

Industry Host: Con Edison

Problem Title: Steam trap failures in customer buildings

Challenge:

Reduce the potential for damages from steam trap failures in customer buildings.

Background:

The underground distribution piping in the Con Edison steam system transports steam from the steam boiler plants to customer buildings to provide energy for producing heat, domestic hot water and, in some cases, air conditioning. Condensation occurs in the piping system as steam flows and loses heat to the environment. The piping network inside customer buildings is typically sloped to a common header or a low point (“drip leg”) to provide drainage of the condensed steam (“condensate”) by gravity. The condensate accumulates at the lowest points in the system. The number of low points in customer buildings varies depending on the extent of the piping. In some cases the low points can be more than a hundred feet apart. If the condensate accumulates to significant amounts and cools down several degrees below the saturation temperature, water hammer can potentially occur in the steam pipe. Two major events occurred in the past that resulted in very powerful and extremely dangerous steam release when the steam pipe ruptured. An event of this magnitude can result in loss of life and significant property damage. The cost of restoration is in the millions to the Company.

To minimize condensate accumulation, thermodynamic steam traps are installed at all low points in the system. Steam traps remove the condensate to prevent water hammer from occurring. Steam traps are designed to fail in the open position to allow for condensate to continuously drain out of the main from the low points. In addition, steam traps can become ineffective if fail in the closed position, thereby allowing the condensate to accumulate at the low points. Steam traps are inspected monthly by Con Edison Steam Distribution personnel. During the inspections steam traps are tested for functionality. Currently, traps are identified failed or ineffective during inspections.

Boundaries & Considerations:

- We have about 5000 steam traps installed in customer buildings and about 1600 steam traps in manholes under the streets of Manhattan from the southern tip up to 96 St on the west side and 86 St on the east side.
- Solution should be cost effective
- Customer building traps are tested on a monthly basis when the meters are read. Street traps are tested every other month.
- Traps can fail in a closed position (“cold trap”) or in an open one (“blowing trap”).
- The steam system is designed to operate at 200 PSIG pressure and 413°F. The ambient temperature in the room can be as high as 150 °F.
- A solution could be battery powered or powered by an 120 VAC source.