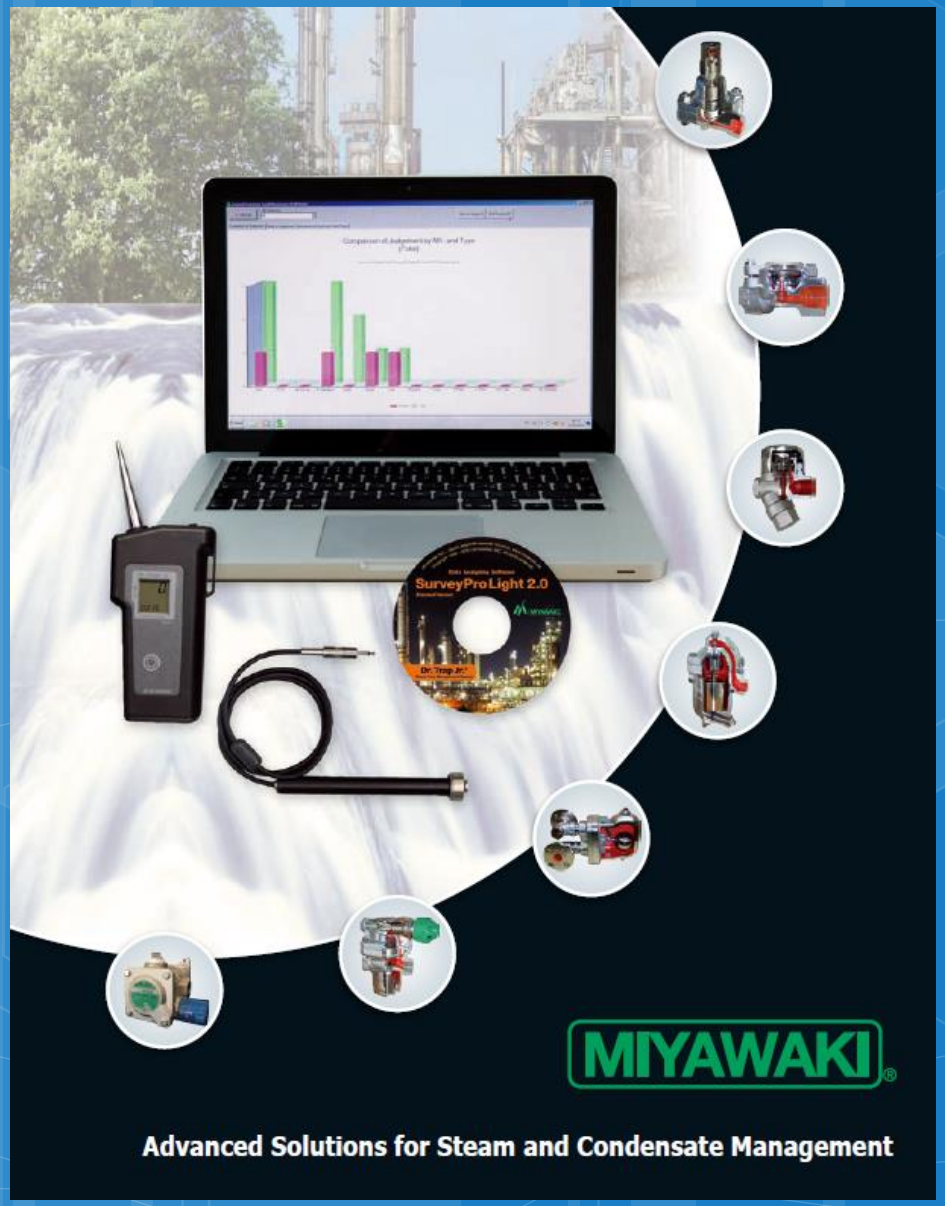


TECHMATIC CONTROLS

24 November 2020

Steam Traps

Techmatic Controls

Ignatius Lim

The Presenter

- 2014: Bachelor of Chemical Engineering from NUS
- 2014-2019: Project Engineer specializing with Tank Gauging and Terminal Automation Systems
- 2019-Present: Business Development for Techmatic Controls

Who are we?

- Techmatic was founded in 1990.
- Supply of industrial valves on pipeline focusing on fluid control
- Provide engineering solutions for our customers
- Local authorised distributor and representative for various brands in SEA
- Office / Warehouse in Kaki Bukit Road 1

Miyawaki Company Profile

- Started in 1933 designing and producing steam traps
- Manufactures a wide range of steam traps and other valves used in many industrial areas.
- Focus on energy conservation, performance and quality

Agenda

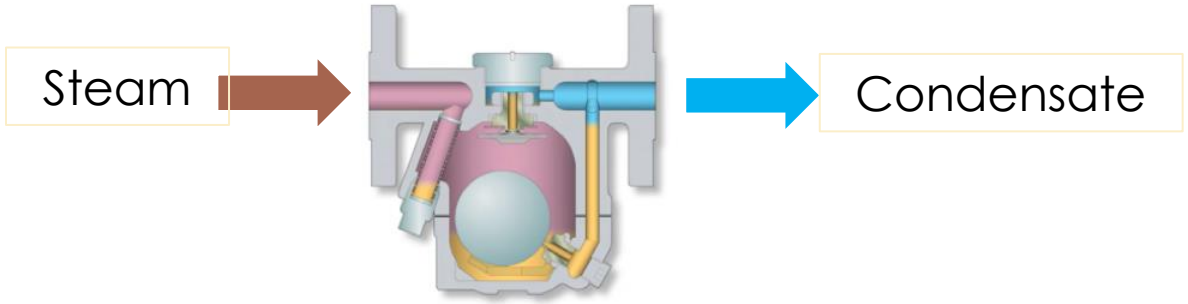
- What is a steam trap and how does it conserve energy
- Selection, Sizing & Installation
- Energy Conservation through Implementation of a Steam Trap Management Program

Steam as an energy transfer system

- Steam is commonly used in industries to transfer energy to processes
- Once steam has released its energy, it will return back to condensate
- You'd want to get rid of condensate in your steam pipes as they can cause many problems

What is a steam trap?

- Automatic valves to discharge condensate and non-condensable gases with minimal loss of steam.
- Can be found in steam pipes and equipment.



- Operate on positive differential pressure between inlet and outlet

The IDEAL Steam Trap

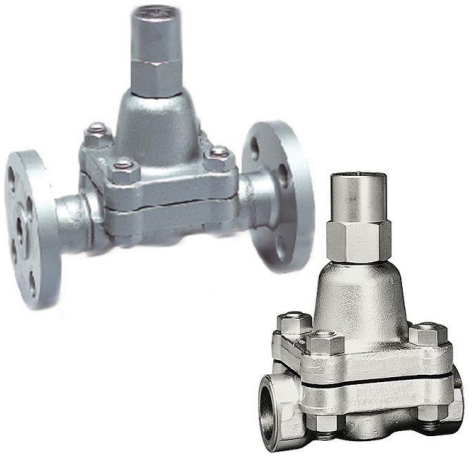
- Discharge condensate perfectly without loss of steam
- Wide Pressure Range
- Large Capacity
- Zero Maintenance
- Cheap

