

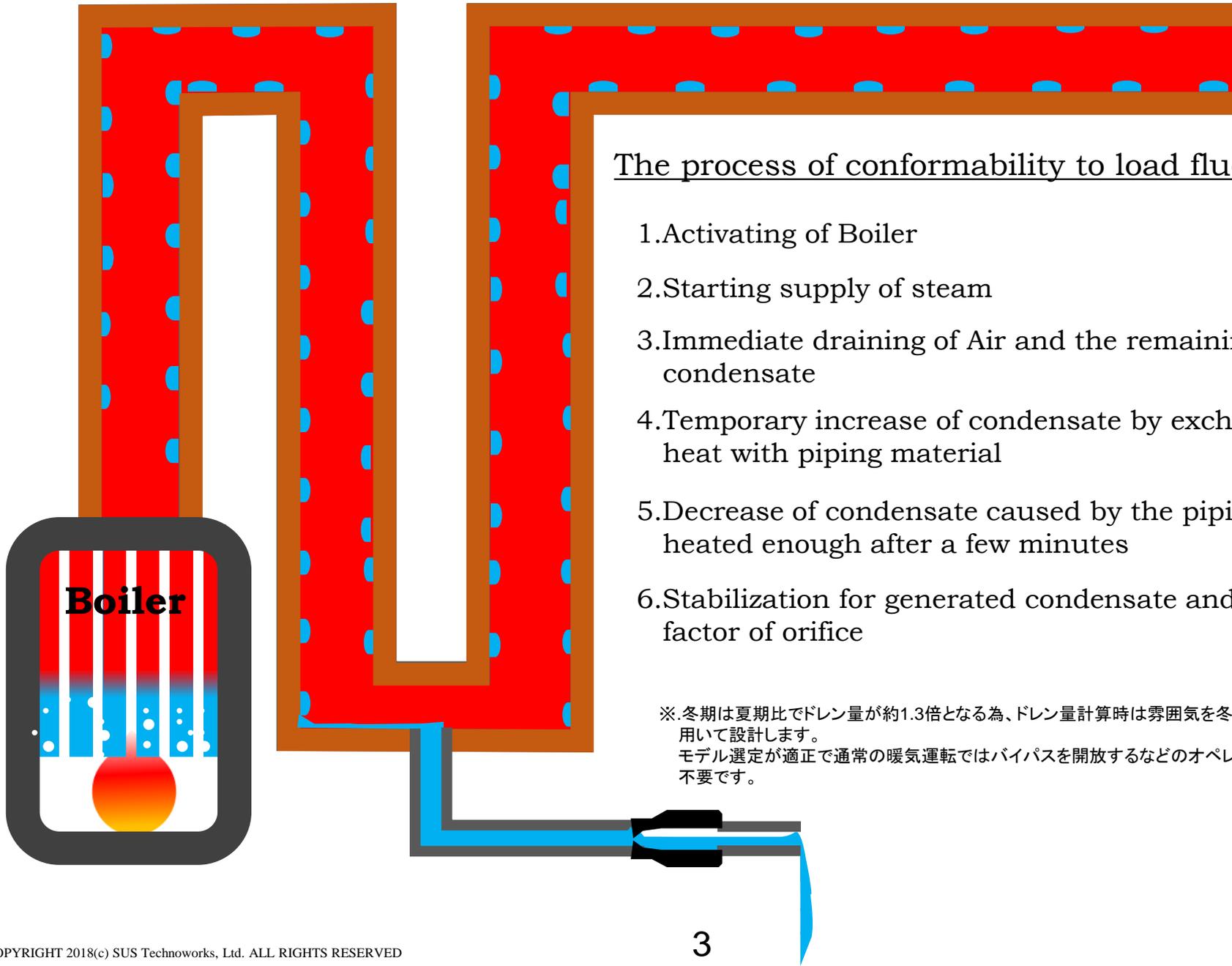
# *O-TRAP* Specification

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*Engineer Div.*

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# ① Conformability to Load Fluctuation in Steam Main Pipe

