

Lesson Topic

Chapter 6 Hazardous Materials Containers and Packaging
IFSTA Awareness Level Training For Hazardous Materials 1st Edition

Learning Objectives

1. Identify different types of containers used in packaging hazardous materials
2. Identify different types of containers used for shipping hazardous materials
3. Identify different types of containers used in transporting hazardous materials

Time Frame

2 Hours

Level of Instruction

Cognitive

Materials Needed

Lesson Plan
2004 ERG
Hand Outs - Copy of IFSTA Study Guide Chapter 6

References

Chapter 6 IFSTA Awareness Level Training for Hazardous Materials Manual 1st Edition
N.F.P.A Standards; NFPA 472: 2-2,1.6

Course Goals

To enable the First Responder at the Awareness Level to identify and recognize containers used in shipping and transporting Hazardous Materials

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Content Outline

9 Types of Hazard Classes

1. Explosives
2. Gases
3. Flammable Liquids
4. Flammable Solids
5. Oxidizers
6. Poisonous Materials
7. Radioactive Materials
8. Corrosives
9. Miscellaneous Hazardous Materials

This chapter will discuss the types of containers and packages for the above classes of Hazardous Materials with the exception of Class 9. Class 9 carries a wide variety of materials that there is no way to determine all the shipping methods.

Explosives (class 1)

- Materials are generally used for military operations, mining, logging, construction, and demolition operations.
- Usually stable during normal storage and transport
- Some materials lose stability over a period of time, i.e. dynamite
- Pre-fire Plans should be prepared for facilities handling these types of materials.
- Be aware of the effects of fire on these types of materials

Packaging of Explosives for Transport

- Packaged in various configurations and quantities
- Cartridge – a case that contains a explosive charge for blasting
 - Small cartridges are packed in fiberboard boxes for shipping
 - Large cartridges are packed in heavy walled, spiral wound fiberboard tubes
- Dynamite – packaged in various sized paper or fiberboard cartridges
- Detonators – packaged in fiberboard cartons
- Black powder
 - Small arms ammunition – 1 pound small metal cans. Can be as many as 50 per case
 - Also shipped in large metal kegs or in plastic bags stored in fiberboard cases
- Some blasting agents such as ammonium nitrate and fuel oil are packaged in multi-walled paper bags similar to a concrete sack.
- Usually Blasting agents and other explosives are shipped in bulk in special cargo trucks.

Gases (class 2)

Generally all gases are stored in storage cylinders, large tanks, and distribution systems.

Types of Containers for Gases

- All compressed gases must be confined in special containers that are designed to withstand pressure.
- Pressure Vessels -
 - Generic name for the container that holds compressed gases
 - Pressures range from 40psi to 4000psi
 - Vary in sizes and shapes
 - Examples, one-ton chlorine cylinders, breathing air cylinders, SCBA's, etc.

- Three basic types of containers that handle compressed gases
 1. Pressure cylinders
 - Workhorse of the industry
 - Carry a wide variety of gases
 - Range in size from very small to those with a maximum capacity of 1000 pounds
 - Manufactured in accordance with the requirements set forth by the U.S. DOT and the Canadian Transport Commission.
 - Must have a pressure relief valve of some type

 2. Pressure tanks
 - Manufactured to comply with requirements set forth by the American Petroleum Institute
 - Most commonly found in fixed installations
 - May be found on motor vehicles and/ or rail cars
 - Must have a pressure relief valve of some type

 3. Pipelines
 - The U.S. DOT regulates all U.S. pipelines that are not on the consumers property
 - Found in many forms'
 - Most common form is the municipal natural gas distribution system

FLAMMABLE LIQUIDS (class 3) CONTAINERS

1. Metal Cans
 - Most Common container
 - Can contain paint, solvents, camping fuel, motor fuel, etc..
 - Packaged usually in cardboard boxes
 - Generally found in large quantities in residential structures, hardware stores, garages, variety stores, service stations, etc...

2. Pails
 - Generally are about 5 gallons in size
 - Usually packaged and shipped on wooden pallets and may be stacked 3 to 4 high

3. Drums
 - Most commonly made of metal but some may be plastic
 - Contains bulk oils, thinners, wide variety of cleaning solvents, etc...
 - Mainly shipped individually not packaged
4. Tanks
 - Tank trucks, tank cars, tank trailers
 - Most common construction is aluminum but may be constructed of steel, or stainless steel
 - Most railcars are constructed of steel
 - On-loading and off-loading is generally performed at the bottom of the tank
 - Some railcars still on-load through the top
 - Most highway tankers are equipped with a vapor recovery system
5. Pipelines
 - Used to transport flammable liquids over long distances
 - Primarily buried underground but may be exposed in places
 - Extend from the refinery to a storage facility with pumping stations some where along the way.

FLAMMABLE SOLIDS (class 4) CONTAINERS

1. Commonly shipped in tubes, pails, steel and fiberboard drums, cardboard boxes
2. Bags can be used for non-bulk packaging of materials
3. Secured tightly to prevent contact with moisture

OXIDIZERS and ORGANIC PEROXIDES (class 5) CONTAINERS

1. Commonly shipped in a plastic-lined multi-ply bag
2. Other Containers
 - Metal tins
 - Fiberboard
 - Plastic
 - Metal drums
 - Stainless steel tank trucks
 - Dry-bulk tank truck and tank railcars
 - Peroxides are limited in the quantity that can be shipped
 - Containers range in size from a few ounces to 55 gallon drums

POISONOUS MATERIALS and INFECTIOUS SUBSTANCES CONTAINERS

1. Can be either solid or liquid form
2. Packaged in a variety of containers
 - Intermodal portable tanks
 - Tank trucks
 - Railroad tank cars
 - Barges
 - Marine tankers
3. Infectious substances can be shipped in small vials that are measured in ounces and over packed in strong containers for shipment.

RADIOACTIVE MATERIALS (class 7) CONTAINERS

1. Strongest containers used in shipping
2. Two categories of packaging:
 - A. TYPE "A" PACKAGING
 - Contains low-level commercial radioactive shipments
 - Containers include cardboard boxes, wooden crates, cylinders
 - Radiopharmaceuticals or medicines that contain radioactive material may be packaged and shipped in small quantities
 - B. TYPE "B" PACKAGING
 - Strongest packaging
 - Used for highly radioactive shipments
 - Containers include highly reinforced concrete casks, lead pipes, and/or heavy gauge metal drums
 - Designed to carry fissionable materials, high grade raw materials, nuclear fuels, and highly radioactive materials

CORROSIVES (class 8) CONTAINERS

1. Containers range in size from glass/plastic bottles to plastic drums
2. Fiberboard drums and multi-layered paper bags are used for materials in dry form
3. Wax bottles are used for hydrofluoric acid because it can attack the glass
4. Containers can also be Intermodal portable tanks, tank trucks, railroad tank cars, barges, and pipelines
5. Maximum capacity for tank trucks is 6,000 gallons
6. Maximum capacity for railroad tank cars is 24,000 gallons

SUMMARY

The containers listed in this chapter are not only for shipping or transporting of hazardous materials, they may also be found in storage areas in industrial or commercial sites. Most of the containers listed are the same for almost all of the classes of hazardous materials that are being transported, this should heighten our awareness to the labeling of the container instead of the container that it's being shipped in.