

Commercial Vehicle Safety Compliance In Alberta

Effective: May 2011



MODULE 12

Cargo Securement

Overview

The Vehicle Safety and Carrier Services Branch of Alberta Transportation has prepared this guide to assist and ensure that commercial carriers operate safely and are compliant with the regulations that govern highway use. The Province of Alberta, other Canadian jurisdictions, the Government of Canada, and the Transportation Industry developed the National Safety Code (NSC) to help reduce the number and severity of collisions. Each jurisdiction has used the NSC standards as guides in drafting their own transportation safety legislation. This approach promotes uniformity across Canada and helps to ensure that the transportation industry remains as viable and sustainable as possible.

Provincial (operates solely in Alberta) and Federal (operates in and outside of Alberta) National Safety Code legislation applies to Alberta carriers who have commercial vehicles registered that are:

- Trucks, tractors or trailers or a combination of these vehicles that are registered to Provincially regulated motor carriers and have a registered gross weight of 11,794 kilograms or more;
- Buses with a manufactured seating capacity of 11 persons or more, including the driver 9 (provincially and federally regulated); and
- Trucks, tractors or trailers, or a combination of these vehicles that are registered to federally regulated motor carriers and have a registered gross weight greater than 4,500 kilograms.

Provincial and Federal carriers must meet different standards. It is important for carriers to understand the differences prior to deciding if they wish to operate outside of Alberta. For more information visit our Operating Status web page located at www.transportation.alberta.ca/661.htm.

The guide contains several modules, each dealing with a specific topic. To get a complete picture of compliance requirements, you should obtain the complete guide. If you intend to use certain parts of this guide only, for example Module 1, “Getting Started”, it is recommended that you also obtain the modules “Introduction” and “Appendices”.

This is a guide only and is not meant to be a substitute for the actual legislation.

Cargo Securement Learning Objectives

As you work through this module, you will be able to:

- ✓ Recognize that Alberta's Cargo Securement Standards changed February 1st 2005.
- ✓ Obtain your own copy of the National Safety Code Standard 10 (Cargo Securement).
- ✓ Understand the application of the performance criteria that all cargo securement systems must be capable of meeting.
- ✓ Identify where to find the default working load limits for various types of unmarked tiedowns.
- ✓ Understand the relationship between the general securement rules and those rules for specific commodities.
- ✓ Identify commodities that have specific cargo securement requirements in addition to the general cargo securement requirements.
- ✓ Identify possible training sources that may be able to help you ensure compliance to Alberta's *Commercial Vehicle Safety Regulation* and National Safety Code Standard 10.

Background

Cargo Securement standards are found in section 17 of the *Commercial Vehicle Safety Regulation*, AR 121/2009. The *Commercial Vehicle Safety Regulation* adopts National Safety Code (NSC) Standard 10 (Cargo Securement) as the standard for securing cargo in Alberta.

The intent of the Cargo Securement standards is to:

- Reduce the number of accidents caused by cargo shifting or falling from commercial vehicles; and
- Harmonize to the greatest extent practicable U.S., Canadian, and Mexican cargo securement regulations.

A copy of this standard is available on the internet at:

www.ccmta.ca/english/produstandservices/publications/publications.cfm#nsc10

Application of the Regulations

Cargo securement standards apply to all types of cargo except items exempted from Division 3 of NSC Standard 10. These exemptions include commodities in bulk that lack structure or fixed shape (e.g., liquids, gases, grain, liquid concrete, sand, gravel, aggregates) and that are transported in a tank, hopper, box or similar device that forms part of the structure of a commercial motor vehicle. Section 17(4)(a) of the *Commercial Vehicle Safety Regulation* makes it an offence for any of these materials to leak, slip, blow, fall from, fall through or otherwise be dislodged from the vehicle or shift upon or within the vehicle to such an extent that the vehicle's stability or maneuverability is affected negatively.

In addition to the *Commercial Vehicle Safety Regulation*, Section 65 of the *Vehicle Equipment Regulation*, AR 122/2009 applies to all commercial and non-commercial carriers transporting goods on Alberta highways, including those carriers operating commercial vehicles registered for 4,500 kilograms or less and to all non-commercial

Requirements for Securement Devices

Cargo Securement standards require that all devices and systems used to secure cargo to or within a vehicle must be capable of meeting the performance criteria. All vehicle structures, systems, parts and components used to secure cargo must be in proper working order when in use. This means that they cannot be damaged or weakened so as to affect their performance. The cargo securement standards reference manufacturing standards for certain types of tiedowns including steel strapping, chain, synthetic webbing, wire rope, and cordage. Changes in the references do not necessarily mean the older securement devices need to be replaced.

