



## *Safety Topic*

**May, 2002**

### Topic: Cylinder Loading, Unloading & Truck Securement

**INTRODUCTION:** Proper loading, unloading and securement techniques can prevent personal injuries, damage to cylinders and other equipment and loss of product. In addition, drivers can be held personally responsible by law for improper loading and securement.

**GOAL:** To insure that all drivers and helpers know how to properly load, unload, and secure cylinders.

**MEETING PREPARATION:** Review the Federal Motor Carrier Safety Regulations, 49 CFR '393 pertaining to load securement devices. Plan to adjourn outdoors to demonstrate loading and securement methods on a truck.

#### **ITEMS TO CONSIDER:**

- Are cylinders secured (a) relative to the vehicle and (b) relative to one another?
- Are small cylinders (D, E, B, MC, etc.) secured in a box or cabinet which itself is secured to the truck? If so, is there a lid or some other type of securement to prevent vertical movement?
- Do tiedown assemblies have an aggregate working load limit of at least 2 times the weight of the load and positioned on cylinders high enough to secure them?
- Does the truck have a tailgate strong enough to assure that cylinders cannot fall from the truck? If not, are tiedown assemblies placed at least every 10 feet throughout the load?
- Are cryogenic and aluminum cylinders protected against a chain binding? Either secure the cylinders with strap binders or arrange them so that high-pressure cylinders act as a buffer between them and the binding.
- Are cylinders secured to the lift gate during the raising and lowering process? Lift gates without securement rails are subject to OSHA fines. Cylinders are usually very unstable while being raised and lowered.

**FOLLOW-UP:** Periodically review truck bindings to determine that employees are using the proper number of straps, placing them at the proper heights, etc. Inspect bindings regularly to insure that they are in proper operating condition.

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### **Miscellaneous Rules (May, 2002 Safety Topic)**

49 CFR, 177.840

(a)(1) *Cylinders*. To prevent their overturning, cylinders containing Class 2 (gases) materials must be securely lashed in an upright position; loaded into racks securely attached to the motor vehicle; packed in boxes or crates of such dimensions as to prevent their overturning; or loaded in a horizontal position. Spec. DOT-4L cylinders must be loaded in an upright position and securely braced.

49 CFR, 177.747(d)

[The Segregation Table for Hazardous Materials states that a flammable gas may not be loaded on the same transport vehicle as a "zone A" poisonous gas. Also, a flammable gas may not be loaded on the same transport vehicle as a "zone B" poisonous gas unless "separated in a manner that, in the event of leakage from packages under conditions normally incident to transportation, commingling of hazardous materials would not occur."]

49 CFR, 393.100

(b) Basic protection component. Each cargo carrying motor vehicle must be equipped with devices providing protection against shifting or falling cargo that meet the requirements of either paragraph (b)(1), (2), (3), or (4) of this section.

(b)(1) Option A. The vehicle must have sides, side boards, or stakes, and a rear endgate, endboard, or stakes. Those devices must be strong enough and high enough to assure that cargo will not shift upon, or fall from the vehicle. Those devices must have no aperture large enough to permit cargo in contact with one or more of the devices to pass through it.

(b)(2) Option B. The vehicle must have at least one tiedown assembly that meets the requirements of "393.102 for each 10 linear feet of lading or fraction thereof (However, a pole trailer or an expandable trailer transporting metal articles under the special rules in paragraph (c) of this section is required only to have two or more of those tiedown assemblies at each end of the trailer). In addition, the vehicle must have as many additional tiedown assemblies meeting the requirements of "393.102 as are necessary to secure all cargo being transported either by direct contact between the cargo and the tiedown assemblies or by dunnage which is in contact with the cargo and is secured by tiedown assemblies.

(b)(3) Option C (for vehicles transporting metal articles only). A vehicle transporting cargo which consists of metal articles must conform to either the rules in paragraph (b) (1), (2), or (4) of this section, or the special rules for transportation of metal articles set forth in paragraph (c) of this section.

(b)(4) Option D. The vehicle must have other means of protecting against shifting or falling cargo which are similar to, and at least as effective as, those specified in paragraph (b)(1), (2), or (3) of this section.

49 CFR, 393.102(b)

(b) Tiedown assemblies. Except for integral securement devices of containers designed for the transportation of containerized, intermodal cargo which conform to the rules in "393.100(e), the aggregate working load limit of the tiedown assemblies used to secure an article against movement in any direction must be at least 2 times the weight of the article. With the exception of marking identification, tiedowns used must meet applicable manufacturing standards listed in this paragraph (b).

49 CFR, 393.102

(b)(6) Tables of working load limits. The working load limits listed in the tables in this paragraph are to be used when the tiedown material is not marked by the manufacturer with the working load limit. Tiedown materials which are marked by the manufacturer with working load limits which differ from the table, shall be considered to have a working load limit equal to the value for which they are marked. Synthetic cordage (e.g., nylon, polypropylene, polyester) which is not marked or labeled to enable identification of its composition or working load limit shall be considered to have a working load limit equal to that for polypropylene fiber rope.

Synthetic Webbing WLL (working load limit)

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

(c) Load binders and hardware. The strength of load binders and hardware that are part of, or used in conjunction with, a tiedown assembly must be equal to, or greater than the minimum strength specified for that tiedown assembly in paragraph (b) of this section.

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