CARGO SECUREMENT RULES

Applicability of the New Rules

The new cargo securement rules apply to the same types of vehicles and cargo as the old rules, covering all cargo-carrying commercial motor vehicles (as defined in 49 CFR 390.5) operated in interstate commerce. This includes all types of articles of cargo, except commodities in bulk that lack structure or fixed shape (e.g., liquids, gases, grain, liquid concrete, sand, gravel, aggregates) and are transported in a tank, hopper, box or similar device that forms part of the structure of a commercial motor vehicle.

Performance Criteria

FMCSA has adopted new performance requirements concerning deceleration in the forward direction, and acceleration in the rearward and lateral directions, that cargo securement systems must withstand. Deceleration is the rate at which the speed of the vehicle decreases when the brakes are applied, and acceleration is the rate at which the speed of the vehicle increases in the lateral direction or sideways (while the vehicle is turning), or in the rearward direction (when the vehicle is being driven in reverse and makes contact with a loading dock). Acceleration and deceleration values are commonly reported as a proportion of the acceleration due to gravity (g). This acceleration is about 9.8 meters/second/second (32.2 feet/second/second), which means that the velocity of an object dropped from a high elevation increases by approximately 9.8 meters/second (32.2 feet/second) each second it falls. FMCSA requires that cargo securement systems be capable of withstanding the forces associated with following three deceleration/accelerations, applied separately:

1. 0.8 g deceleration in the forward direction;
2. 0.5 g acceleration in the rearward direction; and
3. 0.5 g acceleration in a lateral direction.

These values were chosen based on researchers' analysis of studies concerning commercial motor vehicle performance. The analysis indicated that the highest deceleration likely for an empty or lightly loaded vehicle with an antilock brake system, all brakes properly adjusted, and warmed to provide optimal braking performance, is in the range of 0.8-0.85 g. However, a typical loaded vehicle would not be expected to achieve a deceleration greater than 0.6 g on a dry road. The typical lateral acceleration while driving in a curve or on a ramp at the posted advisory speed is in the range 0.05-0.17 g. Loaded vehicles with a high center of gravity roll over at a lateral acceleration above 0.35 g. Lightly loaded vehicles, or heavily loaded vehicles with a lower center of gravity, may withstand lateral acceleration forces greater than 0.5 g.
Generally, motor carriers are not required to conduct testing of cargo securement systems to determine compliance with the performance requirements. The new rules explicitly state that cargo immobilized or secured in accordance with the general securement rules, or the commodity-specific rules, are considered to meet the performance criteria.

Requirements for Securement Devices

The new rules require that all devices and systems used to secure cargo to or within a vehicle must be capable of meeting the performance criteria. All vehicle structures, systems, parts and components used to secure cargo must be in proper working order when used to perform that function with no damaged or weakened components that could adversely affect their performance. The cargo securement rules incorporate by reference manufacturing standards for certain types of tiedowns including steel strapping, chain, synthetic webbing, wire rope, and cordage. FMCSA has updated the rules to reference the November 15, 1999, version of the National Association of Chain Manufacturers (NACM) Welded Steel Chain Specifications. The agency notes that some of the working load limit values in the 1999 version differ slightly from the previous edition of this publication. Also, the 1999 version includes working load limits for a new grade of alloy chain, grade 100. The agency also changed its reference for synthetic webbing from the 1991 edition to the 1998 edition of the Web Sling and Tiedown Association's publication. Generally, the working load limits are the same as those in the 1991 publication. Changes in the references do not necessarily mean the older securement devices need to be replaced. Motor carriers are not required to replace tiedown devices purchased prior to January 1, 2004. If the tiedowns satisfied the old rules, the devices should also satisfy the new rules.

Proper Use of Tiedowns

The new regulations require each tiedown to be attached and secured in a manner that prevents it from becoming loose, unfastening, opening or releasing while the vehicle is in transit. All tiedowns and other components of a cargo securement system used to secure loads on a trailer equipped with rub rails must be located inboard of the rub rails whenever practicable. Also, edge protection must be used whenever a tiedown would be subject to abrasion or cutting at the point where it touches an article of cargo. The edge protection must resist abrasion, cutting and crushing.

