Second Revision No. 402-NFPA 30-2022 [Global Comment]

[See below removal of "inside liquid storage room" and edits to two other definitions.]

~~**3.3.2.3 Inside Liquid Storage Area.**~~

~~A room or building used for the storage of liquids in containers or portable tanks, separated from other types of occupancies.~~

3.3.34* Liquid Storage Room.

A room ~~that is~~ used for the storage of liquids in containers, portable tanks, or intermediate bulk containers~~,~~ in quantities that exceed the maximum allowable quantity (MAQ) and has a floor area that does not exceed 500 ft^2 (46 m^2)~~, and might be totally enclosed within a building — that is, the room might have no exterior walls~~.

A.3.3.34 Liquid Storage Room.

A liquid storage room is generally a small space where the quantity of stored ignitible liquids exceeds the MAQ. The legacy terms *inside room* and *cutoff room* most closely resemble the current definition of liquid storage room. A space designed for ignitible (flammable and combustible) liquid storage will be considered a control area, a liquid storage room, or a liquid warehouse.

3.3.65.2* Liquid Warehouse.

A separate, detached building, ~~or~~ an attached building ~~that is~~, or a portion of a building used for warehousing-type operations for liquids ~~and whose exterior wall comprises at least 25 percent of the building perimeter~~in quantities that exceed the maximum allowable quantity (MAQ).

A.3.3.65.2 Liquid Warehouse.

A liquid warehouse is generally a large space where the quantity of stored ignitible liquids exceeds the MAQ. The legacy term *attached building* most closely resembles the current definition of liquid warehouse. A space designed for ignitible (flammable and combustible) liquid storage will be considered a control area, a liquid storage room, or a liquid warehouse.

Supplemental Information

File Name	Description	Approved
30_SR-402_Area_Definitions_Global_FUN.docx	For staff use	

Submitter Information Verification

Committee: FLC-FUN
Submittal Date: Sun Jul 17 15:01:58 EDT 2022

Committee Statement

Committee Statement: Changes to the text were made to align requirements with the updated definitions of “liquid storage room” and “liquid warehouse” and in elimination of legacy terms, such as "inside liquid storage area."

Section 3.3.32 aligns with the upper bound of liquid storage area with other requirements in the code. New annex material is added to explain how the legacy terms “inside room” and “cutoff room” relate to the current definition of Liquid Warehouse.

The intent of adding “or a portion of a building” to the Liquid Warehouse definition in 3.3.61.2 addresses the scenario where there is separated mixed use of liquid warehousing and some other occupancy in the building that are not required to be separated with a fire wall per Chapter 9. New annex material is added to explain how the legacy term “attached building” relates to the current definition of Liquid Warehouse.

The 25% exterior wall requirement for liquid warehouses was moved to 9.9.5 as a requirement.

Response Message: SR-402-NFPA 30-2022

Public Comment No. 45-NFPA 30-2022 [Global Input]

Second Revision No. 405-NFPA 30-2022 [Global Comment]

[See attached file for new Annex B for background on igntible (flammable and combustible) liquid nomenclature and addition to A.3.3.33.3.]

Supplemental Information

File Name	Description	Approved
30_SR-405_Annex_B_Liquid_Naming_Conventions.docx	for staff use	
30_Global_SR-405_Annex_B-new.pdf	for ballot	

Submitter Information Verification

Committee: FLC-FUN

Submittal Date: Sun Jul 17 15:44:01 EDT 2022

Committee Statement

Committee Statement: This new annex provides further clarification on the rationale to change the ignitible liquid terminology in the 2021 edition of NFPA 30. The Origin and Development for the 2021 NFPA 30 edition indicated that the terms "'flammable liquid' and 'combustible liquid' are no longer used." This statement has created concern among first responders and fire officials, as well as for other companies and agencies who use these terms regularly. As part of this 2021 revision, Annex A.4.3, which showed the differences in the ignitible liquid classifications between agencies, was removed. To clarify the intent of the change, Annex B is added to the code to explain the rationale for the nomenclature change given the different agency classification systems, and to reintroduce a table showing the differences in ignitible liquid classifications. The annex also indicates that the terms "flammable liquid" and "combustible liquid" will be retained, but the preferred term is "ignitible (flammable and combustible) liquids" and the Liquid Class is used to better indicate the fire hazard.

Response Message: SR-405-NFPA 30-2022

A.3.3.33.3 Ignitible Liquid.
Unless otherwise specified, the term *liquid* means an ignitible liquid.
The term *ignitible liquid* refers to any liquid that has a measurable closed-cup flash point. Class I liquids [FP < 100°F (37.8°C)], Class II and Class III liquids [FP ≥ 100°F (37.8°C)], and inflammable liquids are all ignitible liquids.*(See Annex B for more information.)*

Annex B Background on Ignitible (Flammable and Combustible) Liquid Nomenclature Change

This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

B.1 General.

A significant hazard of a liquid that burns is that the fuel can spread horizontally before and after ignition, which increases the heat release rate of the fire as the fuel area increases. A liquid's flash point is only a measure of the ease of ignition, not fire severity. Once ignited, a large pool of liquid, regardless of flashpoint, can overwhelm fire protection systems and create significant temperatures within a building. Even a liquid that has a low heat of combustion and heat release rate per unit area can create an uncontrolled fire where the fuel spreads beyond the design area of the fire protection system or more rapidly than the fire protection system can react. In a storage fire scenario, even high flash point liquids can be ignited by packaging materials. In a use fire scenario, even high flash point liquids can easily start to burn when they are accidentally released as a spray in the presence of an ignition source.

While flash point does not provide a measure of fire severity, it does point to the need for controlling ignition sources and providing ventilation under normal operating conditions. Liquids with flash points below 100°F (37.8°C) are expected to always have a flammable vapor-air mixture above the liquid's surface. Any occupancy where these liquids can be exposed to the atmosphere during normal operations will need hazardous area classified electrical equipment and ventilation to reduce the likelihood of starting a fire.

Flash point can also provide an indication of how effectively a fire can be controlled, suppressed, or extinguished by water-based automatic sprinkler protection. Full-scale fire testing has shown that appropriate water-based automatic sprinkler systems can extinguish a pool fire involving a liquid that has a flash point greater than 200°F (93°C). Pool fires with liquids having lower flash points can be more difficult to extinguish with water-based automatic sprinkler systems. In addition, water miscible liquids can be diluted by sprinkler discharge to a point where they cannot burn; however, a large pool of low flash point alcohol can quickly operate a large area of automatic sprinklers.

Given the challenges created by the storage or use of liquids that burn, it is critical that users and enforcers alike can identify the liquids. The best way to support this need is using a consistent and simple identification system. Table B.1 provides an overview of how various agencies identify these liquids and further classify them. All the agencies use closed-cup flash point as the basis for naming and classification. However, there is quite a bit of disagreement in how *flammable liquid* and *combustible liquid* are defined between the agencies. Early on in the US, most agencies used the same naming convention as NFPA 30. Europe used other naming

conventions including the term *inflammable liquid,* which also meant the liquid would burn. Over time, the transportation codes between the US and Europe began to align and the liquid naming convention definitions used for labeling containers for transportation. The new definitions no longer agreed with the NFPA 30 definitions but still use closed-cup flash point as the basis. Beyond the different definitions for the terms *flammable liquid* and *combustible liquid,* most other agencies fully ignore liquids with a flash point greater than 200°F (93°C) even though they can represent a fire hazard beyond that of standard solid commodities.

