GOOD PRACTICES IN SME

Replacing condensate traps

Designed by freepik

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What are the effects of a poorly performing condensate trap on the installation?

Each condensate trap in a steam and condensate installation is naturally exposed to wear and damage. Sooner or later it will break down. This type of occurrence does not always produce an immediate effect in the form of an observable installation malfunction, and often remains almost unnoticed over year of operation. It is often the source of increasing heat loses due to condensate breaking through the condensate trap. Uncontrolled heat losses are not only one of the reasons for increasing production costs, constituting an obvious economic loss for the production plant. Additionally, condensate breaking through the condensate trap into the steam recovery installation can cause thermal water spikes or strong corrosion. Water spikes and corrosion are the most common causes of malfunction for condensate recovery installations. Malfunctioning condensate traps can also lead to undesired condensate build-up, which usually results in the incorrect defective course of technological processes and could be a source of defective products. For these reasons one of the basic tasks of ensuring correct operation of steam and condensate installations is controlling the condensate traps for correct operation.

Source: Krzysztof Szałucki „Metodyka kontroli poprawności pracy odwadniaczy z analizą wyników pod kątem ekonomicznej pracy systemu pary i kondensatu.”, 2014

Pic. 1 Krzysztof Szałucki: only steam breaks through the trap

Pic. 2 Krzystof Szałucki: partial condensate breakthrough through the trap

Pic. 3 Krzysztof Szałucki: condensate flows from the trap

What are the causes of condensate trap failures?

Of course, each mechanical device suffers from a malfunction after a given time – condensate traps are no exception. However, proper maintenance should improve the durability and reliability of the device and limit the cost of maintenance. There are three unfavourable conditions affecting condensate traps:

- Dirt is the main cause of malfunctions, causing leakage or blockage.
- Pressure spikes (caused by sudden opening of a valve, incorrect piping or application requirements/trap mismatch) can lead to water spikes and the damage of the internal components of the condensate separator.
- Oversized IB (inverted bucket) condensate traps can fail to fulfil their basic function. TD (thermodynamic) traps can experience sudden cycles.

Source: Bruce Gorelick „Zapobieganie awariom odwadniaczy", 2010

How to control proper trap operation?

Methods of controlling proper condensate trap operation include:

– visual method using a viewfinder built up-stream from the trap,

– method based on conduction/medium level detection combined with temperature readings,

– ultrasound method combined with temperature readings.

Other methods including observing the output of the trap and temperature readings alone or thermography are imperfect, and their application should be limited.

Source: Krzysztof Szałucki „Metodyka kontroli poprawności pracy odwadniaczy z analizą wyników pod kątem ekonomicznej pracy systemu pary i kondensatu.", 2014

Pic. 4 Krzysztof Szałucki: ultrasounds used to control a trap

How much could be saved if replacing pierced traps if steam is generated by a natural gas boiler?

The estimated annual savings, which can be achieved by replacing pierced traps, if steam is produced in a gas boiler under the following assumptions:

- Boiler efficiency 90%
- Calorific value of the fuel $33{,}5\ [\frac{MJ}{m^3}]$
- Fuel cost $1{,}30\ [\frac{PLN}{m^3}]$

	Number of pierced traps [units]							
Continuous work hours annually [h/year]	5	10	15	20	25	30	35	40
2 000	3 234 PLN	6 468 PLN	9 701 PLN	12 935 PLN	16 169 PLN	19 403 PLN	22 637 PLN	25 871 PLN
2 500	4 042 PLN	8 085 PLN	12 127 PLN	16 169 PLN	20 211 PLN	24 254 PLN	28 296 PLN	32 338 PLN
3 000	4 851 PLN	9 701 PLN	14 552 PLN	19 403 PLN	24 254 PLN	29 104 PLN	33 955 PLN	38 806 PLN
3 500	5 659 PLN	11 318 PLN	16 978 PLN	22 637 PLN	28 296 PLN	33 955 PLN	39 614 PLN	45 274 PLN
4 000	6 468 PLN	12 935 PLN	19 403 PLN	25 871 PLN	32 338 PLN	38 806 PLN	45 274 PLN	51 741 PLN
4 500	7 276 PLN	14 552 PLN	21 828 PLN	29 104 PLN	36 381 PLN	43 657 PLN	50 933 PLN	58 209 PLN
5 000	8 085 PLN	16 169 PLN	24 254 PLN	32 338 PLN	40 423 PLN	48 507 PLN	56 592 PLN	64 677 PLN
5 500	8 893 PLN	17 786 PLN	26 679 PLN	35 572 PLN	44 465 PLN	53 358 PLN	62 251 PLN	71 144 PLN
6 000	9 701 PLN	19 403 PLN	29 104 PLN	38 806 PLN	48 507 PLN	58 209 PLN	67 910 PLN	77 612 PLN
6 500	10 510 PLN	21 020 PLN	31 530 PLN	42 040 PLN	52 550 PLN	63 060 PLN	73 570 PLN	84 080 PLN
7 000	11 318 PLN	22 637 PLN	33 955 PLN	45 274 PLN	56 592 PLN	67 910 PLN	79 229 PLN	90 547 PLN
7 500	12 127 PLN	24 254 PLN	36 381 PLN	48 507 PLN	60 634 PLN	72 761 PLN	84 888 PLN	97 015 PLN
8 000	12 935 PLN	25 871 PLN	38 806 PLN	51 741 PLN	64 677 PLN	77 612 PLN	90 547 PLN	103 483 PLN

Source: KAPE