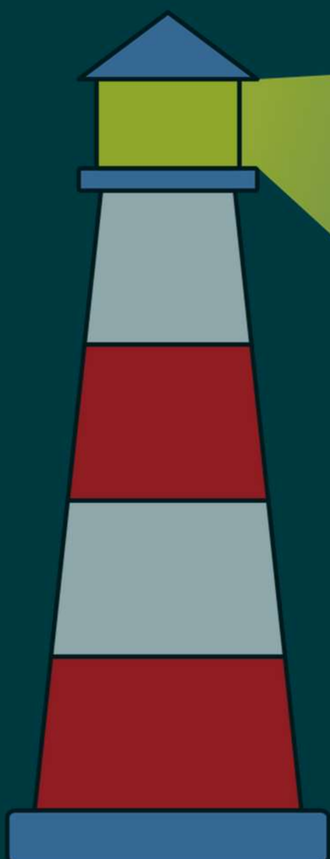
WELCOME TO THE “TRAP ARENA”



Shining the Light on Energy Savings

http://901Servicesllc.com

Presented by Jerry Hardin
Camron Hardin

Steam is __________

A) Perfect

B) Imperfect

QUALITIES OF STEAM

Gary Gleason's favorite phrase is "STEAM IS PERFECT"

Steam Distribution Systems Are ___________

A) Perfect

B) Imperfect

STEAM ENERGY SAVINGS
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Importance of Steam

- How Important is STEAM????
- Why do we want to know about STEAM????

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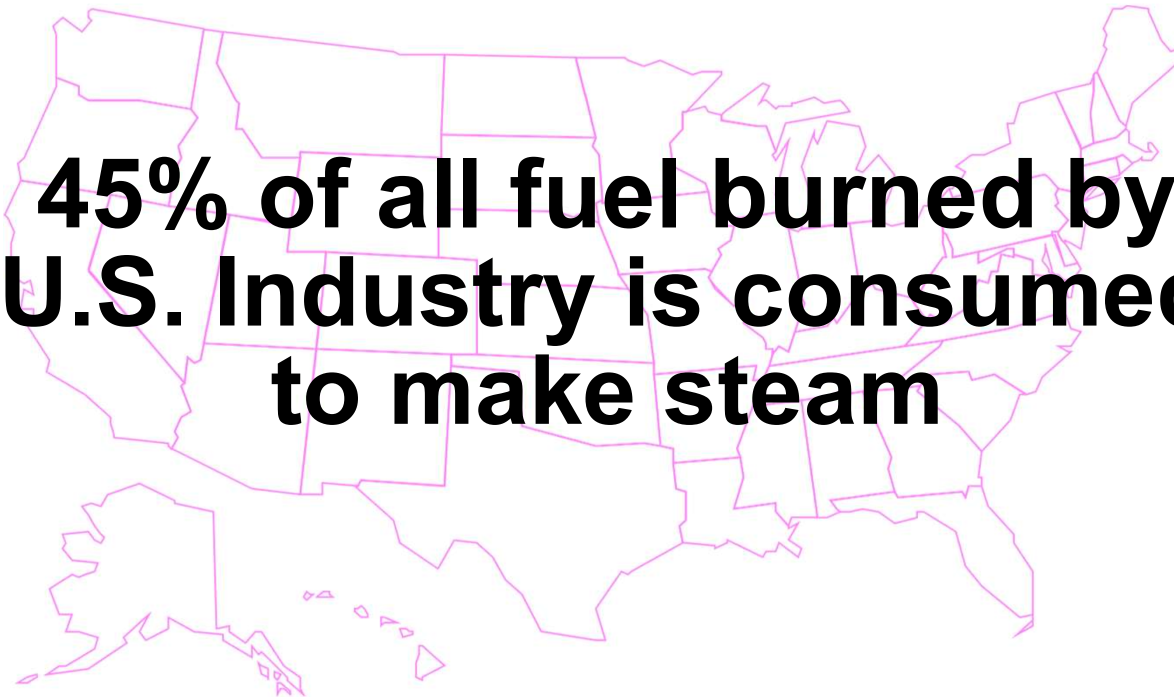
Steam

Part of the energy and environmental picture...

US = 24% of World Energy Consumption

Steam Energy



45% of all fuel burned by U.S. Industry is consumed to make steam

STEAM ENERGY SAVINGS

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WHY IS STEAM ENERGY "PREFERED"

- High usable heat content
- Gives up its heat at constant temperature
- Produced from water - plentiful and cheap
- Clean, odorless, tasteless
- Heat can be used over and over - Flash
- Easily distributed and controlled
- Constant characteristics - Pressure/Temperature/volume relationships

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Steam Is Dangerous !!!

- Many Industrial Accidents…
- 1st, 2nd, 3rd Degree Burns, and Death

- Always Take Precautions
- Turn Valves On/Off SLOWLY!!!
- If Steam Is New To You Or Is Not Understood, SEEK HELP!

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Water Hammer

- High velocity steam will force condensate to travel with it if steam lines are not properly pitched and drip legs not installed.

- High pressure condensate introduced into a flooded return will “implode” the flash steam.

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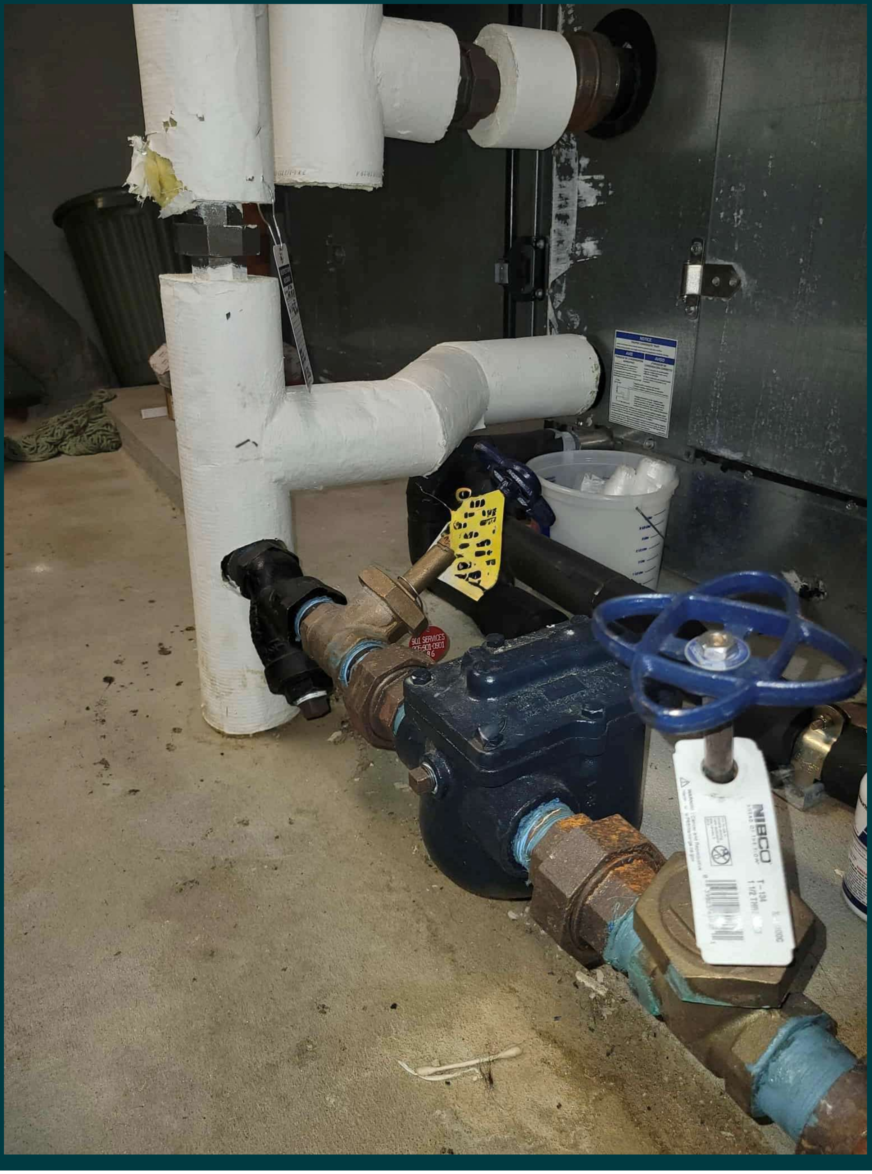
Steam Leaks Are Dangerous

Examine Boiler Headers & Steam Manifolds

WHAT IS WRONG???



