ARTICLE
515 Bulk Storage Plants

Δ **515.1 Scope.** This article covers a property or portion of a property where flammable liquids are received by tank vessel, pipelines, tank car, or tank vehicle and are stored or blended in bulk for the purpose of distributing such liquids by tank vessel, pipeline, tank car, tank vehicle, portable tank, or container.

Informational Note: See NFPA 30-2021, *Flammable and Combustible Liquids Code*, for extracted text that is followed by a reference in brackets. Only editorial changes were made to the extracted text to make it consistent with this *Code*.

Article 515 covers facilities that store (in bulk) and distribute flammable liquids, as opposed to dispensing liquids into fuel tanks of vehicles. Flammable liquid dispensing locations, including those within the bulk storage facility, are covered under Article 514. Bulk storage tanks may be located inside buildings or outside, either above ground or underground. This article addresses the hazardous locations in the vicinity of the storage tank, as well as the tank vehicle, pier, or wharf from which the liquids are loaded and off-loaded. This article also covers the classification of the areas around drum storage containers. Area classification information for facilities at which liquified natural gas is received or stored in bulk is found in NFPA 59A, *Standard for the Production, Storage and Handling of Liquefied Natural Gas (LNG)*.

N **515.2 Other Articles.** In addition to the requirements of this article, bulk storage plants shall comply with Table 515.2, as applicable, except as modified by this article.

N ***TABLE 515.2*** *Other Articles*

Requirement	Division Classified Locations	Zone Classified Locations
Area classification	500.5, 500.6	505.5, 505.6, 505.7
Equipment	Part III of 501, 500.7, 500.8, 501.5	505.8, 505.9, 505.20, 505.22
Wiring	Part II of 501	505.15, 505.16, 505.17, 505.18, 505.19, 505.26, 505.30

Δ **515.3 Classified Locations.** Where the term "Class I" is used with respect to Zone classifications within this article of the *Code*, it shall apply to Zone 0, Zone 1, and Zone 2 designations.

Informational Note No. 1: The term "Class I" was originally included as a prefix to Zone 0, Zone 1, and Zone 2 locations and references as an identifier for flammable gases, vapors, or liquids to differentiate from Class II and Class III locations. Zone 0, Zone 1, and Zone 2 only apply to flammable gases, vapors, or liquids so the "Class I" prefix is redundant and has been deleted, except for text that is extracted from other documents or to remain consistent throughout this article.

Table 515.3 shall be applied where Class I flammable liquids are stored, handled, or dispensed and shall be used to delineate and classify bulk storage plants. The classified location shall not extend beyond a floor, wall, roof, or other solid partition that has no communicating openings.

Where the installation does not meet the requirements found in Table 515.3, the authority having jurisdiction shall have the authority to classify the extent of the classified space.

Informational Note No. 2: See NFPA 30, *Flammable and Combustible Liquids Code*, Chapter 5, for the area classifications listed in Table 515.3 that are based on the premise that the installation meets all the applicable requirements.

Informational Note No. 3: See 514.3(C) through (E) for gasoline dispensing stations in marinas and boatyards.

Informational Note No. 4: See NFPA 30, *Flammable and Combustible Liquids Code*, Section 7.3, for additional information.

Many steps are required to properly classify a hazardous location. Although the *NEC*® provides general area classifications in Articles 501, 502, 503, 505, and 506, it does not classify specific locations. The *NEC* classifications for specific occupancies or processes have been extracted from other NFPA documents. The classifications from those documents are based on the premise that all applicable requirements of the document have been met. Deviations in on-site conditions, such as process conditions, area ventilation, and room construction, from those assumed by the document may alter the general classification. Those responsible for the specific area classification must consider the basis for the general classifications to determine the applicability to a specific location.

NFPA 30, *Flammable and Combustible Liquids Code*, contains the specific construction and installation requirements used to develop the area classifications in Article 515. Table 515.3 is extracted from NFPA 30, Table 7.3.3. The area classifications listed in the table are based on the premise that all applicable requirements of NFPA 30 have been met as conveyed by Informational Note No. 1 to 515.3.

