

Synthetic Tie Down Safety Bulletin

⚠ 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 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 (including limitations), use and inspection, hazards to personnel, environmental effects, all applicable standards and regulations and tie down practices.
- 2 Inspect tie downs for damage** before each use. If the tie down is damaged, **IMMEDIATELY** remove it from service.
- 3 Protect tie downs 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 a tie down's rated capacity.** Always consider the effect of tie down angle and tension on the tie down's capacity and **NEVER OVERLOAD** tie downs.
- 5 Be alert when securing cargo.** Any unplanned release of tension could the load to shift or fall and/or strike personnel with deadly recoil force. Be alert in the "Danger Zone" (near the load, in-line or near tie downs under tension, etc.).
- 6 Maintain and store tie downs properly.** Tie downs should be protected from UV light degradation, as well as from heat, chemical, environmental and/or mechanical 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, hazards 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 subject matter 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 use 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 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 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, **remove it from service immediately** even if the damage you see 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. You must never ignore tie down damage or attempt to perform temporary field repairs of damaged tie downs.

Table 1. Tie down inspection – Removal criteria

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

- missing, damaged or unreadable tie down identification tag and/or working load limit (WLL) tag
- holes, tears, cuts, snags or embedded materials
- broken or worn stitches in the load bearing sew patterns.
- knots in any part of the webbing
- chemical damage (e.g., acid/alkali burns, etc.)
- melting, charring or weld spatters on any part of the webbing
- excessive abrasive wear or crushed webbing
- signs of ultraviolet (UV) light degradation (e.g., bleaching, increased stiffness, abrasion in areas not in contact with the load)
- distortion, excessive pitting, corrosion or other damage to hardware [e.g., buckles, end fitting(s), etc.]
- any conditions which cause doubt as to the strength of the tie down

2c. How often to inspect tie downs?

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 qualified 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 (or by another qualified person) before every use.

Periodic Inspection—Every tie down should be inspected “periodically” by a qualified person [someone other than the individual(s) who performs the frequent inspection]. Periodic tie down inspections shall not exceed one year. The frequency of periodic inspections is based upon the frequency of use, severity of service conditions, nature of the load/cargo being secured and experience gained in the inspection of other tie downs used in similar circumstances. A written record of the most recent periodic inspection should be maintained.

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

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 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 Section 2 of this Safety Bulletin, including (but not limited to):

- dropping or 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 chemicals
- 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’s manufacturer for specific application loss factors.

3c. Safeguard tie downs using protection

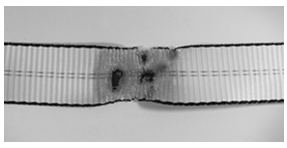
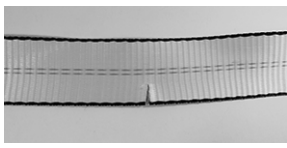
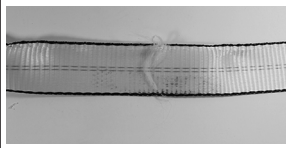
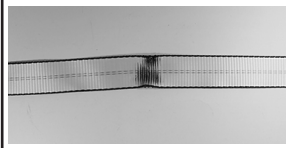
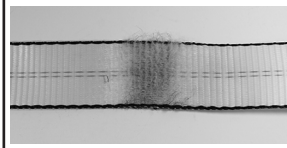
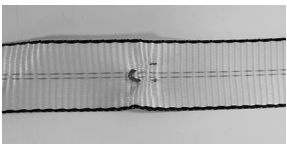
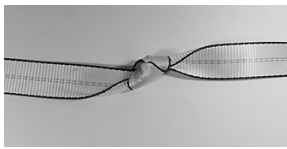
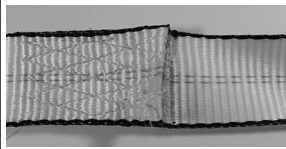
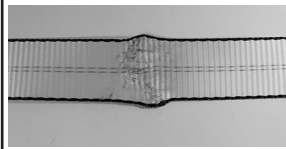
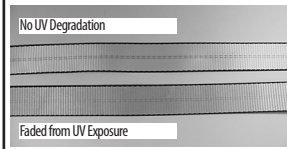
Synthetic tie downs can be damaged, abraded or cut as tension and compression between the tie down, the connection points and the cargo develops. Surfaces in contact with the tie down do not have to be very abrasive or have “razor” sharp edges in order to create the conditions for tie down failure. Therefore, **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.**

Abrasion protection will not prevent damage from cutting. If protection against cutting is necessary, use only tie down protection devices that have been designed, tested, and rated by the manufacturer.

