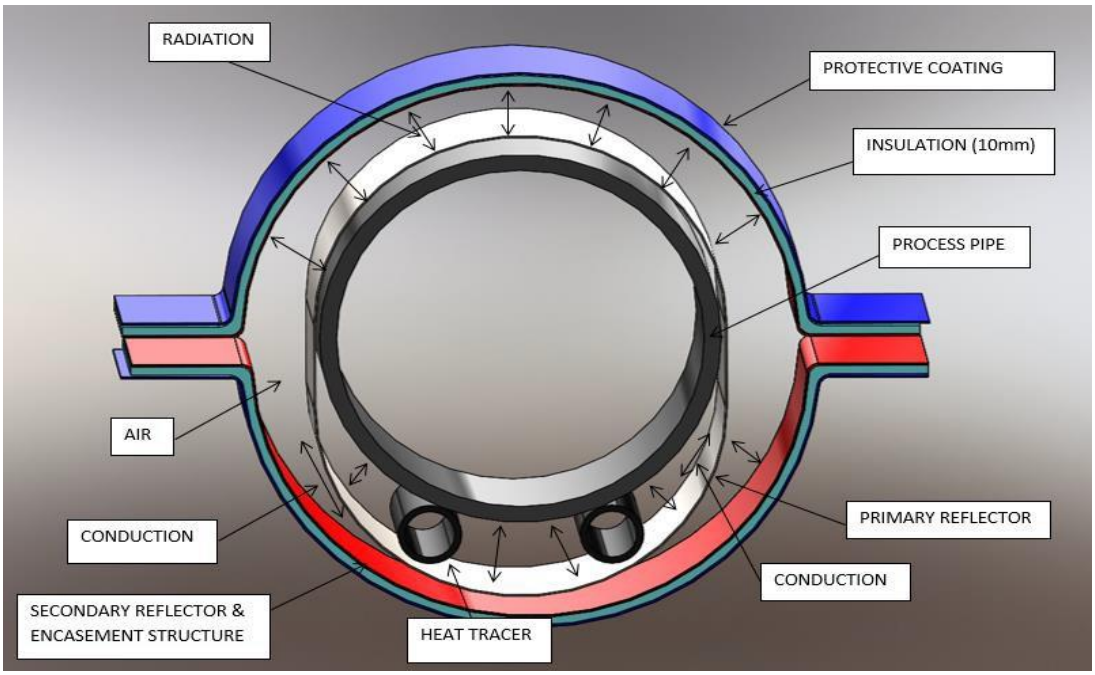
Reflective Insulation System

The advantages of the new method of pipe heating is an extremely easy approach to resolving major issues in any process plant.

Obviously, the overall best method is to use full jacketed systems. However, there are some disadvantages to the full jacketing such as:

- Cost per linear foot
- time to fabricate
- Installation time be taken into consideration

Should the inner core develop a leak, the resulting steam that leaks into the process system creates corrosion and blockage. It is virtually impossible to find the leak in the system due to the design.



This new method results in the following advantages:

- Low cost per linear foot
- Most work can be done by local personnel (standard steam traces can be done by anyone)
- Wrapping of the SOS provided aluminum sheeting can be done by anyone
- The SNAP-ON insulation cover can be done by anyone

The SNAP-On insulation system is simple and can be taken off and snapped back into place without damaging the insulation. This result in NO damage to insulation, which is unlike taking off calcium silicate and then rebuilding the calcium silicate and re-sheathing.

Reflective Insulation System

Subject: Description and Test Results for Reflective Insulation System

Objective: To define and prove the capabilities of the new system in re-melting solidified sulfur.

Assembly of Insulation System:

1. A reflective aluminum foil is wrapped around the 4" pipe with two or more ¾" pipe steam tracers. The foil can be one wrap of standard household aluminum foil, the greater thicknesses or multiple wraps.
2. An aluminum shell surrounds the pipe/tracers/foil – with a minimum ¾" air gap.
3. The outside of the shell has insulation. The first layer of Aerogel is glued to the shell, and subsequent layers can be glued to the inside layer depending on the conditions of the particular application.
4. A protective coating is applied to the outside of the insulation.

Theory on New Insulation System

With the steam flowing through the tracers, the aluminum foil reflects the thermal radiation emanating from the tracers to the pipe. The foil conducts some heat around the pipe. The inside of the shell also reflects thermal radiation inward to the foil.

Results

On May 2 2014, with room temperature (solid) sulfur in the pipe, the steam generator produced a flow of 60# steam through two tracers. Surface thermocouples were mounted on the pipe, the outside of the aluminum foil, and on the outside of the shell (underneath the insulation). The foil was spiral wrapped and had approximately 6 layers. Ten mm of insulation was applied to the outside of the shell. The foil temperature rose to 200F in 5 minutes, and the temperature gain thereafter flattened out, reaching a maximum of 262F. The pipe temperature rose steadily - climbing to the melting point of sulfur of 248F in less than 60 minutes. The pipe temperature maxed out at 278F. Liquid sulfur was exiting a hole at the *midpoint* of the pipe at 1.5 hours. Please see attached graph *Foil Spiral Wrapped on Pipe 5-2-14 #1*.

Conclusion

With solid sulfur melting at 1.5 hours after the steam tracers were activated, this test proves this insulation method is very effective.

It must be noted also that energy saving of 15-20% can be realized by using this method for insulating hot piping (no tracers) such as steam lines or other process piping.