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FLAMMABLE AND COMBUSTIBLE LIQUIDS

MODULE DESCRIPTION

This module covers the safety concerns and necessary precautions you need to be aware of when working around flammable and combustible liquids.

OBJECTIVES

After completing this module, you will be able to:

- Identify the two primary hazards associated with flammable and combustible liquids.
- Define important terms related to flammable and combustible liquids.
- Describe two ways to avoid an explosion or fire.
- Identify potential sources of ignition.

MODULE OUTLINE

1. Flammable and Combustible Liquids
    - There are two primary hazards associated with flammable and combustible liquids: explosion and fire. In order to prevent these hazards, OSHA has standards concerning the handling, storage, and use of flammable and combustible liquids with a flash point below 200F.
    - In order to prevent these hazards, OSHA has developed standards to address the primary concerns of design and construction, ventilation, ignition sources, and storage.
    - Your employer also has a responsibility to make sure both the work that you do and your workplace itself is in compliance with OSHA standards. Let s discuss the OSHA standards as they relate to flammable and combustible liquids.

2. Flammable and Combustible Terminology

- **Boiling point**: is the point at which a liquid boils when at a pressure of 14.7 pounds per square inch absolute (psia).• At temperatures above the boiling point, the pressure of the atmosphere can no longer hold the liquid in the liquid state and bubbles begin to form.• The lower the boiling point, the greater the vapor pressure at normal ambient temperatures and, consequently, the greater the fire risk.
- **Closed Container**: A closed container, such as a can, barrel, or drum, is a container that is sealed by means of a lid or other device so that neither liquid nor vapor will escape from it at ordinary temperatures.
- **Combustible Liquid**: A combustible liquid is any liquid that has a flash point at or above 100 F (37.8 C).
- **Fire Area**: A fire area is an area of a building separated from the remainder of the building by construction having a fire resistance of at least one hour. All communicating openings to the area should be properly protected by an assembly having a fire resistance rating of at least one hour.
- **Flammable Liquid**: A flammable liquid is any liquid having a flash point below 100 F (37.8C), except any mixture having components with flashpoints of 100 F (37.8 C) or higher, the total of which make up 99 percent or more of the total volume of the mixture.
- **Flash Point**: A flash point is the minimum temperature at which a liquid gives off vapor within a test vessel in sufficient concentration to form an ignitable mixture with air near the surface of the liquid. The flash point is normally an indication of susceptibility to ignition.

3. Combustible Liquids

- Class I liquids are flammable liquids and are divided into three subclasses: IA, IB, and IC.• Class II and III liquids are combustible, and Class III liquids are divided into two subclasses: IIIA and IIIB.
- When a combustible liquid is heated to within 30 F (16.7 C) of its flash point, it must be handled in accordance with the requirements for the next lower class of liquids.
  - **For 70 F**
    - **Class IA** includes liquids having flash points below 73 F (22.8 C) and a boiling point below 100 F (37.8 C)
    - **Class IB** includes liquids having flash points below 73 F (22.8 C) and a boiling point at or above 100 F (37.8 C)
  - **For 90 F**
    - **Class IC** includes liquids having flash points at or above 73 F (22.8 C) and below 100F (37.8 C).
  - **For 130 F**
    - **Class II liquids** includes liquids with flash points at or above 100 F (37.8 C) and below 140 F (60 C), except any mixture having components with flash points of 200 F (93.3 C) or higher, the volume of which make up 99 percent or more of the total volume of the mixture.
  - **For 200 F**
    - **Class IIIB** includes liquids with flash points at or above 200 F (93.3 C). This section does not regulate Class IIIB liquids. When the term Class III liquids is used in this section, it only refers to Class IIIA liquids.

4. Flammable (Explosive) Limits
    - When vapors of a flammable or combustible liquid are mixed with air in the proper proportions in the presence of a source of ignition, rapid combustion or an explosion can occur.
    - The proper proportion is called the flammable range, and is also often referred to as the explosive range. The flammable range includes all concentrations of flammable vapor or gas in air, in which a flash will occur or a flame will travel if the mixture is ignited.
    - If the concentration of vapor or gas in the air is below a specific point or above a specific point, a flame will not occur even if it comes into contact with a source of ignition.
    - These boundary-line mixtures of vapor and air are known as the upper flammable limit (UFL) and the lower flammable limit (LFL), and are usually expressed in terms of percentage by volume of vapor in the air.

5. Safe Use of Flammable and Combustible Liquids
    - A good plan for safe use of flammable and combustible liquids contains at least three components:
        - Control of ignition sources (Always provide adequate ventilation to reduce the potential for ignition of flammable vapors.)
        - Proper storage
        - Fire control
        - Safe handling
    - When handling flammable and combustible liquids, you must take adequate precautions to prevent the ignition of flammable vapors. Some sources of ignition include:
        - Open flames
        - Smoking
        - Static electricity
        - Cutting and welding
        - Hot surfaces
        - Electrical and mechanical sparks
        - Lightning