Exhibits 515.1 through 515.5 illustrate the hazardous locations associated with several types of flammable liquid containers and operations.

Δ ***TABLE 515.3*** *Electrical Area Classifications*

Location	Division	Zone	Extent of Classified Area
Indoor equipment installed where flammable vapor–air mixtures can exist under normal operation (see Informational Note)	1	0	The entire area associated with such equipment where flammable gases or vapors are present continuously or for long periods of time
	1	1	Area within 1.5 m (5 ft) of any edge of such equipment, extending in all directions
	2	2	Area between 1.5 m and 2.5 m (5 ft and 8 ft) of any edge of such equipment, extending in all directions; also, space up to 900 mm (3 ft) above floor or grade level within 1.5 m to 7.5 m (5 ft to 25 ft) horizontally from any edge of such equipment[1]
Outdoor equipment installed where flammable vapor–air mixtures can exist under normal operation	1	0	The entire area associated with such equipment where flammable gases or vapors are present continuously or for long periods of time
	1	1	Area within 900 mm (3 ft) of any edge of such equipment, extending in all directions
	2	2	Area between 900 mm (3 ft) and 2.5 m (8 ft) of any edge of such equipment, extending in all directions; also, space up to 900 mm (3 ft) above floor or grade level within 900 mm to 3.0 m (3 ft to 10 ft) horizontally from any edge of such equipment
Tank storage installations inside buildings	1	1	All equipment located below grade level
	2	2	Any equipment located at or above grade level
Tank — aboveground, fixed roof	1	0	Inside fixed roof tank
	1	1	Area inside dike where dike height is greater than the distance from the tank to the dike for more than 50 percent of the tank circumference
	2	2	Within 3.0 m (10 ft) from shell, ends, or roof of tank; also, area inside dike to level of top of dike wall
	1	0	Area inside of vent piping or opening
	1	1	Within 1.5 m (5 ft) of open end of vent, extending in all directions
	2	2	Area between 1.5 m and 3.0 m (5 ft and 10 ft) from open end of vent, extending in all directions
Tank — aboveground, floating roof			
With fixed outer roof	1	0	Area between the floating and fixed roof sections and within the shell
With no fixed outer roof	1	1	Area above the floating roof and within the shell
Tank vault — interior	1	1	Entire interior volume, if Class I liquids are stored within
Underground tank fill opening	1	1	Any pit, box, or space below grade level, if any part is within a Division 1 or 2, or Zone 1 or 2 classified location
	2	2	Up to 450 mm (18 in.) above grade level within a horizontal radius of 3.0 m (10 ft) from a loose fill connection, and within a horizontal radius of 1.5 m (5 ft) from a tight fill connection
Vent — discharging upward	1	0	Area inside of vent piping or opening
	1	1	Within 900 mm (3 ft) of open end of vent, extending in all directions
	2	2	Area between 900 mm and 1.5 m (3 ft and 5 ft) of open end of vent, extending in all directions
Drum and container filling — outdoors or indoors	1	0	Area inside the drum or container
	1	1	Within 900 mm (3 ft) of vent and fill openings, extending in all directions
	2	2	Area between 900 mm and 1.5 m (3 ft and 5 ft) from vent or fill opening, extending in all directions; also, up to 450 mm (18 in.) above floor or grade level within a horizontal radius of 3.0 m (10 ft) from vent or fill opening
Pumps, bleeders, withdrawal fittings			
Indoor	2	2	Within 1.5 m (5 ft) of any edge of such devices, extending in all directions; also, up to 900 mm (3 ft) above floor or grade level within 7.5 m (25 ft) horizontally from any edge of such devices
Outdoor	2	2	Within 900 mm (3 ft) of any edge of such devices, extending in all directions. Also, up to 450 mm (18 in.) above grade level within 3.0 m (10 ft) horizontally from any edge of such devices

