Hazardous Materials: Aboveground Flammable and Combustible Liquid Tank Emergency Venting – Part 7: Interpolated Value Tank Venting Requirements

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Learning Objective: *Given a known tank wetted area, the student shall be able to compute the minimum ventilation required through normal and emergency vents.*

Last week's Coffee Break Training explained how to determine from a table the minimum capacity of normal and emergency vents when the wetted area of a flammable or combustible liquids storage tank is known and the value matches a specific area listed on the "Wetted Area vs. Cubic Feet (m^3) Free Air Per Hour" table found in National Fire Protection Association 30, *Flammable and Combustible Liquids Code.*

When wetted area values do not align with standard tank sizes, the vent designer may interpolate the values.

How does one deal with wetted areas that do not align with specific areas listed on the table? NFPA 30 permits interpolation between the two values to establish the minimum air flow required for ventilation. For example, what is the required ventilation if the wetted area of a tank measures 486 $feet^2$ (45.2 m^2)?

Wetted Area vs. Cubic Feet (m^3) Free Air Per Hour at 14.7 psia and 60 F (1 bar and 15.5 C)

U.S. Customary Units		SI Units	
SQ. FT.	CFH	M^2	M^3H
400	312,000	37.1	8,834.9
500	354,000	46.5	10,024.2

Using the values extracted from the table, the following formula is used to interpolate the value. First, the difference between the tabular values is computed:

500 ft^2	=	354,400 CFH	46.5m^2	=	10,024.2 m^3H
-400 ft^2	=	312,000 CFH	-37.1 m^2	=	8,834.9 m^3H
100 ft^2	=	42,400 CFH	9.4 m^2	=	1,189.3 m^3H

Next, multiply the volumetric difference by the difference between the measured area and the tabular area:

42,400 x (486-400)	1,189.3 x (45.2-37.1)
42,400 x 86 = 3,646,400	1,189.3 x 8.1 = 9,633.3

Third, divide the product by 100 (the tabular scale):

3,646,400/100 = 36,464 CFH	9,633.3/100 = 96.3 M^3H

Finally, add the quotient to the tabular amount corresponding to the lower wetted area to obtain the interpolated value:

36,464 + 312,000 = 348,464 CFH	96.3 + 8,834.9 = 8,931.2 M^3H

The required free air flow for a tank having a wetted area of 486 $feet^2$ (45.2 m^2) is 348,464 CFH (8,931.2 M^3H).

For additional information, refer to NFPA 30.