LIQUIFIED PETROLEUM GAS CODE

INTRODUCTION

National Fire Protection Association (NFPA) documents describe a level of fire protection agreed on by persons representing a variety of interests. The guidance in these documents does not reflect unique conditions or special considerations, such as system performance under adverse conditions. Nor does NFPA guidance reflect the increased system reliability that AXA XL Risk Consulting recommends for high valued properties.

This AXA XL Risk Consulting Guideline takes a position on the provisions of NFPA 58 that AXA XL Risk Consulting believes require clarification or changes. To understand the position, this AXA XL Risk Consulting Guideline must be read with a copy of NFPA 58. The provisions of the NFPA document are not repeated.

POSITION

Note all the conditions under which this code does not apply. For natural gas processing facilities, refineries, chemical plants and petrochemical plants, refer to PRC.2.5.1, PRC.2.5.2, PRC.12.2.1.2 and PRC.14.1.1.1.

Provide fireproofing for tank supports in accordance with PRC.2.5.1.

Protect regulator vents against freezing.

Do not use pipe, tubing, or fittings made of polyethylene or any other combustible material. Metal pipe is preferred.

Shut heaters down upon flame failure whether or not they are attended.

Reduce the exposure created by LPG storage tanks either by protecting them with mounding, burial, water spray, fixed monitor nozzles, insulation, or by separation.

Mounding and Burial

Tanks require corrosion protection if they are to be mounded or buried. Apply a protective coating, such as bitumen or epoxy, to these tanks. Then cover all parts of the tank with clean sand to a depth of at least 1 ft (0.3 m). To conserve space when mounding tanks, it may be necessary to build retaining walls partly or completely around the tanks to hold the fill. If this is done, provide adequate drainage of the walled area. Do not surround tanks by walls unless fill is to be provided.

> The code now requires all mounded and buried tanks to have cathodic protection. In addition, all steel piping over 1 in. (25 mm) is required to have cathodic protection. Cathodic protection may be used to increase the corrosion resistance of mounded and buried tanks. The protective

coating just described is required for the cathodic protection to work correctly. In addition, cathodic protection systems must take into account differences in moisture content of the sand at the top and bottom of mounded tanks.

NOTE: In some parts of the U.S., LP-Gas storage tanks are considered pressure vessels and, therefore, require periodic inspections that entail unearthing the tank. In this situation, perlite or vermiculite may be used as a fill in place of sand. Removing this fill carefully is necessary to avoid damaging the tank or piping.

Water Spray

Design automatic water spray systems for a density of 0.35 gpm/ft² (14.2 L/min/m²) over the tank surface, using directional nozzles. Locate and space the nozzles to cover all tank surfaces with no allowance for "run-down." Provide a water spray system designed for a density of 0.50 gpm/ft² (20.4 L/min/m²) over the pumps and valves adjacent to the tanks. Install water spray systems in accordance with NFPA 15. Drain the area around the tanks to a safe, remote location.

Fixed Monitor Nozzles

Install fixed monitor nozzles so they can wet the entire surface of each tank. Arrange monitor nozzles for both automatic actuation by a fire detection system and manual actuation.

Insulation

Use insulation or fireproofing capable of keeping the tank temperature below 800°F (427°C) for 50 min while being exposed to a torch delivering 70,000 Btu/h/ft² (795,000 kJ/h/m²). Conduct the test on insulation applied to a steel plate. Also conduct a hose stream and weathering test, such as the one specified by U.S. Department of Transportation. No insulation is currently listed for use on tanks by a nationally recognized testing laboratory with follow-up service. Refer any tank installation using insulation to your Principal Consultant for review and acceptance.

Separation

Separate tanks from each other and from important facilities in accordance with Tables 1 and 2.

TABLE 1
Minimum Distance Between Tank Groups (ft)

Total Capacity Of LPG Storage Tank Group[1] (gal)	TankProtection[2]	Total Capacity Of LPG Storage Tank Group[1] (gal)		
		501-2000	2001-90,000	90,001-180,000
501-2000	N/P	25	50	50
	M/B	25	25	25
	I/W	25	25	25
2001-90,000	N/P	50	75	75
	M/B	25	25	25
	I/W	50	50	50
90,001-180,000	N/P	50	75	100
	M/B	25	25	25
	I/W	50	50	75

SI Units: ft = 0.305 m; gal = 3.79 L = 3.79 E-03 m^3

1. 120,000 gal (454,000 L) maximum individual tank capacity, 180,000 gal (681,000 L) maximum aggregate group capacity with a maximum of six tanks per group.
2. N/P: Tanks without special protection
   M/B: Mounded or buried tanks
   I/W: Tanks with insulation or water spray protection

   NOTE: Use the lowest level of protection provided for tank groups.

