



WHEA
Lunch & Learn
Webinar

Steam System Optimization



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Steam System Optimization

1. Operational Improvements
2. Energy Efficiency
3. Safety

STEAM AT 0 PSI



- **START WITH A PINT OF 32F WATER**
- **ADD 180 BTU TO 212F**
- **ADD 970 BTU TO VAPORIZE**
- **27 Cu/Ft**

STEAM AT 15 PSI



- **START WITH A PINT OF 32F WATER**
- **ADD 218 BTU TO 250F**
- **ADD 945 BTU TO VAPORIZE**
- **14 Cu/Ft**

STEAM TABLES

Pressure	Temperature	Sensible Heat	Latent Heat	Total Heat	Volume
<u>0 PSIG</u>	<u>212 F</u>	<u>180 BTU</u>	<u>970 BTU</u>	<u>1150 BTU</u>	<u>26.8 cu. Ft</u>
<u>15 PSIG</u>	<u>250 F</u>	<u>218 BTU</u>	<u>945 BTU</u>	<u>1163 BTU</u>	<u>13.8 cu. Ft</u>
<u>60 PSIG</u>	<u>308 F</u>	<u>277 BTU</u>	<u>905 BTU</u>	<u>1182 BTU</u>	<u>5.8 cu. Ft</u>
<u>100 PSIG</u>	<u>338 F</u>	<u>308 BTU</u>	<u>880 BTU</u>	<u>1188 BTU</u>	<u>3.9 cu. Ft</u>
<u>150 PSIG</u>	<u>366 F</u>	<u>339 BTU</u>	<u>857 BTU</u>	<u>1196 BTU</u>	<u>2.8 cu. Ft</u>
<u>600 PSIG</u>	<u>486 F</u>	<u>472 BTU</u>	<u>731 BTU</u>	<u>1203 BTU</u>	<u>0.8 cu. Ft</u>

SUMMARY

- **HIGHER PRESSURE = SMALLER PIPING**
- **LOWER PRESSURE = MORE USABLE HEAT**

Why Use Steam?

