RELIEF VALVE DISCHARGE CALCULATION

D-400 REACTOR

6:15 P. M. - JANUARY 19, 1980

FROM: Farris Relief Valve Catolog No. FE336, Page 3.3

$$A = \frac{V_L}{24.3\sqrt{1.25\ (P_1-P_2)}\ Kp\ Kg\ Ku}$$

Where:

A = Orifice Area (In.^{2}), Q Orifice = 11.05 In.^{2}

V_L = Liquid capacity in U.S. gallons per minute.

P_1 = Set pressure at inlet, psig = 185

P_2 = Back pressure at outlet, psig = 0

K_p = Overpressure sizing factor, 1% overpressure (From: Farris Book Page 3.7) = 0.07.

K_g = Sizing factor for specific gravity

$$Kg = \frac{1}{\sqrt{G}}$$

G = Specific Gravity

Ku = Viscosity correction factor from curve on Page 3.8 = 1.0

Temperature of reactor at time of release = 109°F.

Reactor contained 34% Vinyl Chloride by volume.

Specific Gravity of water @ 109°F = 0.99.

Specific Gravity of Vinyl Chloride @ 109°F = 0.87.

Specific Gravity of Mixture = (0.34)(0.87) + (0.66)(0.99)
= 0.94

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$$Kg = \frac{1}{\sqrt{0.94}} = 1.03$$

Then:

$$V_L = (11.05)(24.3)\ \sqrt{1.25(185-0)}\ (0.07)(1.03)(1.0)$$

= 294 gallons per minute total discharge.

@ 34% Vinyl Chloride
Discharge of Vinyl Chloride = (0.34)(294) = 100 gallons per minute.

or 725 #'s VCM/Minute

Vinyl discharged in two seconds:

$$= 725\ \frac{\#'s\ VCM}{Min.} \times \frac{1\ Minute}{60\ Seconds} \times 2\ Seconds = 24\ \#'s\ VCM$$

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