TABLE 2
Minimum Distance Between Tank Groups And Important Facilities (ft)

Total Capacity Of LPG Storage Tank Group[1] (gal)	Tank Protection[2]	Combustible Construction & All Bldgs w/Basements	Blank Masonry Without Basements	Other Noncombustible Bldgs Without Basements	Boilers, Fired Heaters & Other Sources Of Ignition	Directly Fired Vaporizers	Loading & Unloading Risers
501-2000	N/P	150	50	75	50	50[3]	25
	M/B	150	50	75	50	50[3]	25
	I/W	150	50	75	50	50[3]	25
2001-30,000	N/P	200	100	150	75	75[3]	75
	M/B	200	100	100	75	75[3]	25
	I/W	200	100	100	75	75[3]	50
30,001-70,000	N/P	300	125	175	75	75[3]	75
	M/B	300	100	100	75	75[3]	25
	I/W	300	100	100	75	75[3]	50
70,001-90,000	N/P	300	150	225	75	75[3]	75
	M/B	300	100	100	75	75[3]	25
	I/W	300	100	100	75	75[3]	50
90,001-120,000	N/P	300	175	250	75	75[3]	100
	M/B	300	100	100	75	75[3]	25
	I/W	300	100	100	75	75[3]	50
120,001-180,000	N/P	300	200	300	75	75[3]	100
	M/B	300	100	100	75	75[3]	25
	I/W	300	100	100	75	75[3]	50
Directly Fired Vaporizers		100	75	100	75[4]	20	75
Loading & Unloading Risers[5]		200	100	150	75	75	100

SI Units: ft = 0.305 m; gal = 3.79 L = 0.00379 m^3

1. 120,000 gal (454,000 L) maximum individual tank capacity, 180,000 gal (681,000 L) maximum aggregate group capacity with a maximum of 6 tanks per group.
2. N/P: Tanks without special protection
   M/B: Mounded or buried tanks
   I/W: Tanks with insulation or water spray protection
3. Indirectly fired vaporizers, including those using steam, water, air or other nonflammable heat transfer mediums, may be located 10 ft (3 m) from the storage tanks. Heaters for these mediums should be located according to the spacing criteria for "Boilers, fired heaters and other sources of ignition." The electrical controls should be for Class I, Group D, Division 2 locations.
4. Fired boilers or heaters used only for heating indirectly fired vaporizers may be located adjacent to their vaporizer. Both the heater and vaporizer must meet this spacing requirement.
5. For tank trucks smaller than 1000 gal (3790 L), the distance is reduced to minimum 50 ft (15 m) from any major building or facility and 25 ft (7.5 m) from the storage tank being filled.

AXA XL Risk Consulting does not believe that LP-Gas tanks and systems should be permitted on roofs or balconies.

Filling by weight is preferred over filling by volume. Filling by volume relies on gauge readings that vary with temperature and sometimes with cylinder orientation. Furthermore, a gauge would never read correctly if the gauge tube were improperly oriented inside a tank. If filling by volume is used, establish a written training program for safe filling practices. The program should strictly prohibit deliberate overfilling of containers.

Do not reduce the level of fire protection below that suggested by the fire safety analysis.

Cylinder Storage and Refueling Pumps

Protect portable cylinders being stored either in ventilated metal enclosures, fenced-in areas, or chained up that are located within 10 ft (3 m) from vehicle traffic or parking with vehicular barrier protection. Protect all vehicle pumps with vehicular barrier protection. Vehicle protection can be either

3 ft (1 m) high concrete filled posts not less than 4 in. (100 mm) in diameter, spaced not more than 4 ft (1.2 m) between posts or a 3 ft (1 m) high concrete barrier that can resist a force of 12,000 lb (53,375 N) when applied at the top of the barrier.

Management Programs

Put training programs in writing, and update them whenever processes or operator duties change. Include in these programs education in the hazards of LP-Gases and training in both safe handling and critical emergency procedures. Forbid personnel from undertaking any operation with LP-Gas whenever any safety component is not in order. See PRC.1.0.4.

Submit information about appliances intended for use with other gases to AXA XL Risk Consulting for review before using them with LP-Gases.

DISCUSSION

Storage of cylinders on loading docks and on the ground near the loading dock are subject to impact from forklifts, trucks and cars. While the ventilated metal enclosures and fenced-in areas will limit access to the cylinders, if the metal enclosure is located outside on the loading dock without barrier protection it is susceptible to impact from the forklifts and can be damaged.