Proper Use of Tiedowns

Each tiedown must be attached and secured so that it doesn't come loose, unfastened, opened or released while the vehicle is moving. All tiedowns and other components of a cargo securement system must be located inside any rub rails whenever practical. Also, edge protection must be used whenever a tiedown would be subject to wear or cutting at the point where it touches an article of cargo. The edge protection must resist wear, cutting and crushing.

Use of Unmarked Tiedowns

Cargo Securement Standards do not prohibit the use of unmarked tiedown devices. However, in view of the potential safety hazards of carriers not properly identifying unmarked tiedowns, they are considered to have a working load limit equal to the default rating for that type of tiedown specified in the following tables referenced in NSC Standard 10, Part 3 page 40.

Section 1 – Chain

Size	Working Load Limit
7 mm (1/4 inch)	580 kilograms (1,300 pounds)
8 mm (5/16 inch)	860 kilograms (1,900 pounds)
10 mm (3/8 inch)	1,200 kilograms (2,650 pounds)
11 mm (7/16 inch)	1,680 kilograms (3,700 pounds)
13 mm (1/2 inch)	2,030 kilograms (4,500 pounds)
16 mm (5/8 inch)	3,130 kilograms (6,900 pounds)

Section 2 - Synthetic Webbing

Width	Working Load Limit
45 mm (1-3/4 inch)	790 kilograms (1,750 pounds)
50 mm (2 inch)	910 kilograms (2,000 pounds)
75 mm (3 inch)	1,360 kilograms (3,000 pounds)
100 mm (4 inch)	1,810 kilograms (4,000 pounds)

Section 3 - Wire Rope (6 x 37, Fiber Core)

Diameter	Working Load Limit
7 mm (1/4 inch)	640 kilograms (1,400 pounds)
8 mm (5/16 inch)	950 kilograms (2,100 pounds)
10 mm (3/8 inch)	1,360 kilograms (3,000 pounds)
11 mm (7/16 inch)	1,860 kilograms (4,100 pounds)
13 mm (1/2 inch)	2,400 kilograms (5,300 pounds)
16 mm (5/8 inch)	3,770 kilograms (8,300 pounds)
20 mm (3/4 inch)	4,940 kilograms (10,900 pounds)
22 mm (7/8 inch)	7,300 kilograms (16,100 pounds)
25 mm (1 inch)	9,480 kilograms (20,900 pounds)

Section 4 - Manila Rope

Diameter	Working Load Limit
10 mm (3/8 inch)	90 kilograms (205 pounds)
11 mm (7/16 inch)	120 kilograms (265 pounds)
13 mm (1/2 inch)	150 kilograms (315 pounds)
16 mm (5/8 inch)	210 kilograms (465 pounds)
20 mm (3/4 inch)	290 kilograms (640 pounds)
25 mm (1 inch)	480 kilograms (1,050 pounds)

Section 5 - Synthetic Fiber Rope

Diameter	Working Load Limit
10 mm (3/8 inch)	185 kilograms (410 pounds)
11 mm (7/16 inch)	240 kilograms (530 pounds)
13 mm (1/2 inch)	285 kilograms (630 pounds)
16 mm (5/8 inch)	420 kilograms (930 pounds)
20 mm (3/4 inch)	580 kilograms (1,280 pounds)
25 mm (1 inch)	950 kilograms (2,100 pounds)

Section 6 - Steel Strapping

Width-thickness	Working Load Limit
1-1/4 x 0.029 inches	540 kilograms (1,190 pounds)
1-1/4 x 0.031 inches	540 kilograms (1,190 pounds)
1-1/4 x 0.035 inches	540 kilograms (1,190 pounds)
1-1/4 x 0.044 inches	770 kilograms (1,690 pounds)
1-1/4 x 0.050 inches	770 kilograms (1,690 pounds)
1-1/4 x 0.057 inches	870 kilograms (1,925 pounds)
2 x 0.044 inches	1,200 kilograms (2,650 pounds)
2 x 0.050 inches	1,200 kilograms (2,650 pounds)

Notes

Unrated and Unmarked Anchor Points

These cargo securement rules do not require the rating and marking of anchor points. While manufacturers are encouraged to rate and mark anchor points, the new rules do not include this as a requirement.

Front End Structures on Commercial Vehicles

Rules concerning front-end structures or headerboards are included in NSC Standard 10 and cover commercial vehicles transporting cargo that is in contact with the front-end structure of the vehicle.

