

National Safety Code for Motor Carriers

Standard 10 – Cargo Securement

Version: September 2004

SUPERSEDED

STANDARD 10
CARGO SECUREMENT

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INTRODUCTORY NOTES

The standard was drafted with the objective to provide jurisdictions with a standard which can be adopted by reference.

Each jurisdiction may encounter situations where existing legislation or regulations contain definitions or provisions which conflict or overlap with the contents of this Standard. For this reason, the following sections are offered as optional text for consideration by jurisdictions where needed:

Interpretation (Definitions)

“driver” (*conducteur*) includes the owner of the vehicle if the owner of the vehicle is not the carrier

PART 1 - GENERAL PROVISIONS

Division 1 - Application

Safety responsibility

- (1) A carrier shall not permit a driver to operate a vehicle where the cargo transported in or on the vehicle is not contained, immobilized or secured in accordance with this Standard.
- (2) A driver shall not operate a vehicle where the cargo transported in or on the vehicle is not contained, immobilized or secured in accordance with this Standard.

Division 2 - General Performance Criteria

Cargo securement

Cargo transported by a vehicle shall be contained, immobilized or secured so that it cannot

- (a) leak, spill, blow off, fall from, fall through or otherwise be dislodged from the vehicle, or
- (b) shift upon or within the vehicle to such an extent that the vehicle’s stability or manoeuvrability is adversely affected.

INTERPRETATION

1 In this Standard,

“anchor point” (*point d’ancrage*) means the part of the structure, fitting or attachment on a vehicle or cargo to which a tiedown is attached;

“bell pipe” (*tuyau évasé*) means concrete pipe with a flanged end that is bigger in diameter than the barrel;

“blocking” (*dispositif de blocage*) means a substantial structure, device or article placed against or around cargo to prevent horizontal movement;

“bolster” (*traverse*) means a transverse, load bearing, structural horizontal component of a bunk securing device;

“boulder” (*gros bloc de pierre*) means a single piece of natural or quarried, irregularly shaped rock

- (a) that weighs 5 000 kilograms or more, or
- (b) that has a volume of more than 2 cubic metres;

“bracing” (*renfort*) means a structure, device or article placed against another structure, device or article to prevent tipping;

“bulkhead” (*cloison*) means a vertical barrier across a vehicle to prevent the cargo moving forward;

“bundle” (*paquet*) means articles that have been unitized for the purpose of securing them as a single article with a uniform shape;

“bunk” (*traverse-berceau*) means a horizontal bolster that

- (i) is installed transversely across a vehicle, and
- (ii) is fitted with a stake at each end;

“cab shield” (*cloison de protection de la cabine*) means a vertical barrier

- (i) placed directly behind the cab of a truck or truck tractor, and
- (ii) capable of protecting the driver if cargo moves forward;

“cargo” (*cargaison*) means all articles or material carried by a vehicle, including those used in the operation of the vehicle

“cargo securement system” (*système d’arrimage de la cargaison*) means the method by which cargo is contained or secured and includes vehicle structures, securing devices and all components of the system

“chock” (*cale de retenue*) means a tapered or wedge-shaped part used to prevent round articles from rolling

“cleat” (*taquet*) means a short piece of material nailed to the deck to reinforce blocking;

“coil bunk” (*support de bobine*) means a device that keeps the timbers supporting a metal coil in place;

“contained” (*confiné*) with respect to cargo means that

- (i) the cargo fills a sided vehicle,
- (ii) every article is in contact with or close to a wall or other articles, and
- (iii) the cargo cannot move or tip;

“container chassis vehicle” (*véhicule à châssis porte-conteneurs*) means a vehicle specifically built for and fitted with locking devices for the transport of intermodal containers;

“cradle” (*berceau*) means a structure that holds a circular article and prevents it from rolling;

“cylinder well” (*puits*) means the depression formed between 2 cylindrical articles when they are laid against each other with their eyes horizontal and parallel;

“deck” (*plate-forme*) means the floor of a vehicle onto which the cargo is loaded;

“dunnage” (*fardage*) means loose material used to support and protect cargo;

"duty status" (*activité ou situation de prestation de travail*) means, in respect of a driver, any of the following periods:

- (i) off-duty time spent in a sleeper berth;
- (ii) off-duty time, other than time spent in a sleeper berth;
- (iii) driving time; or
- (iv) on-duty time, other than driving time.

“edge protector” (*coin de protection*) means a device put on the exposed edge of an article of cargo

- (i) to protect a tiedown or the article from damage, or
- (ii) to distribute tiedown forces over a greater area;

“flatbed vehicle” (*véhicule à plate-forme*) means a vehicle with a deck but no permanent sides;

“forward” (*vers l’avant*) with respect to a vehicle means towards the cab or engine;

“frame vehicle” (*véhicule à châssis simple*) means a vehicle for transporting logs that has a skeletal structure fitted with a front bunk and a rear bunk that together cradle a stack of logs as an integral part of the vehicle;

“friction mat” (*tapis à coefficient élevé de friction*) means a device placed between a deck and cargo, or between articles of cargo, that increases the friction between them;

"front end structure" (*structure d’extrémité avant*) means a vertical barrier across the front of a deck that prevents cargo moving forward;

“heavy vehicle” (*véhicule lourd*) means

- (i) a vehicle that weighs more than 4 500 kilograms, or
- (ii) equipment or machinery that operates on wheels or tracks and weighs more than 4 500 kilograms;

“Hook-lift Container” (*conteneur de type Hook-Lift*) means a specialized container that is loaded and unloaded onto a tilt frame body by an articulating hook-arm.

“integral locking device” (*dispositif intégré de verrouillage*) means a device that is designed and used to restrain an article of cargo by connecting and locking attachment points on the article to anchor points on the vehicle;

“integral securement system” (*système intégré d’arrimage*) means a roll-on/roll-off container or a Hook-lift Container and the vehicle used to transport them which are equipped with compatible front and rear hold-down devices which secure the container to the vehicle;

“intermodal container” (*conteneur intermodal*) means a reusable, transportable container that is specially designed with integral locking devices to secure it to a container chassis vehicle;

“large pipe” (*tuyau de grand diamètre*) means concrete pipe with an inside diameter of more than 114.3 centimetres;

“lengthwise” (*longitudinal*) means along the vehicle from the cab or tongue at the front to the rear;

“light vehicle” (*véhicule léger*) means

- (i) an automobile, truck or van that weighs 4 500 kilograms or less, or
- (ii) a piece of equipment or machinery that operates on wheels or tracks and weighs 4 500 kilograms or less;

“log” (*grumes*) includes a utility pole, a treated pole and a building component of a log cabin;

“longwood” (*longues grumes*) means logs longer than 4.9 m;

“pallet” (*palette*) means a platform or tray on which cargo is placed so that it can be handled as a unit;

“pole trailer” (*remorque à grumes*) means a trailer with a frame that consists only of a drawbar;

“rail vehicle” (*grumier*) means a vehicle fitted with stakes at the front and rear to contain logs loaded crosswise;

“restrain” (*retenir*) includes prevent from tipping or moving;

“Roll-on / Roll-off Container” (*conteneur de type Roll-on/Roll-off*) means a specialized container which is loaded and unloaded onto a tilt frame body by a lifting mechanism in conjunction with rollers which are fixed to the container.

“rub rail” (*lisse de protection*) means a rail along the side of a vehicle that protects the side of the vehicle from impact;

“securing device” (*dispositif d’arrimage*) means a device specifically designed and manufactured to attach, restrain or secure cargo;

“shoring bar ” (*barre d’étayage*) means a device placed transversely between the walls of a vehicle and cargo to prevent the cargo from tipping or moving;

“shortwood” (*courtes grumes*) means logs that are not more than 4.9 metres long;

“sided vehicle” (*véhicule à parois*) means a vehicle, including a van, a dump bodied vehicle and a sided intermodal container carried by vehicle, with a cargo compartment that is enclosed on all sides by walls

- (i) that are strong enough to contain the cargo, and
- (ii) that may have latched openings for loading and unloading;

“small pipe” (*tuyau de petit diamètre*) means concrete pipe with an inside diameter of up to 114.3 centimetres;

“spacer” (*cale d’espacement*) means material placed under an article, or between layers of articles, to make loading and unloading easier;

“stake” (*poteau*) means a part, including a standard, that

- (i) is mounted close to vertical on a vehicle frame or as part of a bunk, and
- (ii) that immobilizes cargo placed against it;

“strapping” (*cerclage*) means tensioned strips of material that are clamped or crimped back on themselves;

“tiedown” (*appareil d’arrimage*) means a combination of securing devices that are attached to one or more anchor points on a vehicle;

“transport” (*transport*) means the carriage of cargo by a vehicle while on a highway

“unitized” (*unifié*) means wrapped, banded or bound together so that several articles can be handled as a single article of cargo or behave as a single article;

“vehicle” (*véhicule*) means a truck, a truck tractor, individually or in combination with one or more semi-trailers or trailers

“void filler” (*matériau de remplissage*) means material that is

- (i) used to fill a space between the cargo and the structure of the vehicle, and
- (ii) is strong enough to prevent the cargo from moving;

“working load limit” (*limite de charge nominale*) means the maximum load that may be applied to a component of a cargo securement system during normal service determined in accordance with Divisions 3 and 4 of Part 1.