Example: 5,200,000 BTU/HR

Steam @ 125 PSIG

3" supply line, 1" condensate line

OR

Hot Water @ 180F

6" pumped supply and 6" return line



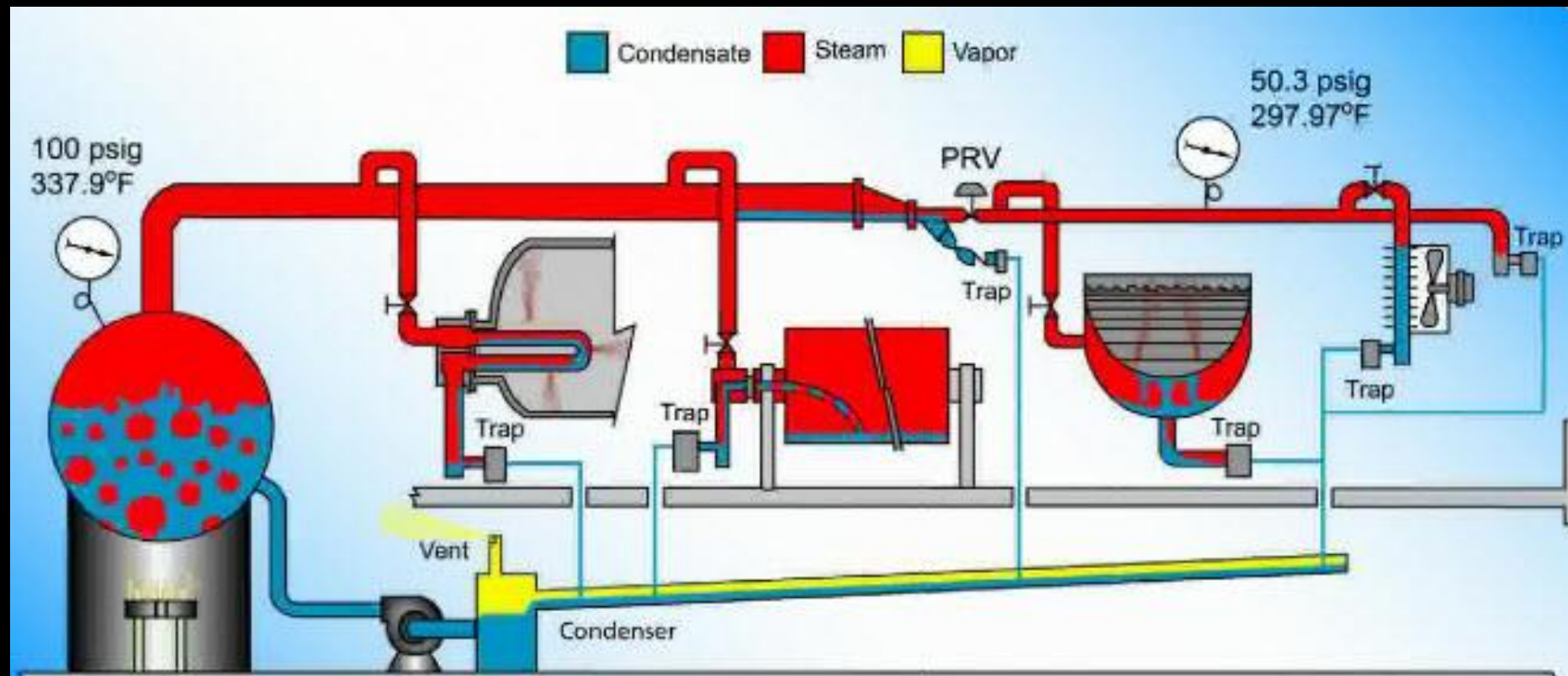
Heating Equipment

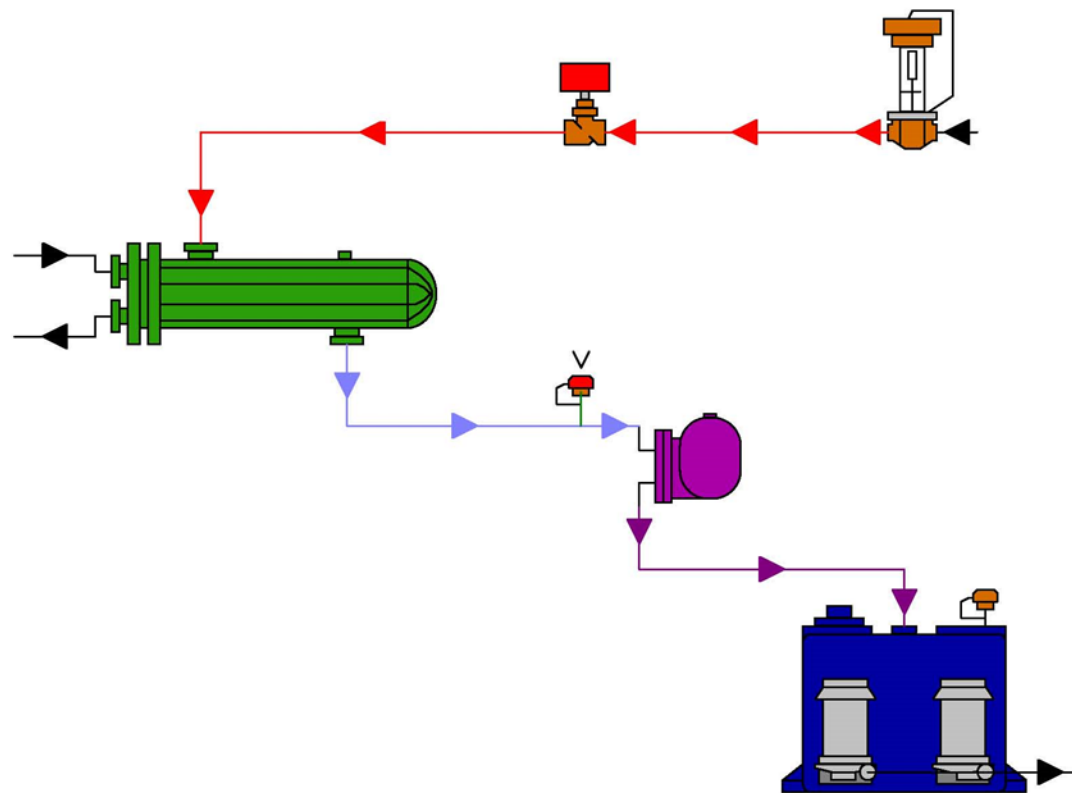