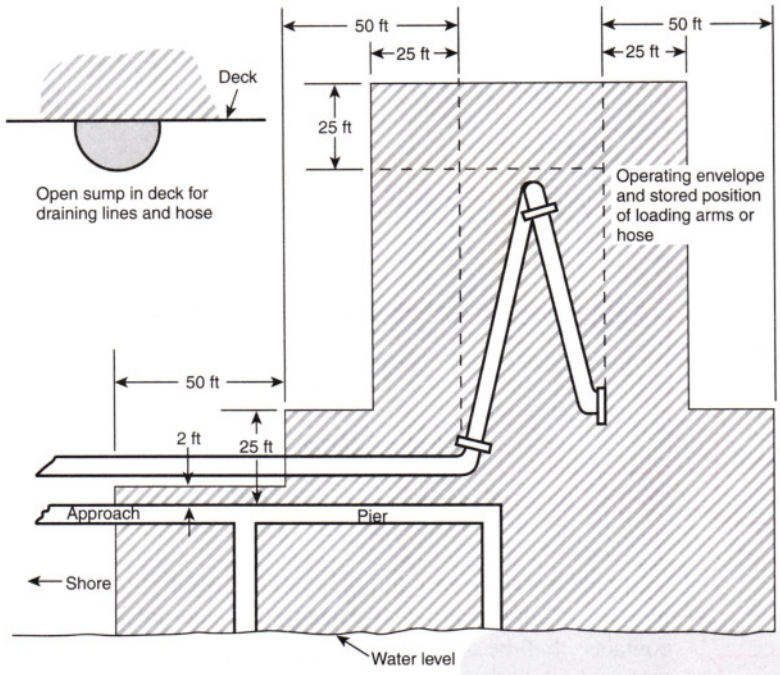
(continues)

Δ *TABLE 515.3 Continued*

Location	Division	Zone	Extent of Classified Area
Pits and sumps			
Without mechanical ventilation	1	1	Entire area within a pit or sump if any part is within a Division 1 or 2 or Zone 1 or 2 classified location
With adequate mechanical ventilation	2	2	Entire area within a pit or sump if any part is within a Division 1 or 2 or Zone 1 or 2 classified location
Containing valves, fittings, or piping, and not within a Division 1 or 2 or Zone 1 or 2 classified location	2	2	Entire pit or sump
Drainage ditches, separators, impounding basins			
Outdoor	2	2	Area up to 450 mm (18 in.) above ditch, separator, or basin; also, area up to 450 mm (18 in.) above grade within 4.5 m (15 ft) horizontally from any edge
Indoor			Same as pits and sumps
Tank vehicle and tank car[2]			
Loading through open dome	1	0	Area inside of the tank
	1	1	Within 900 mm (3 ft) of edge of dome, extending in all directions
	2	2	Area between 900 mm and 4.5 m (3 ft and 15 ft) from edge of dome, extending in all directions
Loading through bottom connections with atmospheric venting	1	0	Area inside of the tank
	1	1	Within 900 mm (3 ft) of point of venting to atmosphere, extending in all directions
	2	2	Area between 900 mm and 4.5 m (3 ft and 15 ft) from point of venting to atmosphere, extending in all directions; also, up to 450 mm (18 in.) above grade within a horizontal radius of 3.0 m (10 ft) from point of loading connection
Loading through closed dome with atmospheric venting	1	1	Within 900 mm (3 ft) of open end of vent, extending in all directions
	2	2	Area between 900 mm and 4.5 m (3 ft and 15 ft) from open end of vent, extending in all directions; also, within 900 mm (3 ft) of edge of dome, extending in all directions
Loading through closed dome with vapor control	2	2	Within 900 mm (3 ft) of point of connection of both fill and vapor lines extending in all directions
Bottom loading with vapor control or any bottom unloading	2	2	Within 900 mm (3 ft) of point of connections, extending in all directions; also up to 450 mm (18 in.) above grade within a horizontal radius of 3.0 m (10 ft) from point of connections
Storage and repair garage for tank vehicles	1	1	All pits or spaces below floor level
	2	2	Area up to 450 mm (18 in.) above floor or grade level for entire storage or repair garage
Garages for other than tank vehicles	Unclassified		If there is any opening to these rooms within the extent of an outdoor classified location, the entire room shall be classified the same as the area classification at the point of the opening.
Outdoor drum storage	Unclassified		
Inside rooms or storage lockers used for the storage of Class I liquids	2	2	Entire room or locker
Indoor warehousing where there is no flammable liquid transfer	Unclassified		If there is any opening to these rooms within the extent of an indoor classified location, the classified location shall extend through the opening to the same extent as if the wall, curb, or partition did not exist.
Office and rest rooms	Unclassified		If there is any opening to these rooms within the extent of an indoor classified location, the room shall be classified the same as if the wall, curb, or partition did not exist.
Piers and wharves			See Figure 515.3.