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Steam Proper Plumbing Steam Standard Practices

Steam Basic Practices

- Pitch steam and condensate lines 1/2" per 10 ft with flow
- Keep steam velocities less than 10,000 ft per minute
- 1 PSIG equals 2.31 ft
- Always place drip traps at <u>elevation changes</u>, <u>before restrictions in piping</u>, <u>equipment</u> & <u>every 100-200 ft</u>

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Sizing Drip Traps

- Most of the time a 1/2” or 3/4” inch steam trap is sufficient for a drip trap application.

Table 17-1. Condensation in Insulated Pipes Carrying Saturatec in Quiet Air at 70°F (Insulation Assumed to be 75% Efficient)

Pressure, psig		15	30	60	125	180	250	450	
Pipe Size (in)	sq ft per Lineal ft	Pounds of Condensate Per Hour Per Lin							
1	.344	.05	.06	.07	.10	.12	.14	.186	
1¼	.434	.06	.07	.09	.12	.14	.17	.231	
1½	**.497**	**.07**	**.08**	**.10**	**.14**	**.16**	**.19**	**.261**	
2	.622	.08	.10	.13	.17	.20	.23	.320	
2½	.753	.10	.12	.15	.20	.24	.28	.384	
3	**.916**	**.12**	**.14**	**.18**	**.24**	**.28**	**.33**	**.460**	
3½	1.047	.13	.16	.20	.27	.32	.38	.520	
4	1.178	.15	.18	.22	.30	.36	.43	.578	
5	**1.456**	**.18**	**.22**	**.27**	**.37**	**.44**	**.51**	**.698**	
6	1.735	.20	.25	.32	.44	.51	.59	.809	
8	2.260	.27	.32	.41	.55	.66	.76	1.051	1
10	**2.810**	**.32**	**.39**	**.51**	**.68**	**.80**	**.94**	**1.301**	**1**
12	3.340	.38	.46	.58	.80	.92	1.11	1.539	1
14	3.670	.42	.51	.65	.87	1.03	1.21	1.688	1
16	**4.200**	**.47**	**.57**	**.74**	**.99**	**1.19**	**1.38**	**1.927**	**2**
18	4.710	.53	.64	.85	1.11	1.31	1.53	2.151	2
20	5.250	.58	.71	.91	1.23	1.45	1.70	2.387	2
24	**6.280**	**.68**	**.84**	**1.09**	**1.45**	**1.71**	**2.03**	**2.833**	**3**

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Drip Leg Sizing

Table 18-1. Recommended Steam Main and Branch Line Drip Leg Sizing

M	D	H	
Steam Main Size (in)	Drip Leg Diameter (in)	Drip Leg Length Min. (in)	
		Supervised Warm-Up	Automatic Warm-Up
½	½	10	28
¾	¾	10	28
1	1	10	28
2	2	10	28
3	3	10	28
4	4	10	28
6	4	10	28
8	4	12	28
10	6	15	28
12	6	18	28
14	8	21	28
16	8	24	28
18	10	27	28
20	10	30	30
24	12	36	36

- Size drip leg diameters large enough to allow condensate to “fall out” of the steam piping.
- Size drip leg volume large enough to store start up loads.

Proper Piping, Trapping & Venting

- Ensures good heat transfer
- Prevents water hammer & corrosion
- Avoids condensate backup into coil
- Prevents Freezing

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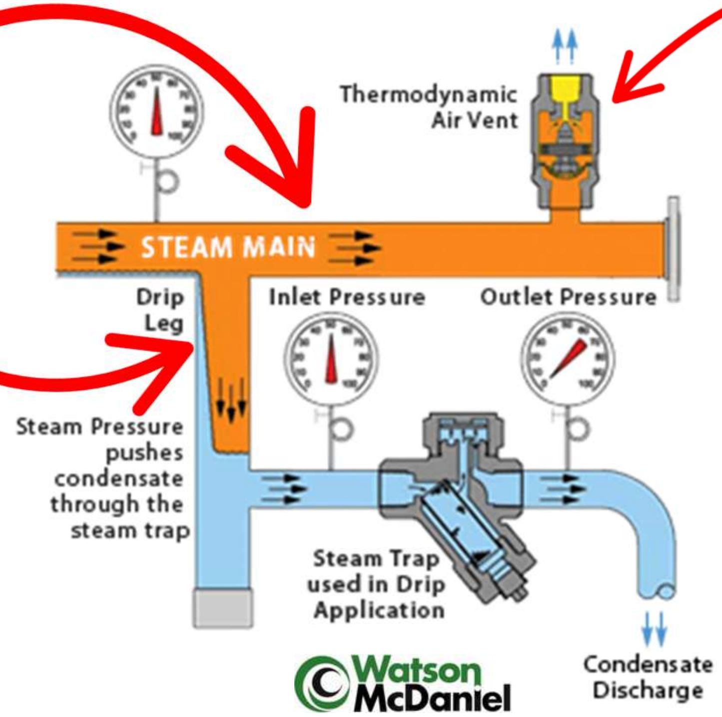
The TRAP ARENA

STEAM PROPER PLUMBING

PIPE SIZE SHOULD BE THE SAME UP TO 4”



CRITICAL FOR STARTUPS

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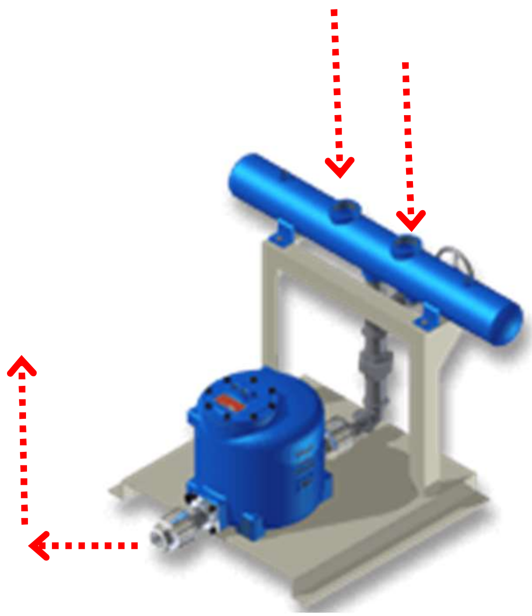
FROM TRAP TO INLET OF RECEIVING TANK



