Facility Dynamics
ENGINEERING

EBCx Workshop Series 15

Session 9 – Field Observations

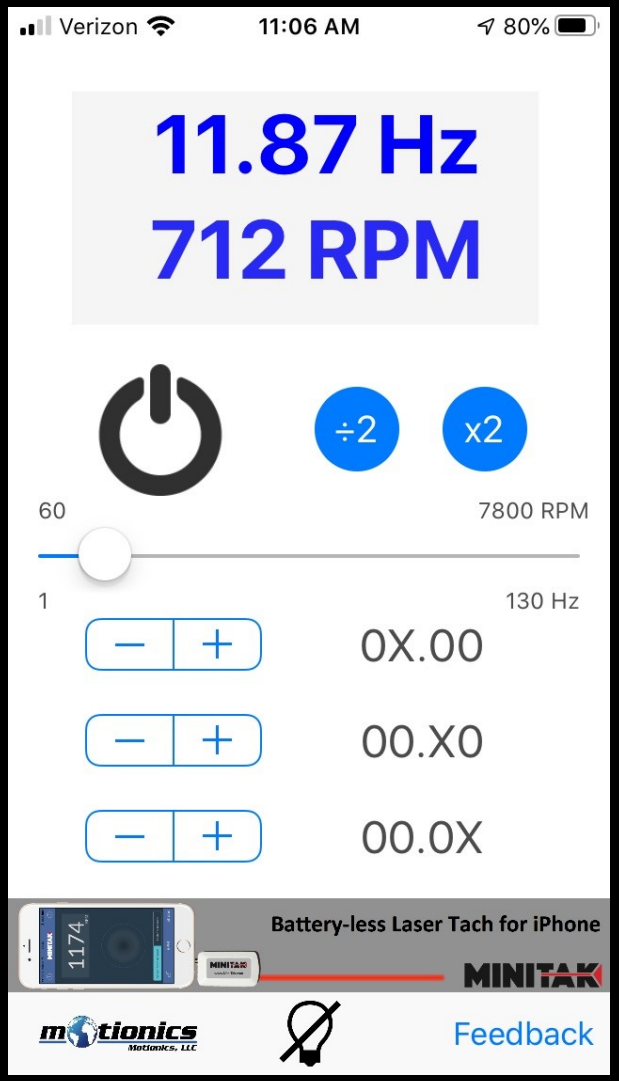
Presented By:

- David Sellers; Facility Dynamics Engineering
- Senior Engineer

This is Cool

Free iPhone app from Motionics

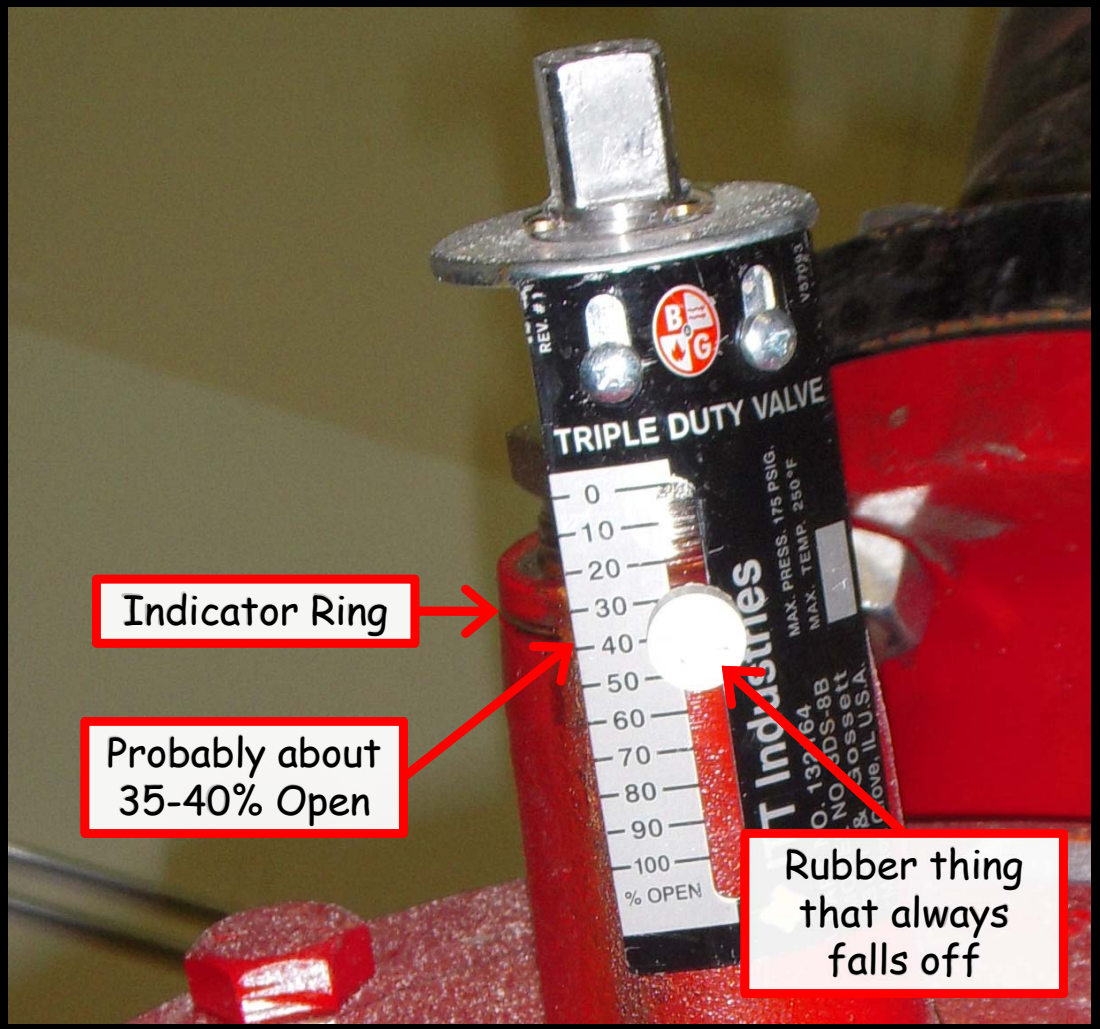
https://apps.apple.com/us/app/strobe-light-tachometer/id978182913



