



WARNING

This bulletin contains important safety information about the use of tie downs. However, it **DOES NOT** contain all the information you need to know about handling, manipulating and securing materials and cargo safely. It is your responsibility to use tie downs safely and to consider all risk factors prior to using any tie down system. Failure to do this may result in severe **INJURY** or **DEATH** due to tie down failure and/or loss of cargo.

The following six points briefly summarize some important safety issues:

- 1 All users must be trained** in tie down selection, use and inspection, cautions to personnel, environmental effects, all applicable standards, regulations and tie down practices.
- 2 Inspect tie down** for damage before each use, if the tie down is damaged, remove it from service.
- 3 Protect tie down from damage.** ALWAYS protect tie downs in contact with edges, corners, protrusions, or abrasive surfaces with materials of sufficient strength, thickness and construction to prevent damage.
- 4 Do not exceed the working load limit of the tie down;** taking into account the tie down, the load, the vehicle anchor points, tie down configuration and angle, etc.
- 5 Be alert when securing cargo.** Users must remain alert to hazards when securing cargo.
- 6 Maintain and store tie downs properly.** Tie downs should be protected from mechanical, chemical and environmental damage.

1. All Tie Down Users Must be Trained and Knowledgeable

All tie down users must be trained on the proper use of tie downs, including tie down selection and inspection, cautions to personnel and environmental effects. The Web Sling & Tie Down Association (WSTDA) defines a "qualified person" as one:

"who by possession of a recognized degree, certificate of professional standing or by extensive knowledge, training and experience has successfully demonstrated the ability to solve or resolve problems related to the subjectmatter and work." (WSTDA T-1, page 2)

It is important that all tie down users be knowledgeable about the safe and proper use and application of tie downs and loading practices and be thoroughly familiar with the manufacturer's recommendations and safety materials provided with each product. In addition, all tie down users must be aware of their responsibilities as outlined in all applicable federal, state, provincial and local regulations and industry standards. If you are unsure whether you are properly trained and knowledgeable, 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 tie downs until you are absolutely sure of what you are doing. Remember, when it comes to using tie downs, lack of skill, knowledge and care can result in severe **INJURY** or **DEATH** to you and others.

2. Tie Downs Must Be Regularly and Properly Inspected

Even seemingly "minor" damage to a tie down can significantly reduce its capacity to hold objects and increases the chance that the tie down will fail during use. Therefore, it is very important that tie downs are regularly and properly inspected. In reality, there simply is no such thing as "minor" damage. If you are not sure whether a tie down is damaged, **DO NOT USE IT.**

2a. How to inspect tie downs

To detect possible damage, you should perform a visual inspection of the entire tie down. You should look 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 tie down

If you identify ANY of these types of damage in a tie down, even if the damage is not as extensive as shown in the pictures in Table 2. Tie downs that are removed from service must be destroyed and rendered completely unusable, as no repairs of tie down webbing, fittings, buckles or stitching/sew patterns shall be permitted. Synthetic web tie downs may be re-webbed using existing hardware if the tie down manufacturer determines the hardware is reusable. All re-webbed tie downs utilizing used hardware shall be proof tested to 150% of the WLL and certified. You should never ignore tie down damage or attempt to perform temporary field repairs of damaged tie downs (e.g., tie knots in the webbing, etc.). **A three-stage procedure** is recommended to help ensure that tie downs are inspected with appropriate frequency.

Initial Inspection - Whenever a tie down is initially received it must be inspected by a designated person to help ensure that the correct tie down has been received and is undamaged, and that the tie down meets applicable requirements for its intended use

Frequent Inspection - Tie downs should be inspected by the person handling/using the tie down before every use.

Periodic Inspection - Every tie down should be inspected "periodically" by a qualified and designated person. The frequency of periodic inspections is based on the tie down's frequency of use, severity of service conditions, and experience gained during the inspection of other tie downs used in similar circumstances.

Tie down users should establish written inspection records to be kept on file.

Table 1. Tie down removal from service criteria

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

- If tie down 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 webbing.
- Acid or alkali burns.
- Melting, charring or weld spatters on any part of the webbing.
- Excessive abrasive wear or crushed webbing.
- Signs of ultraviolet (UV) light degradation.
- Distortion, excessive pitting, corrosion or other
- damage to buckles or end fitting(s).
- Any conditions which cause doubt as to the strength of the tiedown.

3. Tie Downs Must be Adequately Protected From Damage

3a. Avoid environmental degradation

Environmental factors such as an exposure to sunlight, dirt or gritty-type matter and cyclical changes in temperature and humidity, can result in an accelerated deterioration of tie downs. The rate of this deterioration will vary with the level of exposure to these conditions and with the thickness of the tie down webbing. Tie downs that are used outdoors regularly should generally be permanently removed from service within a period of 2 to 4 years. All tie downs that are exposed to these conditions should be highly scrutinized during their inspections. Visible indications of such deterioration can include the following:

- Fading of webbing color.
- Uneven or disoriented surface yarn of the webbing.
- Shortening of the tie down length.
- Reduction in elasticity and strength of the tie down material due to an exposure to sunlight, often evident by an accelerated abrasive damage to the surface yarn of the tie down.
- Breakage or damage to yarn fibers, often evident by a fuzzy appearance of the web.
- Stiffening of the web, which can become particularly evident when tie downs are exposed to outdoor conditions without being used or cyclically tensioned.

