Tunstall®
Established 1958, Member Fluid Controls Institute

Tunstall Corporation
118 Exchange Street
Chicopee, MA 01013
Phone: 800-423-5578
Fax: 413-598-8109

October 2015

Steam Trap Repair?

The following facts, formulas and examples can be used to determine the cost effectiveness of repairing thermostatic steam traps.

1. It takes approximately one lb of steam to generate 1,000 BTU's

2. The energy content of one gallon of #6 fuel oil = 149,700 BTU's with a combustion efficiency of 86.1% (U.S. Dept. of Energy, Office of Industrial Technologies).

3. With #6 oil at $1.30/gallon then:

   $$\frac{\textit{1.30 (\$/gallon)}}{\textit{149,700 (BTU/gallon)}} \quad X \quad \textit{1000 (BTU/lb) X .861 (efficiency)} = \textbf{\textit{\$0.0075 per lb}}$$

   Therefore the cost of steam is $0.0075/lb or $7.50/1000 lbs

4. Steam trap hours of use per year:

heat season	*X*	*hours per day*	
120 days		*12*	*= 1440 hrs*

5. Steam loss thru a typical thermostatic trap with a 0.312" (5/16") orifice at 5 psig and 50% blocked (based on a variant of the Napier formula, as follows) = 23.3 lbs/hr

   Steam flow (to atmosphere) in lbs/hr:

24.24	*X*	*pressure in psi absolute*	*X*	*diameter of orifice squared*	*X*	*50%*	
24.24	*X*	*(5 + 14.7)*	*X*	*(.312)(.312)*	*X*	*.50*	*= 23.3 lbs/hr*

6. Therefore, in one heating season, one trap 50% blocked translates into an effective steam loss cost of approximately $250.00 per trap.

steam loss/hr	*X*	*heating season*	*X*	*cost of steam per lb*
23.3 lbs/hr	*X*	*1440 hrs*	*X*	*$0.0075 per lb = $250.00 per season per trap*

Payback example:

a. Cost to repair 100 steam traps:

Tunstall capsule cost	+	*Labor (15 minutes)*	*X*	*# of traps*		
$30.00		*$10.00*		*100*	=	*$4000.00*

b. Break even point:

Cost to repair one trap	÷	*Cost to allow one trap leak steam*		
$40.00		*$250.00*	≈	*0.16 (16%)*

c. Cost to allow 16 bad traps (16% of system) leak steam

Number of bad traps	*X*	*Dollar loss per trap*		
16		*$250.00*	=	*$4000.00*

It costs approximately the same to repair all 100 traps as it does to let 16% blow thru.

Therefore, it is cost effective to repair <u>ALL</u> of your traps even if 84 out of 100 are working properly.

This payback example illustrates your first year costs vs. savings. These savings accumulate in subsequent years at a rate of $250.00 per failed trap, per year (see below). Keep in mind, your savings will vary up or down depending on steam pressure, hours of use, orifice size and cost of fuel.

Fill in the following formula to determine your break-even % and subsequent annual savings:

Formula #1:	$30.00 (avg Tunstall capsule cost)	+	$10.00 (labor cost per trap)				=	$40.00 (cost to repair one trap)
Formula #2:	0.0075 ($ cost per lb. of steam)	X	1440 (hours of use per year)	X	23.3 (steam loss in lbs per hour)	=	$250.00 ($ lost per year per trap)
Formula #3:	$40.00 (Formula #1)	÷	$250.00 (Formula #2)			=	16% (Breakeven ratio)
Formula #4:	$250 (Formula #2)	X	16% (Formula #3)	X	100 (total # traps)	=	$4000.00 (Subsequent annual savings)