UC Davis


STONEMAN
STONEMAN ENG. & MFG. CO
PATENT NO 8888888

Reading a Triple Duty Valve


TRIPLE DUTY VALVE
0
10
20
30
40
50
60
70
80
90
100
% OPEN
Indicator Ring
Probably about 35-40% Open
Rubber thing that always falls off

Genentec

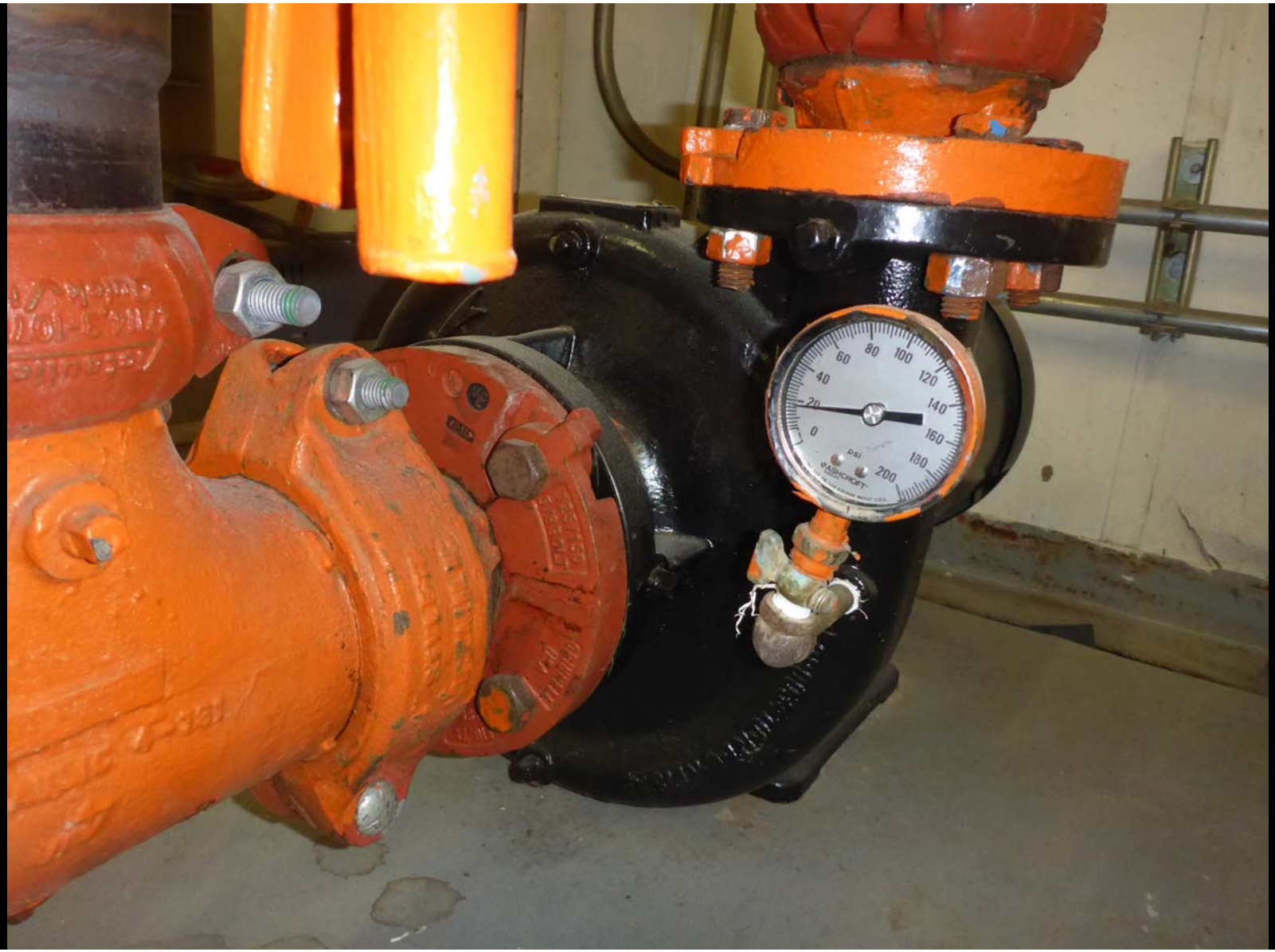

0
20
40
60
80
100
120
140
160
180
200
psi
ASHCROFT

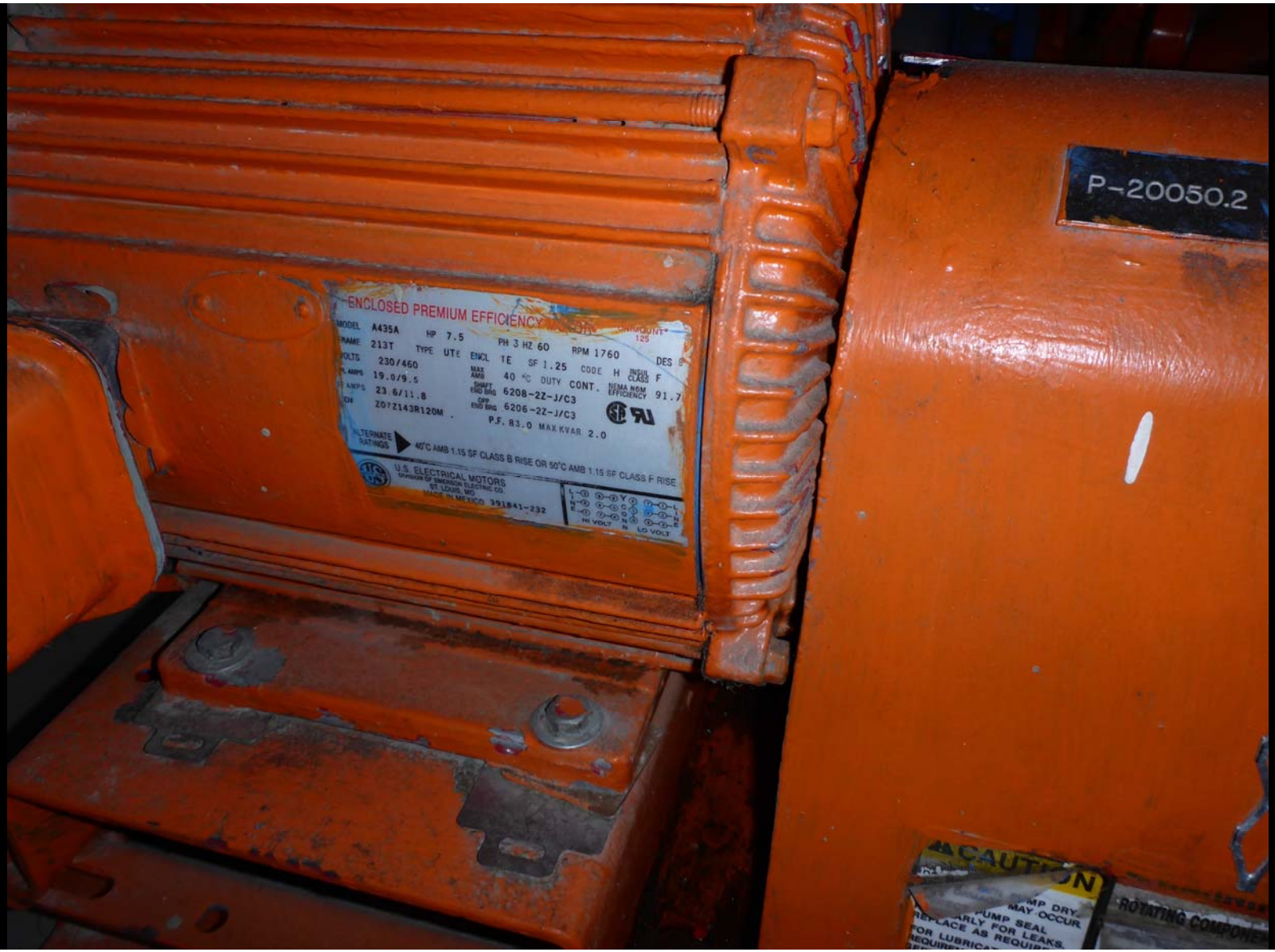

ABB
CAUTION
ATTENTION
WARNING


~189° S
10:13
E
W
N


FINAL FILTER


PRE FILTER


Temtrol


P-20050.2
ENCLOSED PREMIUM EFFICIENCY
MODEL A435A HP 7.5
FRAME 213T TYPE UTE
VOLTS 230/460
FL AMPS 19.0/9.5
LR AMPS 23.6/11.8
PH 3 HZ 60 RPM 1760
ENCL TE SF 1.25 CODE H INSUL CLASS F
MAX AMB 40 °C DUTY CONT. NEMA NOM EFFICIENCY 91.7
SHAFT END BRG 6208-2Z-J/C3
OPP END BRG 6206-2Z-J/C3
P.F. 83.0 MAX KVAR 2.0
ALTERNATE RATINGS 40°C AMB 1.15 SF CLASS B RISE OR 50°C AMB 1.15 SF CLASS F RISE
U.S. ELECTRICAL MOTORS
DIVISION OF EMERSON ELECTRIC CO.
ST. LOUIS, MO
MADE IN MEXICO 391841-232
HI VOLT
LO VOLT
CAUTION
PUMP DRY
MAY OCCUR
PUMP SEAL
REPLACE AS REQUIRED
ROTATING COMPONENT