3b. Avoid actions that cause damage to tie downs

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):

- Dragging tie downs on the ground, floor or over abrasive surfaces.
- Pulling tie downs from under cargo when the cargo is resting on the tie down—place blocks under cargo if feasible.
- Shortening or adjusting tie down using methods not approved by the tie down manufacturer or qualified person.
- Twisting, kinking or knotting the tie down.
- Exposing tie downs to damaging acids or alkalis.
- Using tie downs or allowing exposure to temperatures above 194°F (90°C) or below -40°F (-40°C).
- Using the tie down with hardware that has edges or surfaces that could damage the tie down.
- Running/driving over tie downs with a vehicle or other equipment.

Tie downs are affected by some chemicals ranging from little to total degradation. Time, temperature and concentration factors affect the degradation. For specific applications, consult the manufacturer. In addition, water absorption can decrease a nylon tie down's strength by as much as 10–15% (its strength returns when the tie down dries completely). Consult a tie down manufacturer for specific application loss factors.

3c. Safeguard tie downs using protection

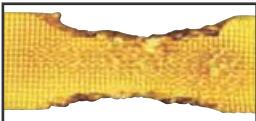
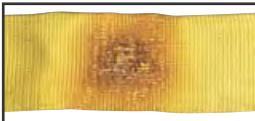
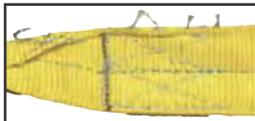
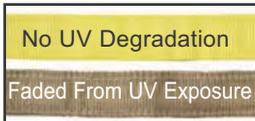
Synthetic tie downs can be damaged, abraded or cut as tension and compression between the tie down, the connection points and the cargo develops. Surfaces in contact with the tie down do not have to be very abrasive or have "razor" sharp edges in order to create the conditions for tie down failure. Therefore, **tie downs 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 types of ways to protect tie downs from such damage. A qualified person might select and use appropriate engineered protectors/softeners—commercially available products (e.g., sleeves, wear pads, edge wraps, body wraps, corner protectors, etc.) specifically designed to protect tie downs from damage. A qualified person might also design and construct their own methods of protection so long as the tie down is adequately protected from and/or kept off of the damaging edge surface.

Regardless of the particular method chosen, the goal is to ensure that the tie down, under tension, maintains its ability to secure a load while avoiding contact with damaging or abrasive surfaces. A qualified person must carefully consider the most appropriate means to accomplish this goal. The protection used should not be makeshift (i.e., selecting and using cardboard, 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 tie downs will be exposed. For instance, some protection provides abrasion resistance but offers virtually no protection against cuts. Several "tests", done in a non-consequence setting, may be necessary to determine the suitability of the protection device(s). After each "test", the protection device(s) and tie down(s) need to be inspected for damage and suitability. You should also keep in mind that no protection is "cut proof" and you should always operate within the specified limits of the tie down and its accessories (e.g., fixtures, hardware, protection, etc.).

Table 2. Type of damage you should look for in tie downs

				
Acid/Alkali burns	Cuts or tears	Snags	Melting or charring	Excessive abrasive wear
				
Embedded materials	Knots	Broken/worn stitches	Crushed webbing	No UV Degradation Faded From UV Exposure

- Sling Protection
- Web Slings
- Round Slings
- Synthetic Chain Slings
- Wire Rope Slings
- Chain Slings
- Shackles & Turnbuckles
- Hooks & Links
- Lifting Points
- Hoists & Blocks
- Lifting Devices
- Pipe & Hose Restraints
- Tie Down Accessories Web Assemblies
- Tie Down Accessories Web Assemblies
- Towing & Recovery
- Rope & Cordage

Sling Protection
Web Slings
Round Slings
Synthetic Chain Slings
Wire Rope Slings
Chain Slings
Shackles & Turnbuckles
Hooks & Links
Lifting Points
Hoists & Blocks
Lifting Devices
Pipe & Hose Restraints
Tie Down Web Assemblies
Accessories
Towing & Recovery
Rope & Cordage

4. Always Use Tie Downs Properly

When using tie downs to secure cargo, a trained, qualified and knowledgeable user must take into account the factors and issues addressed in this bulletin, as well as considering any other relevant factors that may be appropriate. Among the factors related specifically to tie downs, users must perform several activities, including (but not limited to):

4a. Assess the cargo

Consider the nature, shape, weight of the cargo and the potential dynamic (G) forces that might be exerted on the cargo and the direction cargo may shift (forward, backward and sideways).

