Coffee Break Training – Fire Protection Series

Hazardous Materials: Aboveground Flammable and Combustible Liquid Tank Emergency Venting — Part 8: Venting for Pressure Tanks

No. FP-2013-8 February 19, 2013

Learning Objective: *The student shall be able to compute the minimum emergency ventilation requirements for tanks operating at gauge pressures above 1 pound per square inch gauge pressure (6.9 kPa).*

Flammable liquid storage tanks that operate at gauge pressures above 1 psig (6.9 kPa) are considered either low pressure or pressure vessels. (See Coffee Break Training FP-2013-1 for a definition.) In those cases where liquids are stored above ambient pressure, additional attention must be paid to the emergency venting requirements.

The vent designer has three options — depending upon tank size — when venting is provided by combined normal and emergency vents:

1. If the wetted area of the vessel **does not exceed** 2,800 feet^2 (260 m^2), the "Wetted Area vs. Cubic Feet Free Air Per Hour" table displayed in Coffee Break Training FP-2013-6 may be employed.

2. If the wetted area of the vessel **equals or exceeds** 2,800 feet^2 (260 m^2), the "Wetted Area vs. Cubic Feet Free Air Per Hour" table displayed below may be used to establish vent requirements.

Low pressure and pressurized tanks must be adequately vented to prevent catastrophic failure when the vapors are ignited. *(Kansas State Fire Marshal's Office Photo/ Steel Tank Institute and Mike Heim)*

Wetted Area vs. Cubic Feet (m^3) Free Air Per Hour Tanks with Wetted Area More than 2,800 ft^2 (260 m^2) or Operating at More Than 1 psig (6.9 kPa)*

SQ FT	CFH†	M²	M³H	SQ FT	CFH	M²	M³H
2,800	742,000	260	21,011	9,000	1,930,000	836.1	54,652
3,000	786,000	279	22,257	10,000	2,110,000	929	59,749
3,500	892,000	325.1	25,258	15,000	2,940,000	1,393.5	83,251
4,000	995,000	371.6	28,175	20,000	3,720,000	1,858.1	105,339
4,500	1,100,000	418	31,149	25,000	4,470,000	2,322.6	126,576
5,000	1,250,000	464.5	35,396	30,000	5,190,000	2,787.1	146,964
6,000	1,390,000	557.4	39,360	35,000	5,900,000	3,251.6	167,069
7,000	1,570,000	650.3	44,457	40,000	6,570,000	3,716.1	186,042
8,000	1,760,000	743.2	49,838				

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*at 14.7 psia and 60 F (1 bar and 15.5 C)
†CFH equals feet^3/hour

3. In lieu of the tabular values, vent capacity may be based on the following formula:

$$CFH = 1,107(A)^{0.82}$$

Where, CFH = venting capacity requirement (ft^3 of free air per hour) (m^3/hour), A = Tank wetted area, in ft^2 or m^2

For additional information, refer to NFPA 30, *Flammable and Combustible Liquids Code.*