

Hazardous Materials Transportation DOT REGULATIONS

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Published and Distributed by
Genium Publishing Corporation
One Genium Plaza
Schenectady, NY 12304-4690 USA
(518) 377-8854

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ISBN 0-931690-79-X
Printed in the United States of America

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Introduction

*49 CFR, HM-181, HM-126F,
performance-oriented packaging,
labels, placards, bills of lading,
packaging authorizations, vessel
stowage requirements, hazard class*

*Do these terms make your head
spin?*

When you're involved with the transportation of hazardous materials, the terms, rules, and regulations can be overwhelming. Just think about it - thousands of hazardous materials are transported (The hazardous materials shipping table is 200 pages long.); there's a variety of hazards that must be described (explosive, flammable, etc.); there's numerous ways these materials can be shipped (truck, train, plane, ship); not to mention the choice of container (cylinders, tanks, boxes, drums, etc.). Suddenly it's no mystery that the rules have grown to hundreds of fact-filled pages. Also, remember that we're talking about transporting - carrying from place to place. The act of transporting hazardous materials usually involves many people and many different environments. Telling people the important things they need to know about these hazardous materials requires written communications like labels, placards, and shipping papers.

The problem with transporting hazardous materials is not that there aren't enough rules and regulations. Quite the opposite - the problem is that there are so many rules and regulations that it's difficult for people to understand what they need to know about the specific hazardous material that they are transporting at the moment. The Department of Transportation (DOT) recognizes this

I. Regulatory Background

The Department of Transportation (DOT) is one of the Federal agencies that controls the management of hazardous materials. The DOT hazardous materials regulations (HMR) apply to the transportation of hazardous materials in commerce, and govern the safety aspects of transportation.

The regulations give requirements for:

- Classification of materials
- Packaging:
 - manufacture
 - qualification
- Hazard communication:
 - package marking
 - labeling
 - shipping
 - placarding
 - documentation
- Transportation and handling
- Incident reporting.

The HMR are contained in Title 49 of the Code of Federal Regulations (CFR), Subtitle B, Chapter 1, Subchapter C, Parts 171 through 180. Each numbered part deals with a single subject and is divided into sections labeled with the part number and a decimal. For example, the definitions and abbreviations used in the HMR are listed in section *171.8* in Part 171 - General information, regulations, and definitions. This section would be cited in abbreviated form as *49 CFR 171.8*, or, when it is clear that we are dealing with Title 49, *§171.8*.

The most important parts of the HMR include:

Part 171 - Includes definitions, reporting requirements, reference materials, and procedural requirements [including provisions incorporating other regulations, like the international rules governing air (IATA), and sea shipments (IMO)].

Part 172 - Includes the Hazardous Materials Table (§ 172.101), and hazard

II. Using the Haz-mat Regulations

The previous section briefly described the important haz-mat transportation regulations contained in 49 CFR. Shippers are most affected by Part 172. Part 172 contains the requirements applicable to shippers and carriers with respect to marking, labeling, placarding, development of shipping papers, training, and emergency response information connected with these materials.

The Hazardous Materials Table (HMT)

Within Part 172 is a large, 200-page table called the Hazardous Materials Table. This table and the accompanying explanations contain the essential shipping requirements for hazardous materials, such as the proper shipping name, the labels to be used, and the packaging that is authorized for each material, as well as other requirements. It is an imposing set of information, but an understanding of the elements in the table will provide you with a base level understanding of shipping documentation.

For illustrative purposes, the HMT headings and three entries are shown on page 16.

Everything starts from column 2 of the table, an alphabetical list of available *proper shipping names*. Many of the entries in column 2 are pure chemicals, while others include the many mixtures of different chemicals that are shipped regularly as commercial products. The shipper selects the most appropriate name. Once the selection is made, the balance of the regulatory requirements are determined from the other columns in the table.

An explanation of the precise meaning of the table columns is spelled out in 49 CFR 172.101(a) through (k), which precedes the table in Part 172. Remember that the entire

III. Training Requirements

The training regulations apply to all *haz-mat employees* as defined in 49 CFR 171.8. This term includes individuals employed by a *haz-mat employer* and who, in the course of their employment, load, unload or handle these materials; prepare them for transportation, i.e., package them; operate vehicles used to transport them; determine if containers, drums or other packaging are qualified for use in the transportation of these materials; or are responsible for safety in the transportation of hazardous materials.

Types of Training

Haz-mat employee training must include general awareness and safety training, as well as function-specific training. Each employer must provide its employees with a range of training consistent with the nature of the job performed. The general awareness training, in the words of 49 CFR 172.704, is to “provide familiarity with the requirements of this subchapter and to enable them to recognize and identify hazardous materials consistent with the hazard communication standards of this subchapter.”

Safety training includes emergency response instruction in workplace exposure protection measures, the proper procedures for handling packages, and how to avoid accidents.

The function-specific training goes deeper into the aspects of the activities performed, i.e., how to prepare shipping papers, securing packages in a vehicle, the closure of containers, information related to the specific material the employee is dealing with, etc.

The DOT recognizes training associated with other regulatory federal agencies, such as the

IV. What is a Hazardous Material?

An even better way to ask this question would be, “What are the names or characteristics of those materials that are regulated in transportation?” With respect to this subject matter, you should also be asking, “Is this a DOT-regulated hazardous material?” Throughout our discussion, remember that the words “regulated” and “hazardous” are used interchangeably, not because they have the same meaning, but because a material must first be considered hazardous by some regulation before it is subject to transportation regulation by the DOT.

