TRUCKING RISK MANAGEMENT

Cargo Securement: FMCSA Requirements

49 CFR Part 393 Subpart I — Complete Compliance Guide

49 CFR 393	10,000 lbs	150 ft
Federal Standard	Aggregate WLL Minimum	Re-Check Interval

Prepared by First Underwriters Insurance Brokers

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Cargo Securement: FMCSA Requirements

49 CFR Part 393 Subpart I — Complete Compliance Guide

The Federal Motor Carrier Safety Administration (FMCSA) cargo securement regulations under 49 CFR Part 393 Subpart I establish minimum requirements for securing cargo on commercial motor vehicles operating in interstate commerce. These rules apply to all vehicles with a gross vehicle weight rating (GVWR) of 10,001 pounds or more. Violations are among the most common findings during roadside inspections, directly impacting your CSA scores in the Vehicle Maintenance BASIC and potentially resulting in out-of-service orders, fines, and increased insurance premiums.

This guide covers every major provision of the FMCSA cargo securement standard, including general performance criteria, working load limit requirements, commodity-specific rules, inspection obligations, and practical strategies for maintaining compliance. Use this document as a training resource, an audit reference, and a foundation for your fleet's cargo securement policies.

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1 Regulatory Framework and Applicability

The cargo securement standards codified in 49 CFR Part 393 Subpart I (§393.100 through §393.136) establish the federal minimum requirements for securing articles of cargo on commercial motor vehicles (CMVs). These regulations apply to all cargo-carrying CMVs as defined in 49 CFR §390.5, which includes any vehicle with a GVWR of 10,001 pounds or more, any vehicle designed to transport more than 8 passengers for compensation, or any vehicle transporting hazardous materials in reportable quantities.

The regulations were substantially revised in 2004 when FMCSA adopted the North American Cargo Securement Standard Model Regulations developed jointly with Transport Canada and the Secretariat of Communications and Transportation of Mexico. This harmonization ensures consistent requirements across all three North American countries for cross-border freight movement.

Scope of Application

The cargo securement rules apply to the transportation of all types of articles of cargo, except commodities in bulk that lack structure or fixed shape (such as liquids, gases, grain, sand, or gravel) and are transported in a tank, hopper, box, or similar device that forms part of the vehicle structure. The rules cover the following key areas:

- **Performance criteria** — General requirements that all securement systems must meet regardless of cargo type
- **Working load limits** — Minimum aggregate strength requirements for tiedowns based on cargo weight
- **Securement devices** — Standards for the equipment used to restrain cargo including chains, straps, wire rope, and cordage
- **Commodity-specific rules** — Additional requirements for 11 categories of cargo that present unique securement challenges
- **Inspection obligations** — Driver responsibilities for checking cargo securement before and during transport

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Key Regulatory Sections

CFR Section	Subject	Key Requirement
§393.100	Applicability and definitions	Defines scope, terms, and which vehicles must comply
§393.102	Securement systems	Performance criteria all systems must satisfy
§393.104	Blocking and bracing	Front-end structure or equivalent required
§393.106	Inspection during transport	Driver must inspect within first 50 miles, then every 150 miles or 3 hours
§393.108	Working load limits	Aggregate WLL must equal at least 50% of cargo weight
§393.110	Minimum number of tiedowns	Based on article length and weight; at least one regardless of weight
§393.112–.136	Commodity-specific rules	Additional requirements for 11 specific cargo types

■ NORTH AMERICAN HARMONIZATION

The FMCSA cargo securement standards are harmonized with Canadian and Mexican regulations. Carriers operating cross-border should note that while the core requirements are consistent, enforcement procedures and penalty structures differ by country. Always verify local requirements when operating outside the United States.

2 General Performance Criteria

Section §393.102 establishes the fundamental performance criteria that every cargo securement system must satisfy. These criteria apply universally—regardless of the specific cargo type, securement method, or vehicle configuration. A securement system is considered adequate only when it can withstand all forces that the cargo may be subjected to during normal transportation conditions.