NIBCO

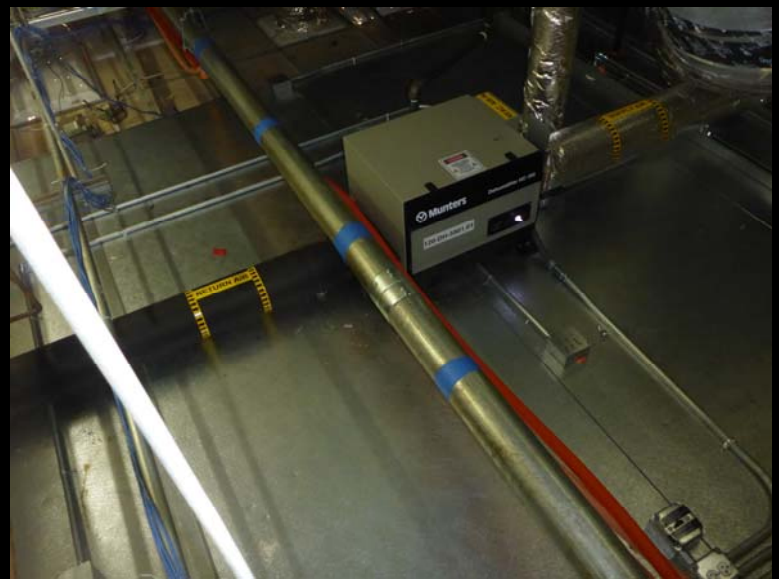

CLEAVER BROOKS


118.1

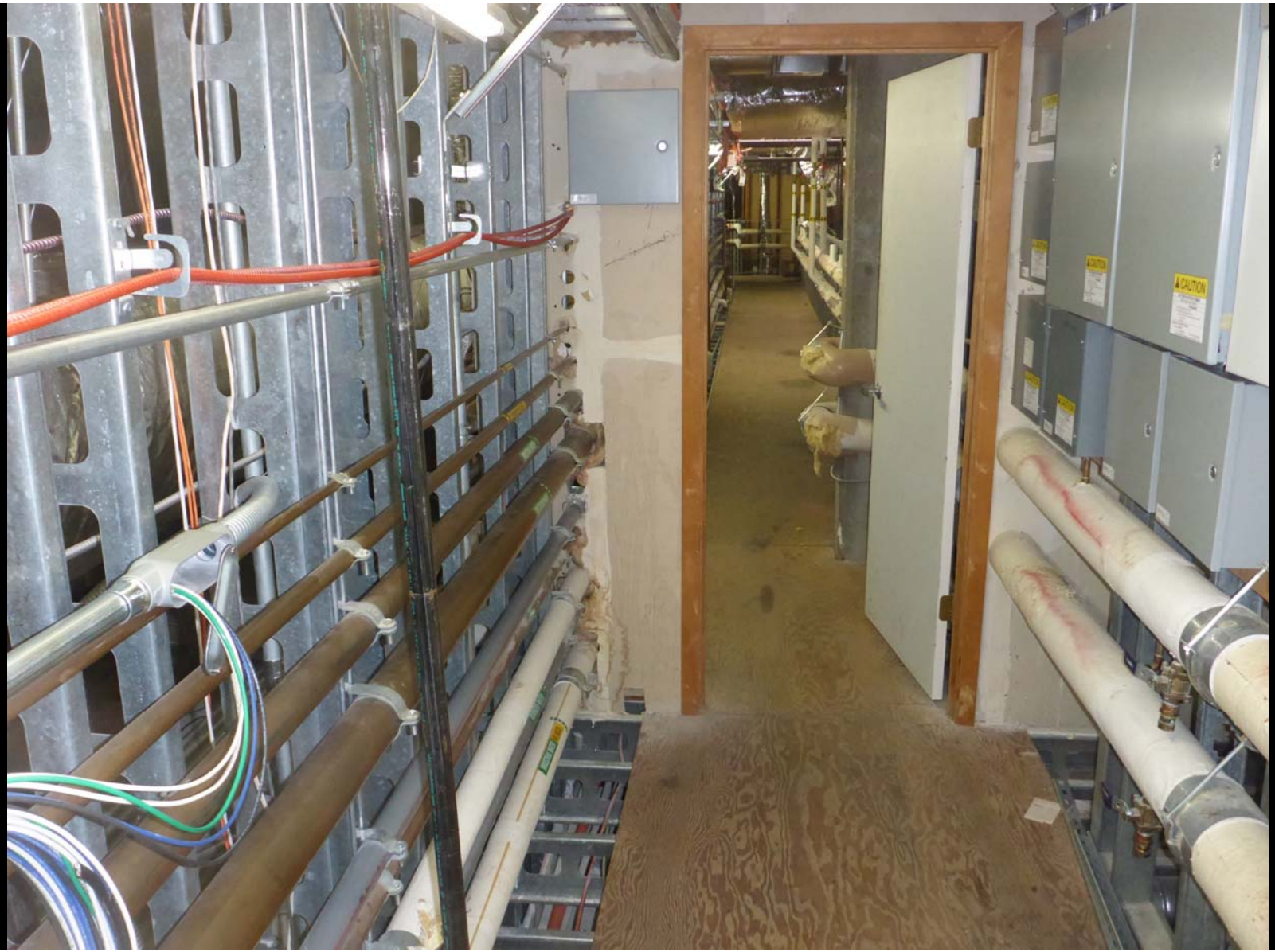

VOLL-pro
Air Monitor
Corporation


Dwyer.
Magnesense®


REAC. AIR IN


Munters

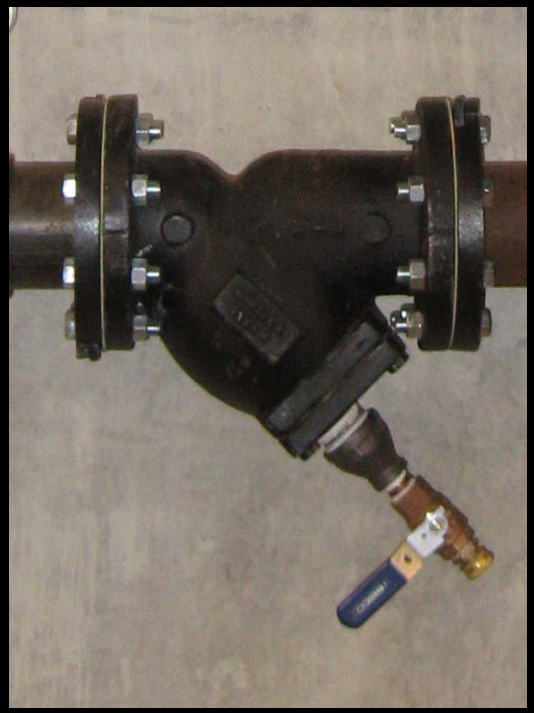
WARNOCK HERSEY
INTERTEK
ALTERS & WORK
REQUIRES