Types of Steam Traps

Float

Inverted Bucket

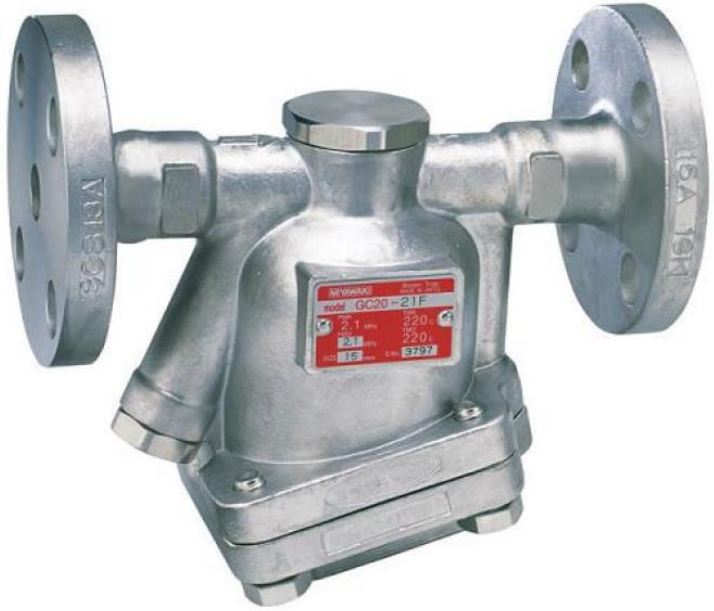
Thermodynamic



Thermostatic

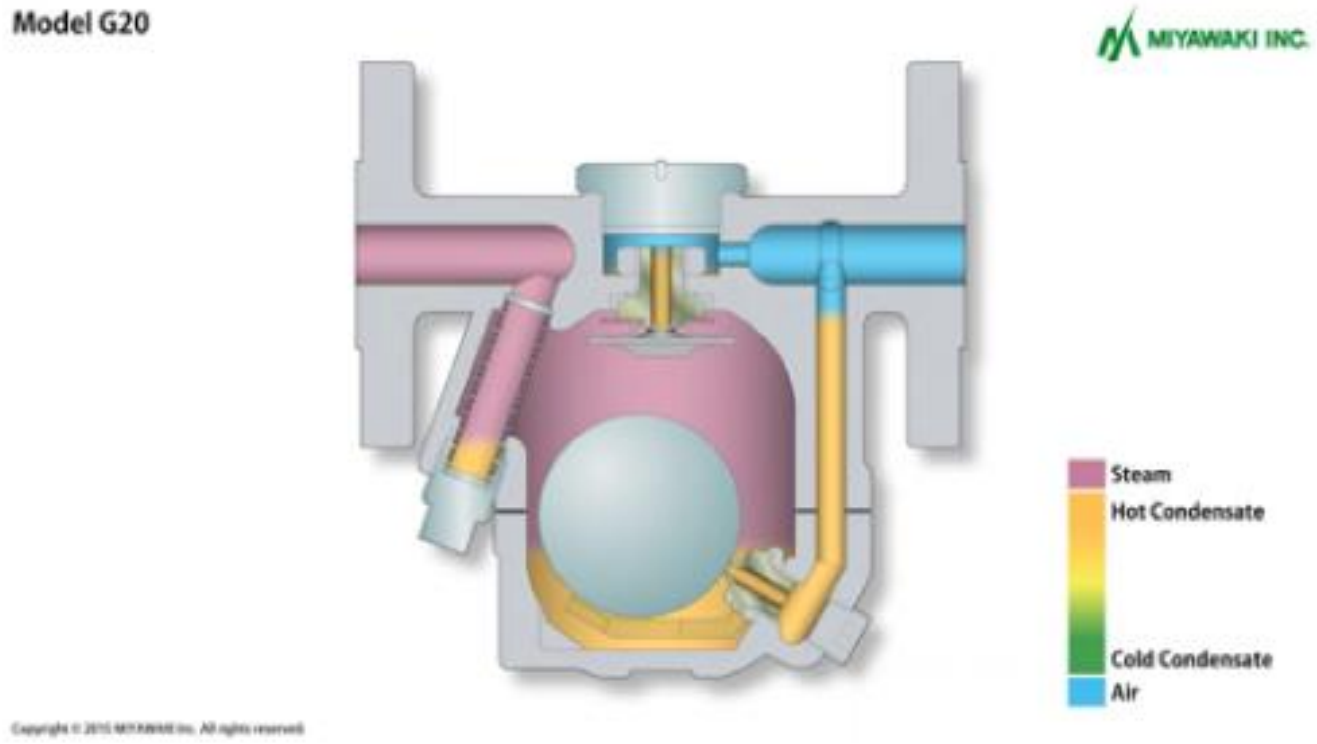
Types of Steam Traps - Float

GH40



GC20

Types of Steam Traps - Float



Types of Steam Traps - Float

+ Great for processes
+ Continuous discharge: No holdback of condensate
+ Large capacity
+ Reliable
+ Good energy conservation
— More costly
— Installation orientation is important

Types of Steam Traps - Bucket

ES5

ER25

ER110

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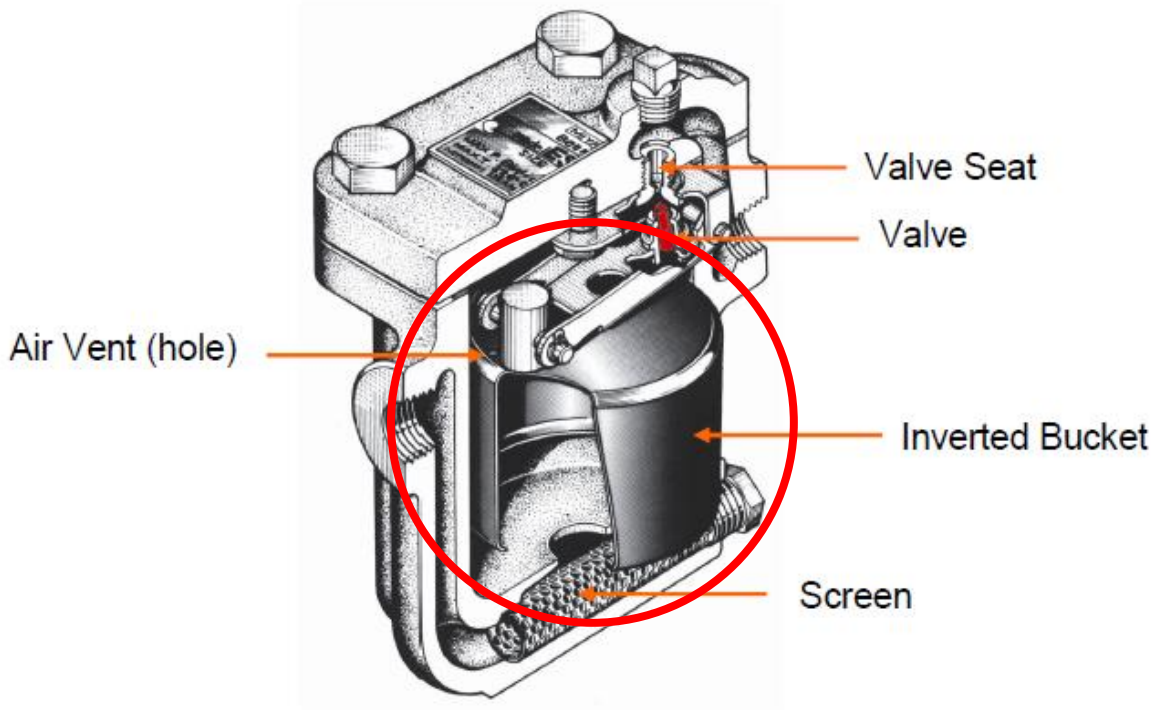
Types of Steam Traps - Bucket



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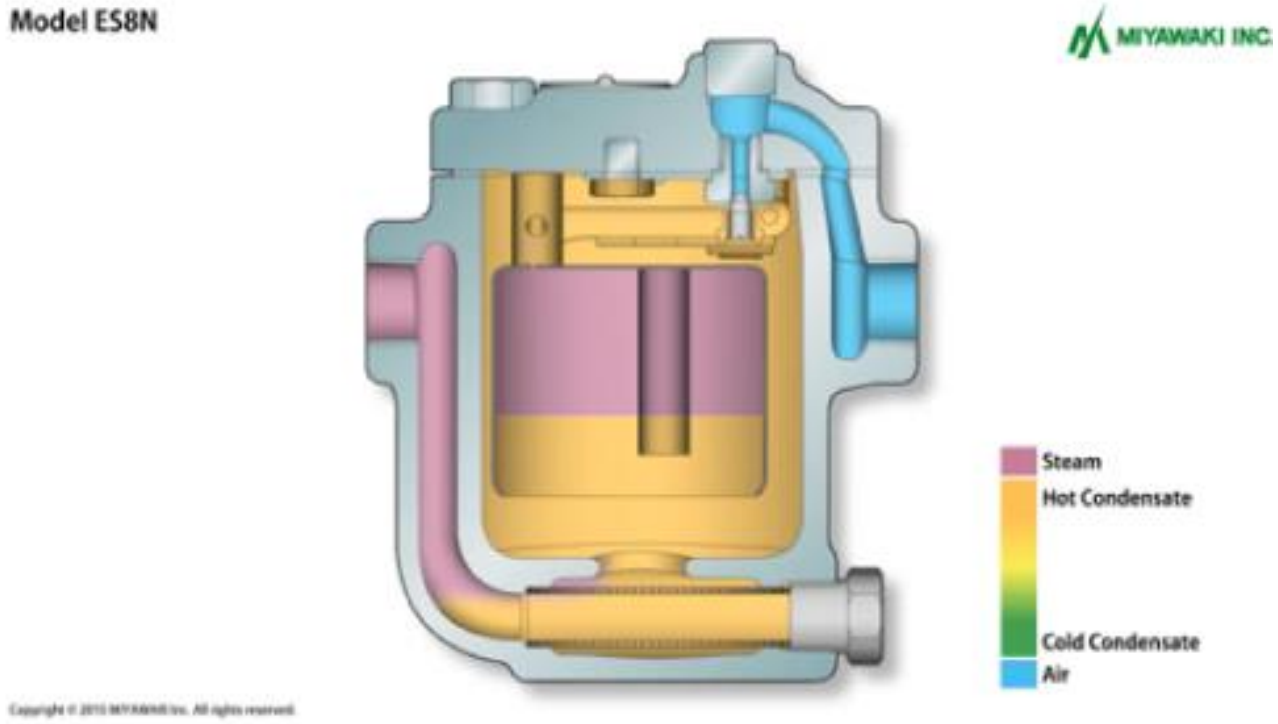
Types of Steam Traps - Bucket