Deceleration and Acceleration Forces

The cargo securement system must be capable of withstanding the following minimum forces, applied separately, without allowing the cargo to shift or become dislodged:

Direction	Force Requirement	Practical Meaning
Forward (deceleration)	0.8g (80% of cargo weight)	Must prevent forward shift during hard braking

Direction	Force Requirement	Practical Meaning
Rearward (acceleration)	0.5g (50% of cargo weight)	Must prevent rearward shift during acceleration
Sideways (lateral)	0.5g (50% of cargo weight)	Must prevent lateral shift during turns or evasive maneuvers
Vertical (upward)	0.2g (20% of cargo weight)	Must prevent cargo from bouncing or lifting from deck

These force values represent the minimum performance standard. Carriers should design securement systems that exceed these minimums to account for real-world conditions including rough roads, emergency maneuvers, and environmental factors such as wind loading on high-profile cargo.

Additional Performance Requirements

- **No loss of cargo:** Articles must not leak, spill, blow off, fall from, or otherwise become dislodged from the vehicle
- **Immobilization or securement:** All articles must be contained, immobilized, or secured by structures of adequate strength, dunnage, shoring bars, tiedowns, or a combination thereof
- **Friction considerations:** The securement system may rely on friction between the cargo and deck surface, provided the cargo is prevented from shifting by a combination of tiedowns and friction
- **Front-end protection:** Cargo must be restrained against forward movement by the headerboard (front-end structure), other cargo, or tiedowns capable of withstanding the 0.8g forward deceleration force
- **Rub rails and stake pockets:** When used as part of the securement system, these components must be in proper condition and securely attached to the vehicle

■ CRITICAL REQUIREMENT: FRONT-END STRUCTURE

Per §393.104, the front-end structure (headerboard/headache rack) must withstand a forward horizontal static load equal to 50% of the rated cargo capacity—but not more than 4,000 pounds. If the cargo is not in contact with the front-end structure, tiedowns alone must resist the full 0.8g forward force. Many out-of-service violations result from inadequate forward restraint.

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3 Working Load Limits and Tiedown Requirements

Sections §393.108 and §393.110 establish the core quantitative requirements for cargo tiedowns. The working load limit (WLL) concept is central to FMCSA cargo securement—it provides a measurable standard for determining whether sufficient securement has been applied to a given load.

Working Load Limit (WLL) Requirements — §393.108

The aggregate working load limit of all tiedowns used to secure an article or group of articles against movement must be at least 50% of the weight of the article or group of articles. This requirement applies in addition to any contribution from friction, blocking, or other containment methods. The WLL for each type of securement device is specified in the regulation or by the manufacturer's rating.

Securement Device	WLL Determination	Common WLL Range
Chain (Grade 43)	Marked on chain; per manufacturer	2,600–6,600 lbs per chain
Chain (Grade 70)	Marked on chain; per manufacturer	3,150–15,800 lbs per chain
Synthetic web strap	Marked on tag/label	2,000–6,000 lbs per strap
Wire rope	Based on diameter per §393.108 table	1,000–7,000 lbs per rope
Manila rope	Based on diameter per §393.108 table	120–1,350 lbs per rope
Synthetic cordage (nylon)	Based on diameter per §393.108 table	200–2,400 lbs per rope
Steel strapping	Based on width and thickness	540–6,750 lbs per strap

Minimum Number of Tiedowns — §393.110

In addition to meeting the aggregate WLL requirement, the regulations specify a minimum number of tiedowns based on the length and weight of the article being secured. These minimums apply when tiedowns are the sole means of securement and the cargo is not otherwise blocked or contained:

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Cargo Condition	Minimum Tiedowns Required
Article 5 feet or shorter, weighing ≤ 1,100 lbs	1 tiedown
Article 5 feet or shorter, weighing > 1,100 lbs	2 tiedowns
Article longer than 5 feet but ≤ 10 feet	2 tiedowns
Article longer than 10 feet	2 tiedowns, plus 1 for each additional 10 feet or fraction thereof
Any article regardless of size when stacked or grouped	Minimum to meet both WLL and stability requirements

Practical WLL Calculation Example

A 20,000-lb steel beam (24 feet long) requires: (1) Aggregate WLL of at least 10,000 lbs (50% of weight), and (2) At least 4 tiedowns (2 base + 1 per additional 10 feet, i.e., 2 + 2 = 4). Using Grade 70 chain rated at 4,700 lbs WLL each, you need at least 3 chains to meet WLL (3 × 4,700 = 14,100 > 10,000) but 4 chains to meet the minimum number requirement. Always satisfy both the WLL and minimum number requirements.