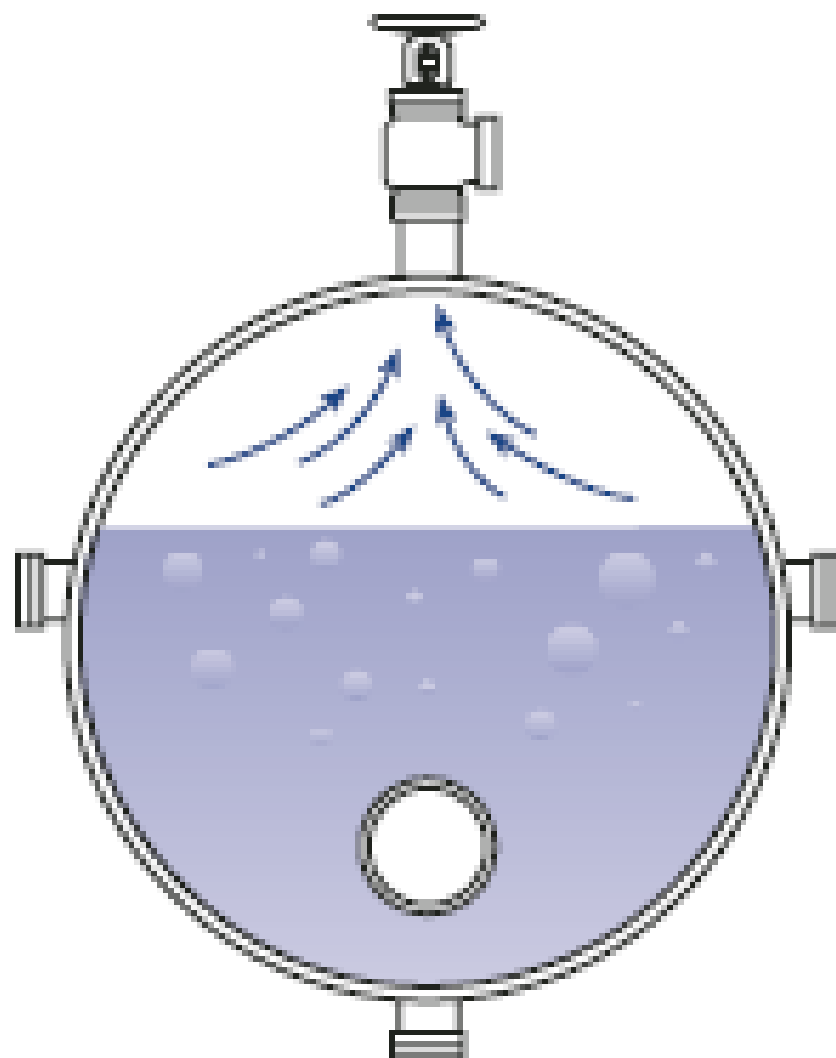
Sterilization Equipment



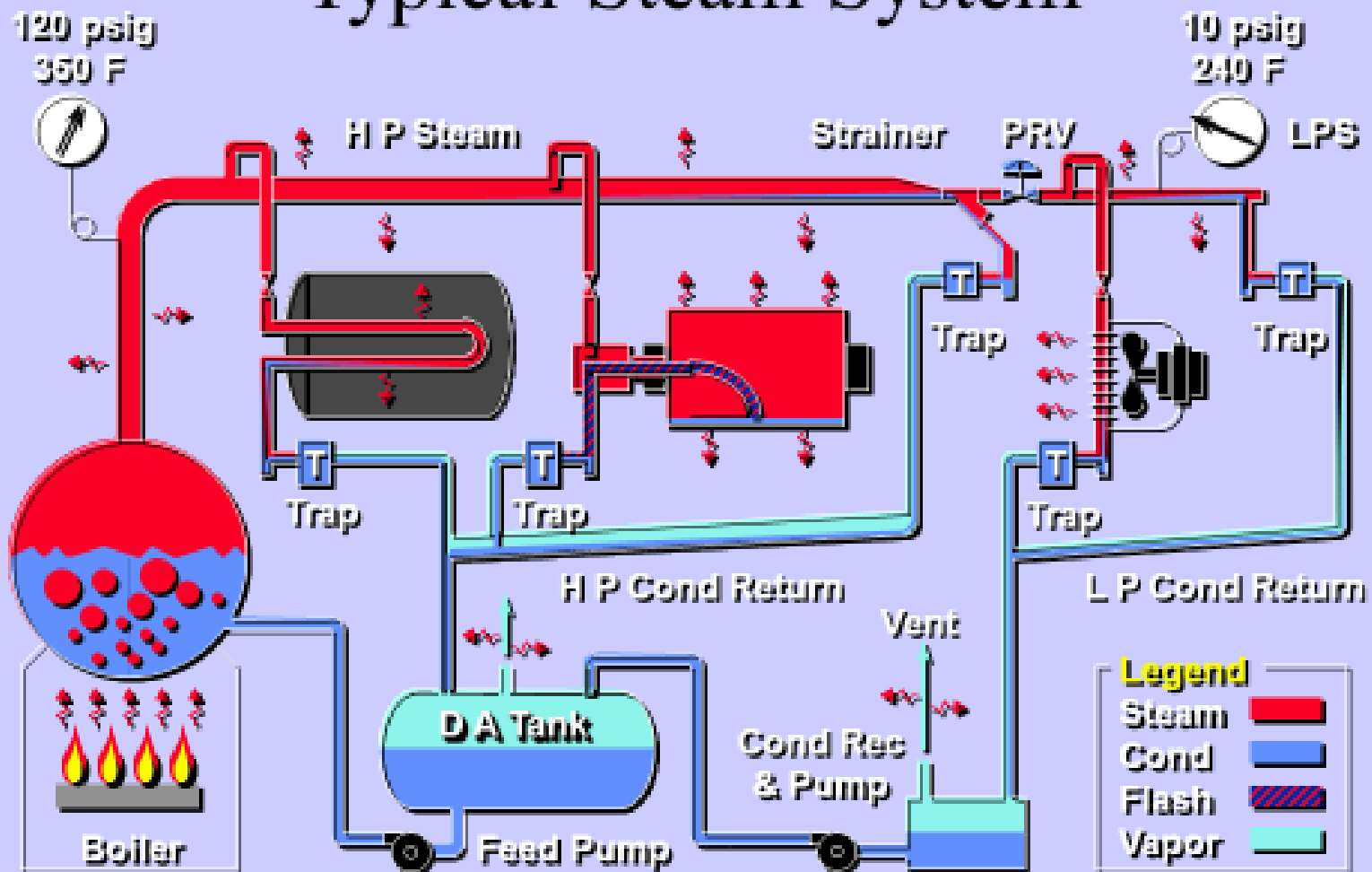