INSTRUCTIONS

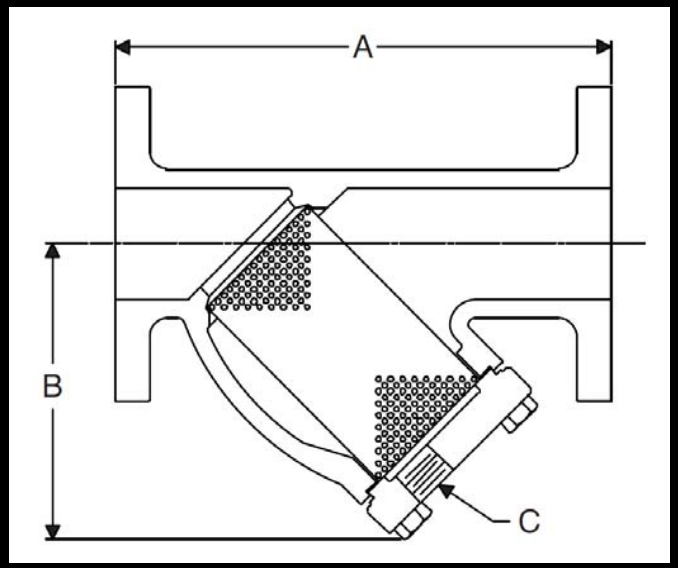

CAUTION

College of San Mateo


WATTS
MADE IN CHINA

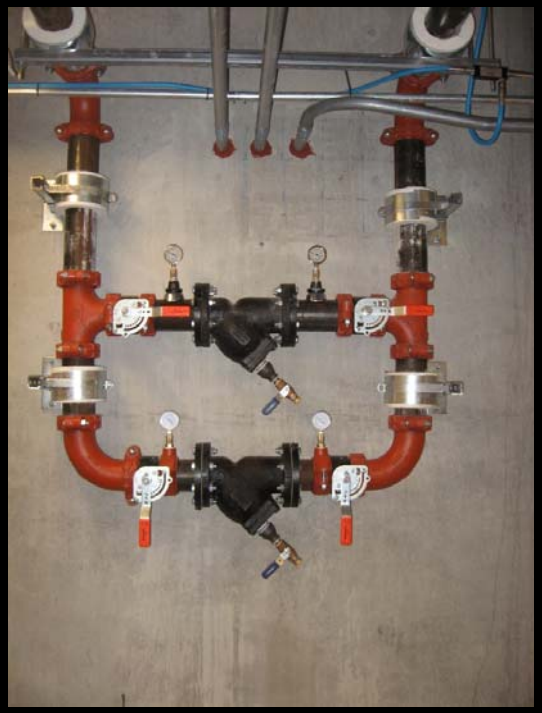
Strainers;
Details Matter





What happens if you put a reducer on the outlet or flip the cover plate so the outlet is on top vs. on the bottom?