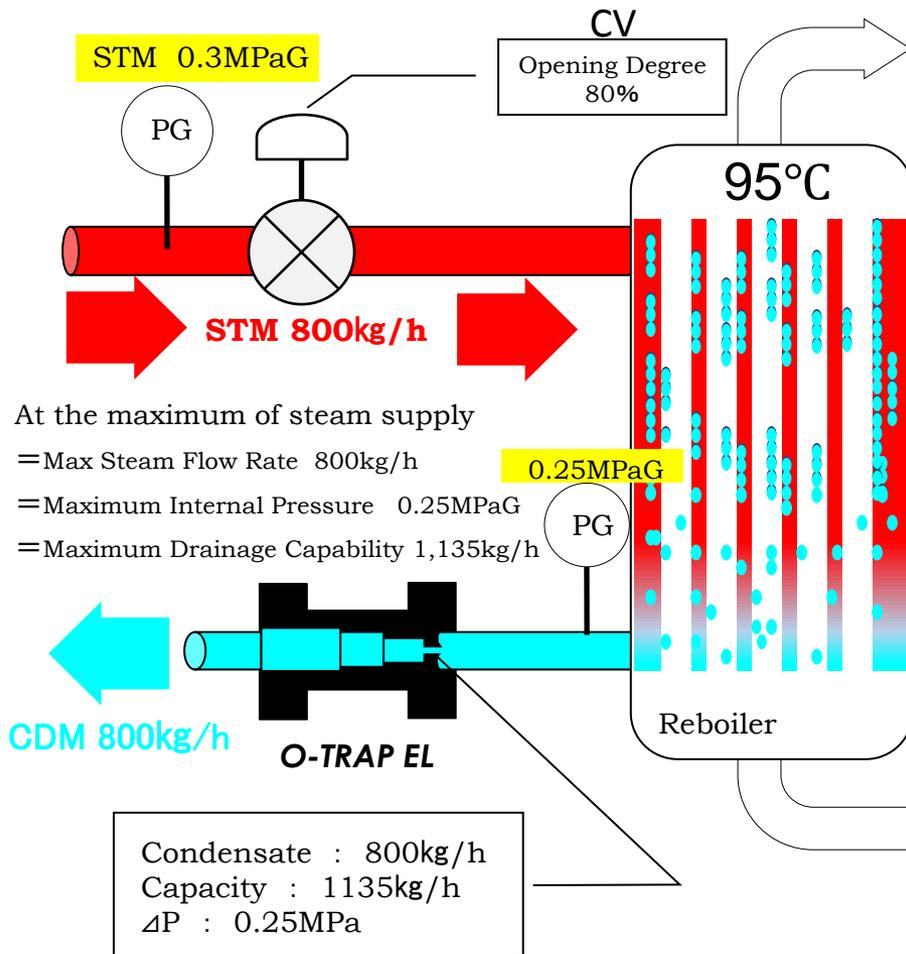


## The process of conformability to load fluctuation

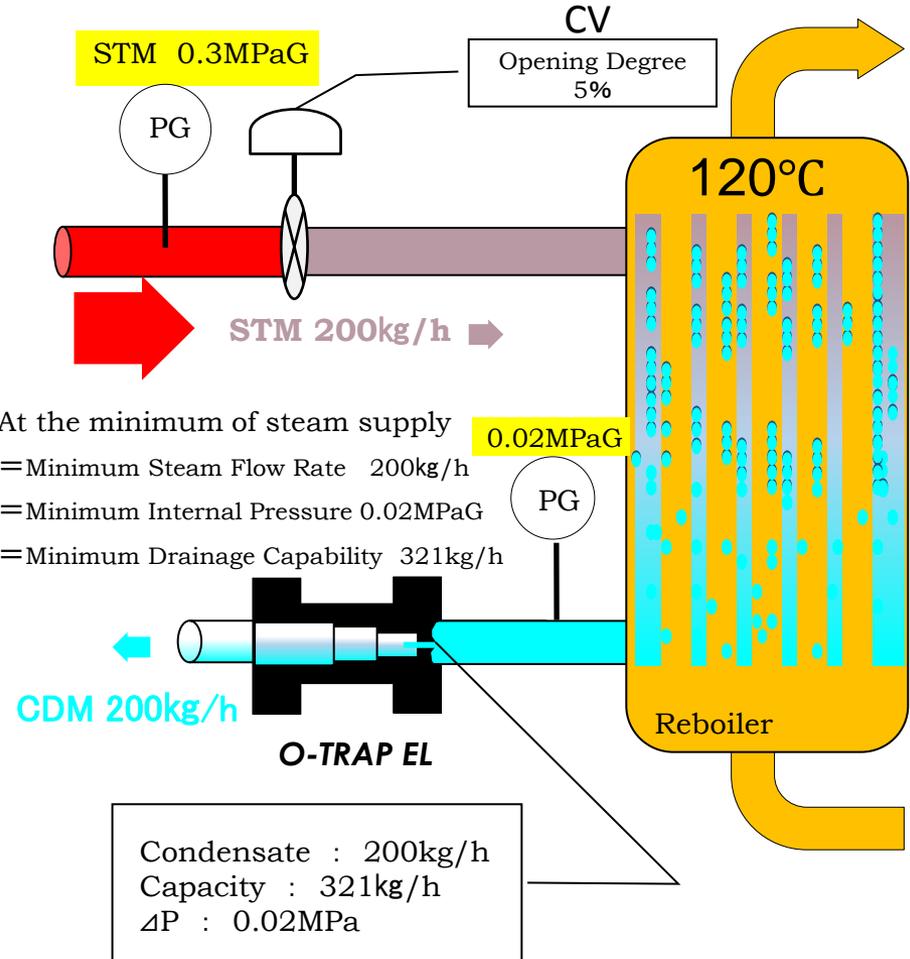
1. Activating of Boiler
2. Starting supply of steam
3. Immediate draining of Air and the remaining condensate
4. Temporary increase of condensate by exchanging heat with piping material
5. Decrease of condensate caused by the piping heated enough after a few minutes
6. Stabilization for generated condensate and the load factor of orifice

※冬期は夏期比でドレン量が約1.3倍となる為、ドレン量計算時は雰囲気を冬期最低気温を用いて設計します。  
モデル選定が適正で通常の暖気運転ではバイパスを開放するなどのオペレーションは不要です。

## ②-1 Conformability to Load Fluctuation in Heating Device



At the maximum of steam supply  
 =Max Steam Flow Rate 800kg/h  
 =Maximum Internal Pressure 0.25MPaG  
 =Maximum Drainage Capability 1,135kg/h



At the minimum of steam supply  
 =Minimum Steam Flow Rate 200kg/h  
 =Minimum Internal Pressure 0.02MPaG  
 =Minimum Drainage Capability 321kg/h