PART 1 - GENERAL PROVISIONS
Division 1 - Application

Application

- 2(1) This Standard applies to a vehicle or combination of vehicles
- (a) transporting cargo on a highway, and
 - (b) exceeding a registered gross vehicle weight of 4 500 kilograms.
- (2) This Standard applies when an intermodal container is used to transport cargo.

Inspection

- 3(1) The driver of a vehicle shall
- (a) inspect the vehicle to confirm that the vehicle's tailgate, tailboard, doors, tarpaulins and spare tire, and other equipment used in its operation, are secured,
 - (b) ensure that the cargo does not interfere with the driver's ability to drive the vehicle safely, and
 - (c) ensure that the cargo does not interfere with the free exit of a person from the cab or driver's compartment of the vehicle.
- (2) The driver of a vehicle shall inspect the vehicle's cargo and the cargo securement system used and make necessary adjustments:
- (a) before driving the vehicle, and
 - (b) not more than 80 kilometres from the point where the cargo was loaded,
- (3) The driver of a vehicle shall re-inspect the vehicle's cargo and the cargo securement system used and make necessary adjustments to the cargo or cargo securement system as necessary, including adding more securing devices, at the earliest of the time
- (a) there is a change of duty status of the driver,
 - (b) the vehicle has been driven for 3 hours; or
 - (c) the vehicle has been driven for 240 kilometres.
- (4) Subsections (2) and (3) do not apply to a driver where

- (a) the cargo is sealed in a vehicle and the driver has been ordered not to open it to inspect the cargo, or
 - (b) the vehicle is loaded in a manner that makes the cargo, or portions of the cargo, inaccessible.
- (5) The driver of a vehicle transporting logs, before the vehicle enters a highway from a private road, shall:
- (a) inspect the vehicle, the logs and the securing devices to ensure compliance with this Standard, and
 - (b) make necessary adjustments to the securing devices, including adding more securing devices.

Division 2 - General Performance Criteria

Cargo securement systems

- 4(1) Cargo securement systems, and each component of a system, used to contain, immobilize or secure cargo on or within the vehicle shall be strong enough to withstand the forces described in section 5(1).
- (2) The components of the cargo securement system of a vehicle.
- (a) shall be in proper working order,
 - (b) shall be fit for the purpose for which they are used,
 - (c) shall have no knots, damaged or weakened components that will adversely affect their performance for cargo securement purposes, and
 - (d) shall not have any cracks or cuts.
- (3) A securing device or integral locking device used to secure cargo to a vehicle shall itself be secured in a manner that prevents it from becoming unfastened while the vehicle is on a highway.

Performance criteria

- 5(1) The cargo securement system shall be capable of withstanding the forces that result if the vehicle is subjected to each of the following accelerations:
- (a) 0.8 g deceleration in a forward direction;

- (b) 0.5 g deceleration in a rearward direction;
 - (c) 0.5 g acceleration in either sideways direction.
- (2) The cargo securement system shall provide a downward force equal to at least 20 % of the weight of an article of cargo if the article is not fully contained within the structure of the vehicle.
- (3) The load on a component of a cargo securement system that reacts to a force referred to in subsection (1) or (2), shall not exceed the working load limit of the component.

Appropriate system

- 6(1) The cargo securement system used to contain, immobilize or restrain cargo shall be appropriate for the size, shape, strength and characteristics of the cargo.
- (2) The securing devices used to secure cargo on or within a vehicle shall be
- (a) designed and constructed for the purpose for which they are used, and
 - (b) used and maintained in accordance with the manufacturer's instructions.

Equivalent Means of Securement

- 7 Where cargo transported by a vehicle is contained, immobilized or secured in accordance with the applicable requirements of Divisions 3, 4 and 5 and Part 2, it meets the requirements of Section 5.

Division 3 - Requirements for Cargo Securement Systems

Exemption

- 8 This Division does not apply to the transportation of a commodity that is transported in bulk, lacks structure, fixed shape or is fluid, and is transported in
- (a) a tank, hopper, box or container that is manufactured as part of the vehicle in which it is transported, or
 - (b) a vehicle that is specifically manufactured to transport the commodity.

General Requirement

- 9 Cargo shall be firmly immobilized or secured on or within a vehicle by structures of

adequate strength, blocking, bracing, dunnage or dunnage bags, shoring bars, tiedowns or a combination of these.

Minimum Strength of Securement System

- 10(1) In this section, the “aggregate working load limit” is the sum of One-half of the working load limit for each end section of a tiedown that is attached to an anchor point.
- (2) The aggregate working load limit of the cargo securement system used to secure an article of cargo on or within a vehicle shall not be less than 50% of the weight of the article.
- (3) The aggregate working load limit of the cargo securement system used to secure a group of articles of cargo on or within a vehicle shall be not less than 50% of the total weight of the group.

Securing Devices Marked With Working Load Limit

- 11(1) The working load limit of a tiedown or a component of a tiedown that is marked by its manufacturer with a numeric working load limit is the marked working load limit.
- (2) A tiedown or a component of a tiedown that is marked by its manufacturer in accordance with a standard referred to in Part 4 has a working load limit equal to that standard.
- (3) A chain that is marked by the manufacturer in accordance with the table of Working Load Limits under Part 4 – Section 7 has a working load limit equal to the amount shown for the grade and size.
- (4) On and after January 1, 2010, a person shall not use a tiedown or a component of a tiedown to secure cargo to a vehicle unless it is marked by the manufacturer with respect to its working load limit.

Unmarked Securing Devices

- 12(1) This section applies to securing devices used to secure cargo to a vehicle that are not marked by the manufacturer with a working load limit.
- (2) Chain has a working load limit equal to that of the same size of Grade 3 Proof Coil under Part 3 section 1.
- (3) Synthetic webbing that is not marked by its manufacturer has the working load limit under Part 3 section 2 based on its width.
- (4) Wire rope has the working load limit under Part 3 section 3 based on its diameter.

- (5) Manila rope has the working load limit under Part 3 section 4 based on its diameter.
- (6) Polypropylene fibre rope, polyester fibre rope, nylon rope and double braided nylon rope has the working load limit under Part 3 section 5 based on its diameter.
- (7) Synthetic cordage that is not marked or labelled to identify its composition has the working load limit under Part 3 section 5 based on its diameter.
- (8) Steel strapping has the working load limit under Part 3 section 6 based on its width.
- (9) A friction mat which is not marked by the manufacturer with a working load limit is assumed to provide resistance to horizontal movement equal to 50% of the weight of the cargo resting on the mat.
- (10) A tiedown or a component of a tiedown that is not referred to in subsections (2) to (9) has a working load limit equal to the working load limit of the lowest grade or classification assigned under Part 3

Steel strapping

- 13(1) Steel strapping that is 2.54 centimetres wide or wider used to secure cargo to a vehicle shall have at least 2 pairs of crimps in each seal.
- (2) An end-over-end lap joint formed in steel strapping used to secure cargo to a vehicle shall be sealed with at least 2 seals.

Blocking Systems to Prevent Forward Movement

- 14 The aggregate working load limit of the components of a blocking system used as a unique form of securement to prevent an article of cargo from moving forward, including tiedowns used as blocking, shall not be less than 50% of the weight of the article being blocked.

Rub rails

- 15 The securing devices used on or within a vehicle shall, wherever practical, be located inboard the rub rails where the vehicle has rub rails.

Timber

- 16 Timber used on or within a vehicle as dunnage, chocks or cradles or for blocking or bracing shall be strong enough that it will not be split or crushed by the cargo or the tiedowns.

Placement of Articles of Cargo

- 17 Where the articles of cargo on or within a vehicle are placed beside each other and secured by tiedowns that pass over 2 or more articles, the articles shall be
- (a) placed in direct contact with each other, or
 - (b) prevented from moving towards each other while the vehicle is on a highway.

Prevention of Rolling

- 18 Where any cargo or portion thereof may roll, it shall be restrained by chocks, wedges, a cradle or another securing device that prevents the cargo from rolling.