OUTLET FROM THE PUMP TRAP TO THE RETURN LINE

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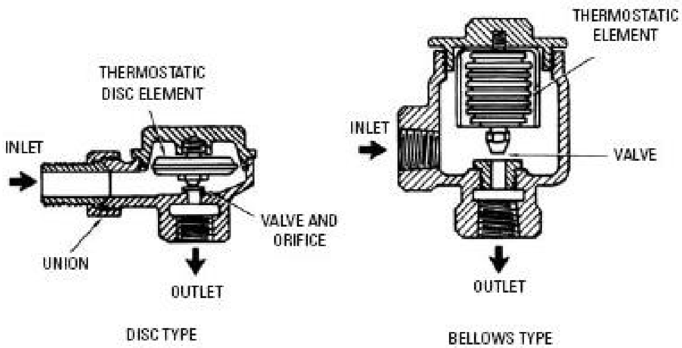
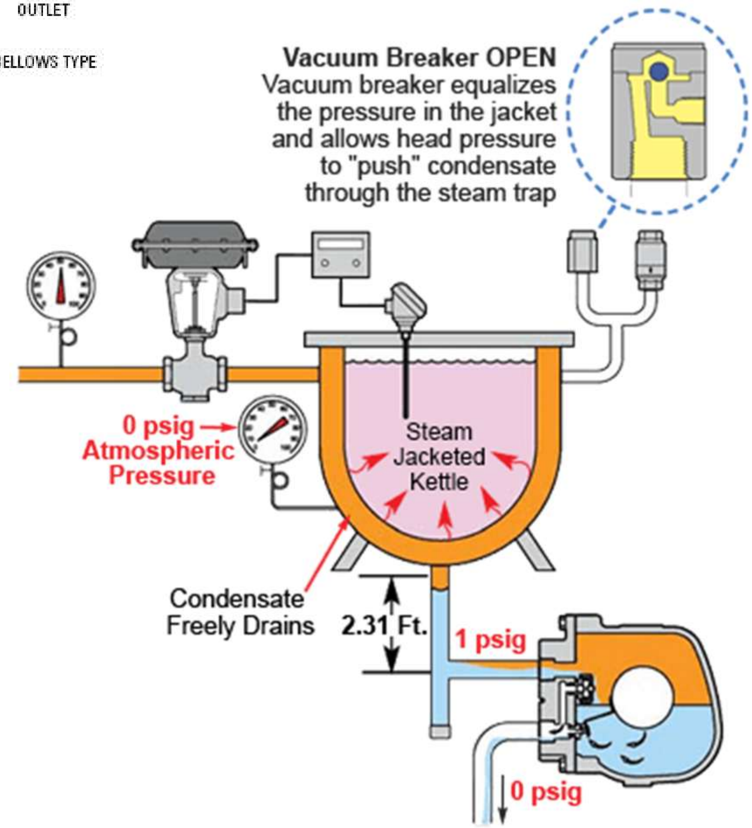
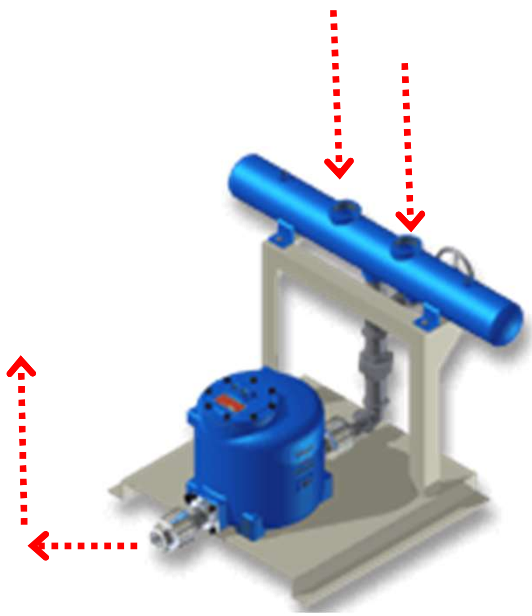


Figure 10-20 Thermostatic trap.



FROM TRAP TO INLET OF RECEIVING TANK



OUTLET FROM THE PUMP TRAP TO THE RETURN LINE

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SENSING LINE

FLOODED REGULATOR

OUTLET PIPE SAME SIZE

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HOW IS STEAM MEASURED?

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BRITISH THERMAL UNIT - BTU

- The amount of heat required to raise one pound of water one degree.

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Steam Basics

- 1 Lb of water at 70 F

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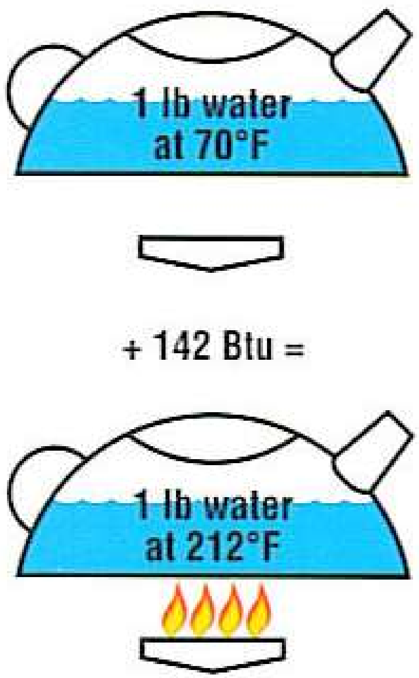
Steam Basics



- 1 Lb of water at 70 F
- Add 142 BTU's
- Knowing that water boilers at 212 F under atmospheric pressure - do we have water, steam, or a mixture???

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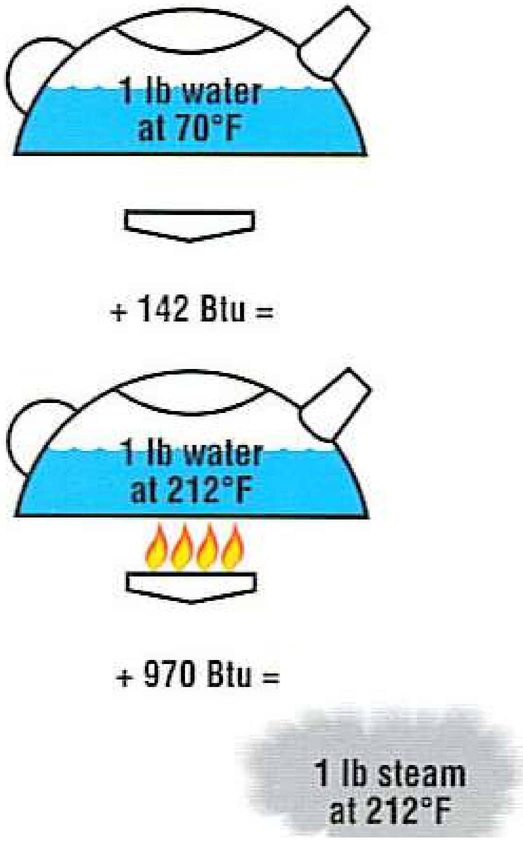
Steam Basics



- We need to add an additional 970 BTU's of heat once the water is at 212 F in order to get 1 lb of steam under atmospheric conditions.

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Quick Sample Problem

- Shell & Tube … Holds 25 Gallons of Water
- Temperature Increases from 60°F to 110°F
- What is the BTU demand????

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Ball Park Calculation

- 25 Gallons x 8 lbs/gallon = 200 lbs H_2O….
- Raising Temp from 60 to 110 = 50°F Rise
- BTU demand is: 200 x 50 = 1,000 BTUs

Add Movement

- Pump is Sized for 50 Gallons/Minute
- Translates to 50x60 = 300 Gallons/Hour
- 300 gallons/hr x 8 lbs/gallon = 2400 lbs/hour
- Temperature Rise is 50°F …
- BTU = 2400 x 50 = 120,000 <u>BTUs/HOUR</u>

What is Trap Size Criteria?

- We know there is::
- ~1,000 BTUs in ONE POUND OF STEAM

- 120,000 BTUs => 120 Pounds of Steam
- 120 lbs of Steam => 120 lbs Condensate

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STEAM

How big is one (1) pound of STEAM?