Table B.1 Differences in Ignitible (Flammable and Combustible) Liquids Definitions

Agency	Agency Naming Convention	Agency Definition	Agency Classification	Classification Basis [Closed-Cup Flash Point / Boiling Point]
NFPA 30 – 2021 edition	Ignitible (flammable or combustible) liquid	Any liquid or liquid mixture with a measurable closed-cup flash point	IA	FP < 73°F (22.8°C) BP < 100°F (37.8°C)
			IB	FP < 73°F (22.8°C) BP ≥ 100°F (37.8°C)
			IC	73°F (22.8°C) ≤ FP < 100°F (37.8°C)
			II	100°F (37.8°C) ≤ FP < 140°F (60°C)
			IIIA	140°F (60°C) ≤ FP < 200°F (93°C)
			IIIB	FP ≥ 200°F (93°C)
NFPA 30 – pre-2021 edition	Flammable liquid	Liquids with a FP < 100°F (37.8°C)	IA	FP < 73°F (22.8°C) BP < 100°F (37.8°C)
			IB	FP < 73°F (22.8°C) BP < 100°F (37.8°C)
			IC	73°F (22.8°C) ≤ FP < 100°F (37.8°C)

Agency	Agency Naming Convention	Agency Definition	Agency Classification	Classification Basis [Closed-Cup Flash Point / Boiling Point]
	Combustible liquid	Liquids with a FP ≥ 100°F (37.8°C)	II	100°F (37.8°C) ≤ FP < 140°F (60°C)
			IIIA	140°F (60°C) ≤ FP < 200°F (93°C)
			IIIB	FP ≥ 200°F (93°C)
US Department of Transportation *Title 49 Subtitle B, Chapter I, Subchapter C, Part 173, Subpart D*	Flammable liquid	Liquids with a FP ≤ 140°F (60°C)	3	FP ≤ 140°F (60°C)
	Combustible liquid	Liquids with 140°F (60°C) < FP < 200°F (93°C)	—	140°F (60°C) < FP < 200°F (93°C)
US Occupational Safety and Health Association *CFR-2021, Title 29, Volume 5, Section 1910–106*	Flammable liquid	Liquids with a FP ≤ 199.4°F (93°C)	Category 1	FP < 73.4°F (23°C) BP ≤ 95°F (35°C)
			Category 2	FP < 73.4°F (23°C) BP > 95°F (35°C)
			Category 3	73.4°F (23°C) ≤ FP ≤ 140°F (60°C)
			Category 4	140°F (60°C) < FP ≤ 199.4°F (93°C)
Globally Harmonized System of Classification and Labelling of Chemicals (GHS) *Ninth edition*	Flammable liquid	Liquids with a FP ≤ 93°C (199.4°F)	Category 1	FP < 23°C (73.4°F) BP ≤ 35°C (95°F)
			Category 2	FP < 23°C (73.4°F) BP > 35°C (95°F)
			Category 3	23°C (73.4°F) ≤ FP ≤ 60°C (140°F)

Agency	Agency Naming Convention	Agency Definition	Agency Classification	Classification Basis [Closed-Cup Flash Point / Boiling Point]
			Category 4	60°C (140°F) < FP ≤ 93°C (199.4°F)
United Nations Recommendations on the Transportation of Dangerous Goods, Model Regulations *Revision 22 / Volume I*	Flammable liquid	Liquids with a FP ≤ 60°C (140°F)	—	FP ≤ 60°C (140°F)
EU Classification, Labelling and Packaging of Substances and Mixtures *EC No 1272/2008*	Flammable liquid	Liquids with a FP ≤ 60°C (140°F)	Category 1	FP < 23°C (73.4°F) BP ≤ 35°C (95°F)
			Category 2	FP < 23°C (73.4°F) BP > 35°C (95°F)
			Category 3	23°C (73.4°F) ≤ FP ≤ 60°C (140°F)

NFPA 30 has recognized that the old naming convention of "flammable and/or combustible liquids," no longer can be used to point to requirements for various liquids since there is significant disagreement on what the terms mean. The technical committee has moved to more closely tie all code requirements to closed-cup flash point since it is the property that has been correlated to the requirements. This approach ensures clarity of when requirements are needed. However, it is also important to help users of the code understand how past terminology fits into the current code.

To ensure a permanent connection between the current version of the code and past versions, the naming convention of "flammable liquid" and "combustible liquid" remain defined in the code. The term *ignitible* has been defined as any liquid with a closed-cup flash point. So, all flammable or combustible liquids are "ignitible liquids." The terminology in the text of the code when referring in general to liquids that are covered by the code is now "ignitible (flammable or combustible)." The NFPA 30 classification system has also been maintained, but the flash point range has been added where the liquid class is used. This helps point users to the physical property that drives all the requirements within NFPA 30.

Second Revision No. 409-NFPA 30-2022 [Global Comment]

[See updates to Chapter 1].

1.1.2

This code shall not apply to the following:

(8) *~~Storage, handling, and use of fuel oil tanks and containers connected with oil-burning equipment~~

~~A.1.1.2(8)~~

~~See NFPA 31.~~

1.3.10

Chapters 21 through 25 shall apply to bulk storage of ignitible (flammable or combustible) liquids in tanks other than those in Chapter 26.

1.3.11

Chapter 26 shall apply to tanks, piping, and components for use in appliances that use Class II and Class IIIA Liquids including diesel, No. 2 heating oil, kerosene, and similar biofuels.

1.3.12

Chapter 27 shall apply to piping systems, other than those in Chapter 26, for transferring ignitible (flammable or combustible) liquids.

Supplemental Information

File Name	Description	Approved
30_SR-409_Fuel_Systems_FUN.docx	For staff use	

Submitter Information Verification

Committee: FLC-FUN

Submittal Date: Mon Jul 18 15:55:08 EDT 2022

Committee Statement

Committee Statement: Fuel systems that use light distillates such as Diesel, Kerosene and #2 Heating Oil can be installed using the same criteria and indeed many are installed in such a way that they utilize the same supply tank(s) and equipment in common. However, several NFPA standards were not in agreement with each other on this topic as they were written by different committees using their own knowledge and experiences. This new chapter is introduced in Chapter 1 with the proposed language.

After having different standards for similar fuel systems, such as those for heating and stationary engines, a task group from NFPA 37 was assembled to look at combining the liquid fuels sections of NFPA 20, 30, 31, 37, and 110. The only fuels included in this work are light distillates such as No. 2 Heating Oil, Kerosene, Diesel, and Jet Fuel. Heavy oils

and gasoline were excluded because they have substantially different physical properties compared to the fuel oils.

A new chapter was added in NFPA 30 so that these systems can be built with a common design standard. NFPA 31 had, by far, the most written regarding the subject and therefore its requirements were used as the basis for the requirements presented in this chapter. The best way to keep the standards for each system covered by the different NFPA documents listed above would be to put common requirements into NFPA 30. This allows the NFPA 30 Tanks committee to update these requirements as necessary, and all affected systems would receive the same updates. Each of the listed documents could then reference this chapter in NFPA 30.

Response Message: SR-409-NFPA 30-2022

Second Revision No. 443-NFPA 30-2022 [Global Comment]

3.3.38* Maximum Allowable Quantity (MAQ).