Division 4 - Tiedowns

Tension

- 19(1) A tiedown used to secure cargo to a vehicle shall be designed, constructed and maintained so that the driver of the vehicle can tighten it.
- (2) The driver of a vehicle shall ensure that tiedowns are taut while the vehicle is on a highway.
 - (3) Subsection (1) does not apply to steel strapping.
 - (4) A tiedown used to secure cargo to a vehicle shall be used in a manner that prevents the tiedown from slipping, loosening, unfastening, opening or releasing while the vehicle is on a highway.
 - (5) A tiedown used to secure stacked articles of cargo is considered to contribute to the securement of all articles of cargo on which that tiedown causes pressure.

Edge protectors

- 20(1) An edge protector shall be used where a tiedown would be subject to abrasion or cutting at the point where it touches an article of cargo.
- (2) An edge protector used between a tiedown and cargo shall be resistant to abrasion, cuts and crushing.
 - (3) An edge protector used between a tiedown and cargo shall allow the tiedown to slide freely when it is tightened or loosened.

Working load limit

- 21(1) Subject to subsection (2), the working load limit of a tiedown, associated connector or attachment mechanism is the lesser of
- (a) the lowest working load limit of the components, or
 - (b) the lowest working load limit of the anchor points or associated connector or attachment mechanism to which the tiedown is attached.
- (2) The working load limit of a tiedown that includes synthetic webbing is the least of
- (a) the working load limit of the synthetic webbing assembly, or
 - (b) the lowest working load limit of the components, or
 - (c) the working load limit of the anchor point to which the tiedown is attached.

Minimum number

- 22(1) Subject to subsection (4), cargo transported by a vehicle shall be secured using the number of tiedowns calculated under subsection (2) or (3).
- (2) Where an article of cargo is not blocked or immobilized by a front end structure, bulkhead, by other immobilized cargo or by another device that prevents it moving forward, it shall be secured by at least
- (a) 1 tiedown where the article is 1.52 metres or shorter and weighs not more than 500 kilograms,
 - (b) 2 tiedowns where the article is
 - (i) 1.52 metres or shorter and weighs more than 500 kilograms, or
 - (ii) longer than 1.52 metres but not longer than 3.04 metres regardless of its weight, or
 - (c) where the article is longer than 3.04 metres
 - (i) 2 tiedowns for the first 3.04 metres of length, and
 - (ii) 1 extra tiedown for each additional 3.04 metres or fraction of 3.04 metres.
- (3) Where an article of cargo is blocked or immobilized by a front end structure, bulkhead, by other immobilized cargo or by another device to prevent it moving forward, it shall be secured by at least

- (a) 1 tiedown where the article is not longer than 3.04 meters, or
 - (b) where the article is longer than 3.04 metres
 - (i) 1 tiedown for the first 3.04 metres of length, and
 - (ii) 1 extra tiedown for each additional 3.04 metres or fraction of 3.04 metres.
- (4) Where a vehicle is transporting machinery or fabricated structural items that shall be secured by special methods because of their design, size, shape or weight, the special methods shall:
- (a) secured adequately any article of the cargo
 - (b) be properly used in accordance with the manufacturer's instructions.

Division 5 - Front End Structures

Application

- 23(1) Subject to subsection (2), this Division applies to a vehicle transporting cargo that is in contact with the front-end structure of the vehicle.
- (2) Where devices are used on a vehicle that perform the same function as the front end structure of a vehicle, the devices shall be at least as strong as and provide the same protection as a front end structure that complies with this Division.
- (3) A cab shield is not a front end structure or part of a cargo securement system.

Height and width

- 24(1) The height of the front end structure of the vehicle shall not be shorter than the shorter of
- (a) the height at which it prevents the cargo from moving forward, and
 - (b) 122 centimetres above the deck.
- (2) The width of the front end structure of a vehicle shall not be narrower than the narrower of
- (a) the width of the vehicle, and
 - (b) the width at which it prevents the cargo being transported from moving forward.

Strength

- 25(1) The front end structure of a vehicle shall be able to withstand a horizontal forward static load equal to 50% of the total weight of the cargo where
- (a) the height of the front end structure is shorter than 1.83 metres, and
 - (b) the cargo is uniformly distributed over all of the front end structure.
- (2) The front end structure of a vehicle shall be able to withstand a horizontal forward static load equal to 40% of the total weight of the cargo where
- (a) the height of the front end structure is 1.83 metres. or higher, and
 - (b) the cargo is uniformly distributed over all of the front end structure.

Penetration resistance

- 26(1) The front-end structure of the vehicle shall be able to resist penetration by an article of cargo that contacts it when the vehicle decelerates at a rate of 6.1 metres per second per second.
- (2) The front-end structure of the vehicle shall not have an opening or gap that is big enough to permit an article of cargo to pass through it.

PART 2- SPECIFIC SECUREMENT REQUIREMENTS BY CARGO TYPE

Applicability

- 27(1) This Part applies in addition to and not instead of Part 1.
- (2) Where a requirement for containing, immobilizing or securing cargo transported by a vehicle required under this Part differs from a requirement under Part 1, the provisions of this Part apply.

Division 1 - Logs

Application

- 28(1) This Division applies to the transportation of logs that
 - (a) are not unitized, or
 - (b) are part of a cargo that has more than 4 processed logs.
- (2) This Division does not apply to firewood, stumps, log debris or logs that are transported in a vehicle or container that is enclosed on all sides and strong enough to contain them.

Vehicle transporting logs

- 29(1) A vehicle that is transporting logs shall be designed, built or specially adapted for such transportation.
- (2) The vehicle shall be fitted with bunks, bolsters, stakes or other means of cradling the logs and preventing them from shifting.
- (3) Stakes that are not permanently attached to the vehicle frame or bunk shall be secured in a manner that prevents the stakes from separating from the vehicle while it is on a highway.

Log configuration

- 30(1) Logs shall be solidly packed on a vehicle.
- (2) The outer logs in the bottom layer of logs shall touch and rest solidly against a bunk, bolster or stake.
- (3) Outside logs on a stack of logs shall
 - (a) touch at least 2 bunks, bolsters or stakes, or
 - (b) where one end of a log does not touch a bunk, bolster or stake, it shall

- (i) rest on other logs in a stable manner, and
 - (ii) extend beyond the end of the bunk, bolster or stake.
- (4) The centre of the highest outside log on each side or end of the vehicle shall be lower than the tops of the bunks or stakes.
- (5) The upper logs that form the top of the cargo shall be crowned.

Securement System

- 31 Tiedowns must be used to secure the load, in combination with bunks, bolsters, stakes, or other means of cradling the logs.
- 32 Sections 10(2) and 10(3) do not apply to this Division.
- 33 Sufficient additional tiedowns or other securing devices shall be used to ensure that no part of the cargo becomes dislodged where
 - (a) the wood's condition results in such low friction between logs that they may slip against each other, or
 - (b) a log is not held in place by contact with other logs or by the bunks, bolsters or stakes.

Shortwood loaded crosswise

- 34(1) This section and sections 35 to 37 apply to shortwood loaded crosswise on a frame, rail or flatbed vehicle other than a pole trailer.
- (2) The end of a log in the lower layer of shortwood shall not extend more than 1/3 of the log's total length beyond the nearest supporting structure on the vehicle.

One stack of shortwood loaded crosswise

- 35(1) Despite section 22, where only one stack of shortwood is loaded crosswise, the stack shall be secured by at least 2 tiedowns arranged as follows:
 - (a) The tiedowns shall attach to the vehicle frame at the front and rear of the load, and shall cross the load lengthwise;
 - (b) The tiedowns shall be positioned at approximately one-third and two-thirds of the length of the logs;

- (2) A vehicle built on or after January 1, 2010 shall be equipped with a device that maintains a tension not less than 900 kg at all times, and automatically takes up slack in the tiedown as the logs settle.

Two stacks of shortwood loaded crosswise

- 36(1) Despite section 22, where two stacks of shortwood are loaded crosswise and side-by-side on a vehicle, they shall be loaded so that
- (a) there is no space between the 2 stacks,
 - (b) the outside of each stack is raised by a piece of metal at least 25 millimetres high within 10 centimetres of the end of the logs or the side of the vehicle and causes the load to lean toward the centre to the vehicle,
 - (c) the highest log is not more than 2.44 metres above the deck, and
 - (d) at least one tiedown used lengthwise across each stack shall be located approximately midway between the bunks or stakes, and
 - (i) be located approximately midway between the bunks or stakes, and
 - (ii) attach to the vehicle frame at the front and rear of the load.
- (2) A vehicle built on or after January 1, 2010 shall be equipped with a device that maintains a tension not less than 900 kg at all times, and automatically takes up slack in the tiedown as the logs settle.

