

CONFIDENTIAL

RELIEF VALVE DISCHARGE CALCULATION
NORTH VCM CHARGE FILTER - REACTOR MODULE NO. 1
LIQUID DISCHARGE
12:30 P.M. - NOVEMBER 5, 1981

From: Teledyne Farris Safety Relief Valve Sizing
Bulletin FE-336, page 3.1

$$A = \frac{V_L \sqrt{G}}{38.0 K_d \sqrt{1.25 P_1 - P_2} K_p K_u}$$

Where:

A = Effective Orifice area, in.² = 0.098 in.²

V_L = Relieving Rate, gallon per minute

G = Specific Gravity, = 0.9

K_d = Coefficient of Discharge = 0.64

K_p = Liquid Capacity Correction Factor, for
4% overpressure = 0.32

K_u = Viscosity Correction Factor = 1.0

P₁ = Set Pressure at Inlet, psig = 275 psig

P₂ = Back Pressure at Outlet, psig = 0 psig

$$\text{Then: } V_L = \frac{(0.098) (38) (0.64) \sqrt{1.25 \times 275 - 0} (0.32) (1.0)}{\sqrt{0.9}}$$

$$= 14.9 \text{ gallons per minute}$$

Vinyl chloride discharged in 10 seconds =

$$14.9 \frac{\text{gallon}}{\text{min.}} \times \frac{7.5 \text{ pound}}{\text{gallon}} \times \frac{1 \text{ min.}}{60 \text{ sec.}} \times 10 \text{ sec.} = 18 \text{ pounds VCM}$$

DTH 000084016

CONFIDENTIAL

RELIEF VALVE DISCHARGE CALCULATION
NORTH VCM CHARGE FILTER - REACTOR MODULE NO. 1
VAPOR DISCHARGE
12:30 P.M. - NOVEMBER 5, 1981

From: Teledyne Farris Safety Relief Valve Sizing
 Bulletin FE-336, page 31

$$A = \frac{W}{C} \frac{\sqrt{T}}{K_d P \sqrt{M}} \frac{\sqrt{Z}}{K_b}$$

Where:

- A = Effective Orifice Area, in.² = 0.081 in.²
 (Valve orifice area assumed to be one-half plugged)
- W = Relieving Rate, pounds per hour
- T = Inlet Temperature, °R = 460 + 74 = 534°R
- Z = Compressibility Factor = 0.92
- C = Gas Flow Constant = ~~0.92~~ 315
- K_d = Coefficient of Discharge = 0.95
- M = Molecular Weight = 62.5
- K_b = Back Pressure Correction Factor = 1
- P = Relieving Pressure, psia = 54.4 psia
 (Vapor pressure of VCM @ 74°F)

Then:

$$W = \frac{(0.081) (315) (0.95) (54.4) \sqrt{62.5} (1)}{\sqrt{534} \cdot \sqrt{0.92}}$$

= 475 pounds per hour

Vinyl chloride discharged in 9 minutes =

$$\frac{475 \text{ pound}}{\text{hr.}} \times \frac{1 \text{ hr.}}{60 \text{ min.}} \times 9 \text{ min.} = 71 \text{ pounds VCM}$$

DTH 000084017