[1]The release of Class I liquids can generate vapors to the extent that the entire building, and possibly an area surrounding it, should be considered a Class I, Division 2 or Zone 2 location.

[2]When classifying extent of area, consideration shall be given to the fact that tank cars or tank vehicles can be spotted at varying points. Therefore, the extremities of the loading or unloading positions shall be used. [**30:**Table 7.3.3]



Key:
Division 1 Division 2 Nonclassified

Notes:
(1) For SI units, 1 in. = 25 mm; 1 ft = 0.3 m.
(2) The "source of vapor" is the operating envelope and stored position of the outboard flange connection of the loading arm (or hose).
(3) The berth area adjacent to tanker and barge cargo tanks is to be Division 2 to the following extent:
(a) 25 ft (7.6 m) horizontally in all directions on the pier side from the portion of the hull containing cargo tanks.
(b) From the water level to 25 ft (7.6 m) above the cargo tanks at their highest position.
(4) Additional locations can be classified as required by the presence of other sources of flammable liquids on the berth, or by Coast Guard or other regulations.

FIGURE 515.3 *Area Classification for a Marine Terminal Handling Flammable Liquids.* ***[30:****Figure 29.3.22]*

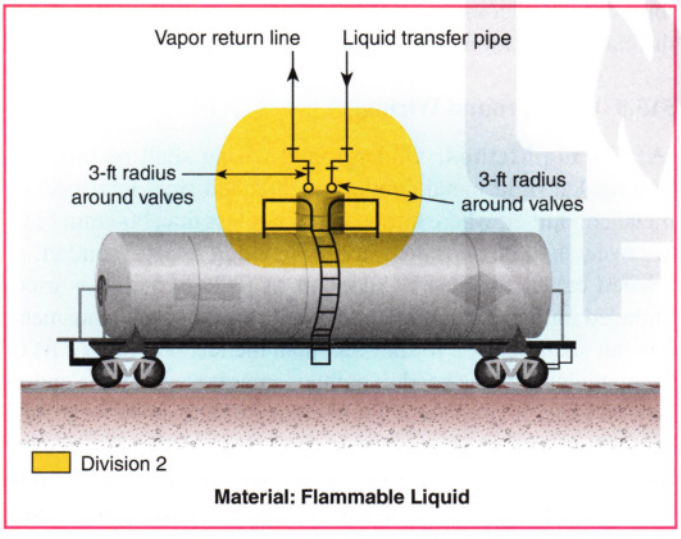


EXHIBIT 515.1 Tank car/tank truck loading and unloading via closed system with transfer through dome only.