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4 Securement Devices and Systems

FMCSA regulations require that all securement devices, tiedown assemblies, and anchor points meet specific performance standards. Using damaged, degraded, or improperly rated equipment is a common cause of securement failures and regulatory violations. Every component in the securement system must be inspected and maintained regularly.

Tiedown Requirements — §393.104

Each tiedown must be attached and secured so that it can resist the forces specified in the performance criteria. Tiedowns must meet these requirements:

- **Proper attachment:** Each tiedown must be attached to the vehicle at anchor points capable of withstanding the applied forces
- **No damage:** Tiedowns must be free of knots, damage, or defects that would reduce their rated capacity
- **Edge protection:** Where a tiedown crosses a sharp edge that could cut or damage it, edge protection must be used
- **No loose ends:** Tiedowns must be taut and free of slack; loose tiedowns do not contribute to securement
- **Proper tensioning:** Ratchets, winches, or other tensioning devices must be in proper working condition

When to Remove Devices from Service

Device Type	Remove from Service When
Chain	Visible stretch, cracks, bent or twisted links, reduced cross-section, or weld splatter damage
Synthetic webbing	Cuts, burns, holes, fraying, UV degradation, knots tied in strap, missing/illegible WLL label
Wire rope	Kinks, bird-caging, broken wires (3+ in one strand or 6+ in one lay length), corrosion, reduction in diameter
Ratchet/Winch	Mechanism does not hold or release properly, bent handle, cracked housing, stripped gears
Anchor point	Deformation, cracking, excessive wear, loose or missing bolts, corrosion at welds
Binder (lever/ratchet)	Worn hooks, cracked body, release mechanism malfunctions, bent or deformed components

Blocking, Bracing, and Friction Mats

In addition to tiedowns, securement systems frequently incorporate blocking and bracing materials. Blocking prevents cargo from moving by filling void spaces, while bracing provides direct contact between the cargo and the vehicle structure. Friction mats (rubberized or textured mats placed between the cargo and deck) increase friction to supplement tiedown capacity. When friction mats are used properly, they can reduce the number of tiedowns

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required—however, they must be in good condition and appropriate for the cargo and deck surface.

5 Commodity-Specific Requirements

Sections §393.116 through §393.136 establish additional securement requirements for 11 categories of cargo that present unique challenges due to their shape, weight, or handling characteristics. These commodity-specific rules supplement—but do not replace—the general performance criteria. Carriers hauling these commodities must comply with both the general rules and the applicable commodity-specific provisions.

CFR Section	Commodity	Key Requirements
§393.116	Logs	Must be loaded within vehicle's rated capacity; bunks must support weight; vertical stakes required unless exempted; each log in contact with at least 2 stakes or chock blocks
§393.118	Dressed lumber and similar building products	Must be blocked, braced, or tied down to prevent lateral, forward, rearward, and vertical movement; bundles must not be higher than side stakes
§393.120	Metal coils	Specific securement depending on coil orientation (eyes vertical, eyes crosswise, eyes lengthwise); additional tiedowns based on coil weight; friction mat or direct contact required
§393.122	Paper rolls	Requirements vary by roll orientation (standing on end, on side with axis crosswise, on side with axis lengthwise); specific blocking and tiedown requirements for each configuration
§393.124	Concrete pipe	Must be arranged in tiers; each pipe in lower tier must contact at least 2 support points; upper tiers blocked to prevent rolling; specific tiedown requirements per tier
§393.126	Intermodal containers	Must be secured by proper twist-lock or other connecting devices at all four corners; containers on chassis must use locking devices designed for that purpose
§393.128	Automobiles, light trucks, and vans	At least 4 tiedowns per vehicle; must be attached at or near each corner; vehicle must be in park (automatic) or lowest gear (manual) with parking brake set
§393.130	Heavy vehicles, equipment, and machinery	Preparation required (lower blades, retract booms, secure articulation points); minimum of 4 tiedowns; additional tiedowns for items over 10,000 lbs based on weight
§393.132	Flattened or crushed vehicles	Stack may not extend beyond vehicle sides; adequate containment on all 4 sides; tiedowns must prevent lateral and longitudinal movement of the stack
§393.134	Roll-on/roll-off containers	Must be blocked against forward movement by vehicle structure and at least 2 tiedowns; hook-lift containers must be engaged and locked