Types of Steam Traps - Bucket

+ Great for processes
+ Large capacity
— Oversizing will cause the steam trap to leak, as there is not enough condensate.
— Installation orientation is important

Types of Steam Traps - Thermodynamic

S55N

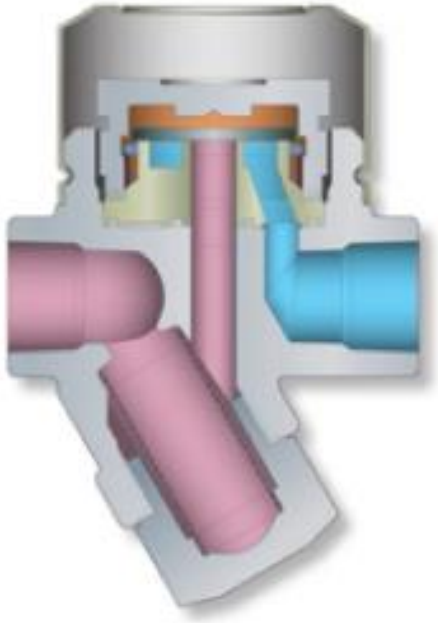
SU2N

SC31

Types of Steam Traps - Thermodynamic

Model SC31

Startup



MIYAWAKI INC.

Steam
Hot Condensate
Cold Condensate
Air

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Types of Steam Traps - Thermodynamic

+ Economical
+ Compact
+ Can install in any orientation

— Smaller capacities
— Less energy saving, as live steam is usually lost with the discharge of condensate

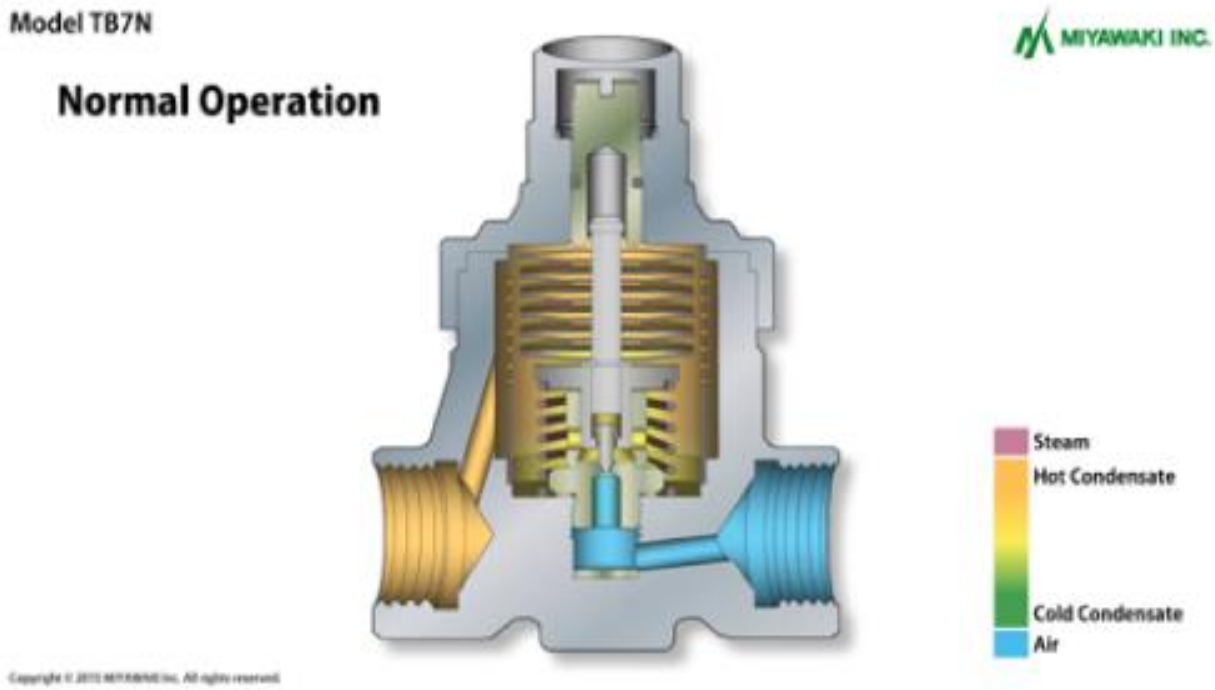
Types of Steam Traps - Thermostatic

TBU4

TB52

TB9N

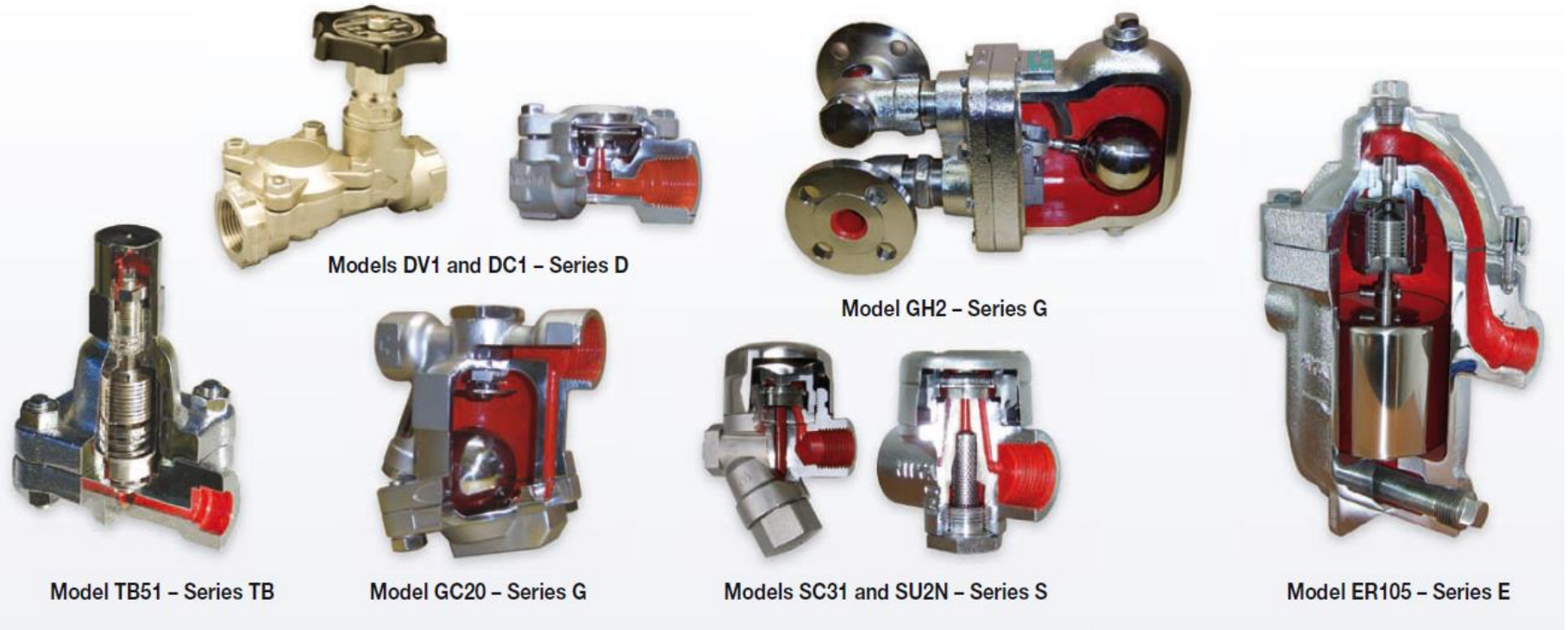
Types of Steam Traps – Thermostatic



Thermostatic

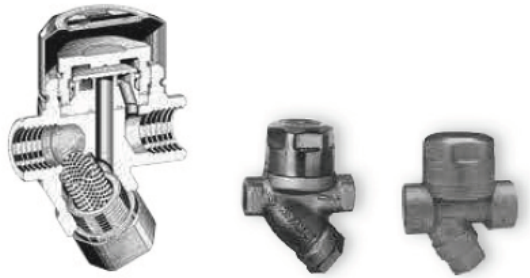
+ Energy Saving
+ Compact
+ Can set discharge temperature on site
— Holds back condensate, require longer drip leg
— Not recommended for process
— Fail closed relatively easily

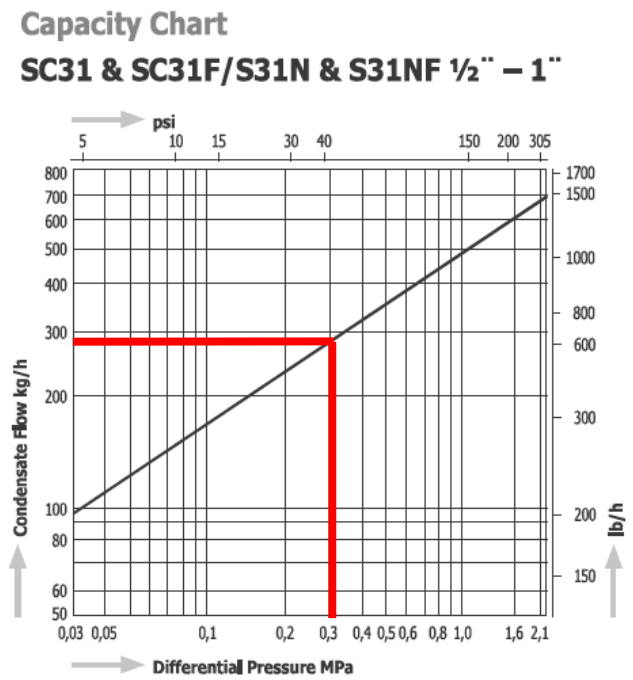
Selection, Sizing & Installation



What are the steps?