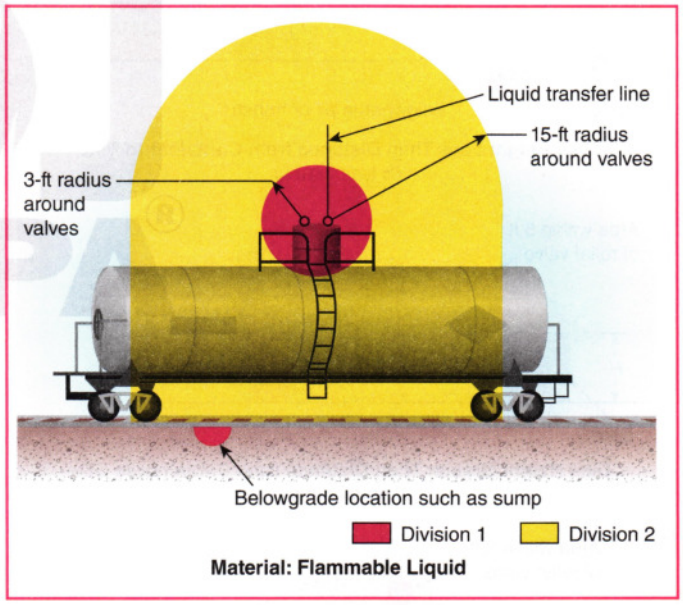


EXHIBIT 515.2 Open system with top or bottom product transfer.

Exhibits 515.1 and 515.2 depict the classification difference between using a closed and an open transfer system on a tank car.

Δ **515.4 Wiring and Equipment Located in Hazardous (Classified) Locations.** All electrical wiring and equipment within the hazardous (classified) locations specified in 515.3 shall comply with the applicable requirements of Table 515.2.

515.7 Wiring and Equipment Above Hazardous (Classified) Locations.

Δ **(A) Fixed Wiring.** All fixed wiring above hazardous (classified) locations shall comply with 501.10(B) or 505.15(C), as applicable.

Δ **(B) Fixed Equipment.** Fixed equipment that might produce arcs, sparks, or particles of hot metal, such as lamps and

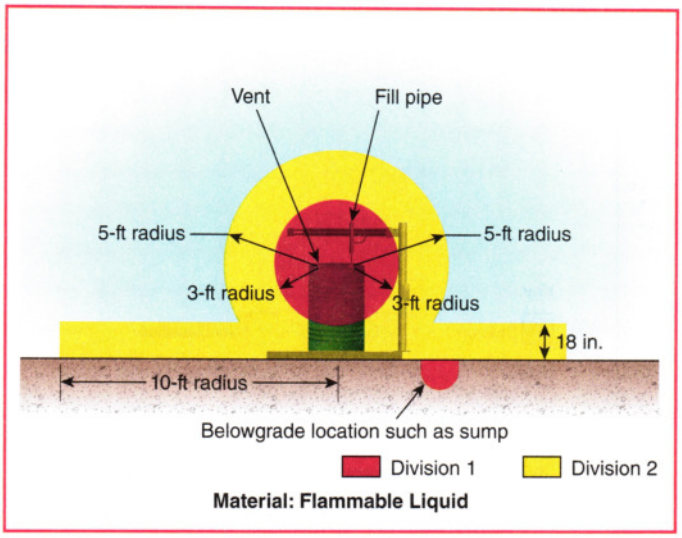


EXHIBIT 515.3 Drum filling station, outdoors or indoors, with adequate ventilation.