Long vehicles carrying shortwood loaded crosswise

- 37(1) A vehicle that is more than 10 metres long transporting shortwood loaded crosswise shall have centre stakes, or comparable structures, that divide its length into two approximately equal sections.
- (2) Where the vehicle is divided by centre stakes, each tiedown shall
- (a) secure the highest log on each side of the centre stake, and
 - (b) be fastened below that highest log.
- (3) Where the vehicle is divided by centre stakes, each tiedown shall
- (a) be fixed at each end and tensioned from the middle,
 - (b) be fixed in the middle and tensioned from each end, or

- (c) pass through a pulley or similar device in the middle of the tiedown and be tensioned from one end.
- (4) Where a stake or other structure on a vehicle transporting shortwood loaded crosswise is subjected to an upward force when the tiedowns are tightened, the stake or other structure shall be anchored to resist that force.

Shortwood loaded lengthwise

- 38(1) Despite section 22, each stack of shortwood loaded lengthwise on a frame vehicle or flatbed vehicle, other than a pole trailer, shall be secured to the vehicle by 2 or more tiedowns.
- (2) Despite subsection (1), a stack of shortwood loaded lengthwise on a frame vehicle or flatbed vehicle, other than a pole trailer, shall be secured to the vehicle with a single tiedown located approximately midway between the bunks or stakes where all the logs in the stack
 - (a) are shorter than 3.04 metres,
 - (b) are blocked in the front by a front end structure strong enough to restrain the cargo or by another stack, and
 - (c) are blocked in the rear by another stack or the vehicle's end structure.
- (3) The aggregate working limit of tiedowns used to secure each stack shall be at least 1/6 of the weight of the stack

Longwood loaded lengthwise

- 39(1) Despite section 22, a stack of longwood loaded lengthwise on a frame or flatbed vehicle, other than a pole trailer, shall be secured to the vehicle by 2 or more tiedowns.
- (2) The aggregate working limit of tiedowns used to secure each stack shall be at least 1/6 of the weight of the stack
- (3) The outside logs of a stack of longwood shall be secured by 2 or more tiedowns.

Pole trailers

- 40(1) This section applies to logs, regardless of the length of individual logs, transported on pole trailers.
- (2) Despite section 22, the logs shall be secured by
 - (a) one or more tiedowns at each bunk, or

- (b) two or more tiedowns used as wrappers that encircle the entire stack of logs at sufficient locations along the stack to secure it effectively.
- (3) Where wrappers are used on a stack of logs, the wrappers at the front and rear ends of the stack shall be not less than 3.04 metres apart.
- (4) Where the vehicle is transporting one or two logs with diameters greater than 0.6 metre, each logs shall be individually immobilized with chock blocks or an equally effective method that prevents the logs from moving.
- (5) Where a log with a diameter greater than 0.6 metre rises above the bunks, it shall be secured to the underlying logs with at least 2 additional tiedowns used as wrappers.

Division 2 - Dressed Lumber

Application

- 41(1) This Division applies to the transportation of
 - (a) bundles of dressed lumber and packaged lumber, and
 - (b) unitized building products, including plywood, gypsum board or other materials of similar shape.
- (2) For the purpose of this Division, "bundle" means the material referred to in subsection (1).

Side by side

- 42 Where bundles are placed side by side
 - (a) bundles shall be in direct contact with each other, or
 - (b) a method shall be used that prevents the bundles from moving towards each other.

Securement system for dressed lumber

- 43 Bundles carried in 2 or more layers shall be secured in accordance with one of sections 44, 45, 46 or 47

Bundles blocked against lateral movement by stakes

- 44 Bundles carried in 2 or more layers which are blocked against lateral movement by stakes on the sides of the vehicle shall be secured by tiedowns laid out over the top layer, as outlined in the provisions of section 22 of this Standard

Bundles restrained from lateral movement by blocking or high friction devices

- 45 Bundles carried in 2 or more layers which are restrained from lateral movement by blocking or high friction devices between layers shall be secured by tiedowns laid out over the top tier, as outlined in the provisions of section 22 of this Standard

Bundles placed directly on top of other bundles or on spacers of adequate size and orientation

- 46(1) Bundles carried in 2 or more layers placed directly on top of other bundles or on spacers of adequate size and orientation, shall be secured by.
- (a) tiedowns over the top layer of bundles, in accordance with provisions of section 22 of this Standard, with a minimum of two tiedowns for bundle(s) longer than 1.52 metres, and
 - (b) tiedowns over the second layer of bundles, or at 1.85 metres above the vehicle deck, whichever is greater, or not over 1.85 metres above the deck for other multiple layers in accordance with the provisions of section 22 of this Standard, for each stack of bundles composed of more than two layers; and
- (2) where spacers are used, then
- (a) the length of spacers between bundles shall provide support to all pieces in the bottom row of the bundle, and
 - (b) the width of individual spacers shall be equal to or greater than the height, and
 - (c) spacers shall provide good interlayer friction, and
 - (d) where spacers are comprised of layers of material, the layers shall be unitized or fastened together in a manner which ensures that the spacer performs as a single piece of material.

Layers of Bundles

- 47 Bundles carried in 2 or more layers shall be secured by tiedowns laid out over each layer of bundles, in accordance with the provisions of section 22 of this Standard with a minimum of two tiedowns over each top bundle(s) longer than 1.52 metres, in all other circumstances.

Division 3 - Metal Coils

Application

- 48 This Division applies to a flatbed vehicle or a sided vehicle or intermodal container that is transporting one or more metal coils that individually or grouped together have a total weight of 2 268 kilograms or more.

Coils transported with eyes vertical by a vehicle or an intermodal container with anchor points

- 49(1) This section applies to coils transported with the eyes vertical.
- (2) Where a vehicle is transporting a single coil or several coils which are not grouped in a row, each coil shall be secured by tiedowns arranged in a manner that prevents the coil from tipping forward, rearward, or sideways. The securement system shall include:
- (a) at least 1 tiedown attached diagonally from the left side of the vehicle near the forward-most part of the coil, across the eye of the coil, to the right side of the vehicle near the rearmost part of the coil,
 - (b) at least 1 tiedown attached diagonally from the right side of the vehicle near the forward-most part of the coil, across the eye of the coil, to the left side of the vehicle near the rearmost part of the coil,
 - (c) at least 1 tiedown attached across the eye of the coil, and
 - (d) blocking and bracing, friction mats or tiedowns that prevent the coil moving forward.
- (3) Where a vehicle is transporting coils that are grouped and loaded side by side in a transverse or lengthwise row, each row shall be secured by
- (a) at least 1 tiedown against the front of the row, restraining against forward movement, and where practical, making an angle of not more than 45 degrees with the deck when viewed from the side,
 - (b) at least 1 tiedown against the rear of the row , restraining against rearward movement, and where practical, making an angle of not more than 45 degrees with the deck when viewed from the side,
 - (c) at least one tiedown over the top of each coil or each transverse row of coils, restraining against vertical movement, and
 - (d) tiedowns shall be arranged to prevent shifting and tipping in the forward, rearward and lateral directions.

- (4) Subject to subsections (2) and (3) a tiedown going over the top of a coil shall be as close as practical to the eye of the coil.

Coils transported with eyes crosswise by a vehicle or an intermodal container with anchor points

- 50(1) This section applies to coils transported with the eyes crosswise.
- (2) Each coil shall be immobilized with timbers, chocks or wedges, a cradle or other device that
- (a) prevents the coil from rolling,
 - (b) supports the coil off the deck, and
 - (c) is not capable of becoming unfastened or loose while the vehicle is on a highway.
- (3) Where timbers, chocks or wedges are used to secure a coil, they shall be held in place by coil bunks or similar devices to prevent the blocking device from coming loose.
- (4) Each coil shall be secured with
- (a) at least 1 tiedown through its eye, restricting against forward movement, and where practical, making an angle of not more than 45 degrees with the deck when viewed from the side, and
 - (b) at least one tiedown through its eye, restricting against rearward movement, and where practical, making an angle of not more than 45 degrees with the deck when viewed from the side.

Coils transported with eyes lengthwise by a vehicle or an intermodal container with anchor points

- 51 An individual metal coil transported with the eye lengthwise shall be secured in accordance with one of sections 52, 53 or 54.
- 52(1) Each coil shall be immobilized by timbers, chocks or wedges, a cradle or another method that
- (a) prevents the coil from rolling,
 - (b) supports the coil off the deck, and
 - (c) is not capable of becoming unfastened or loose while the vehicle is on a highway.