The DOT's definition of a hazardous material can be found in 49 CFR 171.8. The term includes all substances or materials designated by the DOT and determined to be capable of posing an unreasonable risk to health, safety and property when transported in commerce. The term also includes EPA hazardous wastes and substances, marine pollutants, and elevated-temperature materials.

The DOT definition requires these materials to be “designated” as well as capable of posing an “unreasonable risk.” Let’s first look at what constitutes an unreasonable risk. The last portion of the definition that reads “when transported in commerce” does not mean that the materials are hazardous only when being transported. Quite the contrary, although the DOT’s *main* concern is to provide safety in transportation. In the DOT’s terms, hazardous materials fall into certain classes as follows.

V. DOT Communication Requirements

Once a hazardous material is ready for transport, anyone coming in contact with the container *must* be able to identify its contents if a spill or unexpected release occurs during transport. Therefore, the DOT requires the *labeling* of packages, the *marking* of containers, and the *placarding* of transport vehicles.

Think about the ways communication takes place in your life every day. You immediately recognize the red octagonal STOP sign as you drive, you understand the familiar RAILROAD crossing sign, and you know that the yellow light means CAUTION whenever it appears. You see warnings in the form of signs and labels everywhere - from manufacturing plants to grocery stores.

These visible signs are designed to protect you from harm as you go about your daily routine. The same holds true for handling hazardous materials. You need to understand the nature of the material you handle because carelessness could cause you harm. For emergency responders, this is especially critical. Similarly, users of these materials must also know what the physical and health hazards are while they use them in their jobs.

Labeling

The DOT has provided a simple, yet effective, system of hazard communication. The system uses square-shaped labels, color-coded to each of the various classes and divisions into which all of the regulated materials have been categorized. The labels are required on each package of hazardous materials. Usually, they are displayed as diamond-shaped (square-on-point).

VI. Reading and Understanding an MSDS

MSDSs were initially written for health and safety professionals and trained workers in the chemical industry. The information was usually very technical, and the type of information and formats varied from supplier to supplier. As Federal and state right-to-know regulations expanded, a wider audience with diverse backgrounds needed MSDSs. Reading and understanding the various MSDSs became a difficult task for many.

A few years ago, the Chemical Manufacturers Association (CMA) began working on a standard to develop consistent and understandable MSDSs that would be easily recognized in the US, Canada, and Europe. This standard, also accepted by ANSI (American National Standards Institute), does not fulfill every country's legal requirements, but it does provide consistent and useful information to a variety of audiences, including people involved with the transportation of hazardous materials.

As defined by the ANSI standard, an MSDS must be composed of the following 16 sections:

- Sec. 1. Chemical Product & Company Information
- Sec. 2. Composition/Information on Ingredients
- Sec. 3. Hazards Identification
- Sec. 4. First Aid Measures
- Sec. 5. Fire Fighting Measures
- Sec. 6. Accidental Release Measures
- Sec. 7. Handling and Storage
- Sec. 8. Exposure Controls/Personal Protection
- Sec. 9. Physical and Chemical Properties

VII. Finding What You Need

Sometimes it can be confusing when you're looking for specific rules or regulations in the two-volume set of 49 CFR. The following will help you locate selected specific topics in the regulations.

Subject	Part. Sec.
Abbreviations	172.308
Bracing/blocking	173.30
Bulk packaging	171.8 Table 8C
Canadian shipments	171.12a
Carriage by aircraft	175
Carriage by highway	177
Carriage by rail	174
Carriage by water	176
Certification, shipper's	173.204
Certification, training	172.704
Class 1, definition	173.50
Class 2, definition	173.300
Class 3, definition	173.120
Class 4, definition	173.124
Class 5, definition	173.127 & 128
Class 6.1, definition	173.132 & 134
Class 7, definition	173.403
Class 8, definition	173.136
Class 9, definition	173.140
Combination pkgs.	171.8
Combustible liquids	173.120
Composite packages	171.8
Consumer commodity	171.8
Corrosive liquids/solids	173.136
Class 3 packing groups	173.121
Class 4 packing groups	173.125
Class 5 packing groups	173.127 & 129
Class 6 packing groups	173.133
Class 8 packing groups	173.137
Dangerous when wet	173.124
Definitions & Abbreviations	171.8

VIII. Glossary

In the DOT's Hazardous Materials regulations for shippers, carriers and container manufacturers, the terms listed below have the following meanings:

Bulk Packaging. A packaging, other than a vessel or a barge, including a transport vehicle or freight container, in which hazardous materials are loaded with no intermediate form of containment and which has:

- (1) A maximum capacity greater than 450 L (119 gallons) as a receptacle for a liquid;
- (2) A maximum net mass greater than 400 kg (882 pounds) and a maximum capacity greater than 450 L (119 gallons) as a receptacle for a solid; or
- (3) A water capacity greater than 454 kg (1,000 pounds) as a receptacle for a gas as defined in 49 CFR 173.115.

Cargo Tank. A bulk packaging that:

- (1) Is a tank intended primarily for the carriage of liquids or gases and includes appurtenances, reinforcements, fittings and closures. See Tank.
- (2) Is permanently attached to or forms a part of a motor vehicle, or is not permanently attached to a motor vehicle but which, by reason of its size, construction or attachment to a motor vehicle, is loaded or unloaded without being removed from the motor vehicle; and
- (3) Is not fabricated under a specification for cylinders, portable tanks, tank cars or multi-unit tank car tanks.

Carrier. A person engaged in the transportation of passengers or property by:

- (1) Land or water, as a common, contract, or private carrier, or
- (2) Civil aircraft.

Class. See Hazard Class.

Class 1 (explosive). Any substance or article, including a device, that is designed to function