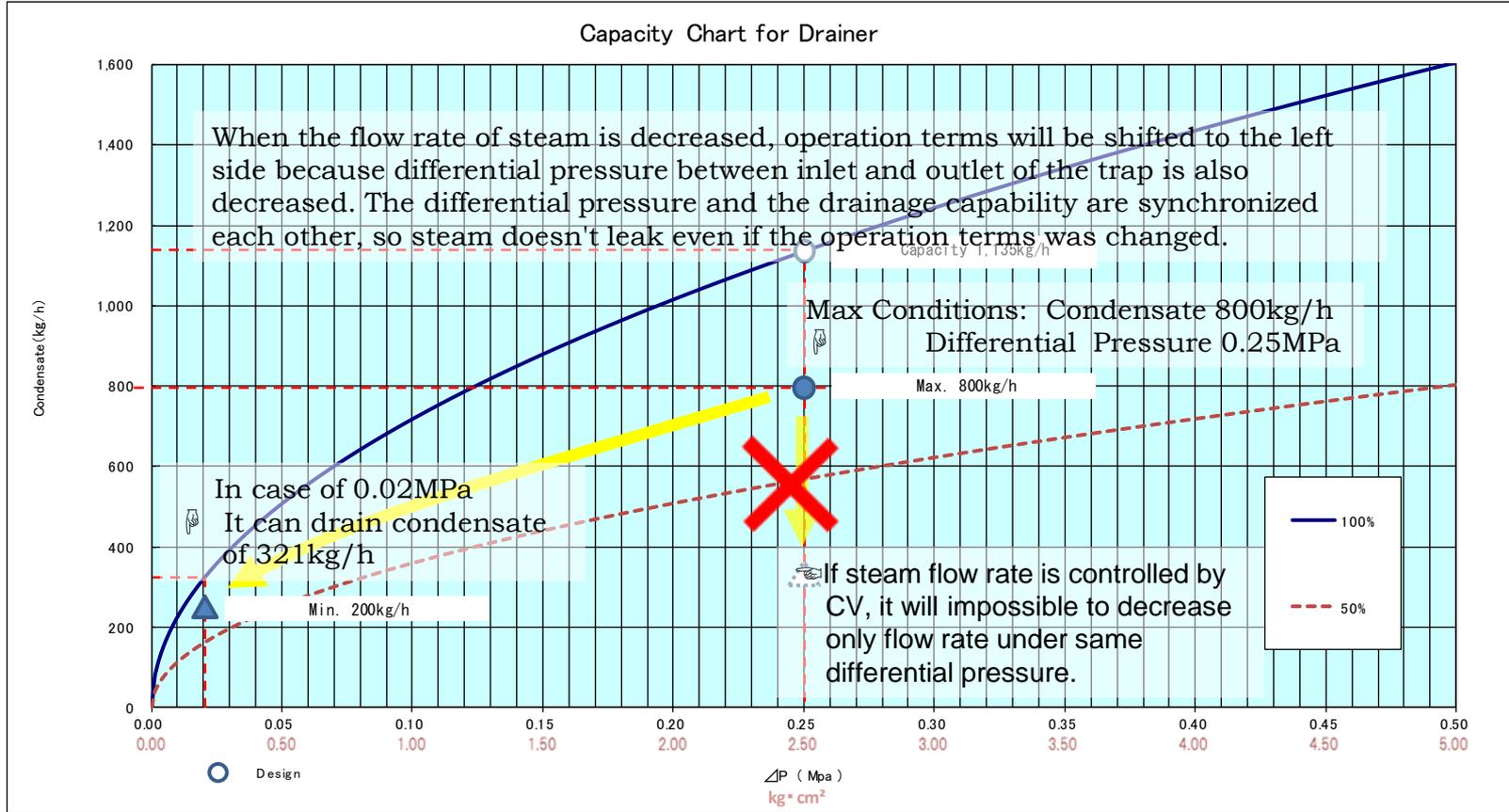
- ▶ When the temperature of material to be heated is raised, steam flow rate=condensate will be decreased because CV will be throttled to keep that temperature. Because internal pressure in the reboiler will be decreased at the same time, the drainage capability will also be decreased in accordance with that pressure.

## ②-2 The relation between Load Fluctuation and Capability of Condensate Drainage

Model	O-TRAP EL5
Delta Pressure	0.25MPa
Capacity	1,135kg/h
Orifice No.	3

図面 No.	O-TRAP EL5			
製品 No.	O-TRAP EL5			
TAG No.	E-165A			
Flange	JIS	10K	50A	RF

Design	Condensate	800.0 kg/h
	Pressure	0.25 MPa
	Back Press	0.00 MPa
	$\Delta P$	0.25 MPa



Above is capability chart of the orifice that installed to the heat exchanger which generates condensate by 800kg/h under differential pressure by 0.25MPa. If load factor decrease and supply of steam decrease to 200kg/h by throttling of CV and then differential pressure(0.05MPa) will decrease corresponding to the supply of steam and consequently load factor will be kept stable. That means that it is possible to operate stably without steam leaking or condensate staying by designing the orifice under the term of maximum steam and differential pressure.