Distribution Piping





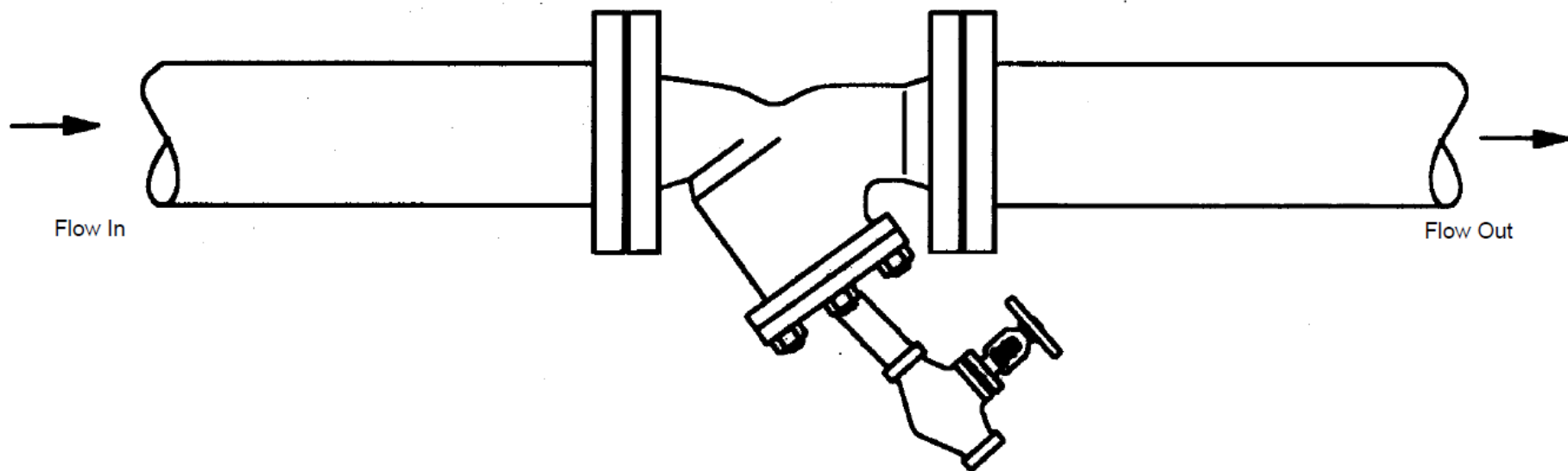
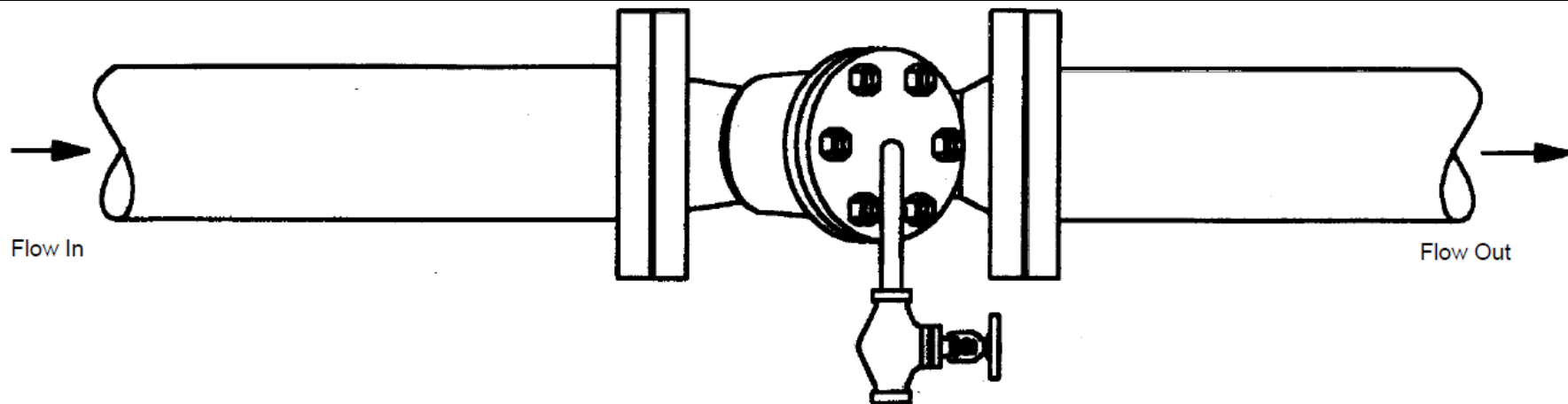


