



Coffee Break Training - Fire Protection Series

Hazardous Materials: Aboveground Flammable and Combustible Liquid Tank Emergency Venting - Part 1: Tank Types

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Learning Objective: The student shall be able to list three types of aboveground flammable and combustible liquid tanks based on their operating pressure ranges.

Flammable and combustible liquid storage tanks located aboveground are susceptible to exposure fires, including pool fires where the tank's own contents may have leaked, ignited and expose the tank to flames and heat. When the tank is heated, the vapors inside expand and can create dangerous pressures that must be relieved before the tank suffers a catastrophic failure*. An aboveground tank is one that is installed above grade, at grade, or below grade without backfill, leaving its exterior surfaces exposed to the atmosphere.



This bulk hydrocarbon liquid storage tank failed catastrophically as a result of a fire, but did not explode. Photo courtesy FEMA/Yuisa Rios.

In 1959, five Kansas City, Missouri, fire fighters were killed when inadequately vented tanks failed and they were caught in the resulting fireball. Forty-one years later, an Iowa fire fighter was killed when a brush fire ignited vapors. In 2007, another tank failure in Valley Center, Kansas, resulted in 11 civilians and one fire fighter requiring medical treatment. Aboveground storage tanks remain a threat to fire fighters and civilians today.

The calculation procedure to properly size emergency tank venting is complicated. Code officials should work with qualified professionals to determine that emergency venting standards are in compliance with safety requirements, particularly those outlined in NFPA 30, *Flammable and Combustible Liquids Code*. Nearly all aboveground liquid storage tanks require some means of emergency venting, and if an identifiable venting device can't be found during an inspection or plan review, ask the designer/owner to provide information indicating how venting will be accomplished in accordance with code requirements.

The first step to understand tank venting is to know that tanks may operate under a variety of pressures. In the model codes, an **atmospheric** tank is one that has been designed to operate at pressures from atmospheric through 1.0 psi gauge pressure (6.9 kPa), all others are considered pressurized tanks. This is an important distinction when evaluating emergency venting requirements.

Tank Description	Operating Design Pressure	
	psig**	kPa
Atmospheric	0 to 1.0	0 to 6.9
Low pressure	1.0 to 15	6.9 to 103
Pressure vessel	>15	>103

**psig refers to gauge pressure

The next few Coffee Break Training items will summarize many of the factors that influence venting requirements for aboveground flammable and combustible liquid storage tanks. Remember always to employ competent professionals and sound engineering judgment when enforcing code requirements.

*Underground tanks don't require emergency vents since they are not subject to exposure fires. Inspectors should be wary of aboveground tanks that don't have emergency vents: often resulting from someone pulling an underground tank and reusing it aboveground.



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