



*Department of Environmental Affairs and Development Planning*

# INSULATING STEAM CONDENSATE PIPES, VALVES AND FLANGES

## FACT SHEET

Steam is used for several purposes in industry such as: heating raw materials, treating semi-finished products and producing energy as well as providing as an energy source for equipment directly. Often the steam generated is transported through un-insulated piping, valves and flanges through which tremendous heat (or energy) losses occur by means of radiation or conduction. Unfortunately steam is not free and is expensive to produce. Thermal insulation can produce great savings in energy by reducing heat loss.

### **WHY implement?**

Un-insulated pipes and flanges could result in various losses, which include:

- Temperature stress at flanges because of bare (un-insulated) flanges on hot insulated pipes, which as a result may cause leaks.
- Heat loss from un-insulated valves and flanges, which is equivalent to a 1m and ½m same size un-insulated pipe respectively (to view yearly heat loss from un-insulated and insulated steam pipes, visit the [Engineering Tool Box](#) web page).

Insulating piping valves and flanges in a company renders:

- A reduction in typical energy loss of up to 90% and contributes to having proper steam pressure at equipment within the plant.
- A reduced risk of burns by insulating hot surfaces, which also contributes to making the work place safer and more comfortable.

Easily removable insulation jackets for valves and flanges (for more information visit the [Power Plus International](#) website) provide easy and quick access and allow for fully operational valves.

### **HOW to implement?**

Conduct an audit on your steam distribution and condensate return system by: determining the size of piping and number of valves and flanges that's need to be insulated, as well as the thickness and type of insulation required (to view recommended minimum thickness of insulation visit the [Engineering Tool Box](#) web page).

## WHAT is required to implement?

Staff that are well acquainted with the situation of the distribution lines are needed to measure and determine the size and lengths of piping and valves that need to be insulated. Capital investment for acquiring and installing insulation.

### Example

A 50 meter length, 100mm diameter pipe carrying steam at 7 bar with a temperature of 170 °C is exposed as it passes from one building to the other. The ambient temperature is 10°C. Without insulation the radiant losses will account for 62,578W of energy loss or a consumption of 110kg/hr of steam to maintain the steam pipe temperature at 170°C. However, with 100mm insulation the energy loss falls to 2245W, or 4kg/hr of steam consumed; a saving of 106kg/hr, which for a typical factory approximates to R45/tonne of steam or R10 732 per annum based upon a 5 day working week of 10 hours per day.

- Insulation optimisation software is freely available for determining: the economic, environmental and energy impact of insulation. To view, visit the [pipeinsulation](#) web page.
- For more information on boiler efficiency visit the [cleaver-brooks](#) web page.

### Sources and Useful Links:

- Energy Star: <http://www.energystar.gov/ia/business/industry/insulate.pdf>
- SEMA newsletter: <http://www.sema.uct.ac.za/ReadMore/SEMA%20NEWSLETTER%20JULY%202004.pdf>
- Engineering Tool Box (yearly heat loss): [http://www.engineeringtoolbox.com/heat-loss-steam-pipes-28\\_257.html](http://www.engineeringtoolbox.com/heat-loss-steam-pipes-28_257.html)
- Power Plus International: <http://www.boilersupplies.com/insultech/>
- Engineering Tool Box (insulation thickness): [http://www.engineeringtoolbox.com/pipes-insulation-thickness-4\\_16.html](http://www.engineeringtoolbox.com/pipes-insulation-thickness-4_16.html)
- Pipe insulation: <http://www.pipeinsulation.org/>
- Cleaver-brooks: <http://www.cleaver-brooks.com/efficiency0.html>

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The entire range of fact sheets can be found by visiting the [www.capegateway.gov.za](http://www.capegateway.gov.za) web page.