FLAMMABLE AND COMBUSTIBLE LIQUIDS SAFETY - AN OVERVIEW OF NFPA 30

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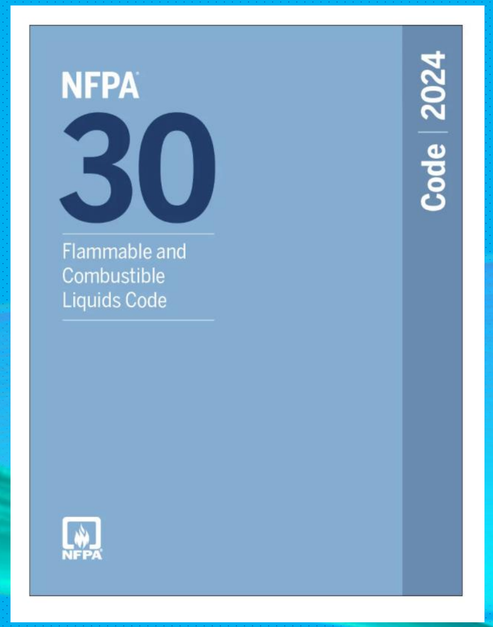


OUTLINE

- What is NFPA 30? - Scope, Purpose, and Application
- Flammable and Combustible Liquids = Ignitible Liquids
- NFPA 30 Outline and Recent Changes
- Incident Review
- Summary and Closing

OBJECTIVES

- Describe scope, application, and purpose of NFPA 30
- Recognize systems that address safe storage, handling, and use of ignitible liquids
- List key areas covered by NFPA 30
- Apply NFPA 30 provisions to incidents involving ignitible liquids

KEY TERMS GUIDING UNDERSTANDING OF IGNITIBILITY

Flash Point

Boiling Point

Vapor Pressure

Flammable Range

FLAMMABLE AND COMBUSTIBLE LIQUID CRITERIA

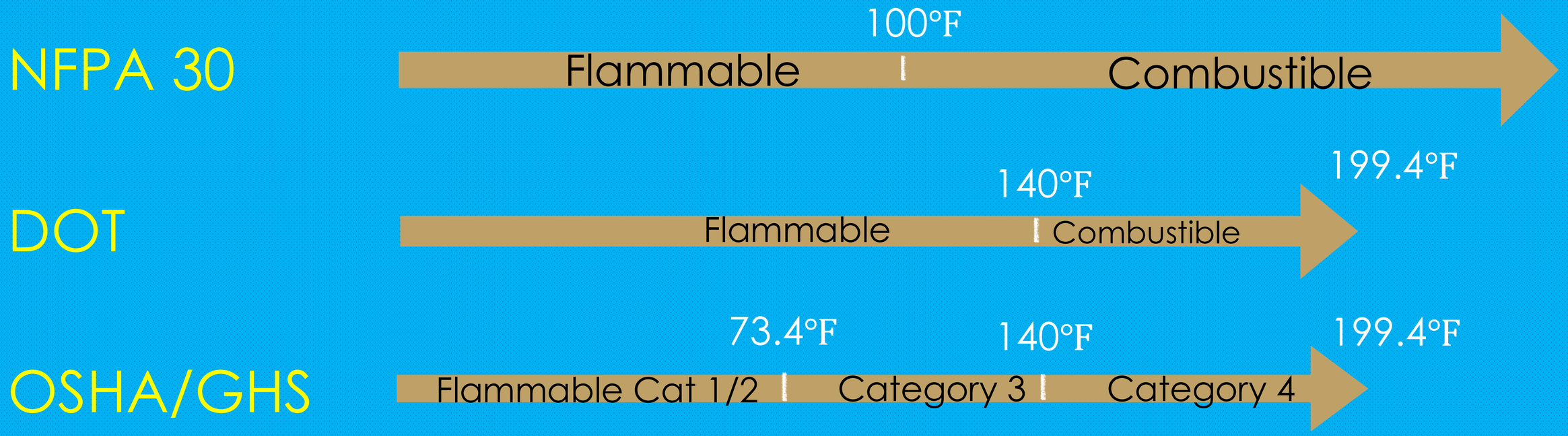
- Basis is flash point (FP) and boiling point (BP)
- Establishes likelihood for ignitability
- Flammable liquid - FP < 100°F (37.8°C)
- Combustible liquid - FP ≥ 100°F (37.8°C)