- (2) Where timbers, chocks or wedges are used to secure a coil, they shall be held in place by coil bunks or similar devices to prevent the blocking device from coming loose.
 - (3) Each coil shall be secured with
 - (a) at least 1 tiedown attached diagonally through its eye from the left side of the vehicle near the forward-most part of the coil, to the right side of the vehicle near the rearmost part of the coil, making an angle of not more than 45 degrees, where practical, with the deck when viewed from the side,
 - (b) at least 1 tiedown attached diagonally through its eye, from the right side of the vehicle near the forward-most part of the coil, to the left side of the vehicle near the rearmost part of the coil, making an angle of not more than 45 degrees, where practical, with the deck when viewed from the side,
 - (c) at least 1 tiedown attached across the top of the coil, and
 - (d) blocking or friction mats to prevent a coil from moving lengthwise.
- 53(1) Each coil shall be immobilized by timbers, chocks or wedges, a cradle or another method that
- (a) prevents the coil from rolling,
 - (b) supports the coil off the deck, and
 - (c) is not capable of becoming unfastened or loose while the vehicle is on a highway.
- (2) Where timbers, chocks or wedges are used to secure a coil, they shall be held in place by coil bunks or similar devices to prevent the blocking device from coming loose.
 - (3) Each coil shall be secured with
 - (a) at least 1 tiedown attached straight through its eye from the left side of the vehicle near the forward-most part of the coil, to the left side of the vehicle near the rearmost part of the coil and, where practical, making an angle of not more than 45 degrees with the deck when viewed from the side,
 - (b) at least 1 tiedown attached straight through its eye, from the right side of the vehicle near the forward-most part of the coil, to the right side of the vehicle near the rearmost part of the coil and, where practical, making an angle of not more than 45 degrees with the deck when viewed from the side,
 - (c) at least 1 tiedown attached across the top of the coil, and
 - (d) blocking or friction mats to prevent the coil from moving lengthwise.

- 54(1) Each coil shall be immobilized by timbers, chocks or wedges, a cradle or another method that
- (a) prevents the coil from rolling,
 - (b) supports the coil off the deck, and
 - (c) is not capable of becoming unfastened or loose while the vehicle is on a highway.
- (2) Where timbers, chocks or wedges are used to secure a coil, they shall be held in place by coil bunks or similar devices to prevent the blocking device from coming loose.
- (3) Each coil shall be secured by
- (a) at least 1 tiedown over the top of the coil, located near the forward-most part of the coil,
 - (b) at least 1 tiedown over the top of the coil located near the rearmost part of the coil, and
 - (c) blocking or friction mats to prevent the coil from moving lengthwise.

Rows of coils

- 55(1) This section applies to the transportation of transverse rows of metal coils with eyes lengthwise and with approximately equal outside diameters.
- (2) A transverse row of coils shall be immobilized by timbers, chocks or wedges, a cradle or another method that
- (a) prevents the coils from rolling,
 - (b) supports the coils off the deck, and
 - (c) is not capable of becoming unfastened or loose while the vehicle is on a highway.
- (3) Where timbers, chocks or wedges are used to secure a row of coils, they shall be held in place by coil bunks or similar devices to prevent the blocking device from coming loose.
- (4) A transverse row of coils shall be secured by
- (a) at least 1 tiedown over the top of each coil, located near the forward-most part of the coil,
 - (b) at least 1 tiedown over the top of each coil, located near the rearmost part of the coil, and

- (c) blocking or friction mats to prevent each coil from moving lengthwise.

Prohibitions

- 56 The use of nailed wood blocking or cleats as the sole means to secure timbers, chocks or wedges, or a nailed wood cradle is prohibited when metal coils are transported with eyes lengthwise or eyes crosswise by a vehicle or an intermodal container with anchor points.
- 57 When coils are transported with eyes crosswise, attaching tiedowns diagonally through the eye of a coil to form an X pattern when viewed from above the vehicle is prohibited.

Securement of Coils Transported in a Sided Vehicle or Intermodal Container without Anchor Points

- 58 Metal coils shall be secured in a manner to prevent shifting and tipping using a system of blocking and bracing, friction mats, tiedowns, or a combination of these.

Division 4 - Paper Rolls

Application

- 59(1) This Division applies to the transportation of paper rolls which individually or together weigh 2 268 kilograms or more.
- (2) Paper rolls may be secured in accordance with this Division where:
 - (a) the total weight is less than 2 268 kilograms, and
 - (b) a single or several paper rolls are unitized on a pallet.

Friction mats

- 60 A friction mat used to provide the principal securement for a paper roll shall protrude from beneath the roll in the direction in which it is providing that securement.

Chocks, wedges and blocking

- 61 Chocks, wedges or blocking used to secure paper rolls shall not shift or become unfastened while the vehicle is on a highway.

Banding

- 62 Where paper rolls are banded together,
 - (a) the rolls shall be placed tightly against each other to form a stable group,

- (b) the banding shall be applied tightly and remain so, and
- (c) the banding shall be secured so that it cannot fall off the rolls or to the deck.

Single layer of paper rolls transported eyes vertical in a sided vehicle

- 63(1) This section applies to paper rolls that are transported with the eyes vertical in a single layer in a sided vehicle.
- (2) The paper rolls shall be placed tightly against the front and both side walls of the vehicle, other paper rolls or other cargo.
 - (3) Where there are not enough paper rolls in a group of paper rolls to reach the walls of the vehicle, void fillers, blocking, bracing, tiedowns or friction mats shall be used to prevent the rolls moving sideways.
 - (4) Paper rolls may be banded together.
 - (5) Where a space behind a group of paper rolls, including that at the rear of the vehicle, exceeds the diameter of the paper rolls, the rolls shall be prevented from moving rearward by blocking, bracing, tiedowns or friction mats or by banding the last roll to other rolls.
 - (6) A paper roll shall be prevented from tipping or falling sideways or rearwards by banding it to other rolls or by using bracing or tiedowns where
 - (a) the vehicle's structure or other cargo does not prevent the roll from tipping or falling sideways or rearwards, and
 - (b) the width of the roll is more than 2 times its diameter.
 - (7) A single paper roll or the forward most roll in a group of paper rolls shall be prevented from tipping or falling forward by banding it to other rolls or by using bracing or tiedowns where
 - (a) the vehicle's structure or other cargo does not prevent the roll from tipping or falling forward,
 - (b) the roll is restrained against moving forward only by friction mats, and
 - (c) the width of the roll is more than 1.75 times its diameter.
 - (8) A single paper roll or the forward most roll in a group of rolls shall be prevented from tipping or falling forward by banding it to other rolls or by using bracing or tiedowns where

- (a) the vehicle's structure or other cargo does not prevent the roll from tipping or falling forward, and
- (b) the width of the roll is more than 1.25 times its diameter

Split cargo of paper rolls transported with eyes vertical in a sided vehicle

- 64(1) This section applies to split cargo of paper rolls transported with the eyes vertical in a sided vehicle
- (2) Where a paper roll in a split cargo of paper rolls transported with the eyes vertical in a sided vehicle is not prevented from moving forward by the vehicle's structure or other cargo, it shall be prevented from moving forward
- (a) by filling the open space,
 - (b) by using blocking, bracing, tiedowns, friction mats, or
 - (c) by using a combination of the methods in clauses (a) and (b).

Stacked cargo of paper rolls transported with eyes vertical in a sided vehicle

- 65(1) This section applies to stacked cargo of paper rolls transported with the eyes vertical in a sided vehicle.
- (2) Section 63 applies to the bottom layer in a stacked cargo of paper rolls.
- (3) Paper rolls shall not be loaded on top of another layer unless the layer beneath extends to the front of the vehicle.
- (4) Paper rolls in the 2nd and subsequent layers shall be prevented from moving forward, rearward or sideways
- (a) in accordance with section 63, or
 - (b) by using a blocking roll from a lower layer.
- (5) A blocking roll used to prevent forward, rearward or sideways movement shall be
- (a) at least 38 millimetres taller than other rolls, or
 - (b) raised at least 38 millimetres using dunnage or another method.
- (6) Despite subsection (5), a roll at the rear end of a layer of rolls shall not be raised using dunnage.

Single layer of paper rolls transported eyes crosswise in a sided vehicle

- 66(1) This section applies to a single layer of paper rolls transported with the eyes crosswise in a sided vehicle.
- (2) The paper rolls shall be prevented from rolling or moving lengthwise
- (a) by contact with the vehicle's structure or other cargo, or
 - (b) by chocks, wedges, blocking, bracing or tiedowns.
- (3) Void fillers, blocking, bracing, friction mats or tiedowns shall be used to prevent a paper roll from moving sideways towards the side walls of the vehicle where the total space between the ends of the paper roll, or the outer rolls in a row of paper rolls, and the walls of the vehicle is more than 203 millimetres.

Rear doors

- 67 A vehicle transporting paper rolls with the eyes crosswise shall not use the rear doors of the vehicle
- (a) to secure the rearmost paper roll or layer of paper rolls, or
 - (b) to hold blocking that secures the rearmost paper roll or layer of paper rolls.

