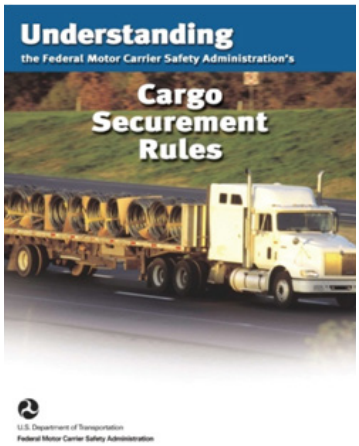
Product Information Report
Load Securement



Overview

The general requirements for securing loads and cargo are governed by the United States Department of Transportation Federal Motor Carrier Safety Administration (DOT FMCSA) Cargo Securement Standard. Federal, provincial and state statues may vary and preside the federal standard. Periodic changes in requirements are intended to reduce the number of accidents caused by shifting or moving cargo on commercial vehicles operating on interstate roads. Revisions will not normally require the purchase of new or different securement equipment or prohibit devices currently in use. Revisions can include changes with the use of chains, the number of tie-downs and the reduction in working load limits of illegible or unmarked components.

A securing device is any device specifically manufactured to attach or secure cargo to a vehicle or trailer. Some are listed here.

- Synthetic webbing
- Chain
- Wire rope
- Manila rope
- Synthetic rope
- Steel strapping
- Clamps and latches
- Blocking
- Front-end structure
- Grab hooks
- Binders
- Shackles
- Winches
- Stake pockets
- D-rings
- Pocket
- Webbing ratchet
- Bracing
- Friction mat

It is the responsibility of each organization to provide its personnel with specific personal safety training.

Binder Chain Assemblies

Binder chain assemblies are used most often to retain loads to trucks, rail cars and flatbed trailers. They typically consist of a section of chain ranging from 6 ft. to 26 ft. long with a grab hook on each end. The hook can be a clevis design connected mechanically or it can be connected to the chain with a welded coupling link. Standard binding chain assemblies are available in various grades. Grade 70 is the most common transport chain and it is typically yellow zinc in color. Binder chains are not required to have identification tags but the grade markings on the links must be legible.

Load Binders

Load binders are used to take up the slack and apply tension to chain tie-down assemblies. They are rated by working load limits and are available with various hooks that will accept the chain size and grade consistent with the load rating. Chain load binders are available in two general configurations: ratchet binders and lever binders.

Ratchet Binders

Ratchet binders provide a 50:1 mechanical advantage and are preferred for use with the transport of heavy vehicles and equipment.

- Heavy equipment with crawler tracks should be blocked against forward movement and restrained with a minimum of four ratchet binders having a working load limit of 5,000 lbs. each.
- Accessory equipment such as buckets and shovels must be completely lowered and secured separately.
- Articulating equipment must also be restrained while in transit

Tie-Down Assembly Size and Grade	Working Load Limit
1/4" Grade 70 Transport or 5/16" Grade 43 High Test	3,900 lbs.
5/16" Grade 70 Transport or 3/8" Grade 43 High Test	5,400 lbs.
3/8" Grade 70 Transport or 1/2" Grade 43 High Test	9,200 lbs.
1/2" Grade 70 Transport or 5/8" High Test	13,000 lbs.

Handle and cam are one solid piece so the handle snaps back over the center

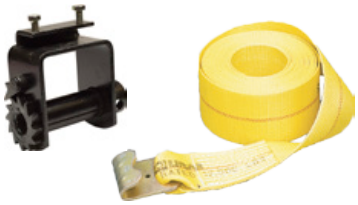
Lever Binders

Lever binders provide a 25:1 mechanical advantage and are preferred when faster loading and unloading is desired.

WARNING: Load binding systems store energy which can release suddenly. Failure to comply with instructions may result in property damage, serious personal injury and loss of life.