FLAMMABLE AND COMBUSTIBLE LIQUID CRITERIA

- Class I liquids - FP < 100°F (37.8°C)
  - *Class IA Liquid.* A liquid that has a flash point below 73°F (22.8°C) and a boiling point below 100°F (37.8°C)
  - *Class IB Liquid.* A liquid that has a flash point below 73°F (22.8°C) and a boiling point at or above 100°F (37.8°C)
  - *Class IC Liquid.* A liquid that has a flash point at or above 73°F (22.8°C), but below 100°F (37.8°C)
- Class II liquid - FP ≥ 100°F (37.8°C) but below 140°F (60°C)
- Class III liquids – FP ≥ 140°F (60°C)
  - *Class IIIA Liquid.* A liquid that has a flash point at or above 140°F (60°C), but below 200°F (93°C)
  - *Class IIIB Liquid.* A liquid that has a flash point at or above 200°F (93°C)

HAZARD COMMUNICATION AND GHS

- Nomenclature - Who Defines Flammable, Combustible, Inflammable?

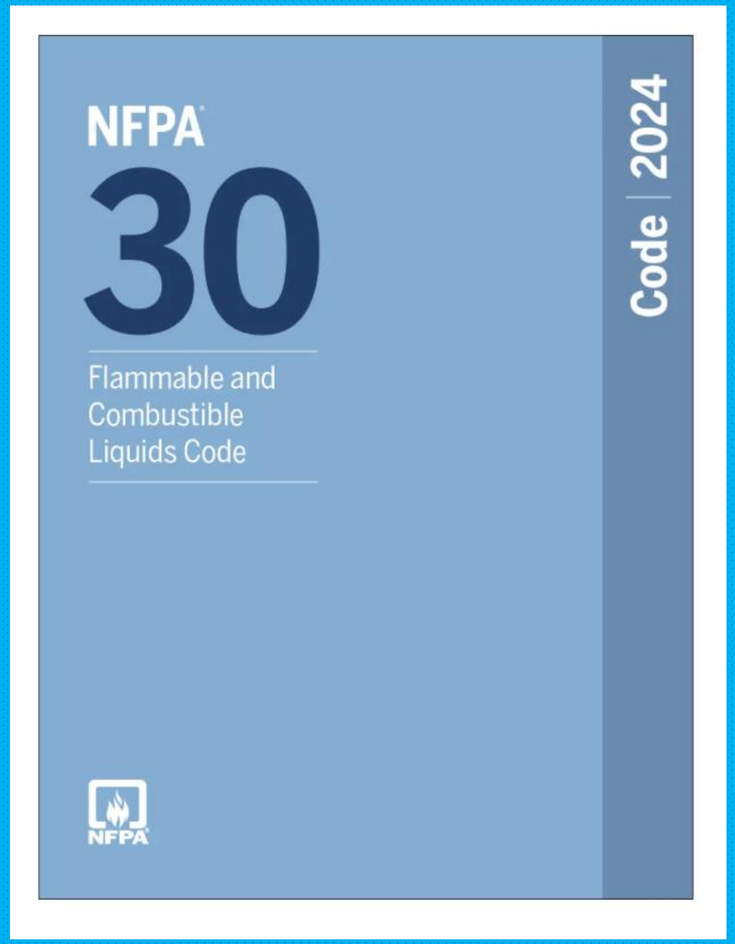


NFPA 30 INTRODUCTION

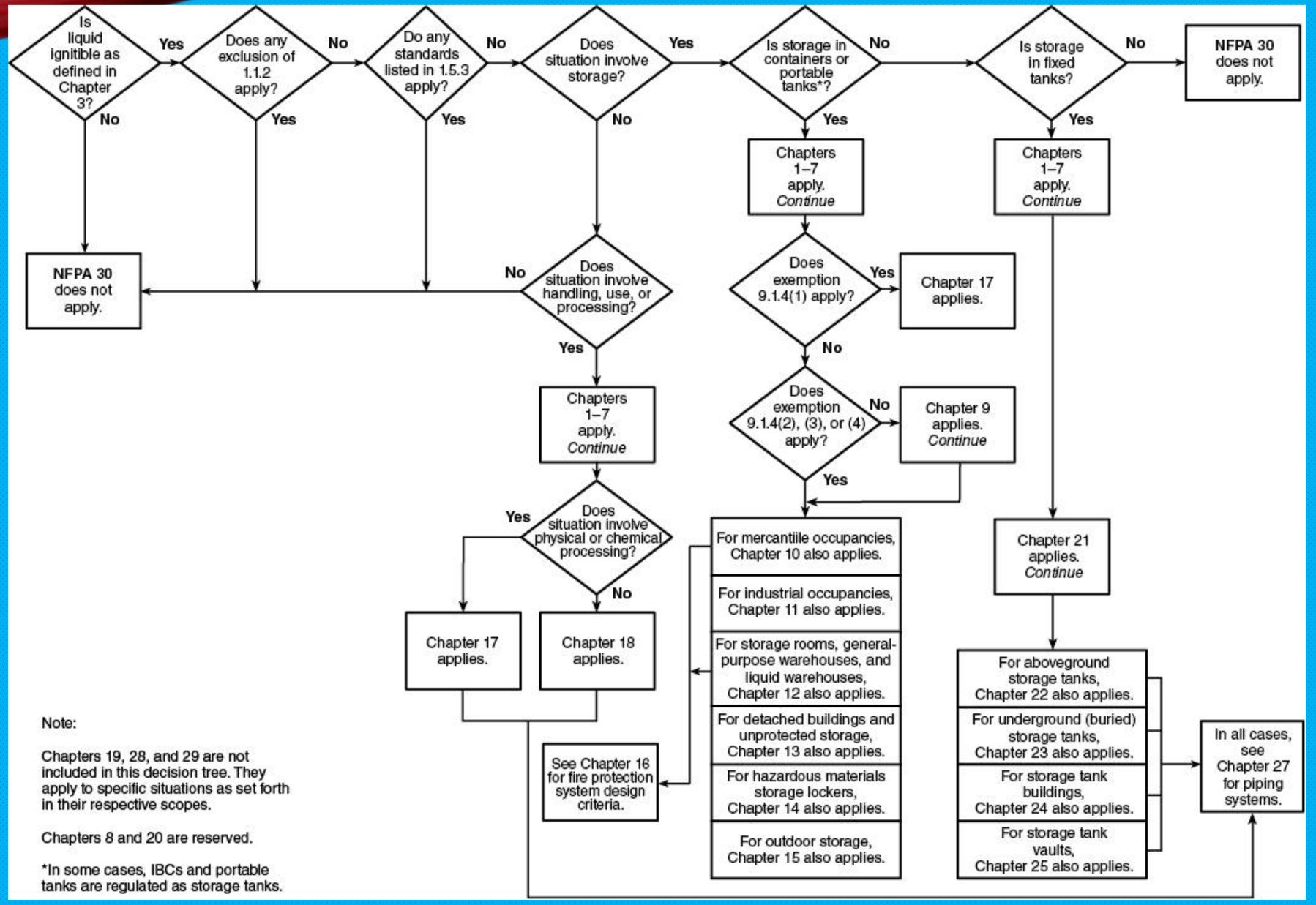
- Scope, Purpose, and Application
- Apply to the storage, handling, and use of ignitible (flammable or combustible) liquids, including waste liquids
- Provide fundamental safeguards for the storage, handling, and use of ignitible (flammable or combustible) liquids
- Apply to users, producers, distributors, and others who are involved with the storage, handling, or use of ignitible (flammable or combustible) liquids.