Stacked cargo of paper rolls transported eyes crosswise in a sided vehicle

- 68(1) This section applies to stacked cargo of paper rolls transported in a sided vehicle with the eyes crosswise.
- (2) Section 66 applies to the bottom layer in a stacked cargo of paper rolls.
- (3) Paper rolls shall not be loaded in a 2nd layer unless the bottom layer extends to the front of the vehicle.
- (4) Paper rolls shall not be loaded in a 3rd or higher layer unless all the cylinder wells in the layer beneath are filled.
- (5) The foremost paper roll in each upper layer and a roll with an empty cylinder well in front of it shall be secured against moving forward by
- (a) banding it to other paper rolls, or
 - (b) blocking against a secured eye-vertical blocking roll resting on the deck that is at least 1.5 times taller than the diameter of the roll being blocked, or

- (c) placing it in a cylinder well formed by 2 paper rolls on the lower layer with a diameter equal to or greater than that of the paper roll on the upper layer.
- (6) The rearmost paper roll in each upper layer shall be secured by banding it to other paper rolls where it is located in either of the last 2 cylinder wells formed by the rearmost paper rolls in the layer below.
- (7) Void fillers, blocking, bracing, friction mats or tiedowns shall be used to prevent a paper roll from moving sideways towards the side walls of the vehicle where the total space between the ends of the paper roll, or the outer rolls in a row of paper rolls, and the walls of the vehicle is more than 203 millimetres.

Single layer of paper rolls transported eyes lengthwise in a sided vehicle

- 69(1) This section applies to paper rolls transported in a sided vehicle in a single layer with the eyes lengthwise.
- (2) A paper roll shall be prevented from moving forward by contact with the vehicle's structure or other cargo or by blocking or tiedowns.
- (3) A paper roll shall be prevented from moving rearward by contact with other cargo or by blocking, friction mats or tiedowns.
- (4) A paper roll shall be prevented from rolling or moving sideways by contact with the vehicle's wall or other cargo or by chocks, wedges or other blocking mechanism.

Stacked cargo of paper rolls transported eyes lengthwise in a sided vehicle

- 70(1) This section applies to stacked cargo of paper rolls transported with the eyes lengthwise in a sided vehicle
- (2) Section 69 applies to the bottom layer in a stacked cargo of paper rolls.
- (3) Paper rolls shall not be loaded in a higher layer unless all the cylinder wells in the layer beneath are filled.
- (4) An upper layer of paper rolls shall be formed by placing the paper rolls in the cylinder wells formed by the rolls beneath.
- (5) Paper rolls in the 2nd and higher layers shall be prevented from moving forward or rearward
 - (a) in accordance with section 69,
 - (b) by using a blocking roll from a lower layer, or

- (c) by banding them to other rolls.

Cargo of paper rolls transported with eyes vertical or with eyes lengthwise on a flatbed vehicle or in a curtain sided vehicle

- 71(1) This section applies to cargo of paper rolls transported with the eyes vertical or with eyes lengthwise on a flatbed vehicle or in a curtain sided vehicle
- (2) The paper rolls shall be loaded and secured as described for a sided vehicle, and the entire load shall be secured by tiedowns in accordance with the provisions of section 22 of this Standard.
- (3) Stacked loads of paper rolls with eyes vertical are prohibited.

Cargo of paper rolls transported with eyes crosswise on a flatbed vehicle or in a curtain sided vehicle

- 72(1) This section applies to cargo of paper rolls transported with the eyes crosswise on a flatbed vehicle or in a curtain sided vehicle
- (2) The paper rolls shall be prevented from rolling or shifting longitudinally by contact with vehicle structure or other cargo, by chocks, by wedges, by blocking and bracing of adequate size, or by tiedowns.
- (3) When used, chocks, wedges or blocking must be held securely in place by some means in addition to friction so that they cannot become unfastened or loose while the vehicle is on a highway.
- (4) Tiedowns shall be used in accordance with the provisions of section 22 of this Standard to prevent lateral movement.

Division 5 -Concrete Pipe

In this Division pipe means concrete pipe.

Application

- 73(1) This Division applies to the transportation of concrete pipes loaded transversely on a flatbed vehicle
- (2) This Division does not apply to
 - (a) unitized concrete pipes that has no tendency to roll, or
 - (b) concrete pipe loaded in a sided vehicle.

- (3) Section 22 does not apply to the transportation of concrete pipes to which this Division applies.

Tiedowns

- 74 A transverse tiedown running through a pipe in an upper layer or over lengthwise tiedowns is considered to secure all the concrete pipe in a lower layer on which that tiedown causes pressure.

Blocking

- 75(1) The blocking used to secure a pipe shall comply with this section.
- (2) Blocking shall be placed symmetrically about the centre of the pipe
- (3) Where one piece of blocking is used it shall extend to at least $\frac{1}{2}$ the distance from the centre to each end of the pipe.
- (4) Where two pieces of blocking are used they shall be placed near each end of the pipe
- (5) Blocking shall be placed firmly against a pipe and shall be secured to prevent it moving out from under the pipe
- (6) Timber blocking shall have a minimum dimension of at least 8.9 centimetres by 14 centimetres

Multi-sized pipe

- 76 Where the pipes to be transported on a vehicle have different diameters,
- (a) pipes with the same diameter shall be grouped together, and
- (b) each group shall be secured separately.

Arranging layers

- 77(1) This section applies to pipe arranged in layers on a vehicle.
- (2) The bottom layer of pipes shall be arranged to cover the full length of the vehicle or, as a partial layer with one or 2 groups.
- (3) Pipe in an upper layer shall be placed only in the cylinder wells formed by adjacent pipes in the layer beneath.

- (4) A 3rd or higher layer of pipe shall not be formed unless all the cylinder wells in the layer beneath are filled with pipe.
- (5) The top layer shall be arranged as a complete layer or, as a partial layer in one or 2 groups.

Bell Pipe

- 78(1) Bell pipe shall be loaded on at least 2 lengthwise spacers of sufficient height so that the bell is clear of the deck.
- (2) Bell pipes loaded in a single layer shall have the bells alternating on opposite sides of the vehicle.
- (3) The ends of consecutive bell pipes shall be
 - (a) staggered, where possible, within the allowable width, or
 - (b) aligned.
- (4) Stacked bell pipes shall have all the bells of the bottom layer on the same side of the vehicle.
- (5) Stacked bell pipes shall be loaded with bells on the opposite side of the vehicle to the bells of the pipe in the layer beneath.
- (6) Where the second layer of stacked bell pipes is not complete, the bells of the pipes in the bottom layer that do not support a pipe above shall alternate on opposite sides of the vehicle.

Single layer or Bottom layer, small pipe

- 79(1) This section applies to small pipes arranged in a single layer or in the bottom layer of stacked pipes.
- (2) The front and the rear pipes of each group of pipes arranged in a single layer or in bottom layer shall be immobilized lengthwise at each end by blocking, vehicle end structure, stakes, a locked pipe unloader or other equivalent means.
- (3) Pipe that is not at the end of a group of pipes arranged in a single layer or in a bottom layer may be held in place by blocks, wedges or both.
- (4) A pipe in a single layer or in the bottom layer shall be held firmly in contact with the adjacent pipe by tiedowns running through the front and rear pipes of a group of pipes:

- (a) One or more tiedowns running through the front pipe of each group of pipes arranged in a single layer or in a bottom layer shall run rearward at an angle, where practical, of not more than 45 degrees with the horizontal, and
- (b) One or more tiedowns running through the rear pipe of each group of pipes arranged in a single layer or in a bottom layer shall run forward at an angle, where practical, of not more than 45 degrees with the horizontal.

Tiedowns for securing layers of small concrete pipes

80(1) This section applies to all cargo of small pipes.

- (2) A pipe may be secured with a tiedown running through it.
- (3) Where each pipe is not secured individually with a tiedown
 - (a) one 1.27 centimetre (1/2 inch) diameter chain or wire rope or two 0.95 centimetre (3/8 inch) diameter chains or wire ropes shall be placed lengthwise over the group of pipes, and
 - (b) one transverse tiedown shall be used for every 3.04 metres of cargo length.
- (4) The transverse tiedowns referred to in subsection (3) shall be placed
 - (a) through a pipe on the top layer, or
 - (b) over the lengthwise tiedown between 2 pipes on the top layer.

Top layer, small pipes

81(1) This section applies to small pipes in the top layer of stacked pipes.

- (2) Where the first pipe of a group in the top layer is not placed in the first cylinder well formed by the pipes at the front of the layer beneath, it shall be secured by an additional tiedown that
 - (a) runs rearward at an angle, where practical, of not more than 45 degrees to the horizontal, and
 - (b) passes through the front pipe of the upper layer or outside before the front pipe of the upper layer and over the lengthwise tiedown
- (3) Where the last pipe of a group in the top layer is not placed in the last cylinder well formed by the pipes at the rear of the layer beneath, it shall be secured by an additional tiedown that

- (a) runs forward at an angle, where practical, of not more than 45 degrees to the horizontal, and
- (b) passes through the rear pipe of the upper layer or outside after the rear pipe of the upper layer and over the lengthwise tiedown.