- Position load binders so handle can be pulled downward to tighten the chain while operator is standing on the ground.
- Do not use handle extensions or cheater bars. Use a ratchet binder if sufficient leverage cannot be achieved using a lever binder.
- After tightening, be sure the handle is in the locked position and that its bottom side touches the chain link.
- Use an open hand under the handle and push upward to release. Do not close your hand around the handle and keep away from the path of the moving handle.
- Routinely check the load and do not use the binder if it exhibits evidence of excessive wear, bending, cracks, nicks.

Synthetic Tie Downs



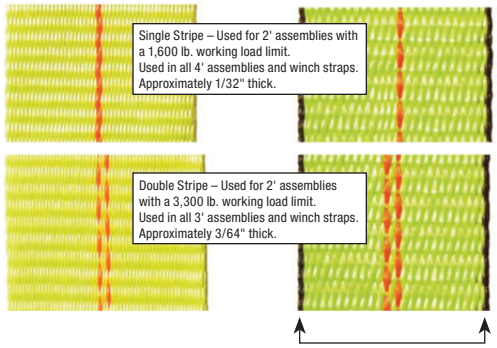
Winch and Strap

Synthetic tie downs are lighter and easier to handle than chains. They conform to the load and are available in different widths to minimize or eliminate potential damage to the cargo. They are available as a winch strap or a ratchet assembly. Both styles are available with numerous end fittings that generally exceed the strength of the webbing to meet a wide variety of requirements.

Synthetic straps vary in width and thickness and their strength classes will vary accordingly. Each strap should have a legible tag that identifies the working load limit or ultimate strength.

A single or double red stipe down the center of the strap is used to help visibly identify the working load limit for a specific width.

NOTE: Wear pads and corner protectors should always be used to resist cutting.



Cut-resistant "Tuff-Edge" Design

Binder Chain

Chain manufacturer grade identification marking spacing can vary from every link to one every three feet. Grade identification is marked with embossed or raised numbers and letters. Grade markings may be difficult to see on chain that has been in service and is rusty, dirty or worn. Wire brushing and cleaning may be necessary to help improve visibility of grade markings.

Grades of Chain

Proof Coil – Grade 30		High Test – Grade 43		Transport (Binding) – Grade 70		Herc-Alloy® – Grade 80		Herc-Alloy® – Grade 100	
G30 3, G-3, M-3, P-30, CG3, L3 Note: Unmarked chain is to be treated as Proof Coil		G43 4, G4, G40, M4, CG4, L4, P43, T4, HT		CM Embossing G70 Other embossing includes 7, G7, G40, M7, CG7, NL7, P70, W7, P70, TS7		CM Embossing HA800 Other embossing includes 8, A8A, WB-80, CA8, CG8, 8G, G8, 8GJC, L8, P8, PWA80, KWS-8, W8A		CM Embossing HA1000 Other embossing includes A10, C10, CG10, P10, PWA100, VIP	
Size (Inches)	Working Load Limit lbs. (kg)	Size (Inches)	Working Load Limit lbs. (kg)	Size (Inches)	Working Load Limit lbs. (kg)	Size (Inches)	Working Load Limit lbs. (kg)	Size (Inches)	Working Load Limit lbs. (kg)
1/4	1,300 (580)	1/4	2,600 (1,180)	1/4	3,150 (1,430)	9/32	3,500 (1,570)	7/32	2,700 (1,225)
5/16	1,900 (860)	5/16	3,900 (1,770)	5/16	4,700 (2,130)	5/16	4,500 (2,040)	9/32	4,300 (1,950)
3/8	2,650 (1,200)	3/8	5,400 (2,450)	3/8	6,600 (2,990)	3/8	7,100 (3,200)	3/8	8,800 (3,990)
1/2	4,500 (2,030)	1/2	9,200 (4,170)	1/2	11,300 (5,130)	1/2	12,000 (5,400)	1/2	15,000 (6,800)

Cargo Securement Guidelines

Minimum Working Load Limit for Cargo Securement Devices

The aggregate working load limit of any securement system used to secure an article or group of articles against movement must be at least 1/2 the weight of the article or group of articles.