For ~~the purposes of~~ this code, the quantity of ignitible (flammable and combustible) ~~(ignitible)~~ liquid permitted in a control area.

3.3.48 Refinery.

A plant in which ignitible (flammable or combustible) ~~(ignitible)~~ liquids are produced on a commercial scale from crude petroleum, natural gasoline, or other hydrocarbon sources.

3.3.51 Solvent Distillation Unit.

An appliance that distills ~~a~~ an ignitible (flammable or combustible) ~~(ignitible)~~ liquid to remove contaminants and recover the liquid.

Submitter Information Verification

Committee: FLC-FUN
Submittal Date: Fri Aug 12 15:30:35 EDT 2022

Committee Statement

Committee Statement: The nomenclature is corrected to match the global ignitible liquid nomenclature change from the previous revision.
Response Message: SR-443-NFPA 30-2022

Public Comment No. 7-NFPA 30-2022 [Section No. 3.3.46]

Public Comment No. 2-NFPA 30-2022 [Section No. 3.3.36]

Public Comment No. 8-NFPA 30-2022 [Section No. 3.3.48]

Second Revision No. 451-NFPA 30-2022 [Global Comment]

3.3.13 Containment.

A means of preventing the spread of a liquid.

3.3.13.1 Primary Containment.

The first level of containment, consisting of the inside portion of the container that comes into immediate contact on its inner surface with the material being contained. [**1,** 2021]

3.3.13.2 Secondary Containment.

The level of containment that is external to and separate from primary containment. [**400,** 2022]

3.3.50* Secondary Containment Piping.

A piping system enclosing a primary piping system to contain leakage.

A.3.3.50 Secondary Containment Piping.

Secondary containment piping systems can contain provisions for testing and monitoring for leaks in the interstitial space. This piping system can include containment sumps. Secondary containment piping can exist as an engineered double-walled assembly.

3.3.52 Spill Control.

A method for the control of an ignitible (flammable or combustible) liquid spill.

Submitter Information Verification

Committee: FLC-FUN

Submittal Date: Tue Aug 16 11:14:36 EDT 2022

Committee Statement

Committee Statement: With the revision of the Containment, Drainage, and Spill Control requirements throughout NFPA 30, definitions were added to clarify the requirements. The definition for Secondary Containment Piping had the word "Piping" added to distinguish it from Secondary Containment, as the previous definition could have been interpreted as something other than another pipe for containment that surrounds the pipe conveying the fluid. The FLC-FUN split the definition into a body and an annex to avoid inadvertently including requirements (testing and monitoring) within the definition. A term for Drainage was not defined as this term is believed to be clear.

Response Message: SR-451-NFPA 30-2022

Second Revision No. 480-NFPA 30-2022 [Section No. 2.2]

2.2 NFPA Publications.

National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 1, *Fire Code,* 2024 edition.

NFPA 10, *Standard for Portable Fire Extinguishers,* 2022 edition.

NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam,* 2024 edition.

NFPA 12, *Standard on Carbon Dioxide Extinguishing Systems,* 2022 edition.

NFPA 12A, *Standard on Halon 1301 Fire Extinguishing Systems,* 2022 edition.

NFPA 13, *Standard for the Installation of Sprinkler Systems,* 2022 edition.

NFPA 14, *Standard for the Installation of Standpipe and Hose Systems,* 2019 edition.

NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection,* 2022 edition.

NFPA 17, *Standard for Dry Chemical Extinguishing Systems,* 2024 edition.

NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection,* 2022 edition.

NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances,* 2022 edition.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems,* 2023 edition.

NFPA 30A, *Code for Motor Fuel Dispensing Facilities and Repair Garages,* 2024 edition.

NFPA 30B, *Code for the Manufacture and Storage of Aerosol Products,* 2023 edition.

NFPA 31, *Standard for the Installation of Oil-Burning Equipment,* 2024 edition.

NFPA 32, *Standard for Drycleaning Facilities,* 2021 edition.

NFPA 33, *Standard for Spray Application Using Flammable or Combustible Materials,* 2024 edition.

NFPA 34, *Standard for Dipping, Coating, and Printing Processes Using Flammable or Combustible Liquids,* 2024 edition.

NFPA 35, *Standard for the Manufacture of Organic Coatings,* 2021 edition.

NFPA 36, *Standard for Solvent Extraction Plants,* 2021 edition.

NFPA 37, *Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines,* 2024 edition.

NFPA 45, *Standard on Fire Protection for Laboratories Using Chemicals,* 2023 edition.

NFPA 58, *Liquefied Petroleum Gas Code,* 2023 edition.

NFPA 59A, *Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG),* 2023 edition.

NFPA 68, *Standard on Explosion Protection by Deflagration Venting,* 2023 edition.

NFPA 69, *Standard on Explosion Prevention Systems,* 2024 edition.

NFPA 70®, *National Electrical Code®,* 2023 edition.

NFPA 80, *Standard for Fire Doors and Other Opening Protectives,* 2022 edition.

NFPA 85, *Boiler and Combustion Systems Hazards Code,* 2023 edition.

NFPA 91, *Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Particulate Solids,* 2020 edition.

NFPA 96, *Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations,* 2024 edition.

NFPA 99, *Health Care Facilities Code,* 2024 edition.

NFPA *101®*, *Life Safety Code®,* 2024 edition.

NFPA 204, *Standard for Smoke and Heat Venting,* 2021 edition.

NFPA 220, *Standard on Types of Building Construction,* 2024 edition.

NFPA 221, *Standard for High Challenge Fire Walls, Fire Walls, and Fire Barrier Walls,* 2024 edition.

NFPA 303, *Fire Protection Standard for Marinas and Boatyards,* 2021 edition.

NFPA 307, *Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves,* 2021 edition.

NFPA 326, *Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair,* 2020 edition.

NFPA 505, *Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations,* 2023 edition.

NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response,* 2022 edition.

NFPA 750, *Standard on Water Mist Fire Protection Systems,* 2023 edition.

NFPA 770, *Standard on Hybrid (Water and Inert Gas) Fire Extinguishing Systems,* 2021 edition.

NFPA 2001, *Standard on Clean Agent Fire Extinguishing Systems,* 2022 edition.

NFPA 5000®, Building Construction and Safety Code®, 2024 edition.

Fire Protection Guide to Hazardous Materials, 2010.

Submitter Information Verification

Committee: FLC-FUN

Submittal Date: Fri Sep 23 10:30:51 EDT 2022

Committee Statement

Committee Statement: The references were updated to comply with the NFPA Manual of Style. NFPA 204 was added to section 2.2 as part of Second Revision 446.

This revision was developed by NFPA staff for editorial purposes, in accordance with 4.4.9.6.2 and 4.4.9.6.3 of the Regulations Governing the Development of NPFA Standards (www.nfpa.org/regs).

Response Message: SR-480-NFPA 30-2022

Second Revision No. 444-NFPA 30-2022 [New Section after 3.3.16]

3.3.18* Emergency Control Systems.

Methods or processes that detect liquid or vapor release and initiate measures to mitigate the release.

A.3.3.18 Emergency Control Systems.

Examples of such measures are shutdown, isolation, ventilation, dilution, and emergency venting.

Submitter Information Verification

Committee: FLC-FUN

Submittal Date: Fri Aug 12 15:35:33 EDT 2022

Committee Statement

Committee Statement: A new definition is introduced to support a new section on Emergency Control Systems in 17.8, as there was no material on this topic in NFPA 30.