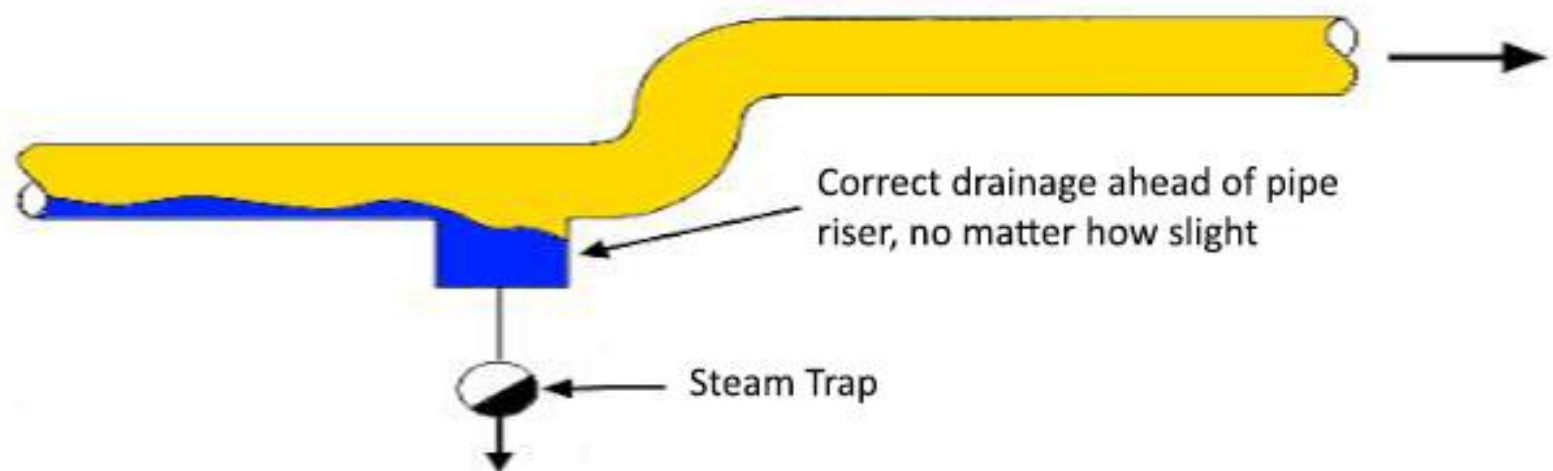
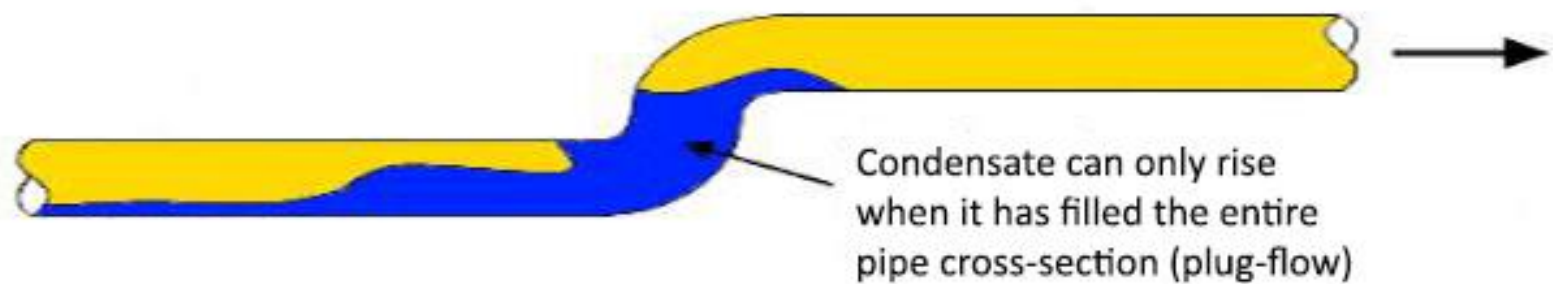
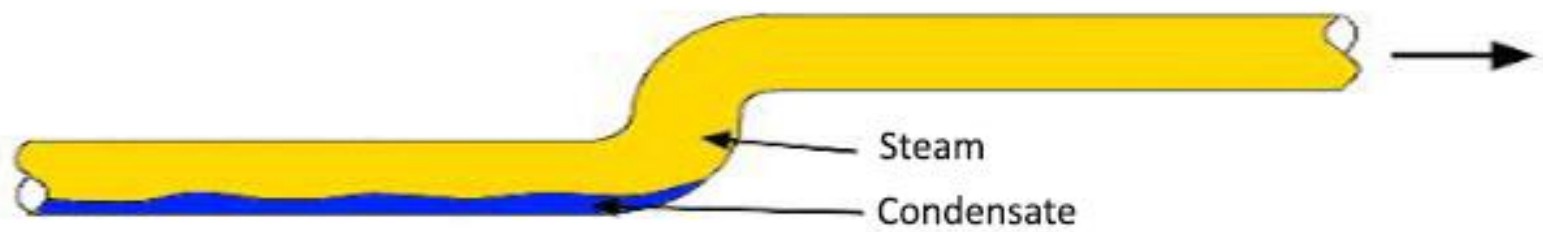
Typical Steam System