Redundant Strainers Allow Uninterrupted Service



Check Valves

- Intended to prevent reverse flow
- Typically found on the discharge of pumps, especially parallel pumps

Wafer Type Check Valve – Outlet

Check Valves

- Intended to prevent reverse flow
- Typically found on the discharge of pumps, especially parallel pumps

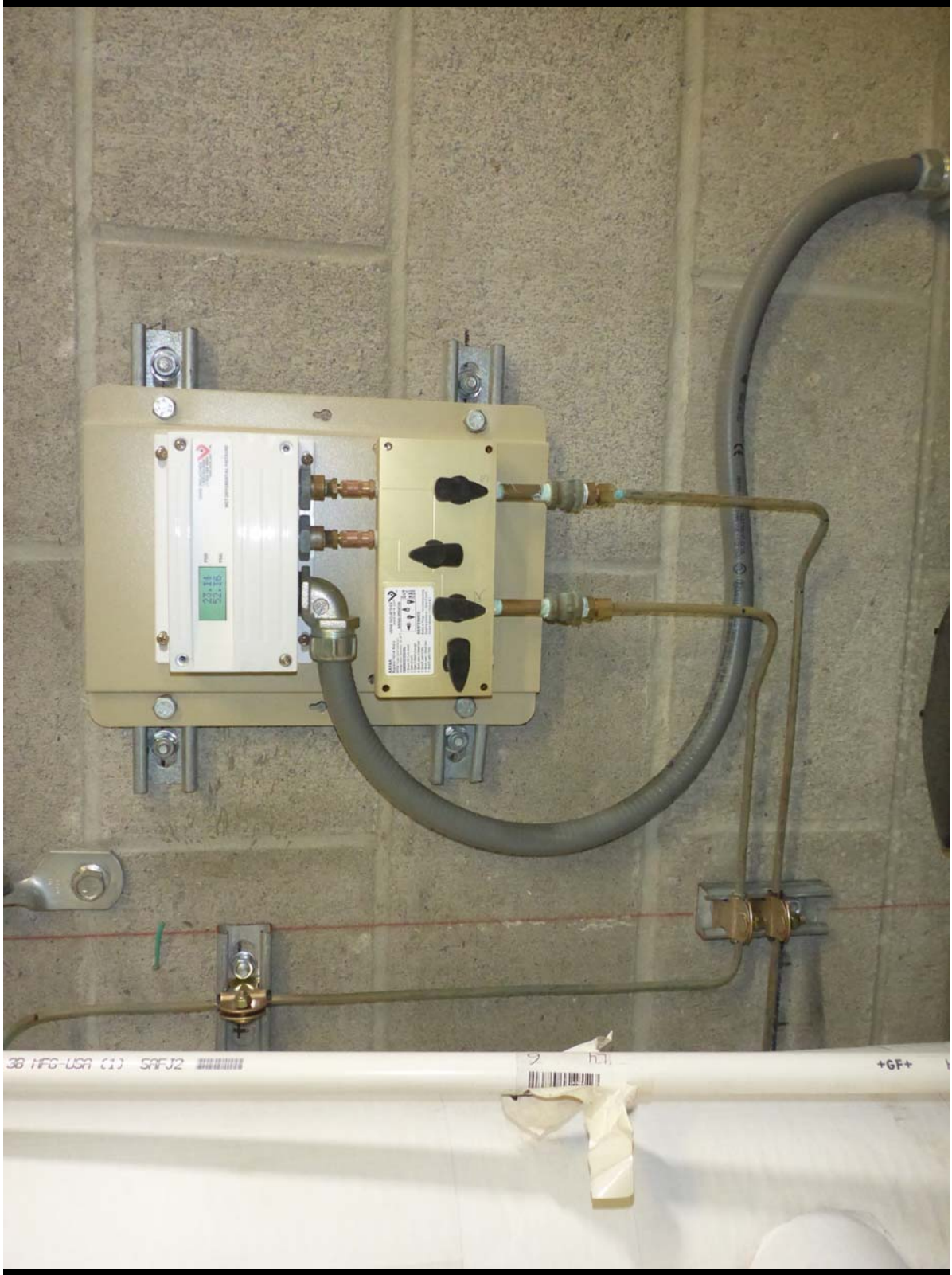
Wafer Type Check Valve – Inlet

Check Valves

- Intended to prevent reverse flow
- Typically found on the discharge of pumps, especially parallel pumps
- Directional; if you put it in backwards, it won't do its job

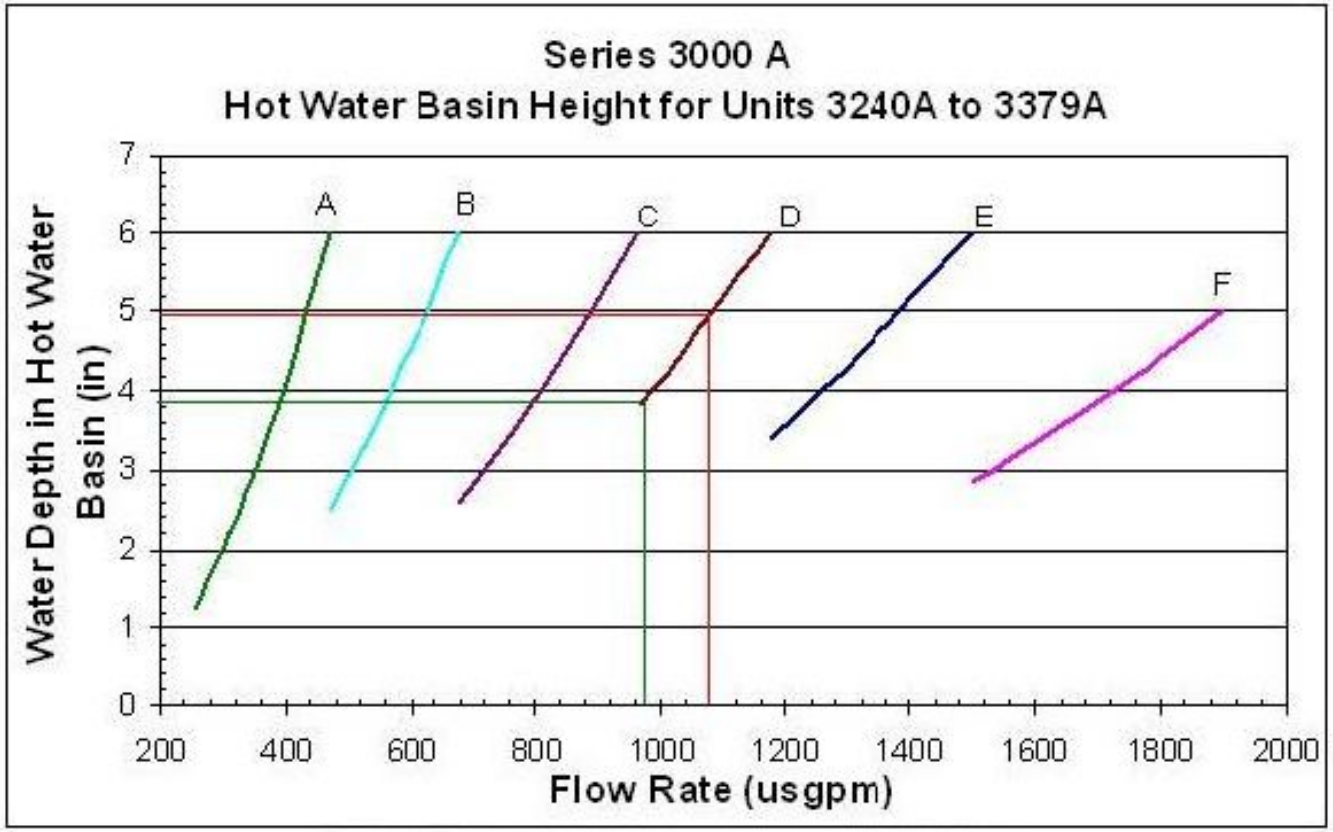
Wafer Type Check Valve – Note Directional Arrow