- 26.8 cu. ft.
- 16 Gallons of Tea
- 186 Cans of Soda
- 7.75 Cases of Water

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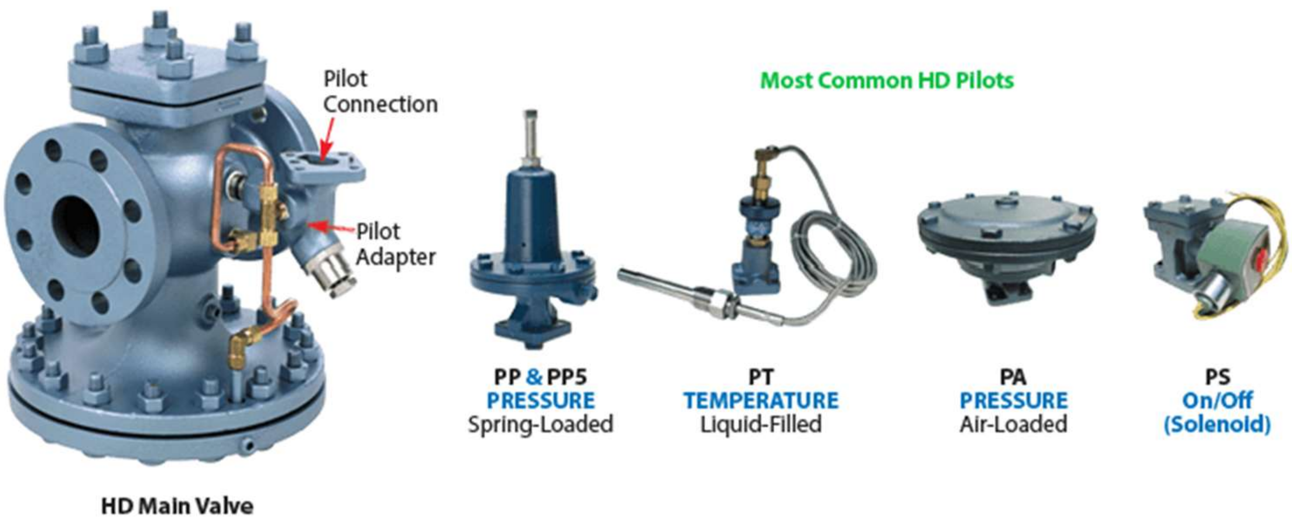
	Col. 1 Gauge Pressure	Col. 2 Absolute Pressure (psia)	Col. 3 Steam Temp. (°F)	Col. 4 Heat of Sat. Liquid (Btu/lb)	Col. 5 Latent Heat (Btu/lb)	Col. 6 Total Heat of Steam (Btu/lb)	Col. 7 Specific Volume of Sat. Liquid (cu ft/lb)	Col. 8 Specific Volume of Sat. Steam (cu ft/lb)
Inches of Vacuum	29.743	0.08854	32.00	0.00	1075.8	1075.8	0.096022	3306.00
	29.515	0.2	53.14	21.21	1063.8	1085.0	0.016027	1526.00
	27.886	1.0	101.74	69.70	1036.3	1106.0	0.016136	333.60
	19.742	5.0	162.24	130.13	1001.0	1131.	0.016407	73.52
	9.562	10.0	193.21	161.17	982.1	1143.3	0.016590	38.42
	7.536	11.0	197.75	165.73	979.3	1145.0	0.016620	35.14
	5.490	12.0	201.96	169.96	976.6	1146.6	0.016647	32.40
	3.454	13.0	205.88	173.91	974.2	1148.1	0.016674	30.06
	1.418	14.0	209.56	177.61	971.9	1149.5	0.016699	28.04
	0.0	14.696	212.00	180.07	970.3	1150.4	0.016715	26.80
	1.3	16.0	216.32	184.42	967.6	1152.0	0.016746	24.75
	2.3	17.0	219.44	187.56	965.5	1153.1	0.016768	23.39
	5.3	20.0	227.96	196.16	960.1	1156.3	0.016830	20.09
	10.3	25.0	240.07	208.42	952.1	1160.6	0.016922	16.30
	15.3	30.0	250.33	218.82	945.3	1164.1	0.017004	13.75
	20.3	35.0	259.28	227.91	939.2	1167.1	0.017078	11.90
	25.3	40.0	267.25	236.03	933.7	1169.7	0.017146	10.50
	30.3	45.0	274.44	243.36	928.6	1172.0	0.017209	9.40
	40.3	55.0	287.07	256.30	919.6	1175.9	0.017325	7.79
	50.3	65.0	297.97	267.50	911.6	1179.1	0.017429	6.66
	60.3	75.0	307.60	277.43	904.5	1181.9	0.017524	5.82

HEAT REQUIRED AT DIFFERENT PRESSURES

psig	°F	Latent Heat	Total Heat	Specific Volume (cu ft/lb)
0	212	970	1150	26.80
50	298	912	1179	6.655
100	338	880	1189	3.882

The TRAP ARENA - (equipment)



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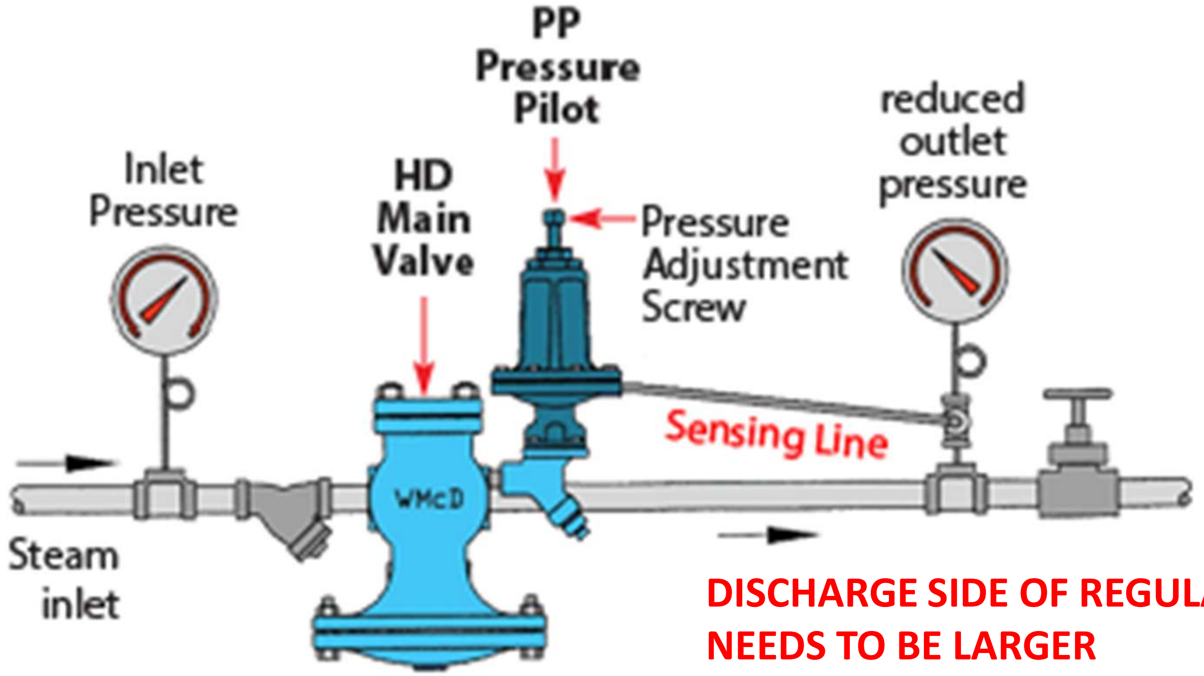
STEAM ENERGY SAVINGS

Watson McDaniel
Precision Manufactured Steam Products



DISCHARGE SIDE OF REGULATOR PIPING NEEDS TO BE LARGER

"LOWER PRESSURES NEED MORE VOLUME OF SPACE TO MAINTAIN SAME LB/HOUR OF FLOW"

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Relief Valves

- Silent Energy Waste

Pressure Guages!!!

- Must need for setting & ensuring pressures are maintained

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Steam Traps

- Must keep steam in the system.
- Must get the condensate out.
- Must get the air and CO_2 out.
- Must function automatically.

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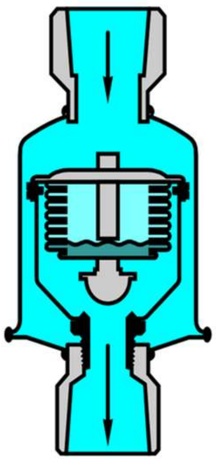
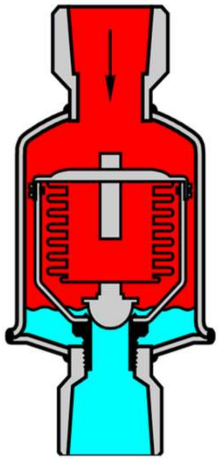
Operation of the Thermostatic Steam Trap

FUNCTION: **BELLOWS EXPAND IN THE PRESENCE OF STEAM. BELLOWS RETRACT IN THE PRESENCE OF CONDENSATE (COOLING) ALLOWING FLOW.**





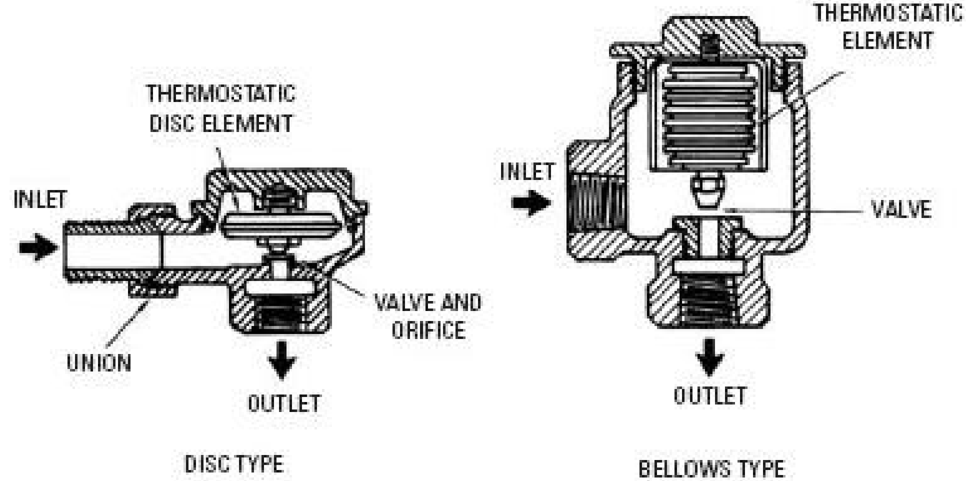


Figure 10-20 Thermostatic trap.