1. Decide the capacity required
2. Select type and model based on application
3. Check capacity of selected steam trap





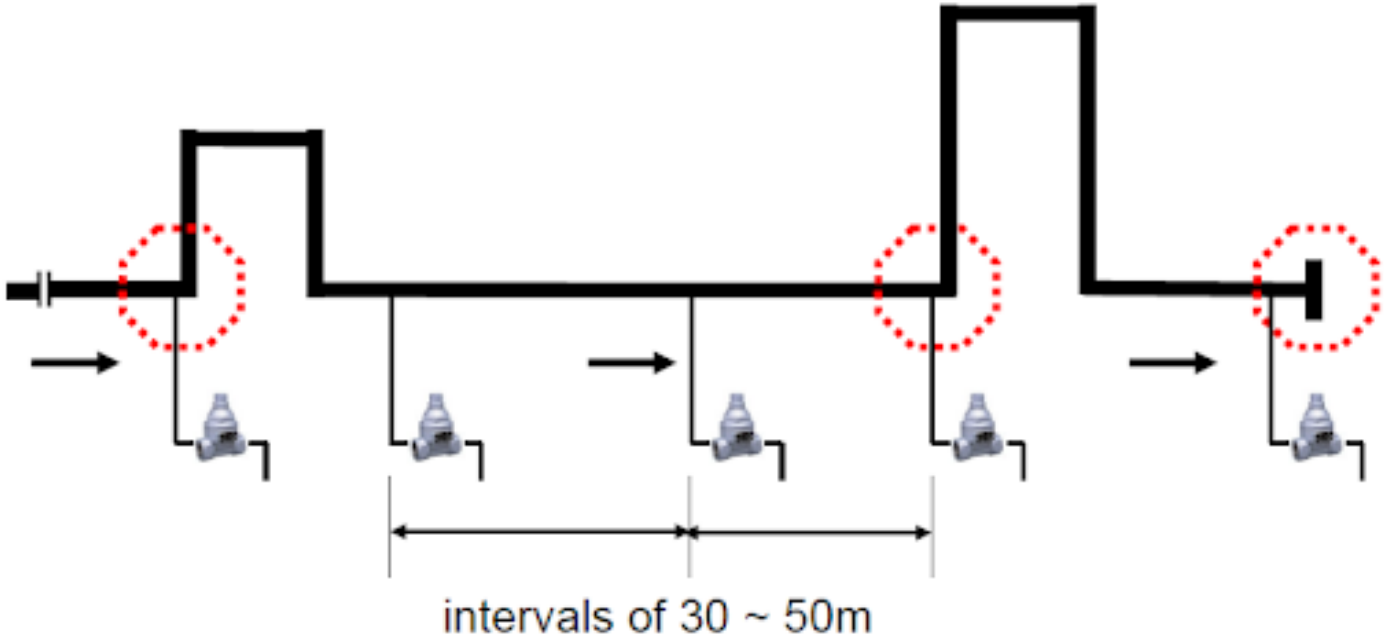
Proper Sizing

- Oversizing leads to:
  - Reduced life time
  - Increased steam loss
- Undersizing
  - Reduced life time
  - May take longer time to heat up a process
- Inappropriate Type
  - Could lead to issues with heating

Installation of steam traps

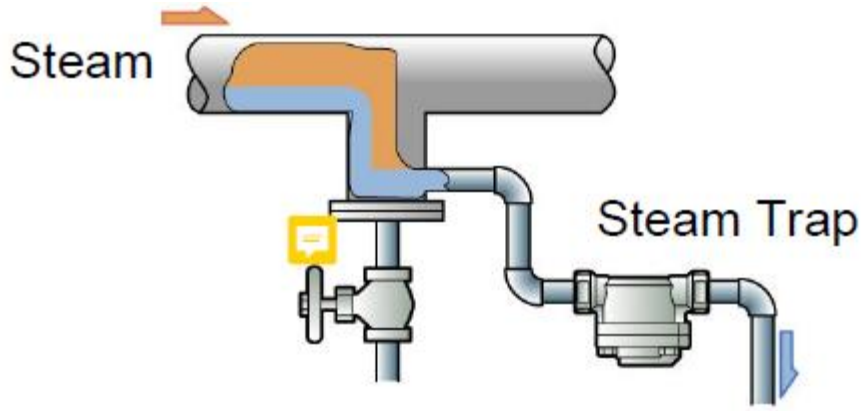
- Flow Direction
- Installation Orientation
- Gravity Flow to steam trap
- Space around the trap

Good Practices



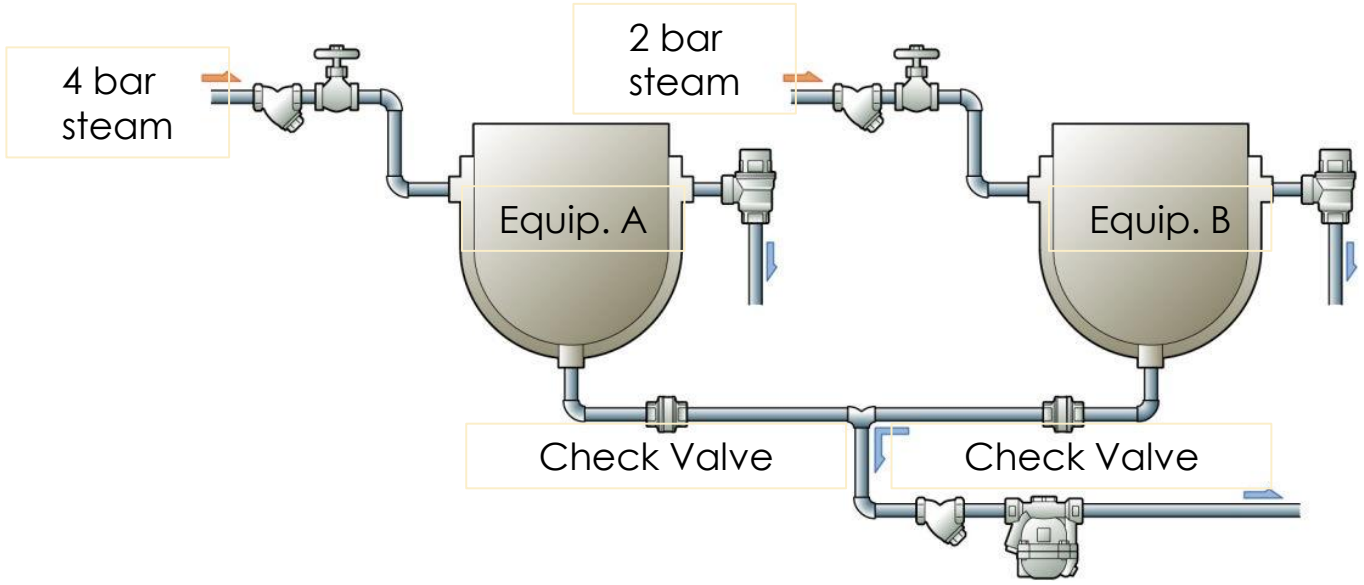
Good Practices

- Use a pocket to capture condensate moving along the steam mains at high speed.



Avoid Group Trapping

- Condensate from equipment B cannot be discharged properly as the check valve cannot open!