Capacities

Inlet Steam Pressure psig	Outlet Steam Pressure psig	NOMINAL VALVE SIZE			
		1/2"	3/4"	1"	1-1/4"
	C.V. Factors Ī	3.48	6.5	10.5	14
15	10	95	175	285	380
	5	135	250	405	545
	3	155	285	465	620
20	12	120	230	365	490
	8	155	290	470	630
	0-5	180	335	540	720
25	15	145	270	435	580
	10	195	360	580	775
	0-7	205	385	620	825
30	20	155	290	470	630
	15	220	410	665	890
	0-12	230	430	695	925
40	30	155	290	470	630
	25	250	470	755	1,010
	0-18	280	525	850	1,135
50	40	190	355	575	770
	30	315	585	955	1,275
	0-21	350	650	1,050	1,400
60	45	280	520	840	1,120
	35	360	670	1,080	1,440
	0-27	385	720	1,165	1,555
75	60	280	525	850	1,135
	50	415	775	1,250	1,665
	0-35	470	875	1,415	1,890
85	70	290	540	870	1,160
	50	490	915	1,480	1,965
	0-43	515	960	1,555	2,070
100	80	370	690	1,115	1,485
	60	580	1,080	1,740	2,325
	0-48	600	1,120	1,815	2,420
125	100	440	825	1,335	1,780
	80	680	1,275	2,060	2,745
	0-62	730	1,365	2,200	2,940
	125	490	910	1,470	1,960