Manufacturing Standards

For further information regarding the following sections, contact the Association(s) listed below it.

Section 1 - Vehicle Structure

Truck Trailer Manufacturers Association - RP 47

Section 2 - Anchor Points

Truck Trailer Manufacturers Association - RP47

Section 3 - Platform Bodies (Flatdecks)

Truck Trailer Manufacturers Association - RP47

Section 4 - Van, Sided & Dump Bodies

Truck Trailer Manufacturers Association - RP47

Web Sling and Tiedown Association

Section 5 – Tiedowns

Web Sling and Tiedown Association

Section 6 - Webbing Assemblies

Web Sling and Tiedown Association

Section 7 - Chain Assemblies

National Association of Chain Manufacturers

Welded Steel Chain – Working Load Limits

Size mm (in)	Grade 3 proof coil	Grade 43 High test	Grade 70 Transport	Grade 80 Alloy	Grade 100 Alloy
7 mm (1/4 in)	580 kg (1300 lb.)	1180 kg (2600 lb)	1430 kg (3150 lb)	1570 kg (3500 lb)	1950 kg (4300 lb)
8 mm (5/16 in)	860 kg (1900 lb.)	1770 kg (3900 lb)	2130 kg (4700 lb)	2000 kg (4500 lb)	2600 kg (5700 lb)
10 mm (3/8 in)	1200 kg (2650 lb.)	2450 kg (5400 lb)	2990 kg (6600 lb)	3200 kg (7100 lb)	4000 kg (8800 lb)
11 mm (7/16 in)	1680 kg (3700 lb.)	3270 kg (7200 lb)	3970 kg (8750 lb)	-	-
13 mm (1/2 in)	2030 kg (4500 lb.)	4170 kg (9200 lb)	5130 kg (11300 lb)	5400 kg (12000 lb)	6800 kg (15000 lb)
16 mm (5/8 in)	3130 kg (6900 lb.)	5910 kg (13000 lb)	7170 kg (15800 lb)	8200 kg (18100 lb)	10300 kg (22600 lb)
Chain Marks	3 30 300	4 43 430	7 70 700	8 80 800	10 100 1000

Section 8 - Wire Rope and Attachments

Wire Rope Technical Board

Section 9 - Synthetic Rope and Attachments

Cordage Institute

Section 10 - Steel Strapping

American Society for Testing and Materials

Section 11 - Clamps and Latches

International Standards Organization - 668.

Section 12 - Roll-on/Roll-off Containers

American National Standards Institute

Summary of Regulatory Standards

General securement rules that apply to all types of cargo, with certain exceptions;

Commodity-specific rules governing commodities that are considered the most difficult to determine the most appropriate means of securement.

General requirements concerning securement, working load limits, blocking and bracing are applicable to all commodities being transported. The commodity-specific requirements take precedence over the general rules when additional requirements are given for a commodity listed in those sections. This means all cargo securement systems must meet the general requirements, unless there is an appropriate commodity-specific rule for that cargo.



Notes

General Standards

Cargo must be firmly secured on or within a vehicle by:

- Structures of adequate strength;
- Dunnage (loose materials used to support and protect cargo) or dunnage bags (inflatable bags intended to fill space between articles of cargo or between cargo and the wall of the vehicle);
- Shoring bars;
- Tiedowns; or
- A combination of the above.

Cargo Placement and Restraint

Articles of cargo that are likely to roll must be restrained by chocks, wedges, a cradle or other equivalent means to prevent rolling. The means of preventing rolling must remain fastened or secured while the vehicle is moving. Articles of cargo placed beside each other and secured by tiedowns placed across the cargo must be:

- Placed in direct contact with each other; or
- Prevented from shifting towards each other while the vehicle is moving.



Notes

Minimum Working Load Limits

The combined working load limit of the items used in the securement system to prevent an article or group of articles from moving must be at least $\frac{1}{2}$ the weight of that article or group of articles.

The combined working load limit is the sum of:

- One-half 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.

Minimum Number of Tiedowns

The cargo securement system used to keep articles from moving must consist of a minimum number of tiedowns. This requirement is in addition to complying with rules concerning the minimum working load limit. When an article of cargo is not blocked or positioned to prevent movement in the forward direction, the number of tiedowns needed depends on the length and weight of the articles. There must be at least:

- One tiedown for articles 1.5 metres or less in length, and 500 kilograms or less in weight;
- Two tiedowns if the article is:
 - 1.5 metres (5 feet) or less in length and more than 500 kilograms (1,100 pounds) in weight; or
 - Greater than 1.5 metres (5 feet) but less than 3.0 metres (10 feet), regardless of weight;
 - Three or more tiedowns if the article is longer than 3.0 metres (10 feet).