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CFR Section	Commodity	Key Requirements
§393.136	Large boulders	Each boulder must be individually secured; specific requirements based on whether boulder is on frame vehicle or other vehicle; cradle or chock required to prevent rolling

■ METAL COIL SECUREMENT — FREQUENT VIOLATION

Metal coils (§393.120) are among the most frequently cited commodity-specific violations. Improperly secured coils can shift during transport, causing catastrophic results. Specific securement varies by coil orientation and weight class. Coils weighing 5,000 lbs or more require additional tiedowns and direct contact or friction mat. Review the specific requirements for your coil configuration before every load.

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6 Driver Responsibilities and Inspection

Section §393.106 places specific inspection responsibilities on drivers transporting cargo on CMVs. These inspection obligations are in addition to the pre-trip inspection requirements under §396.13. Drivers must ensure cargo is properly secured before beginning transport and must re-inspect at defined intervals throughout the trip.

Required Inspection Points

Inspection Point	When Required	What to Check
Pre-trip	Before beginning transport	All securement devices properly applied; cargo positioned and blocked correctly; all tiedowns taut; WLL requirements met
Within first 50 miles	After cargo has settled during initial transit	Re-tension tiedowns; check for shifted cargo; verify blocking and bracing integrity; confirm all devices still secure
Every 150 miles or 3 hours	Whichever occurs first after the 50-mile check	Same as 50-mile check; make adjustments as necessary; re-secure any loose tiedowns
Change of duty status	Whenever driver begins driving after any non-driving duty status	Complete securement inspection before resuming transport

Exceptions to Inspection Intervals

The inspection requirements at the 50-mile and 150-mile/3-hour intervals do not apply when the cargo is sealed and the driver has been ordered not to open the vehicle to inspect, when the vehicle is loaded in a manner that makes inspection of the cargo impracticable, or when the cargo has been loaded by the shipper and the driver was not allowed to inspect or adjust the cargo at loading. However, even in these circumstances, the driver remains responsible for monitoring from outside the vehicle for any visible signs of shifted or loose cargo.

Driver Documentation Best Practices

- **Log each inspection:** Record the time, location, and results of every cargo securement inspection in your trip records
- **Note adjustments made:** Document any tiedowns retightened, devices replaced, or cargo repositioned
- **Photograph loads:** Take photos at loading and at inspection stops to create a visual record of securement condition
- **Report equipment issues:** Immediately report any securement devices that need replacement to fleet maintenance
- **Verify WLL markings:** Confirm WLL labels and markings are legible on all securement devices before use

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✓ BEST PRACTICE: DOCUMENT EVERYTHING

Creating a written or photographic record of your cargo securement at each inspection point provides critical evidence during roadside inspections and in the event of a cargo-related incident. Many carriers use smartphone apps or ELD-integrated systems to timestamp and geotag inspection records. This documentation can be the difference between a citation and a clean inspection.

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7 Common Violations and CSA Impact

Cargo securement violations fall under the Vehicle Maintenance BASIC in FMCSA's Compliance, Safety, Accountability (CSA) program. These violations carry severity weights that range from 1 to 8 depending on the specific violation, and they can significantly impact your CSA percentile scores. Because the Vehicle Maintenance BASIC has an 80% intervention threshold (higher than the 65% threshold for most other BASICs), cargo violations must be combined with other vehicle defects—but frequent securement violations can quickly push carriers toward that threshold.

Most Frequently Cited Violations

Violation	CSA Severity	Description
Failure to secure cargo	6–8 (High)	Cargo not immobilized or secured per §393.102 performance criteria
Insufficient tiedowns	4–6 (Medium-High)	Number of tiedowns or aggregate WLL does not meet §393.108/§393.110 requirements
Damaged tiedowns in use	4 (Medium)	Tiedowns with knots, cuts, fraying, or other damage reducing rated capacity
Loose tiedowns	4 (Medium)	Tiedowns not taut; significant slack in securement system
No edge protection	2 (Low)	Tiedown crosses sharp edge without protective material to prevent cutting
Failure to re-inspect	2 (Low)	Driver did not verify securement within 50 miles or at 150-mile/3-hour intervals
Commodity-specific violation	4–8 (Varies)	Failure to meet additional requirements for logs, coils, autos, etc.
Inadequate front-end structure	6 (High)	Headerboard missing, damaged, or insufficient for rated capacity