Steam Energy Management

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Effective use of steam

- Reduce boiler fuel costs
- Improve efficiency of heat supply to process
- Improve lifespan and performance of steam distribution system

Effective use of steam

3 key elements

- Reduce heat loss
- Proper supply of steam to process equipment
- Use steam condensate heat

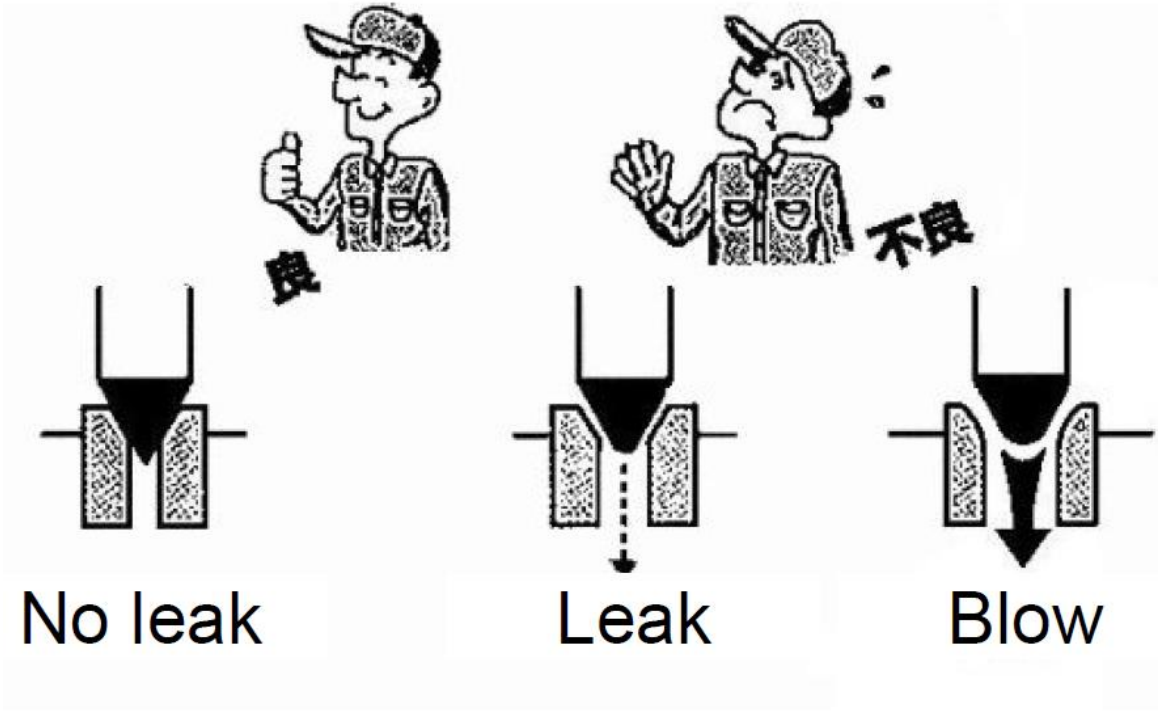
Steam Trap Failure

- Loss of live steam -> higher utility bills
- Water hammer can cause equipment failure
- Reduced operating capacity / takes a long time to heat up process
- Typically 5%-15% of steam traps need to be replaced every year!

Steam Trap Failure

Steam Leak

- Normal wear and tear
- Steam cuts

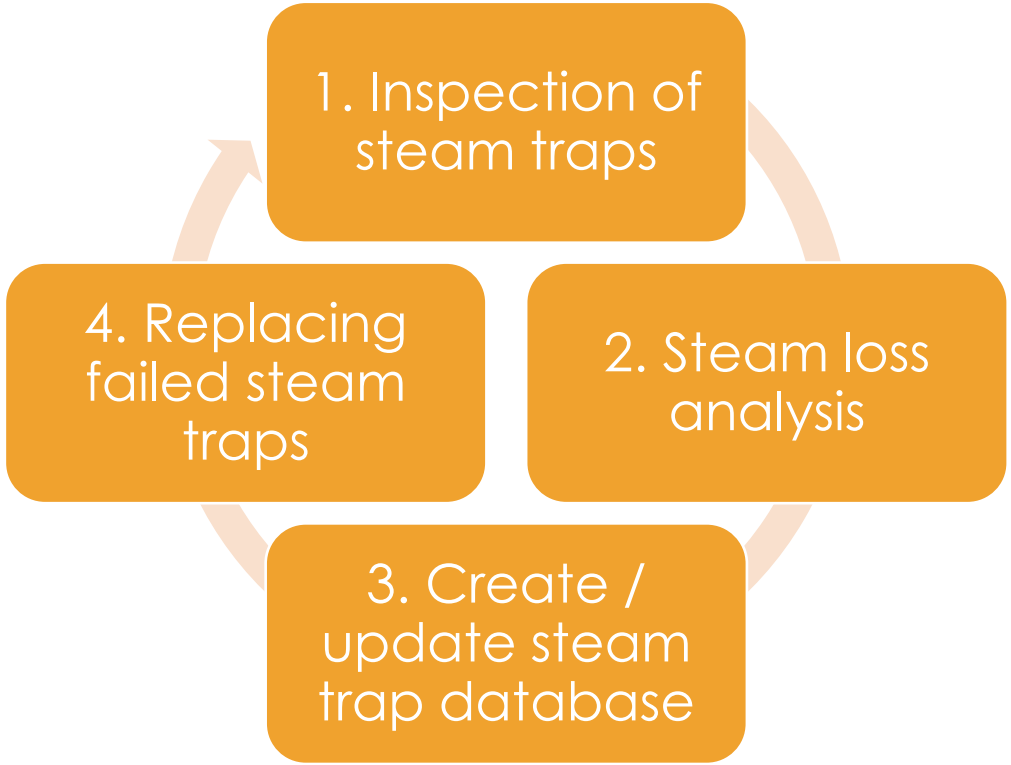


Steam Trap Failure

Plugged (Waterlogged)

- Caused by dirt / debris such as pipe scale
- Condensate may back up into process equipment

Steam Trap Management Plan



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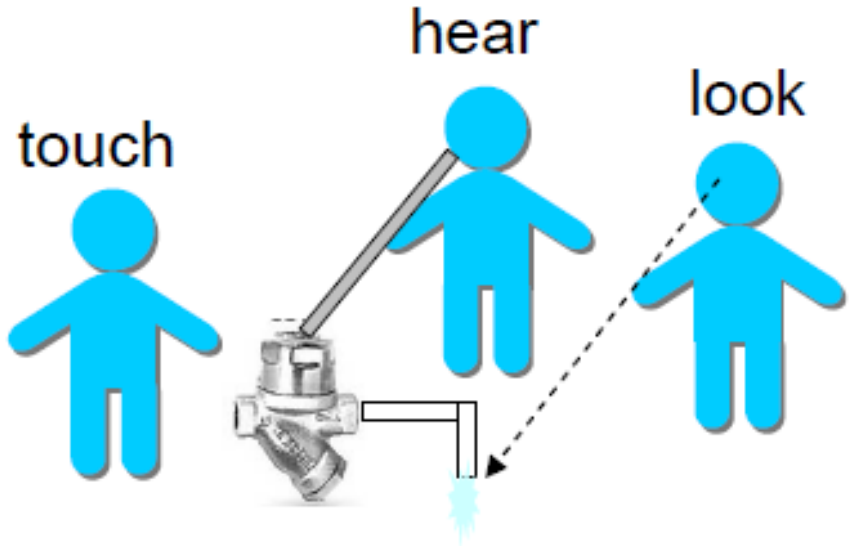
Inspection of steam traps

How is it done?

- Direct Visual Inspection & Observations
- Measurement of Temperature
- By hearing (using industrial stethoscope)
- Ultrasonic Detector



Testing methods – Visual

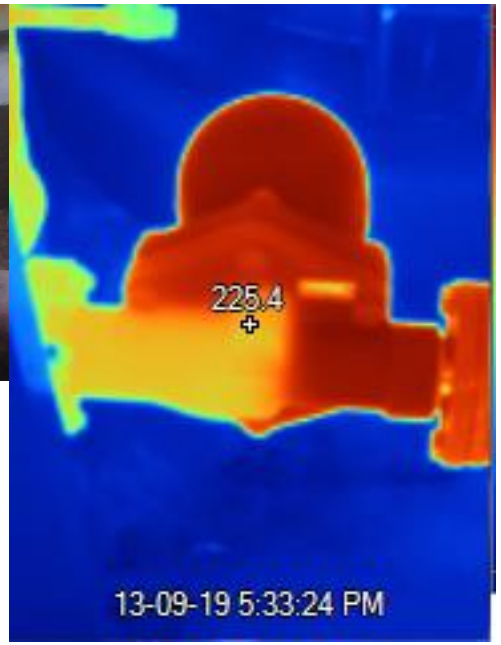
- Observe the discharge
- Time between discharge (thermodynamic & bucket)
- Condition of the steam trap