For example, one tiedown is required if the article of cargo is 1.5 metres in length and does not exceed 500 kilograms (1,100 pounds). If the article of cargo was greater than 1.5 metres in length but less than 3.0 metres, then two tiedowns would be needed regardless of the weight.

When an article of cargo is not blocked or positioned to prevent forward movement and the item is longer than 3.0 metres (10 feet) in length, then it must be secured by:

- Two tiedowns for the first 3.0 metres of length; and
- One additional tiedown for every 3.0 metres of length, or fraction of, beyond the first 3.0 metres.

If an article is blocked or braced to prevent forward movement by a headerboard, bulkhead, other articles that are adequately secured, or by other appropriate means, then it must be secured by at least:

- One tiedown for every 3.0 metres of article length, or fraction of.

Special Rule for Special Purpose Vehicles

Generally, the basic rules concerning the minimum number of tiedowns do not apply to a vehicle transporting one or more articles of cargo such as, machinery or manufactured structural items (e.g. steel or concrete beams, crane booms, girders, trusses, etc.) which, because of their design, size, shape or weight, must be secured by special methods. However, any article of cargo carried on that vehicle must be adequately secured to the vehicle by devices that are capable of meeting the performance requirements and the working load limit requirements.

Commodity-Specific Securement Requirements

Detailed requirements have been adopted for the securement of the following commodities: logs; dressed lumber; metal coils; paper rolls; concrete pipe; intermodal containers; smaller vehicles; heavy vehicles; crushed vehicles; roll-on/roll-off or hook lift containers; and large boulders. These commodities cause the most disagreement between industry and enforcement agencies as to what is required for proper securement.

For the complete securement requirements for these specific commodities, check NSC Standard 10.

1. Logs

The rules for the transportation of logs apply to the transportation of almost all logs with the following exceptions:

- a. Logs that are bundled (using banding or other comparable means may be transported using the general cargo securement rules;
- b. Loads that consist of no more than four logs may be transported using the general cargo securement rules;
- c. Firewood, stumps, log debris and other such short logs must be transported in a vehicle or container enclosed on both sides, front, and rear and of adequate strength to contain them. Longer logs may also be transported in an enclosed vehicle or container.

2. Dressed Lumber and Similar Building Products

The rules in this section apply to the transportation of bundles of dressed lumber, packaged lumber, building products such as plywood, gypsum board or other materials of similar shape. Lumber or building products that are not bundled or packaged must be treated as loose items and transported using the

general cargo securement rules. For the purpose of this section, the term "bundle" refers to packages of lumber, building materials or similar products which are unitized for securement as a single article of cargo.

3. Metal Coils

The rules in this section apply to the transportation of one or more metal coils which, individually or grouped together, weigh 2,268 kilograms (5,000 pounds) or more. Shipments of metal coils that weigh less than 2,268 kilograms (5,000 pounds) may be secured using the general cargo securement rules.

4. Paper Rolls

The rules for securing paper rolls apply to shipments of paper rolls which, individually or together, weigh 2,268 kilograms (5,000 pounds) or more. Shipments of paper rolls that weigh less than 2,268 kilograms (5,000 pounds), and paper rolls that are bundled on a pallet, may either be secured using the rules in this section or the general cargo securement rules.

5. Concrete Pipe

The rules in this section apply to the transportation of concrete pipe on flatbed trailers and vehicles and on lowboy trailers. Concrete pipe that is bundled tightly together into a single rigid article with no tendency to roll, and concrete pipe loaded in a sided vehicle or container must be secured using the general rules.

6. Intermodal Containers

The requirements for intermodal containers cover the transportation of these containers on container chassis vehicles and other types of vehicles. Intermodal containers are freight containers designed and constructed to permit them to be used in two or more modes of transportation (e.g. road and rail).

Cargo contained within intermodal containers must be secured using the general cargo securement rules or, if applicable, the commodity-specific rules.

7. Automobiles, Light Trucks and Vans

This portion of the new standards applies to the transportation of automobiles, light trucks, and vans which individually weight 4,500 kilograms (9,920 pounds) or less. Vehicles which individually are heavier than 4,500 kilograms (9,920 pounds) must be secured in the same manner as heavy vehicles, equipment and machinery.

