SPRINKLER DISCHARGE

The flow from a sprinkler nozzle is computed using the following formula:

$$Q = kP^{0.5}$$

Where Q = flow in gallons per minute (gpm)
k = nozzle flow coefficient
P = pressure at the nozzle in pounds per square inch (psi)

Note 1: $P^{0.5}$ is the same as the square root of P.

Note 2: The nozzle flow coefficient (k) is determined by the testing laboratory during the listing process for a sprinkler.

EXAMPLE #1:

A one-half inch orifice sprinkler has a "k" factor of 5.6. What is the flow rate from this sprinkler if the pressure at the sprinkler is 25 psi?

$$Q = kP^{0.5}$$

$$P^{0.5} = (25)^{0.5} = 5$$

$$Q = 5.6(5) = 28 \text{ gpm}$$

EXAMPLE #2:

A large orifice (17/32 inch) sprinkler has a "k" factor of 8.0. What is the flow rate from this sprinkler if the pressure at the sprinkler is 25 psi?

$$Q = kP^{0.5}$$

$$P^{0.5} = (25)^{0.5} = 5$$

$$Q = 8.0(5) = 40 \text{ gpm}$$

EXAMPLE #3:

What pressure is required at a sprinkler with a "k" factor of 5.6 to achieve a flow of 40 gallons per minute (gpm) from the sprinkler?

$$Q = kP^{0.5}$$

$$40 = 5.6P^{0.5}$$

$$P^{0.5} = 40/5.6$$

$$P^{0.5} = 7.14$$

$$P = 50.98 \text{ psi}$$

EXAMPLE #4

A hydraulic calculation indicates that if the 5 end sprinklers of an 8 sprinkler (dead end) branch line operate, a total flow of 187 gpm at 32.0 psi is required to be supplied at the tee at the top of the riser nipple. Compute a "k" factor for the branch line.

$$Q = kP^{0.5}$$

$$187 = k(32^{0.5})$$

$$k = 187/32^{0.5}$$

$$32^{0.5} = 5.657$$

$$k = 187/5.657$$

$$k = 33.06$$

The "k" factor for the branch line with the 5 end sprinklers flowing is 33.06.

EXAMPLE #5

Determine the total flow from the branch line in the previous example (assuming that the same 5 sprinklers operate) if the pressure at the top of the riser nipple is 50 psi rather than 32 psi.

$$Q = kP^{0.5}$$

$$Q = 33.06(50^{0.5})$$

$$Q = 33.06(7.07)$$

$$Q = 233.7 \text{ gpm}$$

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