YORK
OPTIVIEW CONTROL CENTER
WARNING
DANGER ÉLECTRIQUE
WARNING
MAXE


+GF+

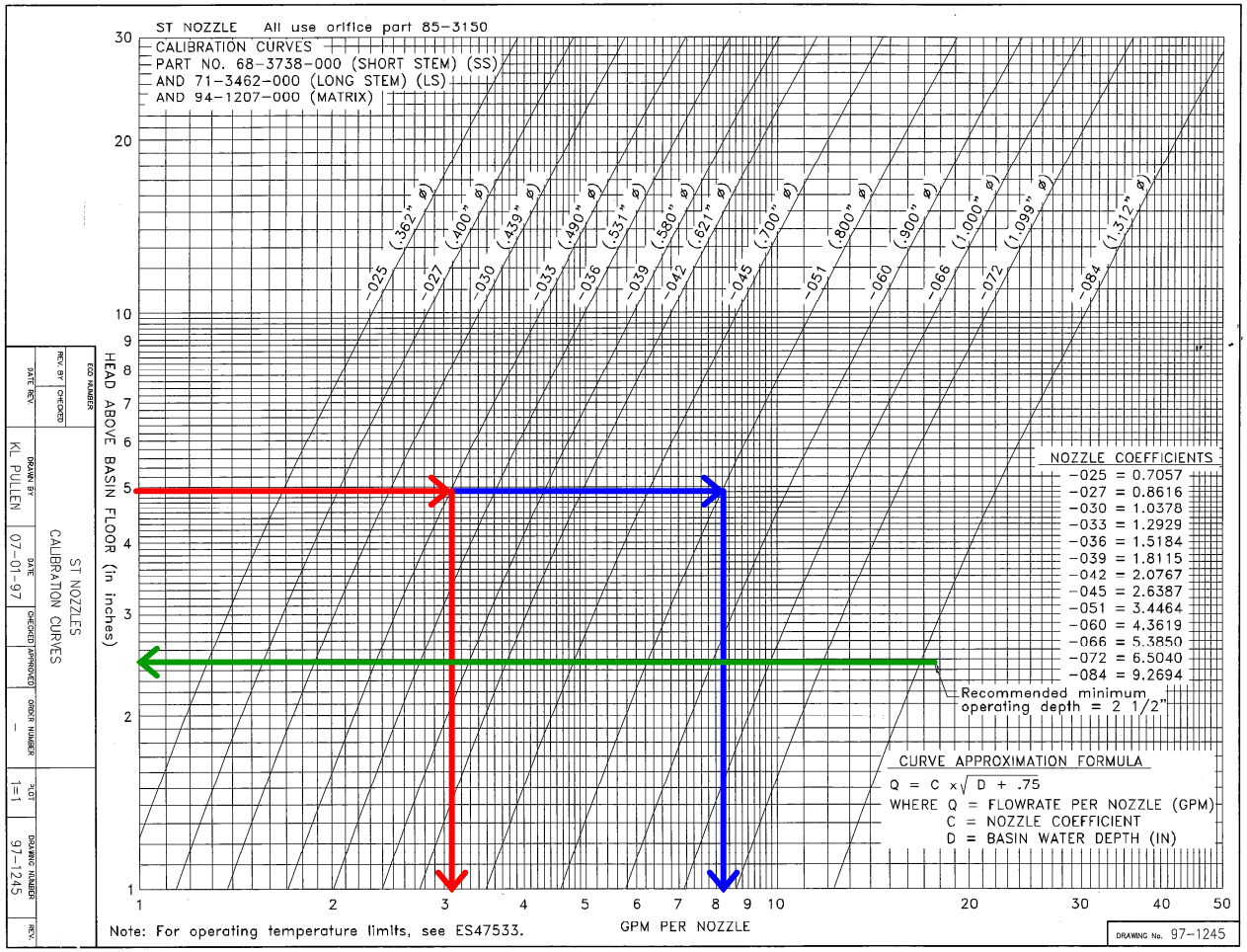
Different Basin Levels = Different Flows

Different Basin Levels = Different Flows



Curve A is for flows between 253 gpm & 470 gpm
Curve 3 is for flows between 471gpm & 678 gpm
Curve C is for flows between 679 gpm & 965 gpm
Curve D is for flows between 966 gpm & 1175gpm
Curve E is for flows between 1176 gpm & 1499 gpm
Curve F is for flows between 1500 gpm & 1900 gpm

Flow rate curves for Series 3000, Units 3240-3379. RLD #1065.