Large pipes

82(1) This section applies to the transportation of large pipe.

- (2) The front pipe and the rear pipe in a group of pipes transported on a vehicle shall be immobilized by blocking, wedges, vehicle end structure, stakes, locked pipe unloader or other equivalent means
- (3) Each pipe in the front half of the group of pipes, including the middle one where there is an odd number, shall have at least one tiedown that passes through the pipe
 - (a) running rearward at an angle, where practical, of not more than 45 degrees with the horizontal, and
 - (b) holding the pipe firmly in contact with an adjacent pipe.
- (4) Each pipe in the rear half of the group of pipes, shall have at least one tiedown that passes through the pipe
 - (a) running forward at an angle, where practical, of not more than 45 degrees with the horizontal, and
 - (b) holding the pipe firmly in contact with an adjacent pipe.
- (5) Where the front pipe in a group of pipes is not in contact with the vehicle's end structure, stakes or other equivalent means, it shall be secured by at least 2 tiedowns positioned in accordance with subsections (3).
- (6) Where the rear pipe in a group of pipes is not in contact with the vehicle's end structure, stakes, a locked pipe unloader, or other equivalent means, it shall be secured by at least 2 tiedowns positioned in accordance with subsections (4).
- (7) Where the vehicle is transporting a single pipe, or several pipes that do not touch each other, a pipe shall be secured under this section as where it were the front or rear pipe in a group of pipes.

Division 6 - Intermodal Containers

Application

83 This Division applies to the transportation of intermodal containers.

Intermodal container transported on Container chassis vehicle

- 84(1) This section applies to the transportation of an intermodal container on a container chassis vehicle
- (2) Despite section 22, an intermodal container shall be secured to the container chassis with integral locking devices.
 - (3) The integral locking devices used shall restrain each lower corner of the intermodal container from moving
 - (a) more than 1.27 centimetres forward,
 - (b) more than 1.27 centimetres rearward,
 - (c) more than 1.27 centimetres to the right,
 - (d) more than 1.27 centimetres to the left, and
 - (e) more than 2.54 centimetres vertically.
 - (4) The front and the rear of the intermodal container shall be independently secured.

Loaded intermodal container transported on other vehicles

- 85(1) This section applies to the transportation of a loaded intermodal container on a vehicle that is not a container chassis vehicle.
- (2) All the lower corners of a loaded intermodal container shall
 - (a) rest on the vehicle, or
 - (b) be supported by a structure
 - (i) capable of bearing the weight of the container, and
 - (ii) independently secured to the vehicle.
 - (3) Despite section 22, an intermodal container shall be secured to the vehicle by either or both

- (a) chains, wire ropes or integral locking devices that are fixed to all the lower corners,
 - (b) crossed chains that are fixed to all the upper corners.
- (4) The front and the rear of the intermodal container shall be independently secured.

Empty intermodal container transported on other vehicles

- 86(1) This section applies to the transportation of an empty intermodal container by a vehicle other than a container chassis vehicle.
- (2) All the lower corners of an empty intermodal container shall
- (a) rest on the vehicle, or
 - (b) be supported by a structure
 - (i) capable of bearing the weight of the container, and
 - (ii) independently secured to the vehicle.
- (3) An empty intermodal container is not required to comply with subsection (2) where
- (a) the container is balanced, positioned and stable on the vehicle before tiedowns or other securing devices are attached, and
 - (b) the container does not overhang either the front or rear of the vehicle by more than 1.5 metres
- (4) An empty intermodal container shall not interfere with the vehicle's manoeuvrability.
- (5) An empty intermodal container shall be secured against moving sideways, lengthwise or vertically in accordance with:
- (a) the provisions of section 85(3) and 85(4) of this Standard, or
 - (b) the provisions of section 22 of this Standard.

Division 7 - Vehicles as Cargo

Application

87(1) This Division applies to the transportation of light vehicles, heavy vehicles and flattened or crushed light vehicles.

Light vehicles

88(1) Light vehicles shall be secured in accordance with this section.

- (2) Despite section 22, a light vehicle shall be restrained at both the front and rear from moving sideways, forward, rearward and vertically using a minimum of 2 tiedowns.
- (3) Tiedowns that are designed to attach to the structure of a light vehicle shall be attached to the mounting points on the vehicle that are specifically designed for that purpose.
- (4) Tiedowns that are designed to fit over or around the wheels of a light vehicle shall restrain the vehicle from moving sideways, forward, rearward and vertically.
- (5) Despite section 20, edge protectors are not required for synthetic webbing at points where the webbing comes into contact with the tires of the light vehicle.

Heavy vehicles

89(1) Heavy vehicles shall be transported in accordance with this section.

- (2) Accessory equipment on a heavy vehicle, including a hydraulic shovel, shall be completely lowered and secured to the vehicle.
- (3) Articulated vehicles shall be restrained in a manner that prevents articulation while the vehicle is on a highway.
- (4) Despite section 22, a heavy vehicle with crawler tracks or wheels shall be restrained against moving sideways, forward, rearward and vertically by at least 4 tiedowns,
 - (a) each with a working load limit of at least 2 268 kilograms, and
 - (b) each attached, as close as practical, at the front and rear of the vehicle or to mounting points on the vehicle that are specifically designed for that purpose.

Flattened or crushed light vehicles

90 Flattened or crushed light vehicles shall be secured in accordance with the sections 91, 92 and 93.

Prohibition

91 Synthetic webbing shall not be used to secure flattened or crushed light vehicles.

Securement system for immobilizing stacks of flattened or crushed vehicles

92(1) Flattened or crushed light vehicles shall be transported with vehicles which.

- (a) have containment walls or comparable structures on 4 sides that
 - (i) extend to the full height of the cargo, and
 - (ii) prevent the cargo moving forward, rearward and sideways, or
- (b) have containment walls or comparable structures on 3 sides that
 - (i) extend to the full height of the cargo, and
 - (ii) prevent the cargo moving forward, rearward and to one side, and
 - (iii) have 2 or more tiedowns per stack of flattened or crushed vehicles, or
- (c) have containment walls or comparable structures on the front and rear that
 - (i) extend to the full height of the cargo, and
 - (ii) prevent the cargo moving forward and rearward, and
 - (iii) have 3 or more tiedowns per stack of flattened or crushed vehicles, or
- (d) have 4 or more tiedowns per stack of flattened or crushed vehicles.

(2) Despite Part 1 Division 4, each tiedown referred to in subsection 1 shall have a working load limit of 2 268 kilograms or more.

Containment of Loose Parts

93(1) A vehicle transporting flattened or crushed light vehicles shall have equipment that

- (a) extends the full height of the cargo, and
- (b) prevents any loose part of the load from falling from the vehicle.

- (2) For the purposes of subsection (1), the equipment used to contain loose parts shall be structural walls, floors, sides or sideboards or suitable covering material, alone or in combination.

Division 8 - Roll-on/roll-off and Hook Lift Containers

Application

- 94 This Division applies to the transportation of roll-on/roll-off containers and hook lift containers.

Replacement of Securing Devices

- 95(1) Where a front stop or lifting device of a securement system on a vehicle that is not equipped with an integral securement system is missing, damaged or not compatible with the securing devices on a container, additional manually installed tiedowns shall be used to secure the container to the vehicle.
- (2) Where a front stop or lifting device of an integral securement system on a vehicle is missing, damaged or not compatible with the securing devices on a container, the container shall be secured to the vehicle using manually installed tiedowns.
- (3) A manually installed tiedown shall provide the same level of securement as the missing, damaged or incompatible component it replaces.

No integral securement system

- 96(1) A roll-on/roll-off container or hook lift container transported by a vehicle that is not equipped with an integral securement system
- (a) shall be blocked against forward movement
 - (i) by the lifting device, stops or a combination of both, or
 - (ii) by another restraint mechanism,
 - (b) shall be secured to the front of the vehicle
 - (i) by the lifting device, or
 - (ii) by another securing device which restrains against sideways and vertical movement, and
 - (c) shall be secured to the rear of the vehicle in accordance with at least one of the following:

- (i) one tiedown attached to both the vehicle chassis and the container;
 - (ii) 2 tiedowns installed lengthwise, each securing one side of the container to one of the vehicle's side rails;
 - (iii) 2 hooks, or equivalent mechanisms, securing both sides of the container to the vehicle chassis at least as effectively as the tiedowns referred to in subclauses (i) and (ii).
- (2) A device used to secure a roll-on/roll off or hook lift container to the rear of a vehicle that is not equipped with an integral securement system
- (a) shall be installed not more than 2 metres from the rear of the container, and
 - (b) despite Part 1 Division 4, all tiedowns shall have a working load limit of at least 2 268 kilograms.
- (3) Sections 10(2) and 10(3) do not apply to this Division.