8. Heavy Vehicles, Equipment and Machinery

These requirements apply to the transportation of heavy vehicles, equipment and machinery which operate on wheels or tracks, such as loaders, bulldozers, tractors and power shovels and which individually weigh 4,500 kilograms (9,920 pounds) or more. Vehicles, equipment and machinery which is lighter than 4,500 kilograms (9,920 pounds) may be secured using these rules, the rules for automobiles, light trucks and vans, or the general freight requirements.

9. Flattened or Crushed Vehicles

The transportation of vehicles such as automobiles, light trucks and vans that have been flattened or crushed for recycling is covered by these requirements. However, vehicles damaged in a crash or accident should be secured using the general cargo securement requirements.

10. Roll-on/Roll-off or Hook lift Containers

These rules apply to the transportation of roll-on/roll-off or hook lift containers. A hook lift container is a specialized container, primarily used to contain and transport materials in the waste, recycling, construction, demolition and scrap industries. These containers are handled by specialized vehicles in which the

container is loaded and unloaded onto a tilt frame body by an moveable hook-arm.

Hoist-type equipment should be considered separate and distinct from roll-on/roll-off equipment. Containers transported on hoist-type equipment must be secured using the general securement rules.

11. Large Boulders

The rules in this section apply to the transportation of any large piece of natural, irregularly shaped rock weighing more than 5,000 kilograms (11,000 pounds) or with a volume of more than 2 cubic metres on an open vehicle, or in a vehicle whose sides are not designed and rated to contain such cargo. Pieces of rock weighing more than 100 kilograms (220 pounds), but less than 5,000 kilograms (11,000 pounds) must be secured, either using this section, or using the general cargo securement rules, including:

- a. Rock contained within a vehicle which is designed to carry such cargo; or
- b. Secured individually by tiedowns, provided each piece can be stabilized and adequately secured.

Rock which has been formed or cut to a shape and which provides a stable base for securement must also be secured, either using this section or with the general securement rules.

Other Sources of Help

The following Web sites may be useful in obtaining information on cargo securement.

Commercial Vehicle Safety Regulation, AR 121/2009 visit: www.qp.gov.ab.ca.

National Safety Code, Standard 10, visit: www.ccmta.ca.

Driver's Handbook on Cargo Securement (note that this is a large file that takes a long time to open on the internet but it is worth the wait):

www.ccmta.ca/english/pdf/cargo_driver_handbook.pdf

NSC Standard 10 Interpretation documents are available on the internet at:

www.ccmta.ca/english/committees/cra/cargo/interpretation.cfm

Other sources of information include:

Alberta Motor Transport Association www.amta.ca

The Canadian Trucking Alliance www.cantruck.com

Transportation Safety Consultants

Driver Training Schools



Notes

✓ Quick Test

Check your understanding by answering the following questions.

Circle T if the statement is true or F if the statement is false.

T	F	1. The <i>Commercial Vehicle Safety Regulation</i> and NSC Standard 10 apply to all commercial vehicles including trailers and commercial vehicles registered for less than 11,794 kilograms.
T	F	2. Logs, concrete pipe; and intermodal containers are the only 3 commodities that must comply with Commodity-Specific Securement Requirements under NSC Standard 10.
T	F	3. Can unmarked load security devices be used under the <i>Commercial Vehicle Safety Regulation</i> and NSC Standard 10?
T	F	4. A carrier is required to ensure its drivers know how to secure loads using the <i>Commercial Vehicle Safety Regulation</i> and NSC Standard 10.
T	F	5. A copy of NSC Standard 10 can be printed off of the CCMTA Web site.

Check your answers with the answer key on the following page. Review the materials in this module if you answered any of these questions incorrectly.

✓ Quick Test Answers

True/False

1. False The *Commercial Vehicle Safety Regulation* (AR121/2009) and NSC Standard 10 apply only to commercial vehicles registered for 4,500 kilograms or more. Commercial vehicles registered for less than 4,500 kilograms must comply with Section 65 of the *Vehicle Equipment Regulation* (AR122/2009).
2. False There are numerous commodities that must comply with Commodity-Specific Securement Requirements under NSC Standard 10.
3. True Unmarked load security devices may be used but they have default working load limits that are specified in NSC Standard 10 part 3 page 40.
4. True The carrier is responsible for ensuring that its drivers are trained on securing cargo in compliance with the law and that the drivers are properly securing cargo.
5. True Copies of NSC Standard 10 can be obtained on the CCMTA Web site.