NFPA 30 ORGANIZATION

- Chapters 1 - 7 Fundamental
- Chapter 9 - 16 Storage
- Chapter 17 - 19 Special Storage
- Chapter 21 - 25 Tank Storage
- Chapter 26 - 29 Operations
- Annexes A - K



NFPA 30 APPLICATION FLOW CHART



RECENT CHANGES TO NFPA 30

- Consolidated terms used for liquid storage – control area, liquid storage room, or liquid warehouse
- Added new chapters on fire protection for processing facilities and petroleum production facilities
- Added requirement for flame mitigation devices on flammable liquid safety cans
- Added new annex providing rationale for use of term “ignitible” liquid

ACCEPTABLE CONTAINERS – GENERAL REQUIREMENTS

- General container specifications
  - Drums or other containers that do not exceed 119 gal (450 L) individual capacity
  - Portable tanks that do not exceed 660 gal (2500 L) individual capacity
  - Intermediate bulk containers that do not exceed 793 gal (3000 L)
- Acceptable containers – metal, plastic, fiber drums, IBC, glass, others (see Table 9.4.3)

OSHA AND NFPA 30

- NFPA 30
  - Voluntary consensus code intended for adoption and enforcement by an AHJ (authority having jurisdiction)
  - Used as the basis for 29 CFR 1910.106
  - Electrical area classification - NFPA 70 Article 500 and OSHA Subpart S

CASE STUDY APPLICATIONS

- Incidents highlight hazards
  - Sherwin-Williams, Dayton, OH
  - Buncefield, UK
  - Caribbean Petroleum Company, PR
  - CAI-Arnel, Danvers, MA
- Consensus standards process facilitates incorporation of lessons learned

SHERWIN-WILLIAMS, DAYTON, OH, 1987

- Lift truck struck cans ignitible liquids creating spill
- Ignition source likely the truck's motor
- Warehouse sprinkler system overwhelmed

BUNCEFIELD, UK - DECEMBER 2005

- Explosion and fires
- Gasoline
- 22 of 31 tanks involved
- Tank fires extinguished on the 4th day
- Smoke plume drifted to France and Portugal

CARIBBEAN PETROLEUM COMPANY - OCTOBER 2009

- Offloading ship into terminal
- Gasoline
- Due to numerous process failures, tank overfilled into secondary containment bund (dike)
- During overfilling, liquid became aerosolized and created large vapor cloud and ignited
- Damaged 17 of 48 tanks in the terminal
- Fire burned for 60 hours

CAI-ARNEL, DANVERS, MA - NOVEMBER 2006

- Ink and paint manufacturing facility
- Fuel involved a mix of heptane, isopropyl alcohol, and normal propyl alcohol in 2000 gal, open-topped tank
- Steam heating not turned off and not interlocked to turn off when high temperature condition reached
- Ventilation turned off

PROCESS SAFETY

- Process Safety Management (PSM) - 29 CFR 119
  - Identify, evaluate and control physical and health hazards
  - Flammable liquids are physical hazards, and many are health hazards as well
  - OSHA references earlier edition of NFPA 30
  - RAGAGEP - recognized and generally accepted good engineering practices

NFPA FIRE & LIFE SAFETY ECOSYSTEM

- NFPA Fire & Life Safety Ecosystem
  - Government responsibility
  - Codes and standards: primary and reference standards
  - Investment in safety
  - Skilled workforce
  - Code compliance
  - Preparedness and emergency response
  - Informed public

CLOSING AND QUESTIONS

- Outlined what NFPA 30 is and how it applies to identification and hazard control for ignitible liquids in storage, handling, or use
- Clarified flammable and combustible criteria and use of terms within various regulatory schemes
- Provided examples of hazards through case studies
- Linked to process safety practices
- Questions?

THANK YOU

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