Division 9 - Boulders

Application

- 97(1) This Division applies to the transportation of boulders
- (a) on a flatbed vehicle, or
 - (b) in a vehicle whose sides are not designed and rated to contain such a cargo.
- (2) A piece of natural, irregularly shaped rock that weighs more than 100 kilograms but less than 5000 kilograms may be secured in accordance with this Division.
- (3) A piece of natural, irregularly shaped rock of any size may be contained within a vehicle that is designed to carry such a cargo.
- (4) A piece of rock of any size that is artificially formed or cut into shape and has a stable base for securement may be secured in accordance with this Division.

Positioning on vehicle

- 98(1) A boulder shall be placed with its flattest or its largest side down on the deck

- (2) A boulder shall be supported on at least 2 pieces of hardwood blocking with side dimensions of not less than 8.9 centimetres by 8.9 centimetres that extend the full width of the boulder,
 - (a) with side dimensions of not less than 8.9 centimetres by 8.9 centimetres,
 - (b) that extend the full width of the boulder,
 - (c) that are placed as symmetrically as possible under the boulder, and
 - (d) that support at least 3/4 of the length of the boulder.
- (3) Where the flattest side of a boulder is rounded or partially rounded and the boulder may roll,
 - (a) the boulder shall be in a crib made of hardwood fixed to the deck,
 - (b) the boulder shall rest on both the deck and the crib, and
 - (c) the boulder shall have at least three well-separated points of contact with the crib and deck to prevent the boulder from rolling in any direction.
- (4) Where a boulder is tapered, the narrowest end shall point towards the front of the vehicle.

Tiedowns

- 99(1) A tiedown used to secure a boulder shall be made of chain.
- (2) A tiedown that touches a boulder
 - (a) shall, where possible, be located in valleys or notches across the top of the boulder, and
 - (b) shall be arranged so that it does not slide across the rock surface.

Number of tiedowns

- 100(1) Despite section 22, each cubic shaped boulder shall be secured with 2 or more tiedowns placed
 - (a) transversely across the vehicle, and
 - (b) as close as possible to the hardwood blocking.
- (2) Despite section 22, each non-cubic shaped boulder with a stable base shall be secured with 2 or more tiedowns

- (a) forming an "X" pattern over the boulder,
 - (b) passing over the centre of the boulder, and
 - (c) attached to each other, where they intersect, by a shackle or other connecting device.
- (3) Despite sections 10(2), 10(3) and 22, each non-cubic shaped boulder with unstable base shall be secured with
- (a) one tiedown surrounding the top of the boulder
 - (i) located at a point between 1/2 and 2/3 of the height of the boulder, and
 - (ii) having a working load limit of at least the half of the weight of the boulder, and
 - (b) 4 tiedowns, each
 - (i) attached to the surrounding tiedown and to the vehicle that prevent the boulder moving horizontally, and
 - (ii) having a working load limit of at least 1/4 the weight of the boulder, and
 - (iii) shall be placed at an angle, where practical, of not more than 45 degrees from the horizontal

PART 3 - DEFAULT WORKING LOAD LIMITS

Section 1 - Chain

Size	Working Load Limit
7 mm (1/4 in)	580 kg (1300 lb.)
8 mm (5/16 in)	860 kg (1900 lb.)
10 mm (3/8 in)	1200 kg (2650 lb.)
11 mm (7/16 in)	1680 kg (3700 lb.)
13 mm (1/2 in)	2030 kg (4500 lb.)
16 mm (5/8 in)	3130 kg (6900 lb.)

Section 2 - Synthetic Webbing

Width	WLL
45 mm (1-3/4 in)	790 kg (1750 lb.)
50 mm (2 in)	910 kg (2000 lb.)
75 mm (3 in)	1360 kg (3000 lb.)
100 mm (4 in)	1810 kg (4000 lb.)

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

Diameter	WLL
7 mm (1/4 in)	640 kg (1400 lb.)
8 mm (5/16 in)	950 kg (2100 lb.)
10 mm (3/8 in)	1360 kg (3000 lb.)
11 mm (7/16 in)	1860 kg (4100 lb.)
13 mm (1/2 in)	2400 kg (5300 lb.)
16 mm (5/8 in)	3770 kg (8300 lb.)
20 mm (3/4 in)	4940 kg (10900 lb.)
22 mm (7/8 in)	7300 kg (16100 lb.)
25 mm (1 in)	9480 kg (20900 lb.)

Section 4 - Manila Rope

Diameter	WLL
10 mm (3/8 in)	90 kg (205 lb.)
11 mm (7/16 in)	120 kg (265 lb.)
13 mm (1/2 in)	150 kg (315 lb.)
16 mm (5/8 in)	210 kg (465 lb.)
20 mm (3/4 in)	290 kg (640 lb.)
25 mm (1 in)	480 kg (1050 lb.)

Section 5 - Synthetic Fiber Rope

Diameter	WLL
10 mm (3/8 in)	185 kg (410 lb.)
11 mm (7/16 in)	240 kg (530 lb.)
13 mm (1/2 in)	285 kg (630 lb.)
16 mm (5/8 in)	420 kg (930 lb.)
20 mm (3/4 in)	580 kg (1280 lb.)
25 mm (1 in)	950 kg (2100 lb.)

Section 6 - Steel Strapping

Width-thickness inch	WLL
1-1/4 x 0.029	540 kg (1190 lb.)
1-1/4 x 0.031	540 kg (1190 lb.)
1-1/4 x 0.035	540 kg (1190 lb.)
1-1/4 x 0.044	770 kg (1690 lb.)
1-1/4 x 0.050	770 kg (1690 lb.)
1-1/4 x 0.057	870 kg (1925 lb.)
2 x 0.044	1200 kg (2650 lb.)
2 x 0.050	1200 kg (2650 lb.)

PART 4 - MANUFACTURING STANDARDS

Section 1 - Vehicle Structure

Truck Trailer Manufacturers Association - RP 47

Section 2 - Anchor Points

Canadian Motor Vehicle Safety Standard (CMVSS 905)

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

Recommended Standard Specification for Interior Van Securement WSTDA-T5

Section 5 - Tiedowns

Web Sling and Tiedown Association

Recommended Standard Specification for Synthetic Webbing Tiedowns WSTDA-T1

Recommended Standard Specification for Winches Used With Synthetic Web Tiedowns
WSTDA-T3

Recommended Standard Specification for Interior Van Securement WSTDA-T5

Section 6 - Webbing Assemblies

Web Sling and Tiedown Association

Recommended Standard Specification for Synthetic Webbing Tiedowns WSTDA-T1

Recommended Operating, Care and Inspection Manual for Synthetic Web Tiedowns
WSTDA-T2

Recommended Standard Specification for Synthetic Webbing Used for Tiedowns
WSTDA-T4

Section 7 - Chain Assemblies

National Association of Chain Manufacturers

Welded Steel Chain Specifications

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)	3220 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

Wire Rope Users Manual

Section 9 - Synthetic Rope and Attachments

Cordage Institute:

CI-1301-96 Polyester Fiber Rope, 3 and 8 Strand Constructions

CI-1302A-96 Polyester/Polyolefin Dual Fiber Rope, 3 Strand Construction

CI-1302B-99 Polyester/Polyolefin Dual Fiber Rope, 8 Strand Construction

CI-1304-96 Polyester Fiber Rope, 3 and 8 Strand Constructions

CI-1305-96 Single Braided Polyester Fiber Rope, 12 Strand Construction

CI-1307-96 Polyester Fiber Rope, Double Braid Construction

CI-1307-96 Polyester Fiber Rope, High Performance Double Braid Construction

CI-1303-96 Nylon (Polyamide) Fiber Rope, 3 and 8 Strand Constructions

CI-1307-96 Nylon (Polyamide) Fiber Rope, Double Strand Construction
CI-1307-96 Nylon (Polyamide) Fiber Rope, High Performance Double Braid Construction

Section 10 - Steel Strapping

American Society for Testing and Materials

Standard Specification for Strapping, Flat Steel and Seals (ASTM D3953-91)

Section 11 - Clamps and Latches

International Standards Organization - 668.

Section 12 - Roll-on/Roll-off Containers

American National Standards Institute

Mobile Wastes and Recyclable Materials Collection, Transportation, and Compaction

Equipment - Safety Requirements (ASC Z245.1 -1999)

Waste Containers - Safety Requirements (ASC Z245.30 -1999)

Waste Containers - Compatibility Requirements (ASC Z245.60 -1999)