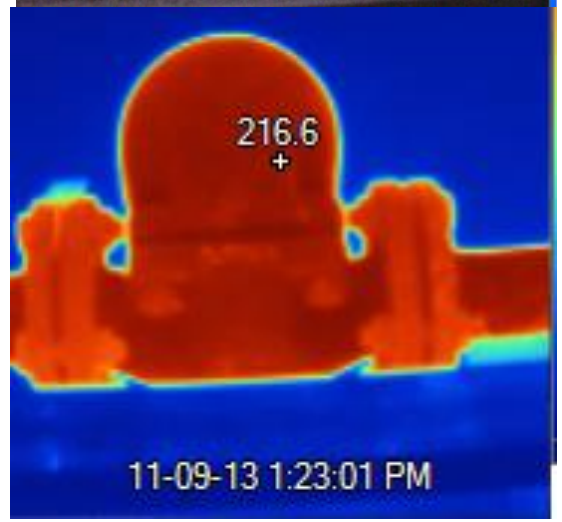
Flash steam Vs Live steam

Testing methods - Temperature

- Use of thermal imaging and infrared temperature gun
- Check upstream and discharge temperature
- Sometimes surface temperature can be misleading.
- Good to know the pressure of steam

Testing methods - Temperature





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Testing methods - Sound

- Useful for closed system
- Using industrial stethoscope
- Requires experience

Testing methods - Sound

- Measuring the ultrasound generated by passage of steam or gas through an orifice
- Most reliable method of measuring steam leaks

PM11 Steam Trap Ultrasonic Checker

Steam Loss Analysis: Dr Trap

100	ES8NF-16	ﾊﾞｹｯﾄ	ﾐﾔﾜｷ	1	15	FF		65	漏れ	中1	7.8	75	2003/02/03
110	DG1-21	ﾀﾞｲﾔﾌﾗﾑ	ﾐﾔﾜｷ	1.2	15	Rc		0	正常				2003/02/03
120	DF1-21	ﾀﾞｲﾔﾌﾗﾑ	ﾐﾔﾜｷ	1.2	15	Rc		0	正常				2003/02/03
130	S31N	ﾃﾞｨｽｸ	ﾐﾔﾜｷ	0.8	15	Rc		0	正常				2003/02/03
140	BF3-21	ﾊﾞｲﾒﾀﾙ	ﾐﾔﾜｷ	0.8	15	Rc		0	正常				2003/02/03
150	TB3	温調	ﾐﾔﾜｷ	0.4	15	Rc	100	120	漏れ	吹放し	11.9	115	2003/02/03
160	TB3	温調	ﾐﾔﾜｷ	0.4	15	Rc	100	0	正常				2003/02/03
170	DF1-21H	ﾀﾞｲﾔﾌﾗﾑ	ﾐﾔﾜｷ	0.4	15	Rc		0	正常				2003/02/03
180	TB5	温調	ﾐﾔﾜｷ	0.4	15	Rc	100	16	漏れ	小1		33	2003/02/03
190	DF1-21H	ﾀﾞｲﾔﾌﾗﾑ	ﾐﾔﾜｷ	0.4	15	Rc		24	漏れ	小2	3.0		2003/02/03
200	DF1-21H	ﾀﾞｲﾔﾌﾗﾑ	ﾐﾔﾜｷ	0.4	15	Rc		0	正常				
210	TB6F	温調	ﾐﾔﾜｷ	1	20	FF	120	0	正常				
220	TB6F	温調	ﾐﾔﾜｷ	1	20	FF	120	95	漏れ	大1	9.7		
230	TB51F-45	温調	ﾐﾔﾜｷ	3	20	FF	170	0	正常				
240	TB51F-45	温調	ﾐﾔﾜｷ	3	20	FF	170	0	正常				
250	SU2NF	ﾃﾞｨｽｸ	ﾐﾔﾜｷ	3	20	FF		22	漏れ	小1	5.6		
260	DL1-21H	ﾀﾞｲﾔﾌﾗﾑ	ﾐﾔﾜｷ	0.3	15	Rc		0	正常				
270	DL1-21L	ﾀﾞｲﾔﾌﾗﾑ	ﾐﾔﾜｷ	0.3	15	Rc		0	正常				
280	SD1	ﾃﾞｨｽｸ	ﾐﾔﾜｷ	0.3	8	Rc		0	正常				
290	SD1	ﾃﾞｨｽｸ	ﾐﾔﾜｷ	0.3	8	Rc		96	漏れ	吹放し	6.4		
300	TB3	温調	ﾐﾔﾜｷ	0.3	20	Rc	100	0	正常				
310	G11N-8	ﾌﾛｰﾄ	ﾐﾔﾜｷ	0.4	20	Rc		0	正常				
320	G11N-8	ﾌﾛｰﾄ	ﾐﾔﾜｷ	0.4	20	Rc		45	漏れ	中2	4.5	43	2003/02/03
330	G12N-8	ﾌﾛｰﾄ	ﾐﾔﾜｷ	0.4	20	Rc		0	正常				2003/02/03

By entering only vibration value, how much leak, steam loss and cost are automatically analyzed.

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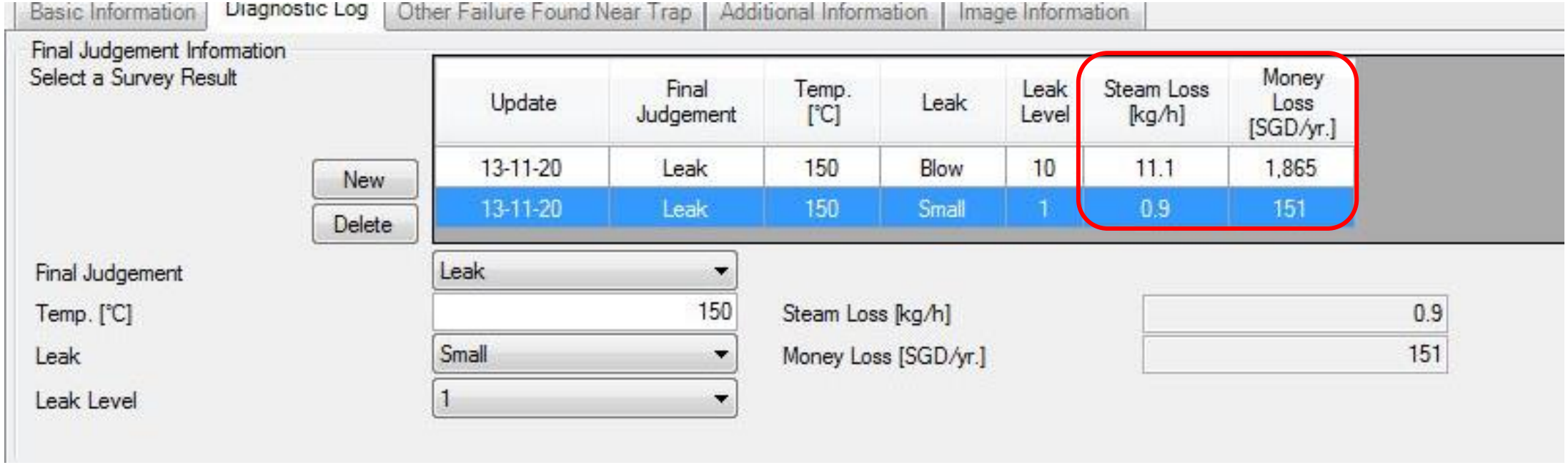
How much steam loss?

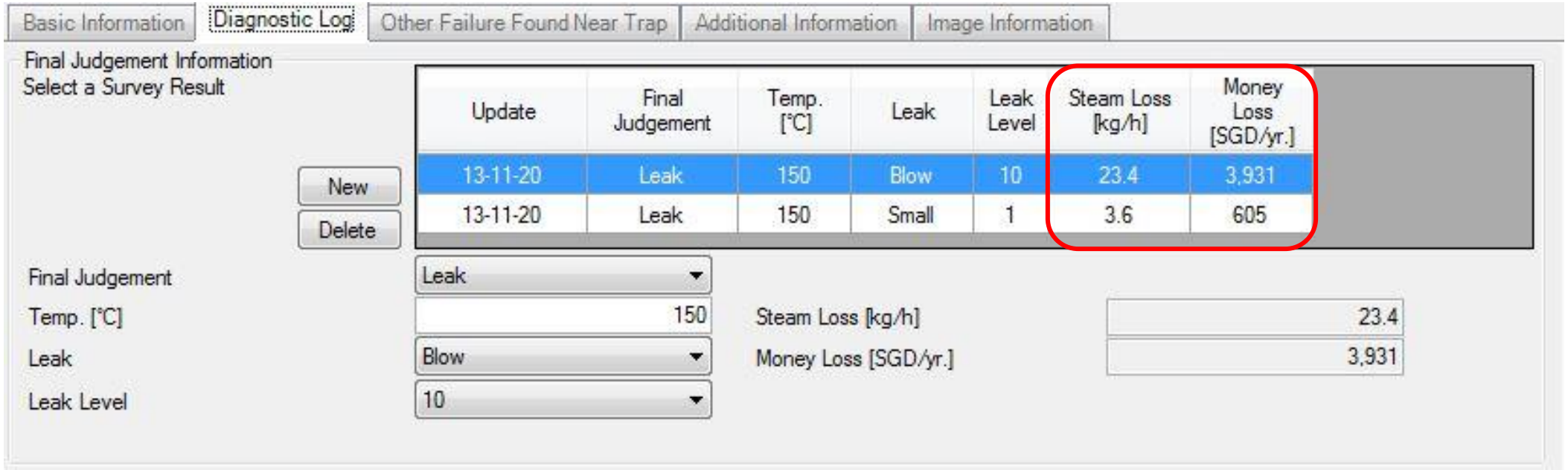


* Assuming 200 days / 12hrs operation

** Steam costs assumed to be S$75/ton

TECHMATIC CONTROLS

How much steam loss?



