevent damage to slings when not in use, you should store slings in a cool, dry and dark location. Slings should be stored in an area free from environmental or mechanical sources of damage, such as wall openings, splines from grinding or on chafing, bare surfaces, chemical exposures, etc. Also, keep slings clean and free of dirt, grime, and foreign materials.
If slings are stored, use only mild soap and water. Rinse slings thoroughly and dry in complete before placing the sling back into service.

Table 4. Increased sling tension as a function of sling-to-load angle of choker

Angle of Sling (degrees from horizontal)	Tension Multiplier
90	1.000
85	1.004
80	1.013
75	1.025
70	1.040
65	1.058
60	1.080
55	1.107
50	1.140
45	1.179
40	1.224
35	1.275
30	1.333



Rating for load weight (per leg) to remove from Table 4 based on the sling (L)

Table 6. Reduction in rated capacity as a function of angle of choker

Angle of Choker (degrees)	Angle of Choker Reduction Factor
120	1.000
115	0.980
110	0.950
105	0.910
100	0.860
95	0.800
90	0.730



Rated Capacity (choker hitch)

Where to Find Additional Information

- WSDA 101-1—Recommended Standard Specification for Synthetic Web Slings
- ASME B30.9—Synthetic Webbing Slings Selection, Use, and Inspection
- OSHA 29 CFR 1910.186—Slings
- Rigging Handbook
- OSHA Guidance on Safe Sling Use (<http://www.osha-slc.gov/publications/slings.pdf>)
- Manufacturer's catalog, manual, website, bulletin, etc.
- Formal trainings provided by manufacturers or other available entities



WEB SLING & TIE DOWN ASSOCIATION

Philosophy of Revision

- * On-product labeling should focus on a core set of important issues—we identified six issues

! WARNING

Read and follow all use and safety information provided with this sling. Failure to do so may result in severe **INJURY** or **DEATH** due to sling failure and/or loss of load.



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- 3 Protect sling from damage.** ALWAYS protect slings in contact with edges, corners, protrusions, or abrasive surfaces with materials of sufficient strength, thickness, and construction to prevent damage.
- 4 Do not exceed a sling's rated capacity.** Always consider the effect of sling angle and tension on the sling's rated capacity.
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- 6 Maintain and store slings properly.** Slings should be protected from mechanical, chemical, and environmental damage.

(continued on back)



Philosophy of Revision

- * The order of the issues is based on:
 - * Before Use (1,2)
 - * During Use (3,4,5)
 - * After Use (6)

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Philosophy of Revision


- * On the remaining parts of the labeling, these issues are addressed in greater depth

Front

Back

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2. INSPECT SLING FOR DAMAGE

The entire web sling must be **inspected before each use** and it shall be **removed from service** if ANY of the following are detected:

- If sling identification tag is missing or not readable
- Holes, tears, cuts, snags or embedded materials
- Broken or worn stitches in the load bearing splices
- Knots in any part of the sling webbing
- Acid or alkali burns
- Melting, charring or weld spatters on any part of the web sling
- Excessive abrasive wear or crushed webbing
- Signs of ultraviolet (UV) light degradation
- Distortion, excessive pitting, corrosion or other damage to fitting(s)
- If provided, exposed red core yarn. However if damage is present and red yarns are not exposed **DO NOT USE** the sling
- Any conditions which cause doubt as to the strength of the web sling



Bulletin addresses these six issues in further depth

⚠ WARNING

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Synthetic Web Sling Safety Bulletin

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1. All Sling Users Must be Trained and Knowledgeable

All web sling users must be trained on the proper use of web slings. The American Society of Mechanical Engineers standard for sling safety (ASME B30.9) states:

"Synthetic webbing sling users shall be trained in the selection, inspection, cautions to personnel, effects of the environment, and rigging practices as covered" by Chapter 9-5.

OSHA Guidance on Safe Sling Use (29 CFR 1910.184) states that a "qualified person" is one:

"who, by possession of a recognized degree or certificate of professional standing in an applicable field, or who, by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter and work."

It is important that all sling users be knowledgeable about the safe and proper use and application of slings and be thoroughly familiar with the manufacturer's use and safety materials provided with each product. In addition, all sling users need to be aware of their responsibilities as outlined in all applicable standards and regulations.

If you are unsure whether you are properly knowledgeable or trained, or if you are unsure of what the standards and regulations require of you, ask your employer for information and/or training—**DO NOT** use web slings until you are absolutely sure of what you are doing. Remember, when it comes to using web slings, lack of skill, knowledge and care can result in severe **INJURY** or **DEATH** to you and others.

2. Slings Must Be Regularly and Properly Inspected

Even seemingly "minor" damage to a web sling can significantly reduce its capacity to hold or lift objects and increases the chance that the sling will fail during use. For example, one sling manufacturer has shown that a 3/8" cut (much smaller than the cut shown in Table 2) caused a sling to break under load at almost half its non-damaged capacity. Therefore, it is very important that web slings are regularly and properly inspected. If you are not sure whether a sling is damaged, **DO NOT USE IT.**

2a. How to inspect slings

To detect possible damage, you should perform a visual inspection of the entire sling and also feel along its entire length, as some damage may be felt more than seen. You should look and feel for any of the types of conditions listed in Table 1. Table 2 shows examples of some of these types of damage, but note that they are relatively extreme examples provided for illustration purposes only.

2b. What to do if you identify damage in a sling

If you identify ANY of these types of damage in a sling, **remove it from service immediately** even if the damage you feel or see is not as extensive as shown in the pictures in Table 2. Slings that are removed from service must be destroyed and rendered completely unusable unless they can be repaired and proof-tested by the sling's manufacturer or other qualified person. You should never ignore sling damage or attempt to perform temporary field repairs of damaged slings (e.g., tie knots in the webbing, etc.).

Table 1. Web sling inspection

The entire web sling must be **inspected before each use** and it shall be **removed from service** if ANY of the following are detected:

- If sling identification tag is missing or not readable
- Holes, tears, cuts, snags or embedded materials
- Broken or worn stitches in the load bearing splices
- Knots in any part of the sling webbing
- Acid or alkali burns
- Melting, charring or weld spatters on any part of the web sling
- Excessive abrasive wear or crushed webbing
- Signs of ultraviolet (UV) light degradation
- Distortion, excessive pitting, corrosion or other damage to fitting(s)
- If provided, exposed red core yarn. However if damage is present and red yarns are not exposed **DO NOT USE** the sling
- Any conditions which cause doubt as to the strength of the web sling



WEB SLING & TIE DOWN ASSOCIATION

Order at www.wstda.com

Available For:

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- * Roundslings
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Summary

- * WSTDA has produced a *system* of safety information for web slings, roundslings and tie downs
- * These warning labels and safety bulletins can be used not only as a “warning” system but also as part of a larger occupational training system