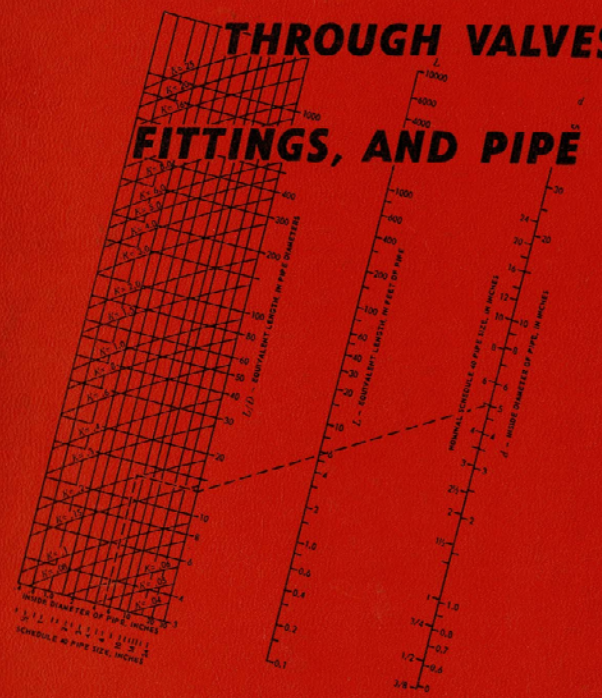
ECO NUMBER	REV. BY	CHECKED	DATE REV.	DRAWN BY	DATE	CHECKED APPROVED	ORDER NUMBER
				KL PULLEN	07-01-97		–

ST NOZZLES
CALIBRATION CURVES

SCALE	DRAWING NUMBER	REV.
1=1	97-1245	

FLOW OF FLUIDS

THROUGH VALVES, FITTINGS, AND PIPE

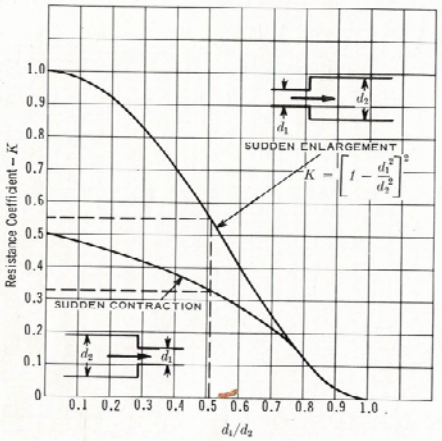


CRANE

Technical Paper No. 410

Resistance in Pipe

Resistance Due to Sudden Enlargements and Contractions[20]



Sudden enlargement: The resistance coefficient K for a sudden enlargement from 6-inch Schedule 40 pipe to 12-inch Schedule 40 pipe is **0.55,** based on the 6-inch pipe size.

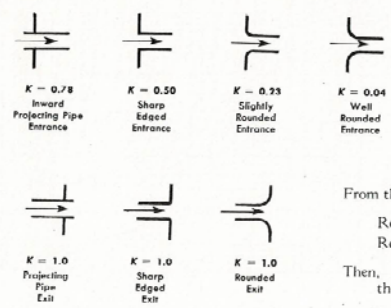
$$\frac{d_1}{d_2} = \frac{6.065}{11.938} = 0.51$$

Sudden contraction: The resistance coefficient K for a sudden contraction from 12-inch Schedule 40 pipe to 6-inch Schedule 40 pipe is **0.33,** based on the 6-inch pipe size.

$$\frac{d_1}{d_2} = \frac{6.065}{11.938} = 0.51$$

Note: The values for the resistance coefficient, K, are based on velocity in the small pipe. To determine K values in terms of the greater diameter, multiply the chart values by $(d_2/d_1)^4$.

Resistance Due to Pipe Entrance and Exit



Problem: Determine the total resistance coefficient for a pipe one diameter long having a sharp edged entrance and a sharp edged exit.

Solution: The resistance of pipe one diameter long is small and can be neglected ($K = f\,L/D$).

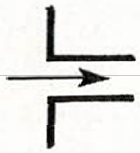
From the diagrams, note:

Resistance for a sharp edged entrance = 0.5
Resistance for a sharp edged exit = 1.0

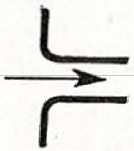
Then,
the total resistance, K, for the pipe = **1.5**

Resistance Due to Pipe Entrance and Exit

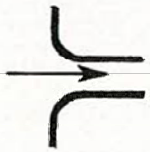
$K = 0.78$
Inward Projecting Pipe Entrance