Out-of-Service Criteria

Cargo securement violations can result in an out-of-service (OOS) order under the Commercial Vehicle Safety Alliance (CVSA) Out-of-Service Criteria. An OOS order prohibits the vehicle from moving until the violation is corrected. Common cargo-related OOS conditions include:

- Any cargo that is leaking, spilling, blowing off, falling from, or shifting to the extent it is likely to fall from the vehicle
- Lack of required securement devices for the cargo being transported (e.g., no tiedowns at all)

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- Total failure of a securement system with imminent danger of cargo loss
- Spare tire or other vehicle component not properly secured and in danger of falling
- Commodity-specific securement entirely missing (e.g., automobiles with no tiedowns attached)

■ FINANCIAL IMPACT OF CARGO VIOLATIONS

Federal penalties for cargo securement violations can reach $16,000 or more per violation. Beyond fines, each violation generates CSA points that persist for 24 months. Carriers with accumulated cargo violations face higher insurance premiums, shipper restrictions, and potential FMCSA interventions. The total cost of a single serious cargo securement violation—including fines, downtime, increased insurance, and lost business—can easily exceed $25,000.

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8 Compliance Best Practices

Maintaining consistent cargo securement compliance requires a systematic approach that encompasses driver training, equipment maintenance, operational procedures, and management oversight. The following best practices are drawn from FMCSA guidance, industry standards, and the operational experience of high-performing carriers.

Training and Education

- **Initial training:** All drivers must receive comprehensive cargo securement training before being allowed to transport cargo independently, covering 49 CFR Part 393 Subpart I requirements, hands-on tiedown application, and WLL calculations
- **Commodity-specific training:** Drivers who haul regulated commodities (coils, logs, autos, etc.) must receive additional training specific to those cargo types
- **Annual refresher:** Conduct yearly refresher training on cargo securement basics, recent violation trends, and any regulatory changes
- **New equipment orientation:** When new securement devices or methods are introduced, all affected drivers must be trained before use
- **Documentation:** Maintain training records including dates, topics covered, instructor qualifications, and driver sign-off for each training session

Equipment Management

- **Inventory and inspect:** Maintain a current inventory of all securement devices; inspect each device before every use
- **Replace immediately:** Remove any damaged, worn, or unmarked securement devices from service immediately—never "make do" with compromised equipment
- **WLL visibility:** Ensure all WLL markings and labels remain legible; replace straps and chains with illegible ratings
- **Storage:** Store securement devices properly to prevent UV degradation (webbing), corrosion (chain), and physical damage
- **Adequate supply:** Provide drivers with more securement devices than the minimum required to allow for adjustments and contingencies

Operational Procedures

- **Load planning:** Consider securement requirements during load planning—not as an afterthought at the dock
- **Standardized methods:** Develop standard securement procedures for your most common cargo types and make them available to all drivers
- **Pre-loaded verification:** When drivers pick up pre-loaded trailers, establish a policy for verifying securement before departure
- **Inspection checklists:** Provide drivers with cargo-specific inspection checklists for use at each required inspection interval

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• **Incident reporting:** Require immediate reporting of any cargo shift, securement failure, or near-miss event for investigation and corrective action

Quick Compliance Checklist — Before Every Trip

■ All cargo positioned and aligned properly on the vehicle | ■ Blocking and bracing in place to prevent movement in all directions | ■ Tiedowns meet minimum number requirements per §393.110 | ■ Aggregate WLL of tiedowns meets or exceeds 50% of cargo weight | ■ All tiedowns taut with no slack or excessive wear | ■ Edge protection applied wherever tiedowns contact sharp surfaces | ■ WLL labels legible on all securement devices | ■ Commodity-specific requirements satisfied (if applicable) | ■ Front-end structure adequate and in good condition | ■ Re-inspection schedule noted for 50-mile and 150-mile/3-hour intervals

Protect Your Fleet with the Right Coverage

Cargo securement violations increase your CSA scores and insurance costs. First Underwriters specializes in trucking insurance for carriers at every risk level—let us find coverage that fits your operation.

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