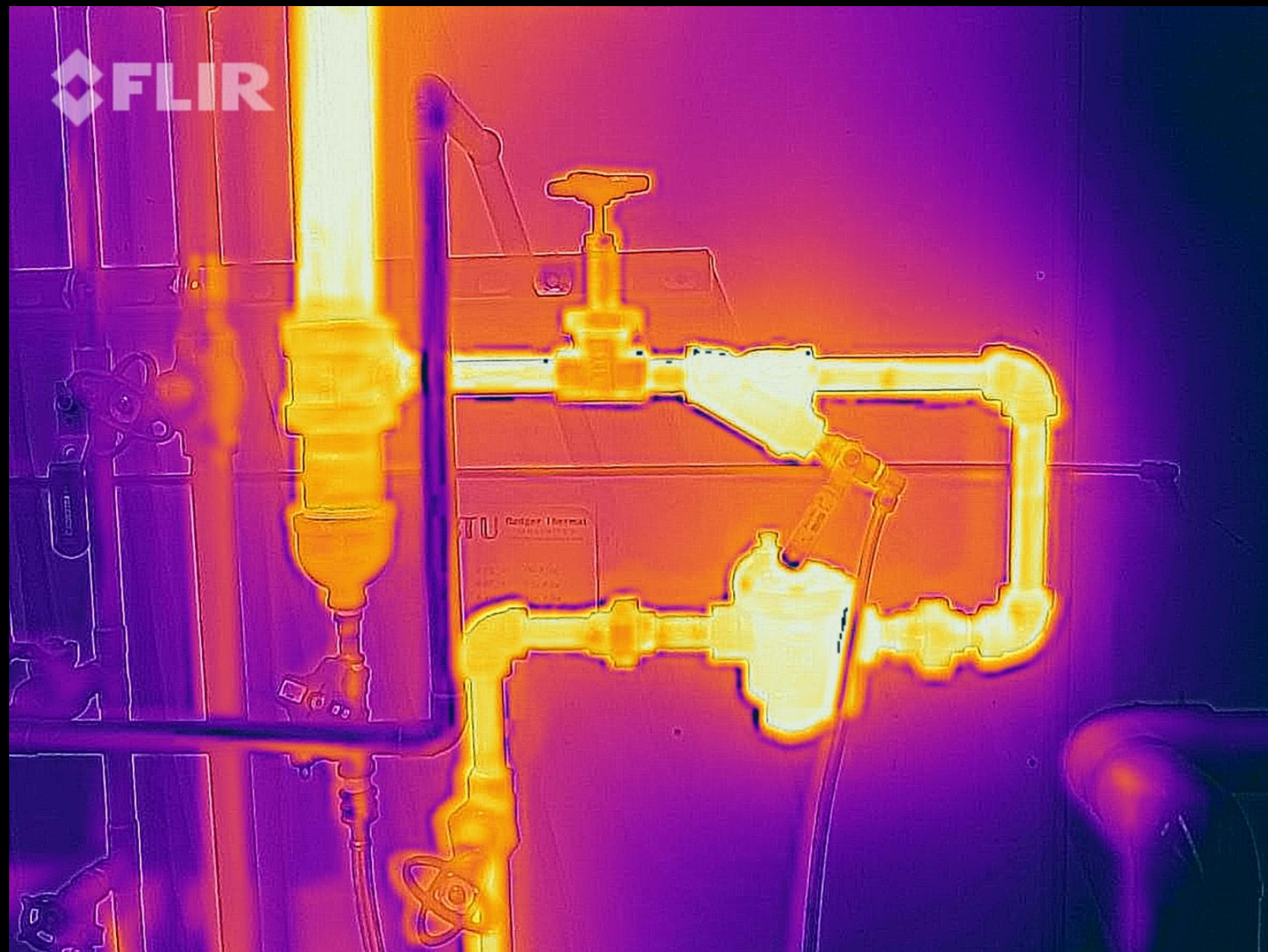
Types of Steam Traps

- **Disc or Thermodynamic**
Responds to a change in velocity
(phase)
- **Thermostatic**
Responds to a change in temperature
- **Float & Thermostatic**
Responds to a change in density
- **Inverted Bucket**
Responds to a change in density

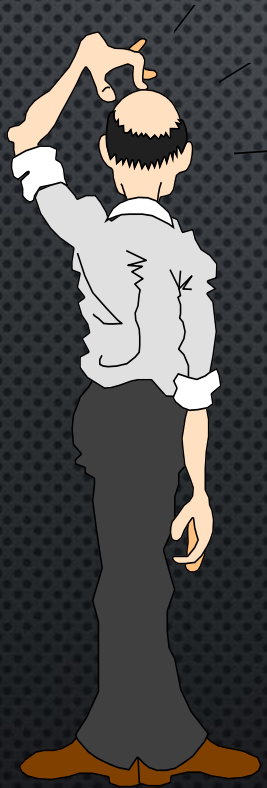




 **FLIR**



Questions?



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