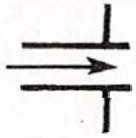
$K = 0.50$
Sharp Edged Entrance



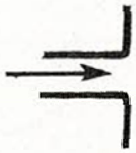
$K = 0.23$
Slightly Rounded Entrance



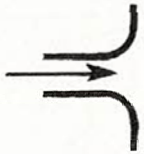
$K = 0.04$
Well Rounded Entrance



$K = 1.0$
Projecting Pipe Exit



$K = 1.0$
Sharp Edged Exit



$K = 1.0$
Rounded Exit

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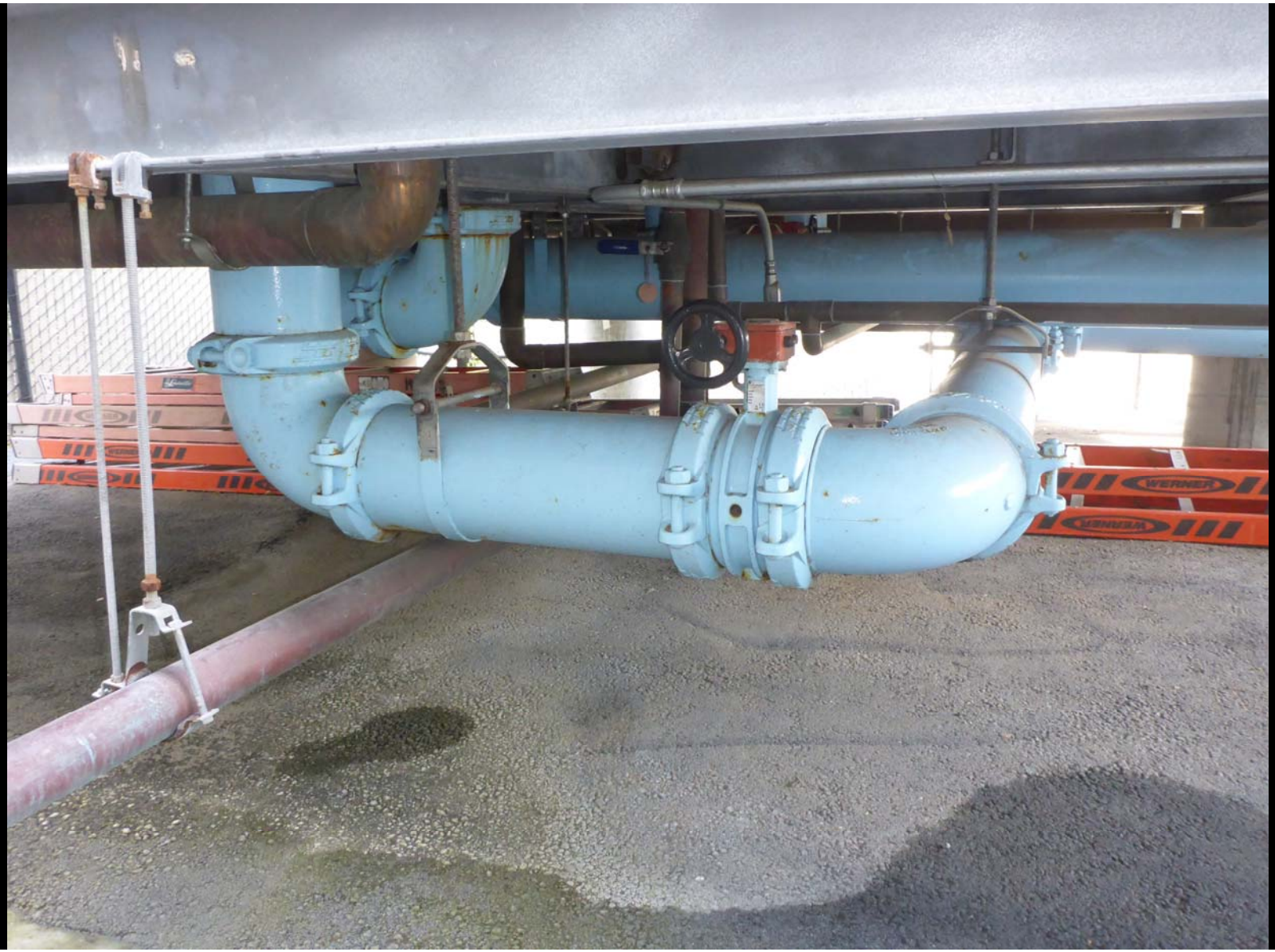
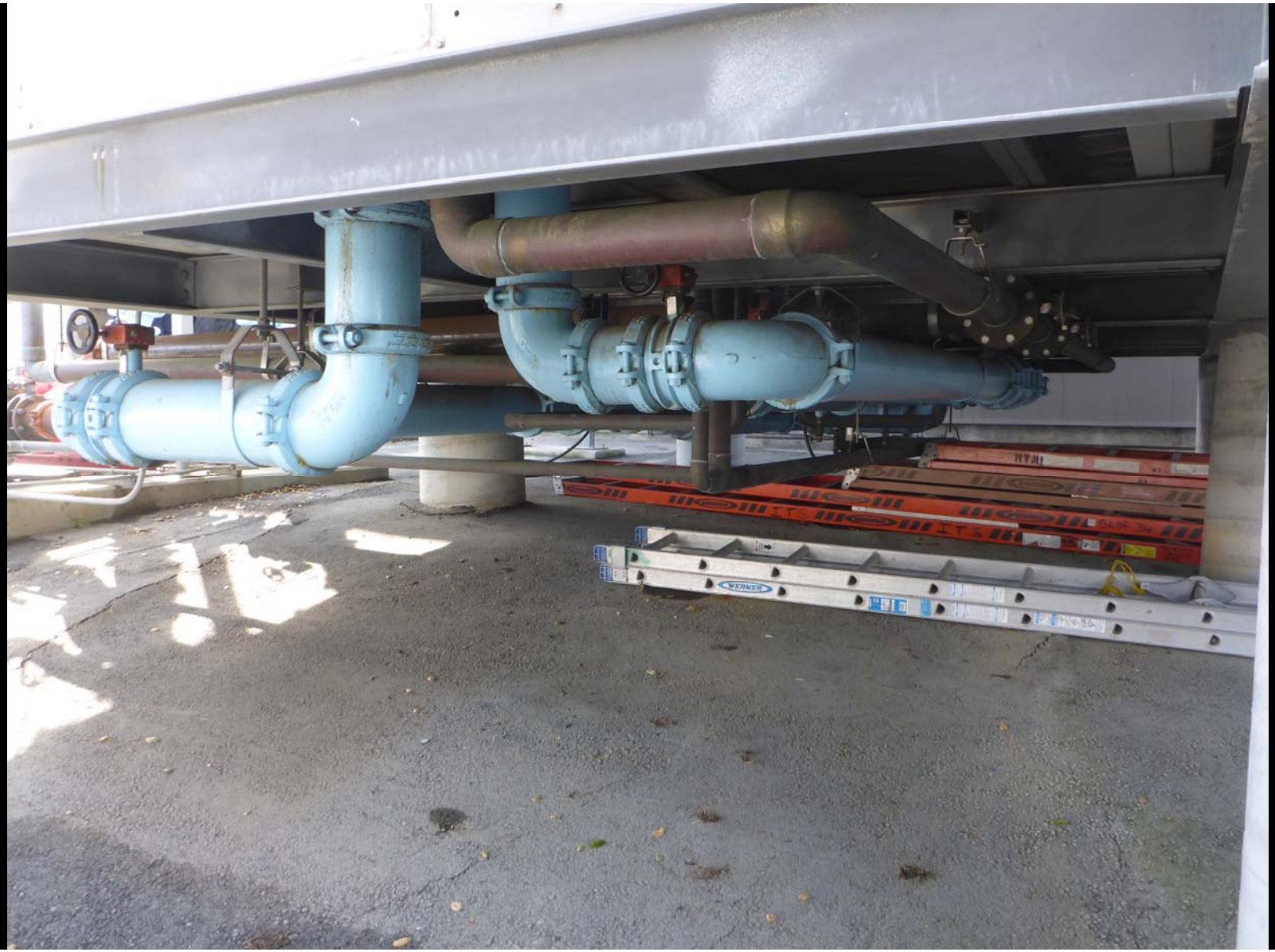

WERNER
WERNER


Louisville
WERNER
WERNER
WERNER
WERNER


WERNER