### ③ The relation between Differential Pressure and Capability of Condensate Drainage

Condensate flow rate which pass through orifice will be decided based on the differential pressure and the diameter of the orifice.

If the differential pressure becomes 4 times, the drainage capability will be 2 times. (According to the Orifice Theory)

If the actual condensate flow rate becomes under half of the drainage capability, steam will be leaked because it will not be able to seal the orifice completely.

Therefore, if the fluctuation of differential pressure becomes beyond 4 times, suitable model will not be able to be selected on the orifice theory in the case of steam main pipe.

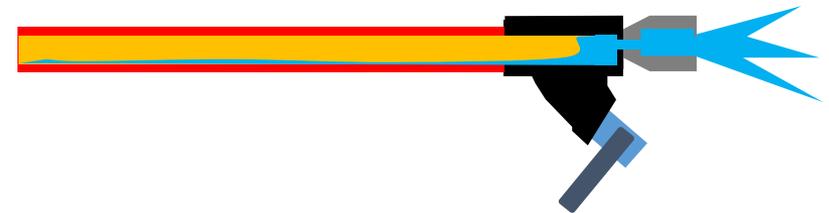
Inlet Pressure: 0.2 MPaG

Condensate Drainage Capability: 50kg/h

Actual Flow Rate: 25kg/h

Load Factor: 50%

Steam Flow Rate: 0kg/h



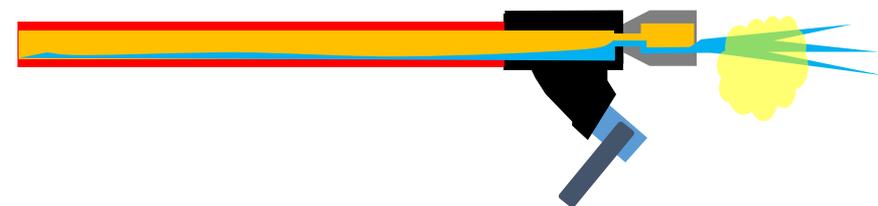
Inlet Pressure : 0.8 MPaG

Drainage Capability : 100kg/h

Actual Flow Rate : 25kg/h

Load Factor : 25%

Steam Flow Rate : 1~2kg/h (MAX7kg/h)



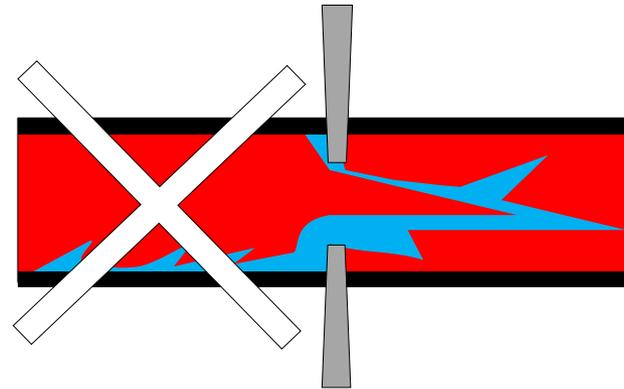
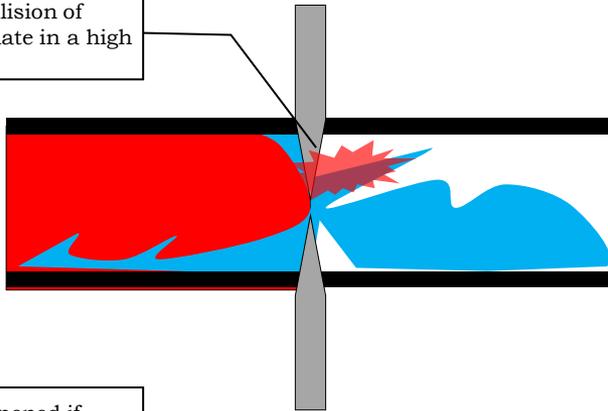
## ④ The erosion of Orifice

Orifice is generally called as hole provided in a flat plate.