Response Message: SR-444-NFPA 30-2022

Second Revision No. 401-NFPA 30-2022 [Section No. 3.3.47]

3.3.49* Safety Can.

A listed container of not more than 5.3 gal (20 L) capacity having a ~~screen or strainer~~ flame mitigation device, such as a flame arrester in each fill and pour opening or expanded metal mesh in the container, and having a spring-closing lid and spout cover designed to safely relieve internal pressure when exposed to fire.

A.3.3.49 Safety Can.

Safety cans listed to UL 30, *Metal Safety Cans,* or *FM Approval Class Number 6051-6052 Standard Safety Containers and Filling, Supply and Disposal Containers for Ignitable (Flammable) Liquids,* are limited to 5 US gal (19 L). UL 1313, *Nonmetallic Safety Cans for Petroleum Products,* allows for capacities up to 5 Imperial gal (23 L). UL/ULC 30 *Metallic and Nonmetallic Safety Cans for Flammable and Combustible Liquids* , limits a maximum of 5 US gal (19 L) and incorporates requirements from the previous versions of UL 30 and UL 1313. The new flame mitigation device (FMD) term is inclusive of different devices that prevent an external ignition source from igniting the container contents, which is evaluated for effectiveness in UL/ULC 30. FMDs include traditional flame arresters (e.g., screen or strainer) and newer designs, such as mesh screen or sintered metal and materials, such as expanded metal mesh.

Submitter Information Verification

Committee: FLC-FUN

Submittal Date: Sun Jul 17 14:49:15 EDT 2022

Committee Statement

Committee Statement: NFPA 30 should permit both flame mitigation device (FMD) as a broad inclusive term and flame arrester as a specific type. The expanded metal mesh installed in the can is included in addition to a flame arrester in each opening. If this clarification is not included, it would limit FMDs to those only in the openings, thus exclude other types. This addition also handshakes with the appendix information which includes both types. The existing annex is expanded to clarify the differences between the old UL/ULC 30 and UL 1313 standards which do not evaluate an FMD and the new UL 30 standard that does.

Response Message: SR-401-NFPA 30-2022

Second Revision No. 410-NFPA 30-2022 [New Section after 6.4.1.2.2]

6.4.1.2.3

Explosion hazards shall be evaluated, at a minimum, if any of the following conditions exist:

(1) Class IA liquids [FP < 73ºF (22.8ºC) and BP < 100ºF (37.8ºC)] are stored in containers larger than 1 gal (4 L) or in quantities exceeding the MAQ

(2) Class I liquids [FP <100ºF (37.8ºC)] are handled, transferred, or used in quantities exceeding the MAQ

(3) Class II or Class III liquids [FP ≥100ºF (37.8ºC)] are handled, transferred, or used at quantities exceeding the MAQ at temperatures at or above their flash point or above atmospheric pressure

(4) Class II or Class III liquids [FP ≥100ºF (37.8ºC)] are handled, transferred, or used for operations at temperatures at or above their boiling point in any quantity

(5) Runaway reactions or creation of ignitible vapors can occur because of normal mixing operations

(6) Ignitible liquids can enter in contact with incompatible material under abnormal conditions

6.4.1.2.4

Where an explosion hazard is determined to exist by the evaluation in 6.4.1.2 , explosion protection shall be provided in accordance with Section 6.8 .

Submitter Information Verification

Committee: FLC-FUN

Submittal Date: Mon Jul 18 20:47:11 EDT 2022

Committee Statement

Committee Statement: The engineering evaluation to address facility specific explosion hazards has been consolidated throughout the document and inserted into new 6.4.1.2.3. Throughout the document instances of explosion control have new pointers to this section. The requirements in 6.4.1.2.3 are intended to trigger an evaluation on what, if anything, is required for fire protection and explosion control, not to mandate explosion control if any of the stated conditions do or could exist. The trigger for 1-gallon containers of Class IA liquids has been moved from 9.16 to 6.4.1.2.3 for consolidation. With respect to heated Class II and III liquids, an appropriate middle ground is to mandate the evaluation when heated above flash point and in quantities greater than the MAQ, or when heated above boiling point in any quantity. All other thresholds that trigger the evaluation were established at the First Draft or in prior editions of the code and are thresholds which can be reasonably expected to result in an explosion hazard. Since the thresholds for evaluating whether explosion control is required have been moved to 6.4.1.2.3, each chapter covering specific ignitible liquid applications should redirect there in a consistent fashion. New section 6.4.1.2.4 directs the user to the list of explosion protection methods.

Response Message: SR-410-NFPA 30-2022

Public Comment No. 28-NFPA 30-2022 [Global Input]

Second Revision No. 407-NFPA 30-2022 [Section No. 6.4.1.3]

6.4.1.3*

Storage, processing, handling, and use of Class II and Class III liquids [FP ≥ 100°F (37.8°C)] heated at or above their flash points shall follow the requirements for Class I liquids [FP < 100°F (37.8°C)], unless an engineering evaluation conducted in accordance with Chapter 6 justifies following the requirements for some other liquid class.

A.6.4.1.3

Storage, processing, handling, and use of Class II and Class III liquids [FP ≥ 100°F (37.8°C)] at temperatures above the FP can produce ignitible vapors if the liquid is released or vessels are vented. Class I liquid [FP < 100°F (37.8°C)] requirements address such events to minimize the likelihood of ignition and the consequences if ignition occurs, thus becoming a benchmark for design features when Class II and Class III liquids [FP ≥ 100°F (37.8°C)] are handled above the FP. However, their characteristics differ from those of Class I liquids [FP < 100°F (37.8°C)]. For example, the extent of travel of the Class II and III vapors is limited by the quick condensation of released vapors as they cool to lower temperatures. This might justify a more limited electrical area classification, different ventilation, elimination of explosion venting, and so forth. In addition, the process handling these Class II and Class III heated liquids could incorporate safety design features that accomplish the intent of NFPA 30, that is to address the hazards of released vapors. Further, the more restrictive building construction requirements in Table 17.6.1 might not be necessary for a particular process involving Class II and Class III liquids [FP ≥ 100°F (37.8°C)] heated above the FP. The option of conducting an engineering evaluation in accordance with Chapter 6 was included to allow the use of alternative designs to address the level of hazards identified. The SFPE's *Engineering Guide to Performance-Based Fire Protection* provides a methodology on how to perform an alternative design.

Users of the code should be aware that there might be other applicable requirements. For example, in the US OSHA Flammable Liquids Standard (1910.106), processing Category 3 and Category 4 liquids (which approximate Class IC through Class IIIA liquids in NFPA 30) is prescriptively managed, and requires actions when the liquid is heated for use to within 30°F (16.7°C) of its flash point.

Submitter Information Verification

Committee: FLC-FUN

Submittal Date: Mon Jul 18 09:52:49 EDT 2022

Committee Statement

Committee Statement: OSHA 1910.106 is based on the 1969 edition of NFPA 30, however when it was first published, it added an additional requirement for handling combustible liquids heated to within 30F (16.7 C) of its flashpoint, where the requirement from NFPA 30 has always been based on when combustible liquids are heated above its flashpoint. The proposed Annex material is to provide information and guidance to the user about the specific US OSHA requirement.