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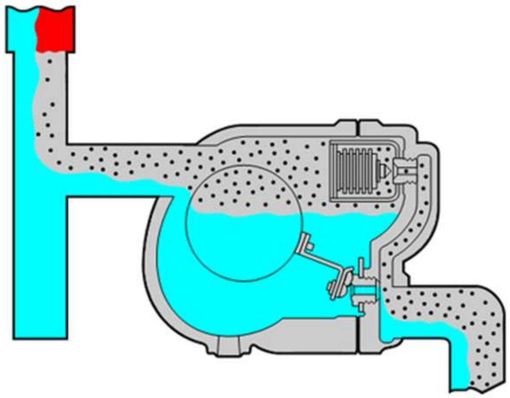
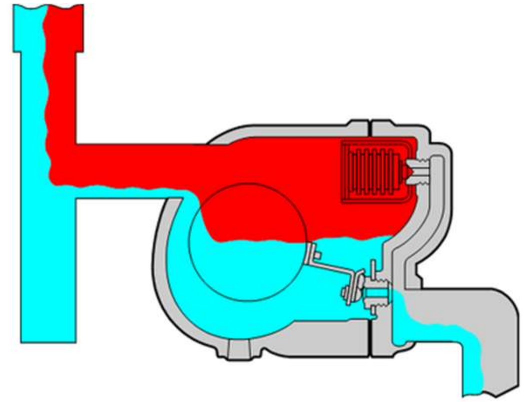
Operation of the F&T Trap

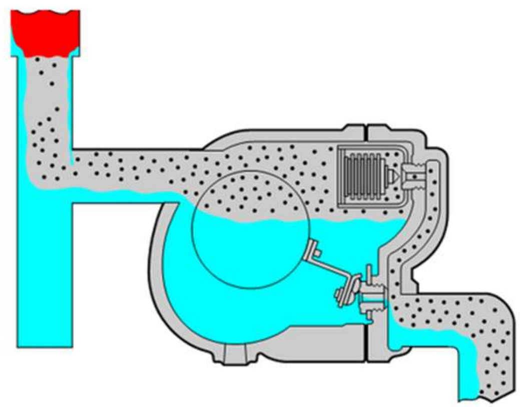




Operates on two methods

- Float style system

- Thermostatic element (air vent)



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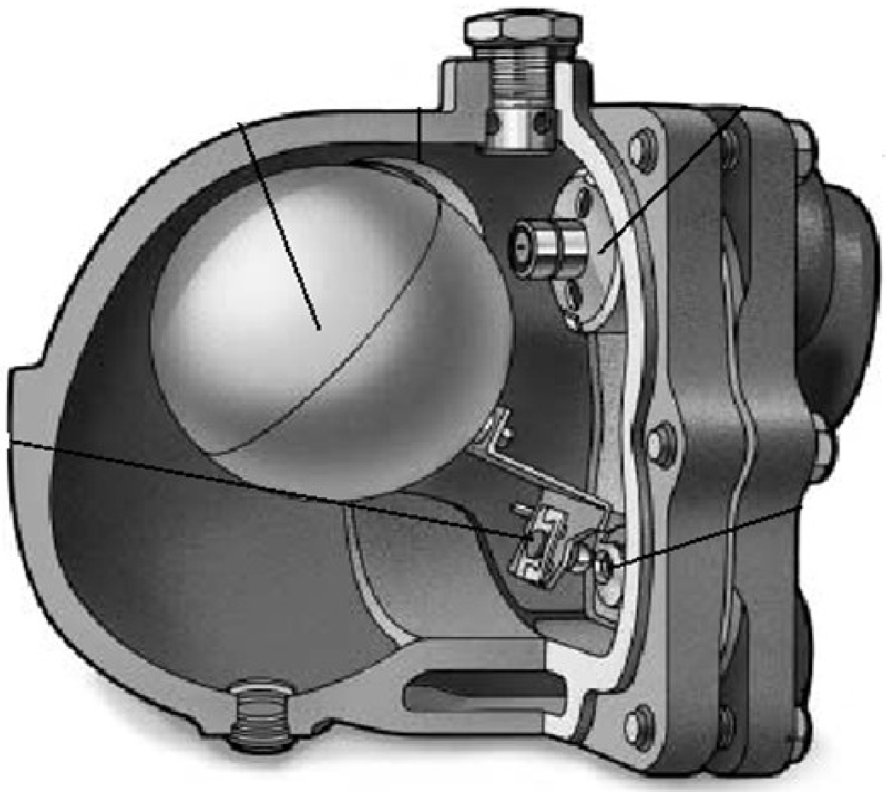
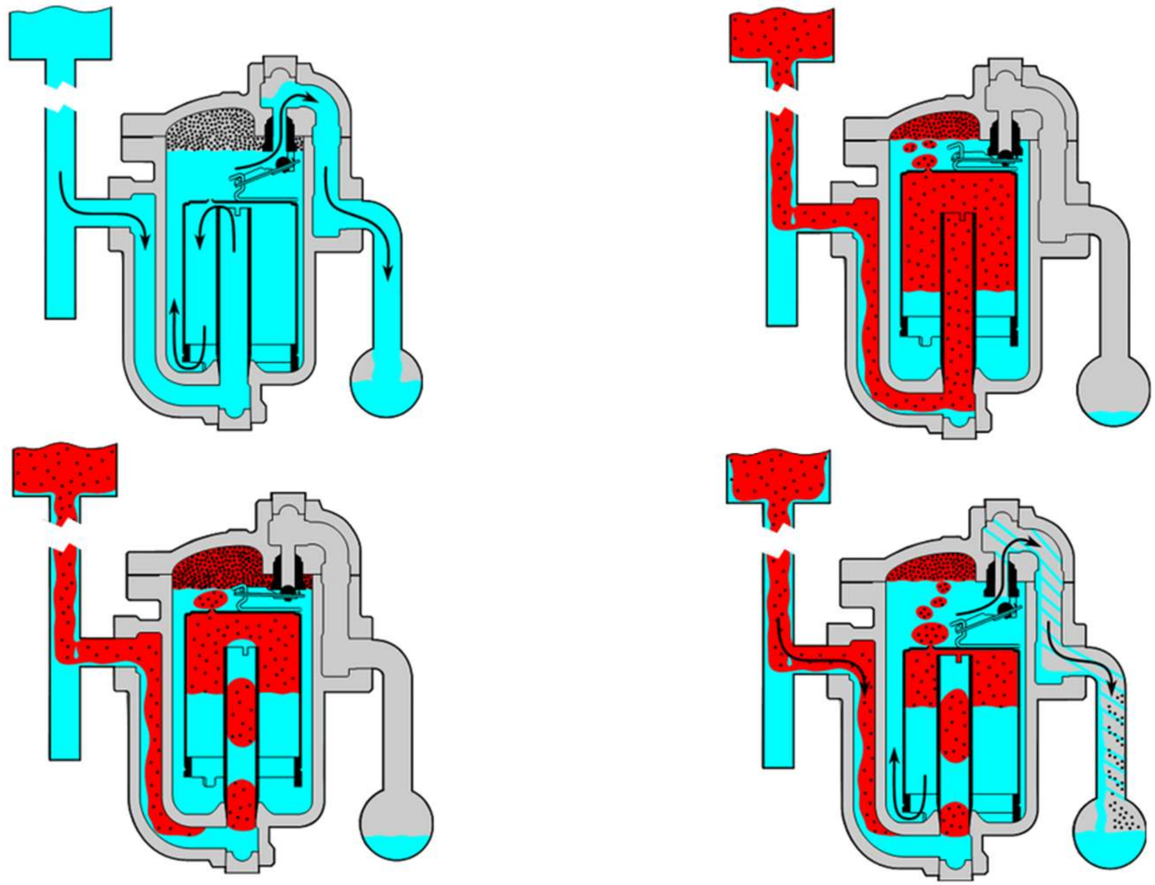
STEAM ENERGY SAVINGS