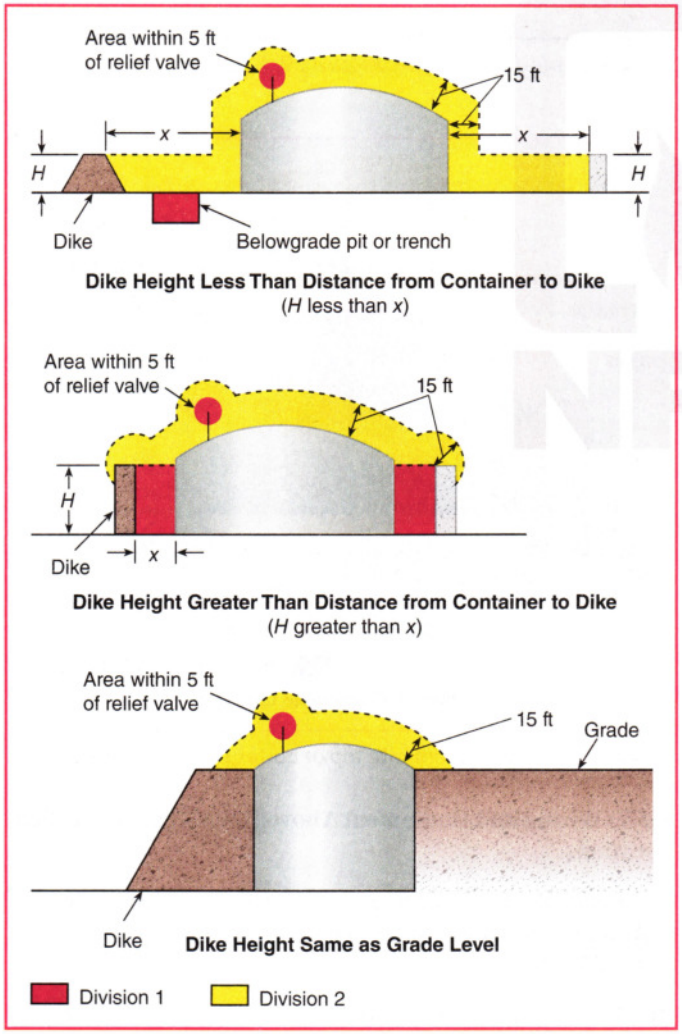


EXHIBIT 515.4 Storage tanks for cryogenic liquids. *[Source: Adapted from NFPA 59A-2019, Figures 11.9.2(a) through 11.9.2(c)]*

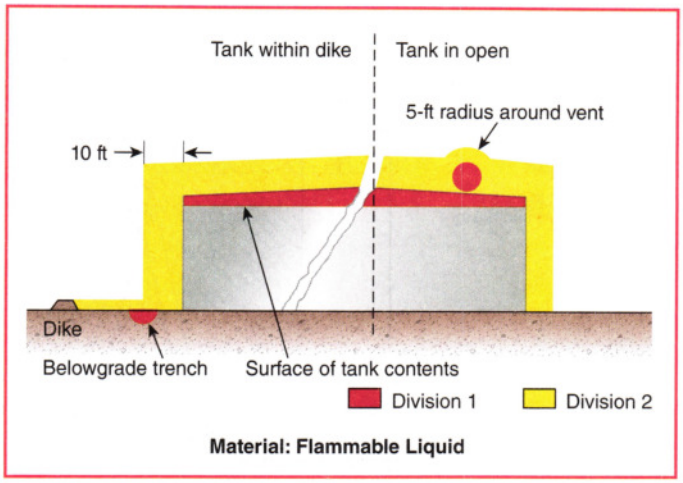


EXHIBIT 515.5 Fixed roof storage tank, outdoors at grade.

lampholders for fixed lighting, cutouts, switches, receptacles, motors, or other equipment having make-and-break or sliding contacts, shall be of the totally enclosed type or be constructed to prevent the escape of sparks or hot metal particles.

Δ **(C) Portable Luminaires or Other Utilization Equipment.** Portable luminaires or other utilization equipment and their flexible cords shall comply with Part III of Article 501 or 505.17 for the class of location above which they are connected or used.

515.8 Underground Wiring.

Δ **(A) Wiring Method.** Underground wiring shall be installed in threaded rigid metal conduit or threaded steel intermediate metal conduit or, where buried under not less than 600 mm (2 ft) of cover, shall be permitted in PVC conduit, RTRC conduit, or a listed cable. Where PVC conduit or RTRC conduit is used, threaded rigid metal conduit or threaded steel intermediate metal conduit shall be used for not less than the last 600 mm (2 ft) of the conduit run to the conduit point of emergence from the underground location or to the point of connection to an aboveground raceway. Where cable is used, it shall be enclosed in threaded rigid metal conduit or threaded steel intermediate metal conduit from the point of lowest buried cable level to the point of connection to the aboveground raceway.

See also

514.8 and its commentary regarding underground wiring. Note that polyvinyl chloride conduit (PVC) and reinforced thermosetting resin conduit (RTRC) are the only nonmetallic raceways permitted for occupancies covered in Article 515.

(B) Insulation. Conductor insulation shall comply with 501.20.

Δ **(C) Nonmetallic Wiring.** Where PVC conduit, RTRC conduit, or cable with a nonmetallic sheath is used, an equipment grounding conductor shall be included to provide for electrical continuity of the raceway system and for grounding of non–current-carrying metal parts.