Response Message: SR-407-NFPA 30-2022

Second Revision No. 411-NFPA 30-2022 [Section No. 6.5.4]

6.5.4 Static Electricity.

6.5.4.1*

The prevention of electrostatic ignition shall apply when either of the following are transferred, handled, or used:

(1) Class I liquids [FP < 100°F (37.8°C)]

(2) Class II or Class III liquids [FP ≥ 100°F (37.8°C)] at or above their flash points

A.6.5.4.1

The prevention of electrostatic ignition in equipment is a complex subject. Refer to NFPA 77 for guidance.

6.5.4.2

All equipment such as tanks, machinery, and piping shall be designed and operated to ~~prevent electrostatic ignitions~~ limit the generation of static electricity .

6.5.4.3

All metallic equipment such as tanks, machinery, and piping ~~where the potential exists for an ignitible mixture to be present~~ shall be bonded and grounded.

6.5.4.3.1

The bond and ground shall be either physically applied or ~~shall be~~ inherently present by the nature of the installation.

6.5.4.3.2

Any electrically isolated section of metallic piping or equipment shall be bonded and grounded ~~to prevent hazardous accumulation of static electricity~~ .

6.5.4.4*

All nonmetallic containers, equipment, and piping shall be designed and operated to prevent electrostatic ignition where the potential for an ignitible mixture exists.

A.6.5.4.4

Table 7.3.3 lists typical areas where ignitible mixtures would be expected to exist under normal operating conditions.

In these areas, configurations of nonmetallic containers, equipment, and piping should be designed and operated to prevent static accumulation that can lead to electrostatic ignition of vapors. ~~Outer layer of~~ This is typically accomplished by using nonmetallic components constructed of materials that have surface resistivity less than 10^9 ~~ohm-meter~~ ohms per square (conductive or static dissipative) and are connected to ground. ~~Other~~ Additional techniques are detailed in ~~Chapter 8 of~~ NFPA 77. ~~Typical methods to accomplish this include the following:~~

~~Outer layer of nonmetallic components constructed of materials that have surface resistivity less than 10^9 ohm-meter (conductive or static dissipative)~~

~~Outer layer of nonmetallic components constructed of materials with surface resistivity greater than 10^9 ohm-meter (insulating) in contact with sufficient surface area of conductive material, properly grounded, to prevent static accumulation~~

~~Other techniques detailed in Chapter 8 of NFPA 77~~

Supplemental Information

File Name	Description	Approved
30_SR-411_Static_Electricity_Global_FUN.docx	Staff use only.	

Submitter Information Verification

Committee: FLC-FUN

Submittal Date: Mon Jul 18 21:13:35 EDT 2022

Committee Statement

Committee Statement: The requirements in 6.5.4 appear to be redundant and some of the terms were not consistent. These revisions clarify these sections and correlates with the recommendations in NFPA 77. To also better align with guidance in NFPA 77, a corrected surface resistivity value indicating that a material is conductive was included to the Annex.

Response Message: SR-411-NFPA 30-2022

Public Comment No. 27-NFPA 30-2022 [Section No. 6.5.4]

Public Comment No. 35-NFPA 30-2022 [Section No. A.6.5.4.5]

Second Revision No. 453-NFPA 30-2022 [Section No. 6.9]

6.9* Emergency Planning and Training.

A.6.9

Containers having flammable vapors within, which can also become pressurized when exposed to fire, can produce a large fireball or jet flame projecting outwardly from the failure point of the container. All vapor-filled metal and plastic containers that can become pressurized have this potential.

This phenomenon is different than a boiling liquid expanding vapor explosion (BLEVE) for two important reasons. A BLEVE requires that a liquid be superheated above its boiling point. Also, the resulting release during a BLEVE will also produce an accompanying shock wave. BLEVE's are only possible with certain metal containers.

This fireball or jet-flame phenomenon was exhibited inadvertently during several unsprinklered fire tests involving ordinary unlisted plastic IBCs. It was first reported in 2007 (Atkinson). Thereafter, several more unsprinklered fire tests were conducted with ordinary unlisted plastic IBCs where this phenomenon was further demonstrated in 2018 (Giubbini).

During these tests, the ordinary unlisted plastic IBCs had volumes of 264 gal (1,000 L) and 275 gal (1,040 L). They were also fully sealed. The IBCs were either almost empty or almost full of liquid with actual liquid volumes of 5 gal (18.9 L), 10 gal (37.9 L), 50 gal (189.3 L), and 225 gals (850 L).

The liquids used in these tests included gasoline, acetone, isopropyl alcohol, kerosene, and diesel fuel. These liquids are categorized as Class IB [FP < 73 F (22.8 C); BP ≤ 100 F (37.8 C)], Class II [100 F (37.8 C) ≤ FP < 140 F (60 C)], or Class IIIA [140 F (60 C) ≤ FP < 200 F (93 C)] liquids.

One of the important takeaways from these tests is the potentially short time span for a release. During one test, overpressurization and generation of a horizontally projected fireball occurred in approximately 1:39 minutes (Giubbini). In some instances, the fireball or jet flame extended outwardly several feet (meters).

While the object of these tests was ordinary unlisted plastic IBCs, all plastic containers, such as 55 gal (208 L) drums and 5 gal (18.9 L) tight head containers, have a similar potential. It is unknown how this phenomenon would apply to listed and labeled plastic IBCs. Generally, plastic containers will be more prone to a faster failure time than metal containers. Nonetheless, it should be noted that the fireball phenomenon has been observed in fire tests for both plastic and metal containers of various sizes.

Based upon this, individuals, such as firefighters when fighting such fires, could be exposed to a significant life safety risk and without any forewarning. This possibility should be considered when conducting emergency planning and training, as per Section 6.9 .

6.9.1

A written emergency action plan that is consistent with available equipment and personnel shall be established to respond to fires and related emergencies~~. This plan shall~~ and include the following:

(1) Procedures to be followed in case of fire or release of liquids or vapors, such as sounding the alarm, notifying the fire department, evacuating personnel, and controlling and extinguishing the fire

(2) Procedures and schedules for conducting drills of these procedures

(3) Appointment and training of personnel to carry out assigned duties, including review at the time of initial assignment, as responsibilities or response actions change, and whenever anticipated duties change

(4) Procedures for maintenance and operation of (a) fire protection equipment and systems, (b) drainage and containment systems, and (c) dispersion and ventilation equipment and systems

(5) Procedures for shutting down or isolating equipment to reduce, mitigate, or stop the release of liquid or vapors, including assigning personnel responsible for maintaining critical plant functions or shutdown of plant processes and safe start-up following isolation or shutdown

(6) Alternate measures for the safety of occupants

6.9.2

Personnel responsible for the use and operation of fire protection equipment shall be trained in the use of that equipment. Refresher training shall be conducted at least annually.

6.9.3

Planning of effective fire control measures shall be coordinated with local emergency response agencies.

6.9.4

Procedures shall be established to provide for safe shutdown of operations under emergency conditions and for safe start-up following cessation of emergencies. ~~Provisions shall be made for training of personnel in shutdown and start-up procedures, and in activation, use, and deactivation of associated alarms, interlocks, and controls. Procedures shall also be established and provisions shall also be made for inspection and testing of associated alarms, interlocks, and controls.~~

6.9.5

Provisions shall be made for training of personnel in shutdown and start-up procedures, and in activation, use, and deactivation of associated alarms, interlocks, and controls.

