## Conduct a Steam Leak Survey

An ultrasonic detector can identify the location of even the smallest steam leaks. Ultrasonic detectors are effective even when background noise levels are high and thick insulation is present. Tag all identified leaks.

## Repair Leaks and Begin Saving

Determine which steam leaks can be repaired by your plant maintenance staff and which should be repaired by service technicians while your steam distribution system is on-line and under pressure.

*Adapted from an Energy TIPS fact sheet that was originally published by the Industrial Energy Extension Service of Georgia Tech. For additional information on industrial energy efficiency measures, contact the Information Clearinghouse at (800) 862-2086.*

# 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).

**Steam Losses Due to Leaks***

| Pressure**, psig | Plume Length, feet | Steam Loss, lb/hr Ambient Temperature, °F | | |
|---|---|---|---|---|
| | | 45 | 75 | 90 |
| 115 | 3 | 10 | 30 | 50 |
| | 6 | 30 | 170 | 280 |
| | 9 | 70 | 420 | 700 |
| | 12 | 110 | 650 | 1,100 |
| 415 | 3 | 20 | 35 | 50 |
| | 6 | 50 | 170 | 290 |
| | 9 | 130 | 500 | 800 |
| | 12 | 220 | 870 | 1,400 |

* Extracted from the *Energy Efficiency Handbook*, published by the Alliance to Save Energy, Council of Industrial Boiler Owners, and the U.S. Department of Energy, January 1998.
** Data unavailable for higher pressures. But note that higher pressures would imply significantly higher steam losses and pose significantly higher safety hazards.

## 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:

**Annual cost increase = 30 lbs/hr x 8760 hrs/yr x $4.50/1000 lbs = $1,182**

### *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.

# About DOE's Office of Industrial Technologies

The Office of Industrial Technologies (OIT), through partnerships with industry, government, and non-governmental organizations, develops and delivers advanced energy efficiency, renewable energy, and pollution prevention technologies for industrial applications. OIT is part of the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy.

OIT encourages industry-wide efforts to boost resource productivity through a strategy called Industries of the Future (IOF). IOF focuses on the following nine energy and resource intensive industries:

| | | | | |
|---|---|---|---|---|
| Agriculture | Chemicals | Glass | Mining | Steel |
| Aluminum | Forest Products | Metal Casting | Petroleum | |

To help industries begin to save energy, reduce costs, and cut pollution right away, OIT offers a comprehensive portfolio of emerging technology, practices, tools, information, and resources in a variety of application areas, such as, motor systems steam systems, compressed air systems, and combined heat and power systems. Likewise, OIT's Industrial Assessment Centers (IAC), located throughout the U.S., offer energy, waste, and productivity assessments to small and medium-sized manufacturers. Users can take advantage of the abundant resources, such as software, fact sheets, training materials, etc. available from OIT.

**Motor Systems** — helps industry increase productivity and reliability through energy-efficient electric motor-driven systems.

**Documents -**

- ☐ Buying an Energy-Efficient Electric Motor
- ☐ Optimizing Your Motor-Driven System
- ☐ Frequently Asked Questions on: The Impacts of the Energy Policy Act of 1992 on Industrial End Users of Electric Motor-Driven Systems
- ☐ Energy Management for Motor Driven Systems
- ☐ Improving Pumping System Performance: A Sourcebook for Industry

**Software –**

- ☐ MotorMaster+ 3.0 and training CD
- ☐ ASDMaster
- ☐ Pumping System Assessment Tool

**Training –**

- ☐ MotorMaster+ 3.0 Software
- ☐ Adjustable Speed Drive Application
- ☐ Pumping System Optimization
- ☐ Pumping System Assessment Tool

Access the Web site at ***www.motor.doe.gov***.

**Steam Systems** — helps industry enhance productivity, increase profits, and reduce emissions through better steam system management.

**Documents –**

- ☐ Energy Efficiency Handbook
- ☐ Plant Services Article - *The Steam Challenge*
- ☐ Energy Manager Article - *Steaming Ahead*
- ☐ Oak Ridge National Laboratory's Insulation Guidelines
- ☐ 1998 IETC Steam Session Papers

**Case Studies –**

- ☐ Georgia Pacific Achieves 6-Month Payback
- ☐ Bethlehem Steel Showcase Demonstration

**Software –**

- ☐ 3EPlus Software for Determining Optimal Insulation Thickness

Access the Web site at ***www.oit.doe.gov/steam***.

**Compressed Air Systems** — dedicated to improving the efficiency and performance of industrial compressed air systems.

**Documents –**

- ☐ Improving Compressed Air System Performance: A Sourcebook for Industry

**Training –**

- ☐ Fundamentals of Compressed Air Systems (For schedule and location, call (800) 862-2086)

Access the Web site at ***www.knowpressure.org***.

**Industrial Assessment Centers** — enable small and medium-sized manufacturers to have comprehensive industrial assessments performed at no cost to the manufacturer.

**Documents –**

- ☐ IAC Database

Access the Web site at ***www.oit.doe.gov/iac***.

**For more information, simply check the box next to the product, fill out the form below and fax back to (360) 586-8303:**

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**For more information on Motor, Steam, Compressed Air Systems, and IACs, call the Information Clearinghouse at (800) 862-2086.**
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