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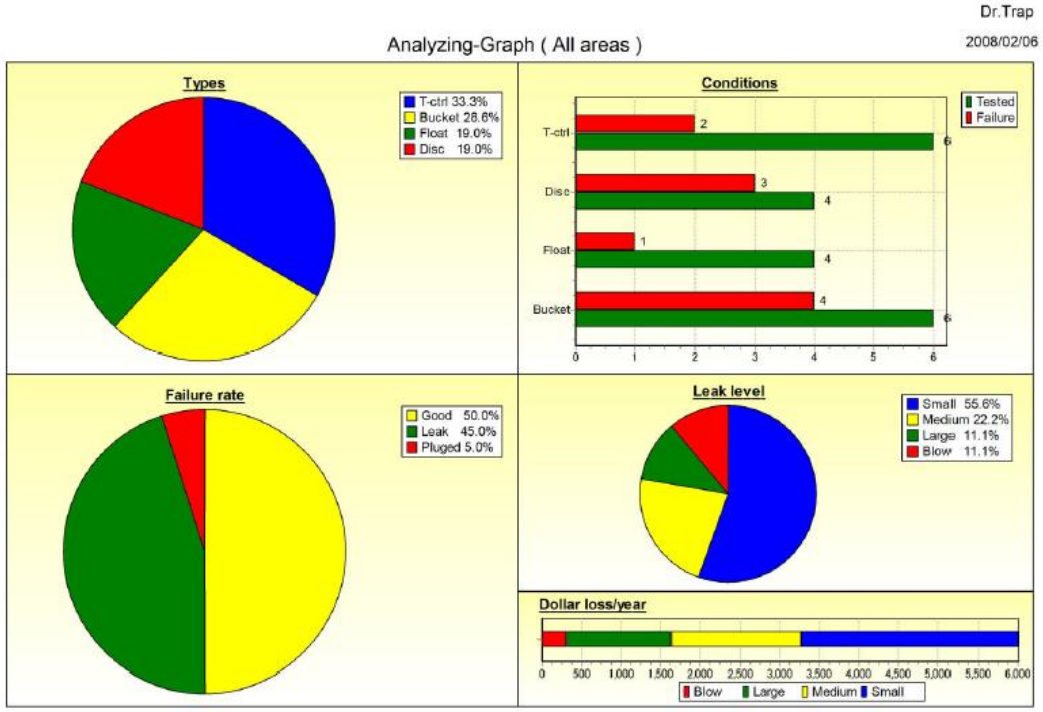
TECHMATIC CONTROLS

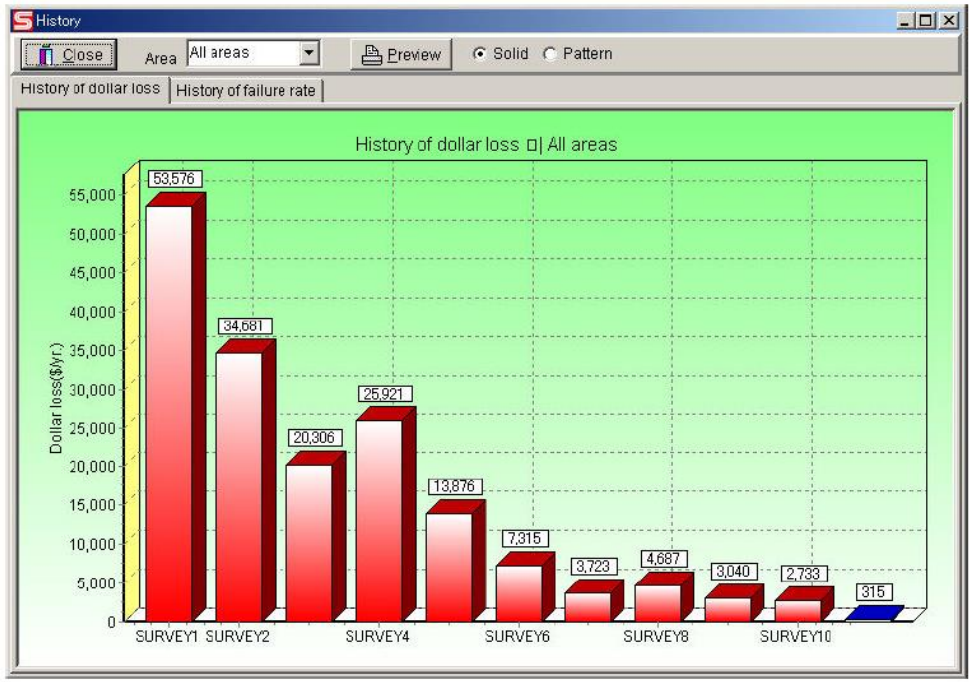
How much steam loss?

* Assuming 200 days / 12hrs operation
** Steam costs assumed to be S$75/ton

TECHMATIC CONTROLS

Steam Loss Analysis: Dr Trap





TECHMATIC CONTROLS

Steam Loss Analysis: Dr Trap

	2005	2006	2007	2008	2009
Amount of the bad Steam Trap	681	326	289	262	204
Percentage of the bad Steam Trap (%)	16.8	7.3	6.9	6.1	4.9
Steam Wastage (Ton/year)	16,796	2,993	2,461	1,418	1,508
Amount of loss (year)	¥25,221,000	¥4,554,000	¥3,937,000	¥2,218,000	¥2,316,000
CO2 emission (Ton-CO2/year)	3,201	570	471	270	288

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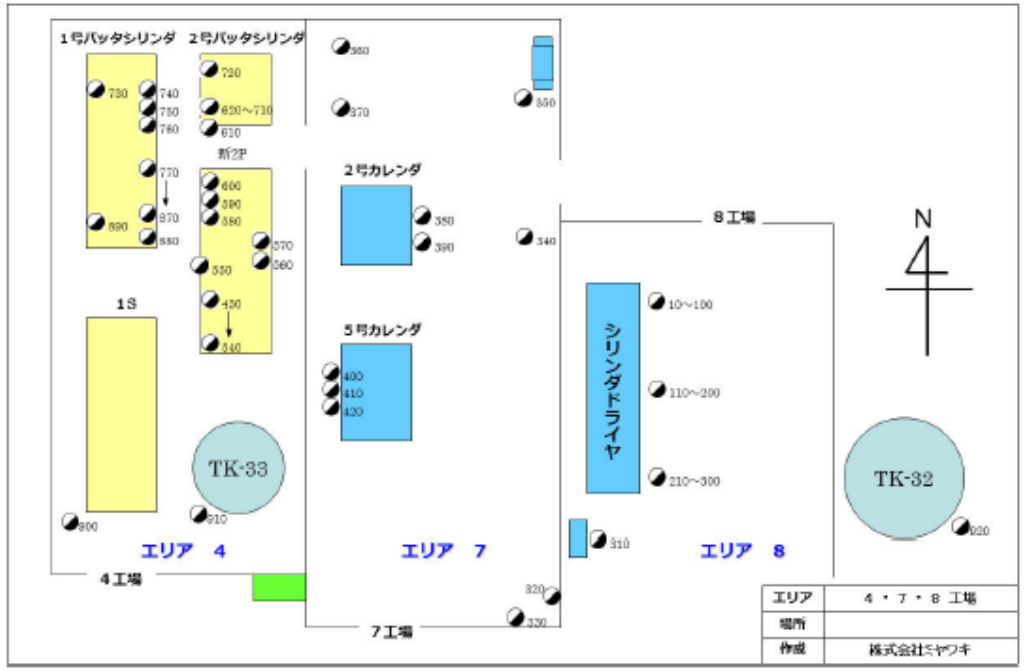
Maintain Steam Trap Database

Trap Layout Drawing



Steam Trap tag

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Maintain Steam Trap Database