6.9.6

Procedures shall also be ~~established and provisions shall also be~~ made for inspection and testing of associated alarms, interlocks, and controls.

6.9.7

The emergency procedures shall be kept readily available in the operating areas and shall be updated when conditions change, as identified in 6.4.2.

6.9.7.1

Where premises are likely to be unattended for considerable periods of time, a summary of the emergency plan shall be posted or located in a strategic and accessible location.

Submitter Information Verification

Committee: FLC-FUN

Submittal Date: Wed Aug 17 10:16:54 EDT 2022

Committee Statement

Committee Statement:	The potential for fireballs and jet-flames emitting from containers is a significant, and potentially deadly hazard that is not well known. The annex calls attention to this hazard based on two studies to alert first responders of these dangers. The potential for this hazard emphasizes the need for pre-fire planning to minimize risk to fire responders.
Response Message:	SR-453-NFPA 30-2022

Second Revision No. 437-NFPA 30-2022 [Section No. 6.10.3]

6.10.3

Combustible waste material and residues in operating areas shall ~~be kept to a minimum, stored in covered metal containers, and disposed of daily~~ comply with the requirements in 6.10.3.1 through 6.10.3.3 .

6.10.3.1

Combustible waste material shall be kept to a minimum and stored in metal waste receptacles or listed combustible waste receptacles.

6.10.3.2*

Rags, wipes, and waste with ignitible (flammable or combustible) liquid residues shall be kept to a minimum and stored in listed oily waste receptacles.

A.6.10.3.2

The self-closing lid and metal construction of an oily waste receptacle prevents spontaneous combustion. The ongoing exothermic reaction can generate a large amount of smoke, which can fill a facility.

One of the main safety features of an oily waste can is the self-close lid. Cans allowed to be overfilled will prevent the lid from closing. It is recommended if the rags and wipes cannot be removed safely from the site, they should be stored in a noncombustible container with a tight-fitting lid outdoors away from other combustible materials.

6.10.3.3

Waste receptacles in operating areas subject to 6.10.3.1 and 6.10.3.2 shall be emptied daily.

Supplemental Information

File Name	Description	Approved
30_SR-437_6.10.3.docx	Staff use only.	

Submitter Information Verification

Committee: FLC-FUN

Submittal Date: Mon Aug 08 11:31:07 EDT 2022

Committee Statement

Committee Statement: NFPA 30 users sometimes do not understand which product solution was best for their application of combustible waste vs. oily waste. These requirements delineate the application requirement in the NFPA 30 to the appropriate product standards/product solutions. Listed combustible waste receptacles are available, but the committee did not have loss history showing that listing should be mandatory for combustible waste without oily residue. Oily waste receptacles are those that meet UL 32 or FM Class 6920. “Combustible waste receptacles standards” are different from “oily waste receptacles standards” and require two completely different product solutions. Recently FM combined

the two standards 6920 and 6921 into a single standard 6920-21, but the definitions and requirement remain different for the two types of receptacles. In accordance with the FM and UL standards oily waste cans are required to be labeled with the following warning: “EMPTY EVERY NIGHT.” The annex material answers two frequently asked questions regarding why oily waste should be disposed of daily and where to dispose the waste.

Response Message: SR-437-NFPA 30-2022

Public Comment No. 1-NFPA 30-2022 [Section No. 6.10.3]

Second Revision No. 470-NFPA 30-2022 [New Section after 6.11]

6.12* Containment, Drainage, and Spill Control.

Ignitible (flammable or combustible) liquids shall not be released into a sewer, storm drain, ditch, drainage canal, lake, river, or tidal waterway; upon the ground, a sidewalk, a street, or a highway; or into the atmosphere, unless such release is permitted by the relevant federal, state, and local governing regulations.

A.6.12

Examples of relevant regulations include the following:

(1) Permits of the jurisdictional air quality management board

(2) National Pollutant Discharge Elimination System permit

(3) Waste discharge requirements established by the jurisdictional water quality control board

(4) Sewer pretreatment requirements for publicly or privately owned treatment works

6.12.1* Design Intent.

The facility shall be designed and operated to prevent the discharge of liquids to public waterways, public sewers, or adjoining property as determined by regulatory requirements and the requirements of Section 6.12 .

A.6.12.1

Containment of spills, leaks, or other container failures can be accomplished by any of the following:

(1) Listed liquid drainage floor assemblies — FM Approval Standard 6090, *Approval Standard for Ignitable Liquid Drainage Floor Assemblies* , is one example of a listing standard

(2) Noncombustible, liquidtight raised sills, curbs, or ramps of suitable height at exterior openings

(3) Noncombustible, liquidtight raised sills, curbs, or ramps of suitable height, or other flow-diverting structures at interior openings

(4) Sloped floors

(5) Open-grate trenches or floor drains that are connected to a properly designed drainage system

(6) Wall scuppers that discharge to a safe location or to a properly designed drainage system

(7) Other means that are acceptable to the authority having jurisdiction

Where sills, curbs, or ramps are used, the appropriate height will depend on a number of factors, including the maximum expected spill volume, the floor area, and the existence of any drainage systems. Historically, curbs and sills have been 4 in. (100 mm) high.

A variety of curb, sill, and ramp heights can be used to obtain the desired secondary containment volume. As a guide, 1 ft^2 of water at a depth of 1 in. equals 0.6 gal (1 m^2 of water @ 25 mm = 25 L). Once the total quantity of liquid containment has been established, the necessary curb, sill, or ramp height can then be calculated.

Liquid drainage flooring assemblies are designed based on a volumetric flow rate rather than a static volume. Thus, liquid drainage floor assemblies should have a volumetric flow capacity of at least 150 percent of the required fire protection at maximum anticipated flow rates.

Where open-grate trenches are used, the volume of the trench should be able to contain the maximum expected spill volume or otherwise be connected to a properly designed drainage system.

It should be noted that these containment and drainage provisions address only fire protection concerns. Consult the appropriate environmental regulations for other restrictions that could apply.

6.12.2 Spill Control.

Where required by other chapters, spill control shall be provided in accordance with Section 6.12 .

6.12.2.1

Buildings, or portions thereof, used for storage of ignitible (flammable or combustible) liquids in individual containers having a capacity of more than 55 gal (208.2 L) shall be provided with spill control to prevent the flow of liquids to adjoining areas. [**400:** 6.2.1.9.2.1]

6.12.2.2

Where spill control is required, floors in indoor locations and similar surfaces in outdoor locations shall be constructed to contain a spill from the largest single vessel by one of the following methods: [**5000:** 34.3.2.8.2.2]

(1) Liquidtight sloped or recessed floors in indoor locations or similar areas in outdoor locations [**5000:** 34.3.2.8.2.2(1)]

(2) Liquidtight floors in indoor locations or similar areas in outdoor locations provided with liquidtight raised or recessed sills or dikes [**5000:** 34.3.2.8.2.2(2)]

(3) Sumps and collection systems [**5000:** 34.3.2.8.2.2(3)]

(4) Other approved systems

6.12.2.3

Except for drains, both of the following shall apply:

(1) Solid floors shall be liquidtight.

(2) Walls shall be liquidtight where they join the floor and for at least 4 in. (100 mm) above the floor.

6.12.2.4

Means shall be provided to prevent ignitible (flammable or combustible) liquid spills from running into basements.

6.12.3 Secondary Containment.

Where required, secondary containment shall be provided in accordance with this section.