Use of Unmarked Tiedowns

The new rules do not prohibit the use of unmarked tiedown devices. Although many of the participants in the public meetings and numerous commenters to the rulemaking proposal argued the rules should include such a prohibition, FMCSA believes it is inappropriate to prohibit unmarked tiedowns at this time. However, in view of the potential safety hazards of motor carriers misidentifying unmarked tiedowns, there is a provision that unmarked welded steel chain be considered to have a working load limit equal to that of grade 30 proof coil, and other types of unmarked tiedowns be considered to have a working load limit equal to the lowest rating for that type in the table of working load limits.

Unrated and Unmarked Anchor Points

FMCSAs cargo securement rules do not require rating and marking of anchor points. While the agency encourages manufacturers to rate and mark anchor points, the new rules do not include a requirement for ratings and markings.

Front End Structures on CMVs

FMCSA revised its rules concerning front-end structures or headerboards by changing the applicability of the requirements to cover CMVs transporting cargo that is in contact with the front-end structure of the vehicle. By contrast, the old rules required certain vehicles to be equipped with front-end structures regardless of whether the devices were used as part of a cargo securement system.

Summary of the new cargo rules

The new cargo securement rules include general securement rules applicable to all types of articles of cargo, with certain exceptions, and commodity-specific rules covering commodities that are considered the most difficult to determine the most appropriate means of securement. Requirements concerning securement, working load limits, blocking and bracing are applicable to all commodities being transported. The commodity-specific requirements take precedence over the general rules when additional requirements are given for a commodity listed in those sections. This means all cargo securement systems must meet the general requirements, except to the extent a commodity-specific rule imposes additional requirements that prescribe in more detail the securement method to be used.

General Rule

Cargo must be firmly immobilized or secured on or within a vehicle by structures of adequate strength, dunnage (loose materials used to support and protect cargo) or dunnage bags (inflatable bags intended to fill space between articles of cargo or between cargo and the wall of the vehicle), shoring bars, tiedowns or a combination of these.

Cargo Placement and Restraint

Articles of cargo that are likely to roll must be restrained by chocks, wedges, a cradle or other equivalent means to prevent rolling. The means of preventing rolling must not be capable of becoming unintentionally unfastened or loose while the vehicle is in transit. Articles of cargo placed beside each other and secured by transverse tiedowns must be:

1. Placed in direct contact with each other, or
2. Prevented from shifting towards each other while in transit.

Minimum Working Load Limit for Cargo Securement Devices and Systems

The aggregate working load limit of any securement system used to secure an article or group of articles against movement must be at least one-half the weight of the article or group of articles. The aggregate working load limit is the sum of: One-half the working load limit of each tiedown that goes from an anchor point on the vehicle to an attachment point on an article of cargo; and The working load limit for each tiedown that goes from an anchor point on the vehicle, through, over or around the cargo and then attaches to another anchor point on the vehicle.

Minimum Number of Tiedowns

The cargo securement system used to restrain articles against movement must meet requirements concerning the minimum number of tiedowns. This requirement is in addition to complying with rules concerning the minimum working load limit. When an article of cargo is not blocked or positioned to prevent movement in the forward direction, the number of tiedowns needed depends on the length and weight of the articles. There must be - one tiedown for articles 5 ft or less in length, and 1,100 lbs or less in weight; two tiedowns if the article is -

1. 5 ft or less in length and more than 1,100 lbs in weight; or
2. greater than 5 ft but less than 10 ft, regardless of weight.

In the following example, one tiedown is required because the article of cargo is 5 ft in length and does not exceed 1,100 lbs. If the article of cargo were greater than 5 ft in length but less than 10 ft, two tiedowns would be needed regardless of the weight. When an article of cargo is not blocked or positioned to prevent movement in the forward direction, and the item is longer than 10 ft in length, then it must be secured by two tiedowns for the first 10 ft of length, and one additional tiedown for every 10 ft of length, or fraction thereof, beyond the first 10 ft. An example of this is provided below. If an article is blocked, braced or immobilized to prevent movement in the forward direction by a headerboard, bulkhead, other articles that are adequately secured, or other appropriate means, it must be secured by at least one tiedown for every 10 ft of article length, or fraction thereof.

Special Rule for Special Purpose Vehicles

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

Commodity-Specific Securement Requirements

FMCSA has adopted detailed requirements for the securement of the following commodities: logs; dressed lumber; metal coils; paper rolls; concrete pipe; intermodal containers; automobiles, light trucks and vans; heavy vehicles, equipment and machinery; flattened or crushed vehicles; roll-on/roll-off containers; and large boulders. During public meetings concerning the development of the model regulations, participants said that these commodities cause the most disagreement between industry and enforcement agencies as to what is required for proper securement.