Float and Thermostatic Trap



Operation of the
Inverted Bucket Steam Trap



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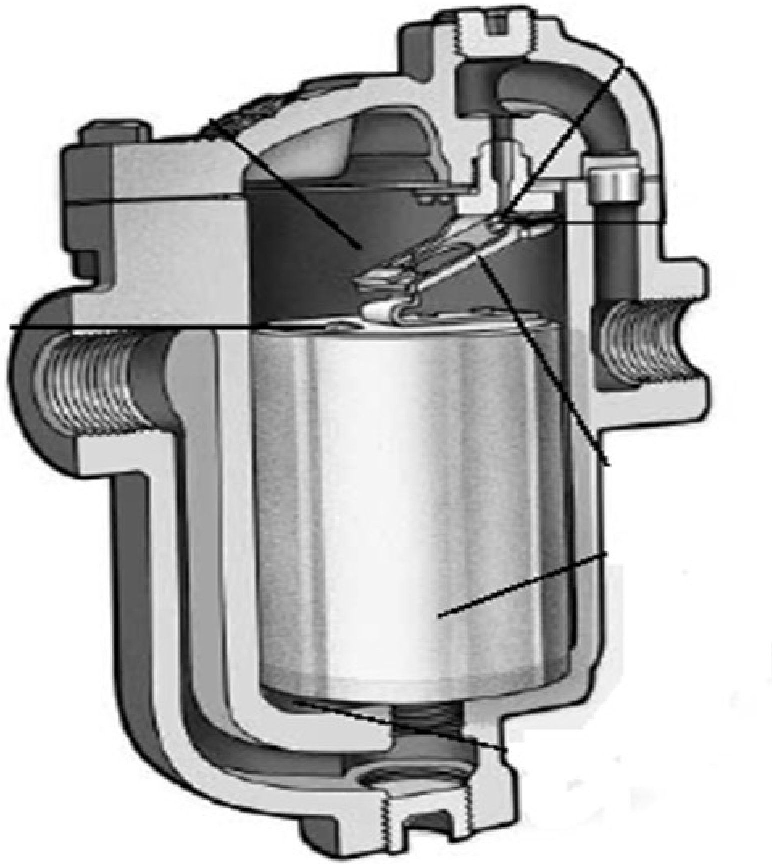
Inverted Bucket Trap



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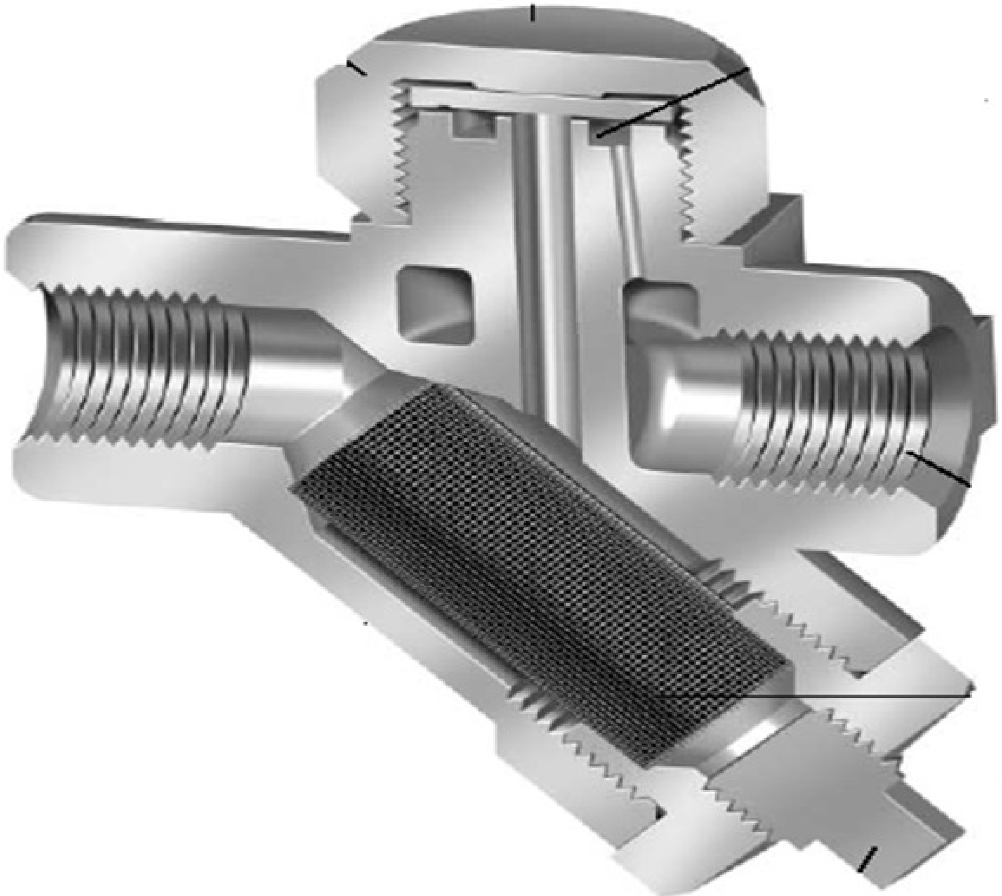
Thermodynamic Trap



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STEAM ENERGY SAVINGS

How Various Steam Traps Meet Specific Operating Requirements

Characteristics	Inverted Bucket	F & T	Disc	Thermostatic
Method of Operation	Intermittent	Continuous	Intermittent	Intermittent
Energy Conservation (Time in Service)	Excellent	Good	Poor	Fair
Corrosion Resistance	Excellent	Good	Poor	Fair
Resistance to Hydraulic Shock	Excellent	Poor	Excellent	Poor
Vents air and CO_2 at steam temperature	Yes	No	No	No
Operation against back pressure	Excellent	Excellent	Poor	Excellent
Resistance to damage against freezing	Good	Poor	Good	Good
Performance on very light loads	Excellent	Excellent	Poor	Excellent
Ability to handle dirt	Excellent	Poor	Poor	Fair
Mechanical failure (Open-Closed)	Open	Closed	Open	—

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Inverted Bucket

	Bellows Balance Pressure	Thermodynamic Traps	F&T Traps	Inverted Bucket
Modulation	Poor	Fair	Good	Good
Backpressure	Good	Poor	Good	Good
Dirt	Fair	Poor	Poor	Good
Wear	Fair	Poor	Good	Good
Water Hammer	Poor	Good	Poor	Good
Freezing	Good	Good	Poor	Good

STEAM ENERGY SAVINGS
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Steam Trap Leaks

Table 6. Steam leak rates

er	Leak rate (lb_m/h) at steam temperature of 500°F					
	Steam pressure (psig)					
	50	100	150	200	250	300
	23	41	59	77	96	119
	91	163	235	308	382	478
	206	366	529	693	860	1,075
	366	651	940	1,232	1,528	1,912
	822	1,465	2,115	2,773	3,438	4,302
	1,462	2,605	3,761	4,929	6,112	7,648
	2,285	4,071	5,876	7,702	9,551	11,949
	3,290	5,862	8,462	11,091	13,753	17,207

Steam Traps Leaks

- Trap leaking with 1/4” orifice and 100 psig operating pressure
- 163 lb/hr x 8760 hrs/year = 1,427,880 lbs of steam per year from (1) trap
- 1427 Mlb x $12 per thousand = $17,134

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How to Test Steam Traps

- **Visual (Best)**
  Test Valve Method

- **Listening (Next Best)**
  Ultrasound Device

- **Temperature (Indicative Only)**
  Pyrometer

- **Other Devices (Least Reliable)**

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Visual (Best)

Eyes On The Event - Start Asking Questions - WHY?