Survey List - Survey List Name[Asia Pacific Breweries] Area[All] Event Name[Latest Information]

Main

Close (C) Save (S) — File

Print Preview; Save as Excel File; Select Display Items — Output

Filter; Advanced Filter; Filter Off; Short Term Failure [yrs] 2; Search — Filter

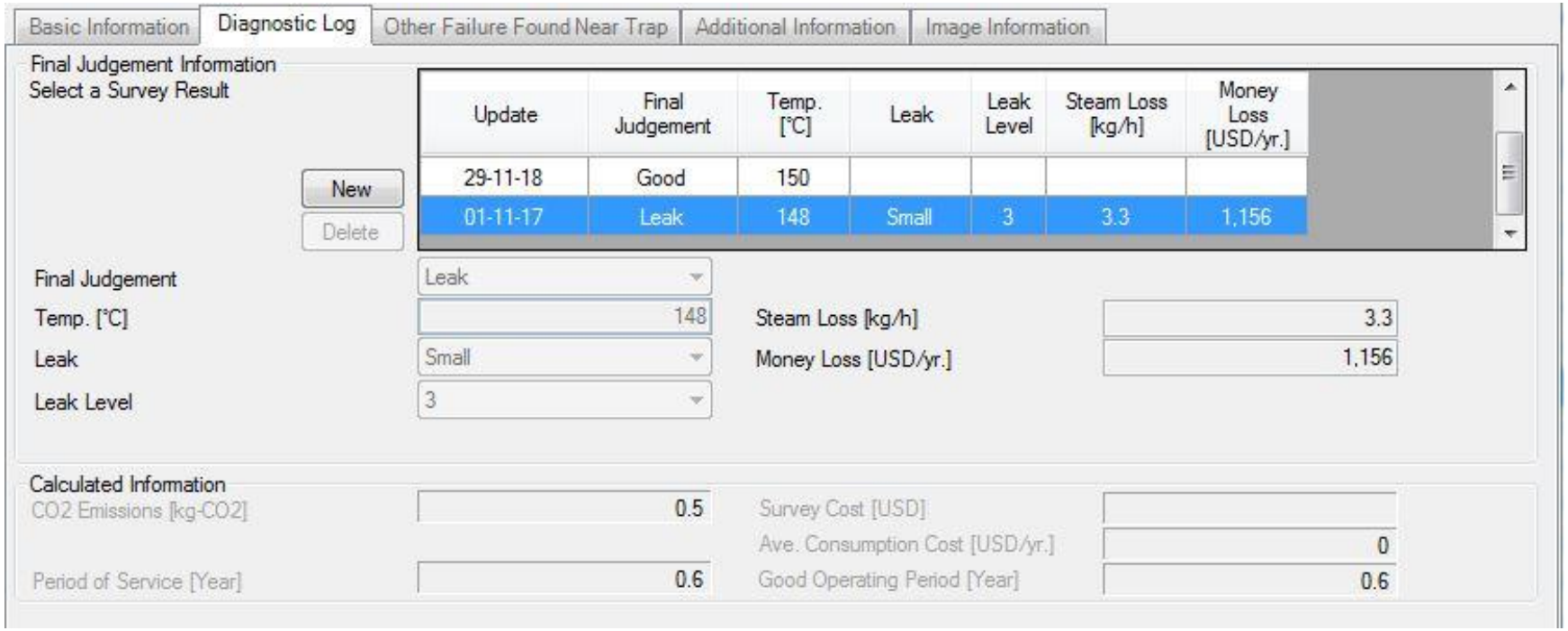
Show History None; Highlight None — View

Create New Event; Delete Event — Data Processing

Edit	Order	Area	Trap No.	Remarks	Location	Type	Name	Mfr.	Inlet Press. [barg]	Size [mm]	Connect.	Flange Std.	Set Temp. [°C]	Temp. [°C]	Final Judgement	Update	Map Name	Leak
Edit	1	APB	1	ST 15	Left of Tank near condensate co...	Float	FT43-10	SARCO	8.0	40	FLG			65	T-Low	29-11-18	1	
Edit	2	APB	2	ST 15.11.32	Near Heat Exchanger (85 degC T...	Float	UNA23AO13	GEST...	2.0	50	FLG			31	Plugged	29-11-18	1	
Edit	3	APB	3	ST 15.11.33	(Before Control Valve)	Disc	SU2NF	MIYA...	2.0	20	FLG			31	Plugged	29-11-18	1	
Edit	1	APB	4	ST 15.11.34	Horizontal Trap	T-ctrl	TB7NF	MIYA...		20	FLG	PN16	100		OOS	28-11-18	2	
Edit	2	APB	5	ST 15.11.35	(By Pass)Vertical	T-ctrl	TB7N	MIYA...		20	FLG		100		OOS	28-11-18	2	
Edit	3	APB	6	ST 15.12.32	Near Heat Exchanger (78 degC T...	Float	FT14-14	SARCO	4.0	25	FLG			77	Good	29-11-18	2	
Edit	4	APB	7	ST 15.12.33	(Near Control Valve)	T-ctrl	TB7F	MIYA...	8.0	20	FLG		100	148	Leak	29-11-18	2	Small
Edit	5	APB	8	ST 15.12.34 (gestra)	(By Pass)	Thermo	BK45	GEST...	8.0	20	FLG			104	Good	29-11-18	2	
Edit	6	APB	9	ST 04.11.35	Condensate Return(Front)	Float	UNA23AO13	GEST...	4.0	50	FLG			32	Plugged	29-11-18	2	
Edit	9	APB	10	ST 04.11.40	Condensate Return(Middle)	Float	UNA23AO13	GEST...	4.0	50	FLG			32	Plugged	29-11-18	2	

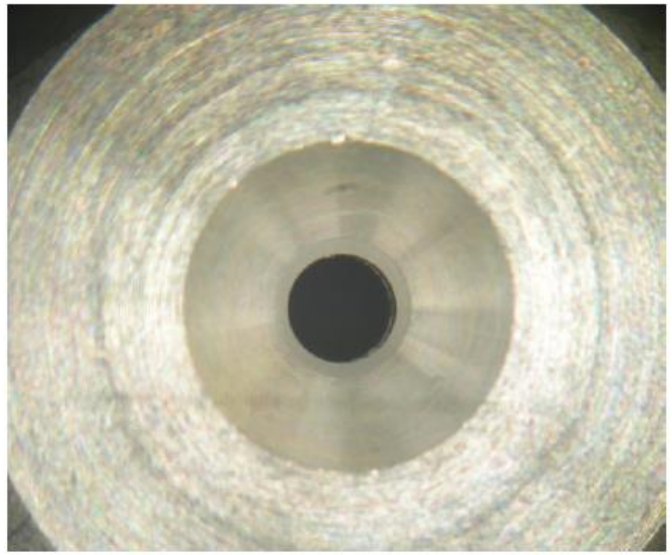
TECHMATIC CONTROLS

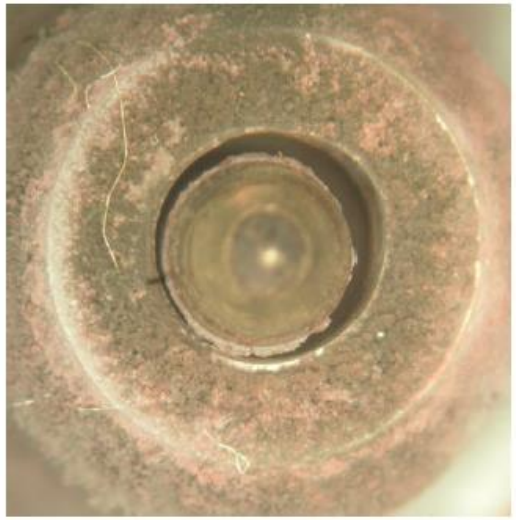
Maintain Steam Trap Database

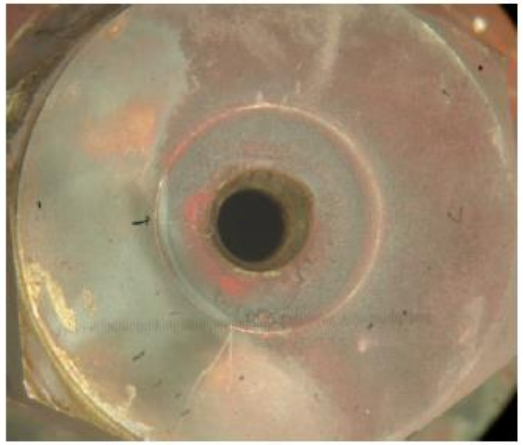


TECHMATIC CONTROLS

Photos







TECHMATIC CONTROLS

Ignatius Lim


MIYAWAKI
40A


572


END
Thank you for your attention
Any Questions ?