6.12.3.1

Buildings, or portions thereof, used to store liquids where the capacity of an individual vessel exceeds 55 gal (208.2 L) or the aggregate capacity of multiple vessels exceeds 1000 gal (3785 L) shall be provided with secondary containment.

6.12.3.2

Where secondary containment is required, floors in indoor locations and similar surfaces in outdoor locations shall be constructed to contain a spill from the largest single vessel by one of the following methods: [**5000:** 34.3.2.8.2.2]

(1) Liquidtight sloped or recessed floors in indoor locations or similar areas in outdoor locations [**5000:** 34.3.2.8.2.2(1)]

(2) Liquidtight floors in indoor locations or similar areas in outdoor locations provided with liquidtight raised or recessed sills or dikes [**5000:** 34.3.2.8.2.2(2)]

(3) Sumps and collection systems [**5000:** 34.3.2.8.2.2(3)]

(4) Other approved systems

6.12.3.3

Where secondary containment is provided, it shall have a capacity that is not less than the largest single container, intermediate bulk container, bulk container, vessel, or tank that can drain into it, plus the capacity to contain the fire protection water that can reasonably be expected to contain a fire occurring within the secondary containment area, plus the volume occupied by anything that is, or could be sitting in the containment were a spill to occur.

6.12.4 Drainage.

If drainage is used it shall meet the requirements of Section 6.12 .

6.12.4.1

Where a drainage system is used to remove liquids from the fire area, it shall direct liquid leakage and fire protection water to an approved safe location without creating any additional exposure hazards.

6.12.4.2

If drainage systems are connected to public or private sewers, or discharged into waterways, the drainage system shall be equipped with traps and separators.

6.12.4.3

Drainage systems shall be designed to handle the anticipated liquid flow, including fire protection water.

6.12.4.4

Curbs, scuppers, or special drainage systems shall be permitted to be used.

6.12.4.4.1

An open-grated trench across the width of the opening inside of the room that drains to a safe location shall be permitted to be used as an alternative to a sill or ramp.

Submitter Information Verification

Committee: FLC-FUN

Submittal Date: Wed Aug 24 14:38:01 EDT 2022

Committee Statement

Committee Statement: NFPA 30 applies to a broad range of occupancies and facilities which vary in size from the "mom and pop" mercantile occupancies to large industrial complexes. Users need clear guidance as to when these requirements apply and are asking for better information on how to meet the requirements when applicable. Containment, drainage, and spill control are methods of fire risk mitigation.

Section 6.12 includes the common requirements in NFPA 30 which are used in the occupancy specific chapters and allows any occupancy specific requirements to remain in the containment, drainage, and spill control sections of chapters 9, 10, 12, 13, 15, 16, 17, 18, and 24. This section also aligns drainage, containment, and spill control requirements in NFPA 30 with those found in NFPA 400 Hazardous Materials Code, and NFPA 5000 Building Construction and Safety Code, where deemed appropriate.

The technical changes were only intended to be limited to using MAQs as a trigger for providing containment, drainage, and spill control. This is to clarify confusion regarding users as to when these requirements are applicable. Also, the 10-gallon container threshold for implementing containment requirements was removed as it was deemed excessive. Instead, the Technical Committee preferred to implement the analogous requirement in NFPA 400 for a general 55-gallon threshold to implement spill containment requirements. Relevant requirements from NFPA 30 Chapters 9 and 24 were moved into this section as part of the consolidation.

Drainage and containment requirement for the 10-gallon container threshold in chapter 16 is part of providing the overall protection for the storage. The 55-gallon threshold in chapter 6 is more generic and applies to all facilities whether protected or not. The committee would like to look at Figure 16.8.1 in next revision cycle.

Response Message: SR-470-NFPA 30-2022

Public Comment No. 53-NFPA 30-2022 [New Section after 6.11.3.5]

Second Revision No. 454-NFPA 30-2022 [Chapter I]

Annex K Informational References

K.1 Referenced Publications.

The documents or portions thereof listed in this annex are referenced within the informational sections of this code and are not part of the requirements of this document unless also listed in Chapter 2 for other reasons.

K.1.1 NFPA Publications.

National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 1, *Fire Code*, 2024 edition.

NFPA 10, *Standard for Portable Fire Extinguishers*, 2022 edition.

NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam*, 2024 edition.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2022 edition.

NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*, 2019 edition.

NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection*, 2022 edition.

NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*, 2022 edition.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, 2023 edition.

NFPA 30, *Flammable and Combustible Liquids Code*, 1993 edition.

NFPA 30B, *Code for the Manufacture and Storage of Aerosol Products*, 2023 edition.

NFPA 31, *Standard for the Installation of Oil-Burning Equipment*, 2024 edition.

NFPA 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, 2024 edition.

NFPA 58, *Liquefied Petroleum Gas Code*, 2023 edition.

NFPA 68, *Standard on Explosion Protection by Deflagration Venting*, 2023 edition.

NFPA 69, *Standard on Explosion Prevention Systems*, 2024 edition.

NFPA 70®, *National Electrical Code*®, 2023 edition.

NFPA 72®, *National Fire Alarm and Signaling Code*®, 2022 edition.

NFPA 77, *Recommended Practice on Static Electricity*, 2024 edition.

NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, 2024 edition.

NFPA 91, *Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Particulate Solids*, 2020 edition.

NFPA *101*®, *Life Safety Code*®, 2024 edition.

NFPA 204, *Standard for Smoke and Heat Venting*, 2024 edition.

NFPA 220, *Standard on Types of Building Construction*, 2024 edition.

NFPA 306, *Standard for the Control of Gas Hazards on Vessels*, 2024 edition.

NFPA 326, *Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair*, 2020 edition.

NFPA 329, *Recommended Practice for Handling Releases of Flammable and Combustible Liquids and Gases*, 2020 edition.

NFPA 385, *Standard for Tank Vehicles for Flammable and Combustible Liquids*, 2022 edition.

NFPA 496, *Standard for Purged and Pressurized Enclosures for Electrical Equipment*, 2024 edition.

NFPA 497, *Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas*, 2024 edition.

NFPA 505, *Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations*, 2023 edition.

NFPA 551, *Guide for the Evaluation of Fire Risk Assessments*, 2022 edition.

NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response*, 2022 edition.

NFPA 730, *Guide for Premises Security*, 2023 edition.

NFPA 5000®, *Building Construction and Safety Code®*, 2024 edition.

Fire Protection Guide to Hazardous Materials, 2010.

Flammable and Combustible Liquids Code Handbook, 2018.

Hall, John R., Jr., Ph.D., "A Fire Risk Analysis Model for Assessing Options for Flammable and Combustible Liquid Products in Storage and Retail Occupancies," *Fire Technology*, Vol. 31, No. 4, November 1995, pp. 291–306.

Nugent, David P., and Hall, Elizabeth L., "International Foam-Water Sprinkler Research Project, Task 1 Technical Report: Literature Search & Technical Analysis," National Fire Protection Research Foundation, April 1992.

K.1.2 Other Publications.

K.1.2.1 ACC Publications.

American Chemistry Council, 700 Second Street, N.E., Washington DC 20002.

Implementation Resource Guide for Responsible Care Security Code of Management Practices: Value Chain Activities, 2008.

Site Security Guidelines for the US Chemical Industry, 2001.

Transportation Security Guidelines for the US Chemical Industry, 2001.