There are a variety of types of ways to protect tie downs from damage. A qualified person might select and use appropriate engineered protectors (e.g., sleeves, pads, corner protectors, etc.) specifically designed to protect tie downs from damage. Regardless of the particular method chosen:

- The goal is to ensure that the tie down maintains its ability to secure a load while avoiding contact with damaging or abrasive surfaces.

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

				
Acid/alkali burns	Cuts/tears	Holes/punctures/snags	Melting/charring/ weld spatter	Excessive abrasive wear
				
Embedded particles	Knots	Broken/worn stitching	Crushed webbing	UV Degradation

- A qualified person must ensure that the protection method chosen is appropriate for the types of damage to which the tie down will be exposed.

The protection used must not be makeshift (i.e., selecting and using cardboard, work gloves, or other such items based solely on convenience or availability).

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., hardware, tie down protection, etc.).

4. Always Use Tie Downs Properly

“When using tie downs to secure cargo, a trained, qualified and knowledgeable user must take into account all risk factors and the 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 competently perform several activities including (but not limited to) those discussed in the following subsections. Also refer to U.S. Dept. of Transportation Cargo Securement Rules for additional information.

4a. Assess the cargo

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

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 multiple 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.

Refer to the manufacturer’s tag and/or other materials to determine the reduction in working load limit (WLL) 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) deviates from 90° (see Table 3 for the reduction in the effective downward pressure due to tie down angle).

Nylon and polyester elongate at different rates when under tension. Tie downs of different materials shall not be used together when restraining cargo in the same direction due to different elongation characteristics.

Web tie downs shall be attached to the vehicle and positioned in accordance with applicable regulations for the commodity being transported to prevent against shifting of and/or loss of cargo. Additionally, tie down users are required to know commodity-specific rules governing proper tie down determination as published by the Federal Motor Carrier Safety Administration, Standard for Protection Against Shifting and Falling Cargo: 49 CFR 393.100 ~ 393.136 Final Rule and/or Canadian Council of Motor Transport Administrators, National Safety Code Standard 10 and/or current regulations in effect.

4c. Do not misuse tie downs

Use this tie down 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, Especially in the “Danger Zone”

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, especially in the “Danger Zone.”

The “Danger Zone” is any area where (a) the load could fall on or swing into personnel or property, or (b) deadly recoil could be produced by an unplanned release of tension. Be alert in the “Danger Zone”.

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.

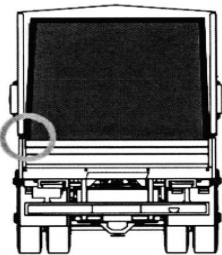
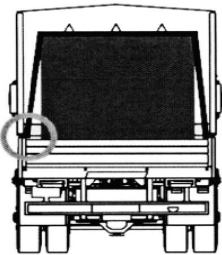
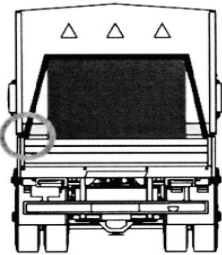
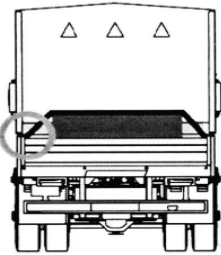
Users must secure their footing before using tie downs to prevent slipping or falling. Also, users must be alert to hazards resulting from tossing tie down assemblies over the cargo.

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.

(continued on next page)

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

				
Angle	90°	60°	45°	30°
Effective Downward Pressure	100%	87%	71%	50%

Web tie downs and associated hardware may be subjected to dirt, mud, snow, ice, road salt, cleaning solutions, etc. Frequent inspection, clean water rinsing and lubrication as appropriate will ensure proper operating condition. Aluminum fittings should not be cleaned with chlorine based cleaning agents, or used in high chlorine environments. Washing of tie down webbing (including pressure washing) is not recommended as any washing can cause accelerated degradation of the webbing and loss of strength due to mechanical/chemical damage.

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):



TDSB-2 2019 EN

- 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://www.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 NSC Standard 10.
[<https://www.ccmta.ca>; search for “NSC Cargo Securement Standard Interpretation Guides”]
- Manufacturer’s catalog, manual, website, bulletins, etc.
- Formal training provided by manufacturers or other outside entities