Quantify and Eliminate Steam Leaks

A steam distribution system must be properly maintained to minimize operating costs. Steam leaks are a significant and highly visible waste of energy. Steam leaks are often found at valve stems, unions, pressure regulators, equipment connection flanges, and pipe joints. In a 150 pound-per-square-inch-gauge (psig) steam system with a steam production cost of $4.50 per 1000 pounds, a leak through a hole only 1/32nd of an inch in diameter---no larger than the tip of a ball point pen---can increase operating costs by $185 per year.

The "plume length" method can be used to estimate the energy loss due to a steam leak. Determine the leak’s plume length by estimating the length of the approximate distance at which water condenses out of the steam. This is usually beyond the visible plume. As indicated in the table, the plume length, in conjunction with steam pressure and ambient temperature information, indicates the steam loss, in pounds per hour (lb/hr).

**Example**

A survey of a plant’s 115 psig steam distribution system reveals a steam leak at an equipment connection flange. The plume length is estimated at 3 ft. At an ambient temperature of 75°F, what is the annual cost penalty associated with not fixing the leak?

From the table, the steam loss is 30 lbs/hr. Assuming continuous operation with a steam production cost of $4.50/1000 lbs, the annual operating cost penalty due to the leak is:

\[
\text{Annual cost increase} = 30 \text{ lbs/hr} \times 8760 \text{ hrs/yr} \times \frac{4.50}{1000} \text{ lbs} = 1182
\]

**Suggested Actions**

Conduct periodic steam leak surveys. Identified leaks should be repaired as soon as possible. Steam leaks don’t get smaller, and neither does the cost of fixing them. Steam leaks can also pose significant safety hazards.
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