K.1.2.2 AIChE Publications.

American Institute of Chemical Engineers, 120 Wall Street, FL 23, New York, NY 10005-4020.

Fisher, H. G., and Forrest, H. S., "Protection of Storage Tanks from Two-Phase Flow Due to Fire Exposure," *Process Safety Progress*, Vol. 14, July 1995, pp. 183–199.

Guidelines for Analyzing and Managing the Security Vulnerabilities of Fixed Chemical Sites, 2003.

Guidelines for Chemical Process Quantitative Risk Analysis, 2nd edition, 1999.

Guidelines for Evaluating Process Plant Buildings for External Explosions and Fires and Toxic Releases, 2012.

Guidelines for Safe Warehousing of Chemicals, 1998.

Guidelines for Siting and Layout of Facilities, 2nd edition, March 2018.

Guidelines for Pressure Relief and Effluent Handling of Systems, 2nd edition, April 2017.

Guidelines for Vapor Cloud Explosion, Pressure Vessel Burst, BLEVE and Flash Fire Hazards, 2nd edition, July 2010.

Houser, J., et al., "Vent Sizing for Fire Considerations: External Fire Duration, Jacketed Vessels, and Heat Flux Variations Owing to Fuel Consumption," *Journal of Loss Prevention in the Process Industries*, Vol. 14 No. 5, September 2001, pp. 403–412.

K.1.2.3 ANSI Publications.

American National Standards Institute, Inc., 25 West 43rd Street, 4th Floor, New York, NY 10036.

ANSI Z400.1/Z129.1, *Hazardous Workplace Chemicals — Hazard Evaluation and Safety Data Sheet and Precautionary Labeling Preparation*, 2010.

ANSI Z535.2, *Environmental and Facility Safety Signs*, 2011 (reaffirmed 2017).

K.1.2.4 API Publications.

American Petroleum Institute, 200 Massachusetts Avenue, NW, Suite 1100, Washington, DC 20001.

API RP 70, *Security for Offshore Oil and Natural Gas Operations*, 1st edition, 2003, reaffirmed 2010.

API RP 70I, *Security for Worldwide Offshore Oil and Natural Gas Operations*, 1st edition, 2004, reaffirmed 2012.

API Specification 12R1, *Installation, Operation, Maintenance, Inspection, and Repair of Tanks in Production Service*, 2021.

API RP 500, *Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Division 1 and Division 2*, 3rd edition, 2012.

ANSI/API RP 505, *Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Zone 0, Zone 1, and Zone 2*, 2018.

API 607, *Fire Tests for Quarter-turn Valves and Valves Equipped with Nonmetallic Seats*, 2016.

API Standard 620, *Design and Construction of Large, Welded, Low-Pressure Storage Tanks*, 12th edition, 2013 [Addendum 1 (2014) and Addendum 2 (2018)].

API Standard 650, *Welded Tanks for Oil Storage*, 13th edition, 2020.

API Standard 653, *Tank Inspection, Repair, Alteration, and Reconstruction*, 5th edition, 2014 [Addendum 1 (2018)].

API RP 752, *Management of Hazards Associated with Location of Process Plant Buildings*, 3rd edition, 2009.

API RP 753, *Management of Hazards Associated with Location of Process Plant Portable Buildings*, 1st edition, 2007, reaffirmed 2020.

API Standard 1164, *Pipeline SCADA Security*, Edition 2, 2009, reaffirmed 2016.

API 1501, *Filtration and Dehydration of Aviation Fuels*, 4th edition, 1965.

API RP 1604, *Closure of Underground Petroleum Storage Tanks*, 4th edition, 2021.

API RP 1615, *Installation of Underground Petroleum Storage Systems*, 6th edition, 2011.

API RP 1621, *Bulk Liquid Stock Control at Retail Outlets*, 5th edition, 1993, reaffirmed 2020.

API RP 1631, *Interior Lining of Underground Storage Tanks,* 5th edition, 2021, reaffirmed 2020.

API RP 1632, *Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems*, 3rd edition, 1996, reaffirmed 2010.

API RP 2001, *Fire Protection in Refineries* , 2019.

API Standard 2003, *Protection Against Ignition Arising Out of Static, Lightning, and Stray Currents*, 8th edition, 2015, reaffirmed 2020.

API Standard 2015, *Cleaning Petroleum Storage Tanks*, 8th edition, 2018.

API RP 2016, *Guidelines and Procedures for Entering and Cleaning Petroleum Storage Tanks*, 1st edition, reaffirmed 2006.

API RP 2030, *Application of Fixed Water Spray Systems for Fire Protection in the Petroleum and Petrochemical Industries* , 2014.

API Publication 2214, *Spark Ignition Properties of Hand Tools*, 4th edition, 2004.

API Standard 2217A, *Guidelines for Work in Inert Confined Spaces in the Petroleum Industry*, 5th edition, 2017.

API Publication 2218, *Fireproofing Practices in Petroleum and Petrochemical Processing Plants*, 3rd edition, 2013, reaffirmed 2020.

API Publication 2219, *Safe Operating Guidelines for Vacuum Trucks in Petroleum Service*, 4th

edition, 2016.

API Standard 2350, *Overfill Protection for Storage Tanks in Petroleum Facilities*, 5th edition, 2021.

API *Security Guidelines for the Petroleum Industry*, 3rd edition, 2005.

API Standard 2610, *Design, Construction, Operation, Maintenance, and Inspection of Terminal and Tank Facilities*, 3rd edition, 2018.

API Publication, "An Engineering Analysis of the Effects of Oxygenated Fuels on Marketing Vapor Recovery Equipment," September 1990.

API Publication 4589, *Fugitive Hydrocarbon Emissions from Petroleum Production Operations*, 1st edition, 1993.

API/National Petrochemical and Refiners Association, *Security Vulnerability Assessment Methodology for the Petroleum and Petrochemical Industries*, 2nd edition, 2004.

K.1.2.5 ~~NACE~~ The Association for Materials Protection and Performance Publications.

~~NACE International, 1440 South Creek Drive, Houston, TX 77084.~~ Association for Materials Protection and Performance, 15835 Park Ten Place Houston, Texas 77084.

NACE SP-0169, *Control of External Corrosion on Underground or Submerged Metallic Piping Systems*, 2013.

NACE SP-0285, *Corrosion Control of Underground Storage Tank Systems by Cathodic Protection*, 2011.

K.1.2.6 Association of Canadian Distillers Publications.

Association of Canadian Distillers, Suite 518, 90 Rue Sparks, Ottawa, Ontario, K1P 5B4, Canada.

"Fire Tests of Distilled Spirits Storage Tanks," Client Report CR-5727.1, 2001.

K.1.2.7 ASTM Publications.

ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM C1055, *Standard Guide for Heated System Surface Conditions that Produce Contact Burn Injuries*, 2020.

ASTM D4206, *Standard Test Method for Sustained Burning of Liquid Mixtures Using the Small Scale Open-Cup Apparatus*, 1996, reapproved 2018.

ASTM D4956, *Standard Specification for Retroreflective Sheeting for Traffic Control*, 2019.

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Committee Statement

Committee Statement: The annex is revised to comply with the NFPA Manual of Style for citing documents. The National Association of Corrosion Engineers (NACE) is now The Association for Materials Protection and Performance (AMPP). STI R931 has been withdrawn and its content has been merged into the latest revision of STI R912.

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