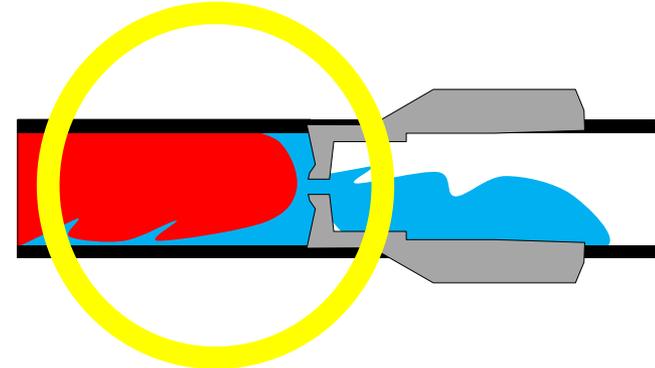
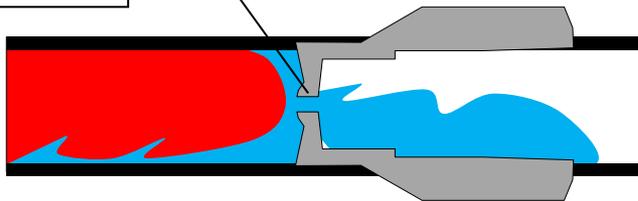
This aperture is so thin that erosion will be happened caused by condensate and flashed steam which pass through in a high speed.

On the other hand, the orifice of O-TRAP is made by tunnel structure and it will not happen erosion because only condensate pass through in a low speed.

Erosion happens by collision of condensate with thin plate in a high speed.



Erosion will not be happened if orifice is designed so that only condensate pass through in it.



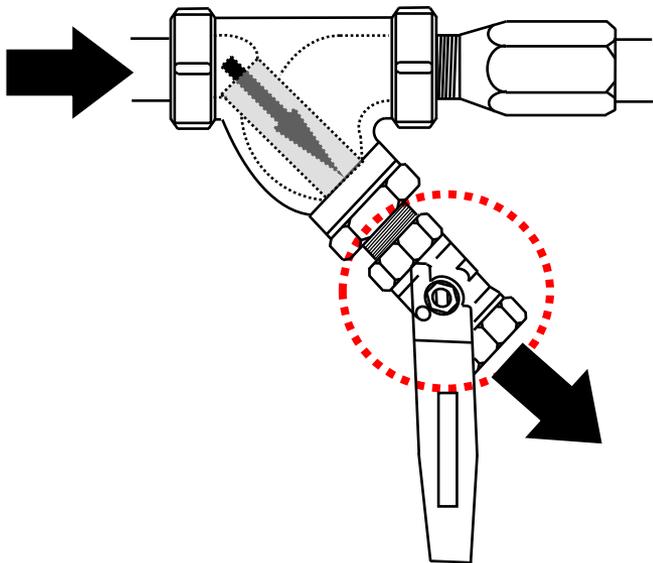
※In case the diameter of the O-TRAP model we selected is enlarged by the erosion within 3 years, we will replace new one free of charge.

## ⑤ Operational Notes : Avoid clogging immediately after replacement

Immediately after exchanging the traditional steam trap with O-TRAP, the strainer or the orifice may get clogged with something, a trap of the pipe end or steam header in particular. It is conceivable as a reason that the fixed scale will peel off and flow because condensate begin to drain continuously. Regarding traps installed at the end of steam pipe or header, you'd better remove scale by flashing for a few of ten seconds after installing as possible as you can to avoid this phenomenon.

- ① Immediately after exchanging with O-TRAP, drain condensate enough by opening ball valve.
- ② After supplying steam, do flashing for about 30 seconds by opening ball valve again. (please be careful not to burn yourself )。

If clogging happened immediately after replacing by any chance, you'd better do flashing again after a few months.





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