4b. Use an appropriate tie down system

Users must determine the number and location of tie downs required and select a suitable tie down (or set of tie downs) for the type of cargo, environment and the vehicle's anchor points. Users must identify the working load limit of the tie down(s) and the vehicle's anchor points. Tie down fittings must be the proper type, size and shape to attach properly to vehicle anchor points. Consult the manufacturer's tag and/or other materials to determine the reduction in working load limit due to tie down configuration and angle. The effective downward pressure on a load will be reduced when the angle from the horizontal (tie down to trailer) is less than 90° (see Table 3 for the reduction in the effective downward pressure due to tie down angle).

4c. Do not misuse tie downs

Use tie downs for securing cargo only. NEVER use a tie down for towing purposes. NEVER use a tie down for lifting, lowering, or suspending objects.

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

Even if you account for all of the factors/issues discussed in this Safety Bulletin, things can still go wrong. Therefore, all personnel must be alert to potential risks associated with the use of tie downs.

The cargo must be securely blocked and stabilized before applying tension to or releasing the tie downs. Be especially careful when releasing tie downs, as cargo may have shifted (even slightly) during transport and could move or fall dangerously when tie downs are released—have a plan to be able to get out of the way if this should occur.

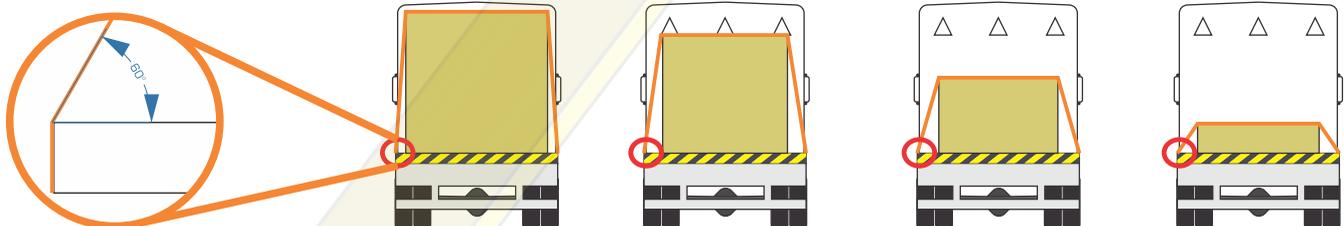
Users must secure their footing before using tie downs to prevent slipping or falling. Also, users must be alert to hazards resulting from tossing assemblies over the cargo.

6. Properly Store and Maintain Tie Downs

In order to prevent damage to tie downs, they should be stored in a cool, dry and dark location. Tie downs should also be stored in an area free from environmental or mechanical sources of damage, such as: weld spatter, splinters from grinding or machining, heat sources, chemical exposure, etc.

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

Table 3. Reduction in effective downward pressure as a result of tie down angle



Angle	90°	60°	45°	30°
Effective Downward Pressure	100%	86.6%	70.7%	50%

Where to Find Additional Information

This bulletin does not provide you with all the information you need to know in order to be considered trained and knowledgeable about securing cargo and using tie downs, but it does provide important information about the use of tie downs. If you need more information about tie downs or your responsibilities according to regulations and standards, talk to your employer. You and your employer can consult a number of sources of information to help ensure that you are properly knowledgeable and trained when using tie downs, including (but not limited to):

- WSTDA-T-1—Recommended Standard Specification for Synthetic Web Tie Downs.
- WSTDA-T-2—Recommended Operating and Inspection Manual for Synthetic Web Tie Downs.
- Protection against shifting and falling cargo. 49 CFR 393.100-393.136 U.S. Department of Transportation
- Understanding the Federal Motor Carrier Safety Administration's Cargo Securement Rules. U.S. Department of Transportation. Publication No.: MC-P/PSV-04-001. (<http://fmcsa.dot.gov/documents/cargo/cs-policy.pdf>)
- FMCSA Final Rule on Cargo Securement. U.S. Department of Transportation (<http://www.fmcsa.dot.gov/cargosecurement.pdf>)
- CCMTA National Safety Code Standard 10 Cargo Securement (<http://www.ccmta.ca/english/pdf/Standard%2010.pdf>)
- Interpretation guide for CCMTA NSC 10 (<http://www.ccmta.ca/english/committees/cra/cargo/pdf/interpretationguide.pdf>)
- Manufacturer's catalog, manual, website, bulletins, etc.
- Formal training provided by manufacturers or other outside entities.

WSTDA - TDSB-1 2010

Industry Links

~Web Sling & Tie Down Association
www.wstda.com

~Alberta Transportation
www.alberta.ca/transportation

~CCMTA National Safety Code
www.ccmta.ca/en/national-safety-code/national-safety-code-nsc

~National Association of Chain Mfg
www.nacm.info