The aggregate working load limit is the sum of:

- 1/2 the working load limit of each tiedown that goes from an anchor point on the vehicle to an attachment point on an article of cargo

PLUS

- The working load limit for each tiedown that goes from an anchor point on the vehicle, through, over or around the cargo and then attaches to another anchor point on the vehicle.

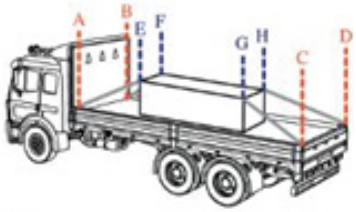
Containing, Immobilizing and Securing Cargo – Aggregate Working Load Limit (WLL)

Aggregate Working Load Limit is the sum of the working load limits of each device used to secure an article on a vehicle is called the aggregate working load limit. The aggregate working load limit of any securement system must be at least 50% of the weight of the cargo being secured.

How do you calculate Aggregate WLL for tiedowns?

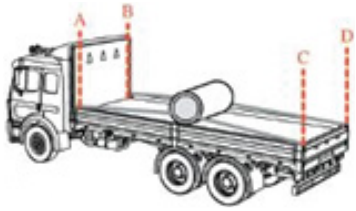
To calculate Aggregate Working Load Limit, add together:

- 50% of WLL of each end section of a tiedown that is attached to an anchor point
- 50% of the WLL of each end section that is attached to the cargo



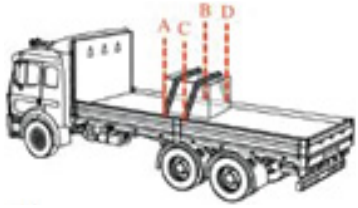
Example:

50% of A
+ 50% of B
+ 50% of C
+ 50% of D
+ 50% of E
+ 50% of F
+ 50% of G
+ 50% of H
= Aggregate WLL



Example:

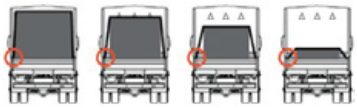
50% of A
+ 50% of B
+ 50% of C
+ 50% of D
= Aggregate WLL



Example:

50% of A
+ 50% of B
+ 50% of C
+ 50% of D
= Aggregate WLL

Cargo Securement Guidelines (cont.)



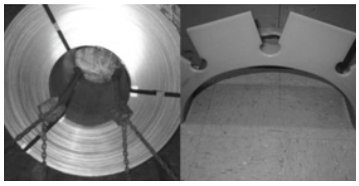
The steeper the tiedown angle, the less shifting (ideally more than 45º).

Proper Use of Tiedowns

Tiedowns that pass over the cargo work by increasing the effective weight of the cargo, making the the cargo seem heavier. This increases the pressure of the cargo on the deck and keeps the cargo from shifting. It is good practice to tension these tiedowns with as high an initial tension as possible.

Rub Rails

Each tiedown must be attached and secured so that it does not become loose or unfastened, open, or release during transit. All tiedowns and other components of a cargo securement system must be located within the rub rails (when present).



Use of Edge Protection

Edge Protector

Edge Protection

Edge protection must be used if a tiedown could be cut or torn when touching an article of cargo. The edge protection itself must also resist crushing, cutting and abrasion.

Use of Unmarked Tiedowns

The new rules do not prohibit the use of unmarked tiedown devices. Unmarked welded steel chain shall be considered to have a working load limit equal to that of Grade 30 Proof Coil, and other types of unmarked tiedowns be considered to have a working load limit equal to the lowest rating for that type in the table of working load limits.

The driver is responsible for the following cargo-securement inspection activites:

Driver Action Required	Pre-Trip	Within first 50 miles (80km)	When duty status of driver changes	At 3-hour intervals or every 150 miles (240km), whichever is first
Inspect cargo and securing devides	✔	✔	✔	✔
Inform carrier if packaging is not adequate	✔			
Adjust cargo and/or securing devices	As necessary	As necessary	As necessary	As necessary
Add additional securing devices	As necessary	As necessary	As necessary	As necessary