PRESSURE VARIATIONS IN PIPE LINES

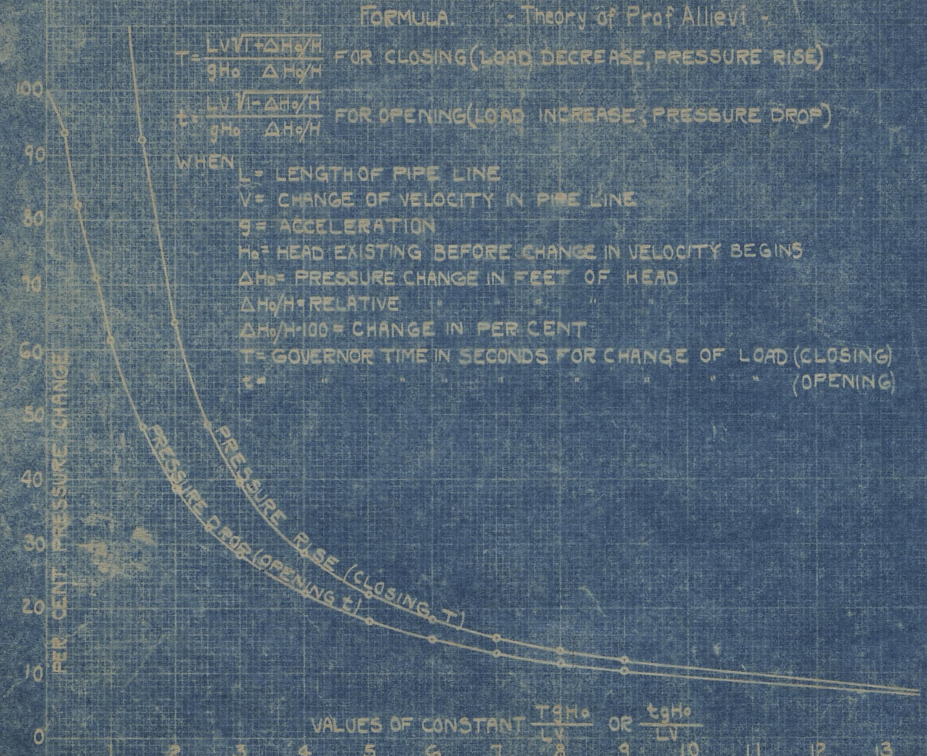
FORMULA. - Theory of Prof Allievi -

$T = \frac{LV}{gH_o} \frac{\sqrt{1+\frac{\Delta H_o}{H}}}{\frac{\Delta H_o}{H}}$ FOR CLOSING (LOAD DECREASE, PRESSURE RISE)

$t = \frac{LV}{gH_o} \frac{\sqrt{1+\frac{\Delta H_o}{H}}}{\frac{\Delta H_o}{H}}$ FOR OPENING (LOAD INCREASE, PRESSURE DROP)

WHEN

L = LENGTH OF PIPE LINE
V = CHANGE OF VELOCITY IN PIPE LINE
g = ACCELERATION
H_o = HEAD EXISTING BEFORE CHANGE IN VELOCITY BEGINS
ΔH_o = PRESSURE CHANGE IN FEET OF HEAD
$\frac{\Delta H_o}{H}$ = RELATIVE " " " "
$\frac{\Delta H_o}{H} \cdot 100$ = CHANGE IN PER CENT
T = GOVERNOR TIME IN SECONDS FOR CHANGE OF LOAD (CLOSING)
t = " " " " " " " " (OPENING)



EXAMPLE FOR FORMULA

L = 1000 FT.
V = 10 FT
g = 32,2 FT PER SEC.
$\frac{\Delta H_o}{H} \cdot 100 = 25\%$

$T = \frac{1000 \cdot 10 \sqrt{1+0,25}}{32,2 \cdot 200 \cdot 0,25} = 7$ SECONDS

$t = \frac{1000 \cdot 10 \sqrt{1-0,25}}{32,2 \cdot 200 \cdot 0,25} = 5,36$ "

EXAMPLE FOR UPPER CURVE

$\frac{TgH}{LV} = \frac{7 \cdot 32,2 \cdot 200}{1000 \cdot 10} = 4,52$

$\frac{\Delta H_o}{H} = 0,25$ AS READ FOR RISE FROM CURVE

EXAMPLE FOR LOWER CURVE

$\frac{tgH}{LV} = \frac{5,3 \cdot 6 \cdot 32,2 \cdot 200}{1000 \cdot 10} = 3,47$

$-\frac{\Delta H_o}{H} = 0,25$ AS READ FOR DROP FROM CURVE

ALLIS-CHALMERS MANUFACTURING CO.
HYDRAULIC DEPT.
MILWAUKEE, WISCONSIN
1921 U.S.A.

O.K. A.P.