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Listening (Next Best)

This Has Been Proven To Be Reliable Most Of The Time

- **This Method Relies HEAVILY On The Listeners Experience**

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HEAR SDT MORE Ultrasound Solutions

Temperature (Indicative Only)

This Method Provides Partial Information Only

- Must Compile Other Information To Completely Diagnose Condition Of The Steam Trap

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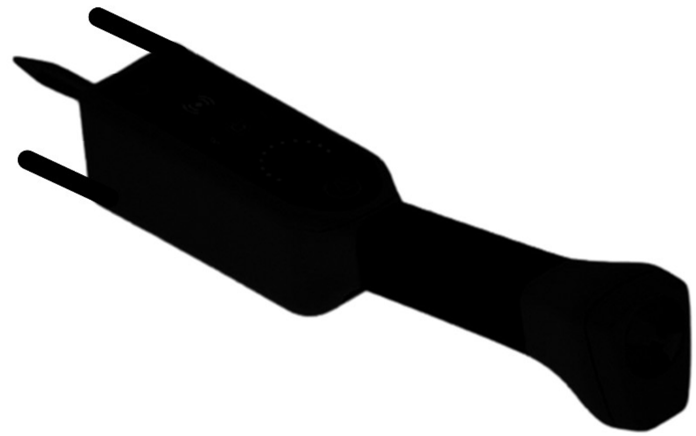
Other Devices (Least Reliable)



Provides Minimal Information Only

- **Adjacent Equipment & Plumbing Issues Not Considered**
- **Leaking Parts & Piping Not Discovered**
- **PRV & Sensing Lines Are Not Reviewed**
- **Relief Valves Leaking By Not Discovered**

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Steam Trap Assessments

WHY?

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STEAM ENERGY SAVINGS

Survey Your Steam Traps

Repair / Replace Defective Steam Traps

=

Energy Savings

$ $ $

Environmental Savings

STEAM ENERGY SAVINGS

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Steam Trap Testing Facts

Steam traps are tested to determine if they are functioning properly and not cold plugging or failing in an open position and allowing live steam to escape into the condensate return system. There are four basic ways to test steam traps: temperature, sound, visual, and electronic.

Recommended Steam Trap Testing Intervals

- High-Pressure (150 psig and above): Weekly to Monthly
- Medium-Pressure (30 to 150 psig): Monthly to Quarterly
- Low-Pressure (below 30 psig): Annually

For additional information on monitoring, download the following sub-metering case studies from the AMO publication library:

- Solutia: Utilizing Sub-Metering to Drive Energy Project Approvals Through Data
- Nissan North America: How Sub-Metering Changed the Way a Plant Does Business

Also refer to the following guidebook on the EERE Federal Energy Management website at *www.femp.energy.gov*:

- Metering Best Practices: A Guide to Achieving Utility Resource Efficiency, Release 2.0

Adapted from an Energy TIPS fact sheet that was originally published by the Industrial Energy Extension Service of Georgia Tech.

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Entire Steam Trap Population Is Assessed

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Adjacent Plumbing Issues ARE Discovered

Leaking Parts / Pipes May Be Identified

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PRV Issues (Sensing Lines) Are Reviewed

Relief Valve Issues May Be Discovered (Leaking By)

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Safety Issues May Be Discovered During Assessment Reporting

How Is Energy Savings Calculated?

Input	Your Values	Notes
Fuel Cost ($/MMBtu)	5	Enter your fuel cost
Boiler Efficiency (%)	80	Typical = 75-85%
Steam Pressure (psig)	150	Enter pressure, enthalpy auto-fills
Steam Enthalpy (Btu/lb)	1195	Auto-calculated from lookup table
Steam Quantity (lb)	1000	Base unit for calculation
Water & Treatment Cost ($/1000 lb)	0.25	Makeup water + chemicals per 1000 lb steam
Fuel Steam Cost ($/1000 lb)	7.46875	Formula: (Fuel Cost / Eff) × (Steam Btu / 1,000,000)
Total Steam Cost ($/1000 lb)	7.71875	Fuel cost + water/treatment cost
Annual Steam Usage (MMlb)	100	Enter annual steam demand in million lb
Annual Steam Cost ($)	771875	Total steam cost × MMlb × 1000

STEAM ENERGY SAVINGS
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Steam Cost Example

		FY25			FY26		
Rates							
	internal	34.15	3.00%		35.18	3.00%	
	external	35.94	3.00%		37.02	[illegible]	
Volume							
	internal	560,420			570,999		
	external	98,865			96,754		
		659,285			667,753		
Revenue							
	internal	19,139,750			20,086,081		
	external	3,553,477			3,581,930		
	Gross Revenue	22,693,226			23,668,010		
	Less:						
	Central reallocation	(177,674)			-		
	Condensate Credit	(1,588,526)			(1,893,441)		
	Adjustments	-			-		
	Net Revenue	20,927,027			21,774,569		
Expense							
	Salaries	2,141,033	3.00%	merit	2,376,173	3.00%	merit
	Benefits	770,772	0.80%	CFB 36.0% (proposed)	855,422	0.00%	CFB 36.0% (proposed)
	Other Expenses	1,410,163	4.00%	inflation	2,124,200	4.00%	inflation
	Electricity	184,305	0.28		195,555	0.29	
	Water & Sewer	474,214	0.72		383,884	0.57	
	Gas	4,956,642	7.52		5,185,060	7.76	
	Utility Tax	102,819			107,612		
	Net investment plant	100,000			100,000		
Transfers							
	Debt Service	4,416,240		will finalize with new R8 report	4,416,240		will finalize with new R8 report
	EM fee	157,827		gas and electricity	165,185		gas and electricity
	Reserve	3,500,000			3,000,000		
	Other Transfers	-			-		
Total Expenses and Transfers		18,214,015			18,909,331		
Net Income		2,713,011			2,865,238		
%		14.90%			15.15%		

35.18
37.02

STEAM ENERGY SAVINGS
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Trap Type Summary

Description		Population Count	% of Total	Failure Count	In Service Failure
UK	Unknown	3	0.7%	3	100%
FL	Float	18	4.4%	2	14.3%
FT	Float & Thermostatic	81	19.6%	9	12.7%
IB	Inverted Bucket	293	70.9%	25	9.2%
TH	Thermostatic	10	2.4%	0	0%
DC	Disc	8	1.9%	0	0%
Total		413	100%	39	10.4%

Manufacturer Summary

Description		Population Count	% of Total	Failure Count	In Service Failure
NOT	NO TRAP	3	0.7%	3	100%
ARM	Armstrong	341	82.6%	32	10.2%
AYV	Ayvaz	28	6.8%	2	9.1%
W-M	Watson McDaniel	27	6.5%	2	8.7%
SPE	Spence	4	1%	0	0%
SPI	Spirax Sarco	10	2.4%	0	0%
Total		413	100%	39	10.4%

Application Summary

Description		Population Count	% of Total	Failure Count	In Service Failure
CL	Coil	72	17.4%	10	14.5%
DR	Drip	306	74.1%	27	9.7%
PR	Process	33	8%	2	7.7%
LD	Liquid Drainer	2	0.5%	0	0%
Total		413	100%	39	10.4%

Total Annualized Summaries

Fuel Used (MMBTU/yr) Steam	**4,274**
Loss (lb) CO2 Emissions (lb)	**3,066,951**
Repair Cost (USD) Payback	**500,003 0**
Period (months) Average Time	**0 N/A 7**
To Resolve (Days) Plugged Trap	
Count Monetary Summary	

Plugged Cost (USD)	**N/A**
CO2 Cost (USD) Steam	**N/A**
Loss Cost (USD) Total	**61,339**
Savings (USD)	**61,339**

Condition Summary

Description		Population Count	% of Total
OK	Good	334	80.9%
OS	Out of Service	37	9%
BT	Blow Thru	16	3.9%
CD	Cold	9	2.2%
PL	Plugged	7	1.7%
LK	Leaking	4	1%
FL	Flooded	2	0.5%
RC	Rapid Cycling	1	0.2%
NT	Not Tested	1	0.2%
NF	Not Found	1	0.2%
TR	Trap Removed	1	0.2%
Total		413	100%

901 SERVICES

STEAM ENERGY SAVINGS

Total Annualized Summaries

Fuel Used (MMBTU/yr) Steam	4,274
Loss (lb) CO2 Emissions (lb)	3,066,951
Repair Cost (USD) Payback	500,003
Period (months) Average Time	0
To Resolve (Days) Plugged Trap	0
Count Monetary Summary	N/A
	7

Plugged Cost (USD)	N/A
CO2 Cost (USD)	N/A
Steam Loss Cost (USD)	61,339
Total Savings (USD)	61,339

Condition Summary

Description		Population Count	% of Total
OK Good		334	80.9%
OS	Out of Service	37	9%
BT	Blow Thru	16	3.9%
CD Cold		9	2.2%
PL Plugged		7	1.7%
LK Leaking		4	1%
FL Flooded		2	0.5%
RC	Rapid Cycling	1	0.2%
NT	Not Tested	1	0.2%
NF	Not Found	1	0.2%
TR	Trap Removed	1	0.2%
Total		413	100%

STEAM ENERGY SAVINGS
901 SERVICES

Danny Thomas

Trap Type Summary

Description		Population Count	% of Total	Failure Count	In Service Failure
IB	Inverted Bucket	12	50%	2	16.7%
FT	Float & Thermostatic	6	25%	0	0%
DC Disc		6	25%	0	0%
Total		24	100%	2	8.3%

Manufacturer Summary

Description		Population Count	% of Total	Failure Count	In Service Failure
W-M	Watson McDaniel	4	16.7%	1	25%
ARM Armstrong		14	58.3%	1	7.1%
SPI	Spirax Sarco	6	25%	0	0%
Total		24	100%	2	8.3%

Application Summary

Description		Population Count	% of Total	Failure Count	In Service Failure
DR Drip		17	70.8%	2	11.8%
PR Process		6	25%	0	0%
LD	Liquid Drainer	1	4.2%	0	0%
Total		24	100%	2	8.3%

Total Annualized Summaries

Fuel Used (MMBTU/yr) Steam	**0 0**
Loss (lb) CO2 Emissions (lb)	**0 0**
Repair Cost (USD) Payback	**0**
Period (months) Average Time	**N/A**
To Resolve (Days) Plugged Trap	**1**
Count Monetary Summary	

Plugged Cost (USD)	**N/A**
CO2 Cost (USD) Steam	**N/A**
Loss Cost (USD) Total	**0 0**
Savings (USD)	

Condition Summary

Description		Population Count	% of Total
OK Good		21	87.5%
CD Cold		1	4.2%
NF	Not Found	1	4.2%
PL Plugged		1	4.2%
Total		24	100%

Total Annualized Summaries

Fuel Used (MMBTU/yr) Steam	0
Loss (lb) CO2 Emissions (lb)	0
Repair Cost (USD) Payback	0
Period (months) Average Time	0
To Resolve (Days) Plugged Trap	0
Count Monetary Summary	N/A
	1

Plugged Cost (USD)	N/A
CO2 Cost (USD)	N/A
Steam Loss Cost (USD)	0
Total Savings (USD)	0

Condition Summary

Description	Population Count	% of Total
OK Good	21	87.5%
CD Cold	1	4.2%
NF Not Found	1	4.2%
PL Plugged	1	4.2%
Total	24	100%

STEAM ENERGY SAVINGS
901 SERVICES

IRC

Trap Type Summary

Description		Population Count	% of Total	Failure Count	In Service Failure
UK	Unknown	3	0.8%	3	100%
FL	Float	18	4.6%	2	14.3%
FT	Float & Thermostatic	75	19.3%	9	13.8%
IB	Inverted Bucket	281	72.2%	23	8.9%
TH	Thermostatic	10	2.6%	0	0%
DC	Disc	2	0.5%	0	0%
Total		389	100%	37	10.5%

Manufacturer Summary

Description		Population Count	% of Total	Failure Count	In Service Failure
NOT	NO TRAP	3	0.8%	3	100%
ARM	Armstrong	327	84.1%	31	10.4%
AYV	Ayvaz	28	7.2%	2	9.1%
W-M	Watson McDaniel	23	5.9%	1	5.3%
SPE	Spence	4	1%	0	0%
SPI	Spirax Sarco	4	1%	0	0%
Total		389	100%	37	10.5%

Application Summary

Description		Population Count	% of Total	Failure Count	In Service Failure
CL	Coil	72	18.5%	10	14.5%
PR	Process	27	6.9%	2	10%
DR	Drip	289	74.3%	25	9.6%
LD	Liquid Drainer	1	0.3%	0	0%
Total		389	100%	37	10.5%

Total Annualized Summaries

Fuel Used (MMBTU/yr) Steam	**4,274**
Loss (lb) CO2 Emissions (lb)	**3,066,951**
Repair Cost (USD) Payback	**500,003 0**
Period (months) Average Time	**0 N/A 6**
To Resolve (Days) Plugged Trap	
Count Monetary Summary	

Plugged Cost (USD)	**N/A**
CO2 Cost (USD) Steam	**N/A**
Loss Cost (USD) Total	**61,339**
Savings (USD)	**61,339**

Condition Summary

Description		Population Count	% of Total
OK	Good	313	80.5%
OS	Out of Service	37	9.5%
BT	Blow Thru	16	4.1%
CD	Cold	8	2.1%
PL	Plugged	6	1.5%
LK	Leaking	4	1%
FL	Flooded	2	0.5%
RC	Rapid Cycling	1	0.3%
NT	Not Tested	1	0.3%
TR	Trap Removed	1	0.3%
Total		389	100%

Total Annualized Summaries

Fuel Used (MMBTU/yr) Steam	4,274
Loss (lb) CO2 Emissions (lb)	3,066,951
Repair Cost (USD) Payback	500,003
Period (months) Average Time	0
To Resolve (Days) Plugged Trap	0
Count Monetary Summary	N/A
	6

Plugged Cost (USD)	N/A
CO2 Cost (USD)	N/A
Steam Loss Cost (USD)	61,339
Total Savings (USD)	61,339

Condition Summary

Description		Population Count	% of Total
OK Good		313	80.5%
OS	Out of Service	37	9.5%
BT	Blow Thru	16	4.1%
CD Cold		8	2.1%
PL Plugged		6	1.5%
LK Leaking		4	1%
FL Flooded		2	0.5%
RC	Rapid Cycling	1	0.3%
NT	Not Tested	1	0.3%
TR	Trap Removed	1	0.3%
Total		389	100%

STEAM ENERGY SAVINGS
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Work Order Trap Detail

Pinkel

Tag Number Nests Groups Elevation (ft) Physical

Location 6U.746J IRC IRC Traps 5 6U. AHU 3W; Humidifier; Off Jacket

Steam Trap Characteristics

Type Manufacturer Model	Float & Thermostatic		
Connection Size Maximum	Armstrong 15B3		
Operating Pressure (psig)	3/4" 15 NPT		
Connection	Threaded	Condensate Recovery Application	Closed
Condition	Blow Thru	Insulation Type	Drip
Piping Direction	Stacked	Installed Date	
Steam Pressure In (psig)	15	Time in service (months per year)	2018-Jun-6
Steam Pressure Out (psig)	0	Superheat	12 No No
		Shutdown Required	

Trap Valve Data

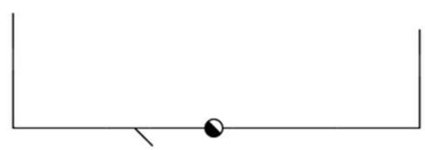
Valve Description	Type	Connection Size	Connection	Condition	Position
1 - Upstream valve 2 - Downstream Valve 3					
- Depressurizing valve 4 - Downstream					
blowdown valve 5 - By-pass valve 6 -					
Upstream blowdown valve 7 - Upstream					
trap station isolation valve 8 - Downstream					
trap station isolation valve 9 - Strainer 10 -					
Strainer Blowdown Valve 11 - Check valve					

Follow Up

Technician name Jerry Hardin 2022-

Date checked Jan-17 2022.Jan.17]

Comments Test BT



Recommendations replace trap and strainer

Work Order Trap Detail

Pinkel

Tag Number	6U.746J
Nests	IRC
Groups	IRC Traps
Elevation (ft)	5
Physical Location	6U. AHU 3W; Humidifier; Off Jacket

Steam Trap Characteristics

Type	Float & Thermostatic
Manufacturer	Armstrong
Model	15B3
Connection Size	3/4"
Maximum Operating Pressure (psig)	15
Connection	NPT Threaded
Condition	Blow Thru
Piping Direction	Stacked
Steam Pressure In (psig)	15
Steam Pressure Out (psig)	0

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Steam Basics

Questions?

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