THERMINOL
Heat Transfer Fluids by Eastman

Design reviews by Eastman Therminol experts offer significant client savings

As every engineer knows, making design adjustments before system installation is much simpler than costly retrofits. That is why so many companies across the globe take advantage of expert design reviews from the Eastman Therminol® heat transfer fluids team.

Therminol engineers focus on heat transfer fluids and systems every day, so we possess the insight to support designers and engineers tasked with building, operating, and maintaining incredibly complex systems. Leveraging knowledge gained from thousands of diverse projects around the world, our team can find ways to improve your systems before they become expensive problems.

PROBLEM	ANALYSIS	SOLUTION	RESULT
Effective design reviews require specific experience to ensure efficient operations and ongoing operability.	Heat transfer fluid (HTF) systems have specific and sometimes complicated challenges that require expert knowledge to properly manage.	Our Therminol team of expert engineers works with and troubleshoots HTF systems daily, giving them invaluable insight into our clients' challenges.	Expert design reviews can offer custom solutions to help avoid costly retrofits and ensure optimal operability.

Here are a few examples of how Therminol expert design reviews have helped our clients realize significant savings.

Fluid management

At elevated temperatures, all organic HTFs degrade over time at a rate based on each fluid's specific chemistry. Properly designed liquid phase systems must have a way to vent these degraded low boilers from their thermal expansion tanks.

One system evaluation our team administered found that a provision for venting had been omitted. Without intervention, this oversight could have resulted in pump cavitation or significantly increased system pressure. Costly fluid replacements or design/equipment modifications would have certainly resulted.

Our team also noted that, because of its location in a cold climate, this same system required freeze protection on the expansion tank top nozzles—protection that would assist in offering reliable and uninterrupted operation. In addition, a plan to add makeup fluid into the system was encouraged to support routine fluid quality maintenance; without it, fluid life and operability could be adversely affected.

However, venting may not be optimal for all system designs. Another system evaluation our team encountered called for using a small-diameter pipe to provide for recirculation of the heat transfer fluid through the expansion tank during the venting process. This is a good feature because it raises the temperature of tank contents for increased vapor pressure of the low boilers to be removed and permits fluid from all circuits to pass through the expansion tank, eliminating low boilers from the fluid.

However, the small-diameter pipe would have been inadequate. Our team of experts offered insight to increase the diameter of the drop-leg pipes. This increase would connect the expansion tank to the return header with a diameter as close as possible to that of the return header piping. This supports quicker, more effective low-boiler removal.

Expansion tanks must have two pipes connecting them to the return header to support the recirculating flow. However, many system designs call for only a single drop-leg pipe. Though such a design can accommodate the natural expansion and contraction of fluid volume that occurs through temperature changes, it fails to support the necessary venting process for proper in-service fluid quality management.

Environmental considerations

Therminol experts help clients stay "green." During one particular system review, our team encountered a plan to route collected liquid discharges through activated carbon canisters before discharging the cleaned water.

Our experts advised to separate the oil layer prior to processing the water layer with only soluble organics to avoid rapidly degrading the absorptive capacity of the beds. This significantly extends the usable life of the carbon beds by reducing the load of organics.

In addition, they suggested a real-time instrument for monitoring and alerting for organics content of water effluent streams.

Safety

Therminol experts believe operational safety is a fundamental requirement of system design and installation. While reviewing one system design, we raised safety concerns about the placement of a vent collection tank. The original plan called for the tank to be placed in an alley adjacent to a personnel walkway. If excessive venting or an accidental spill occurred, safety in the area would have been compromised and people could have been adversely affected. Our team recommended rerouting to a safe area.

Our team also commonly observes the omission of an engineered sample port for the safe collection of fluid samples. These should be installed on circulation headers to ensure sample integrity. Provisions should also be made for the fluids to be cooled to a safe handling temperature to avoid thermal burns and unnecessary exposure to airborne vapors. The Therminol team can provide information about sampling designs or references for prefabricated sampling stations.

Engineering specifications

As part of Therminol's standard technical documentation, the *Systems Design Data* booklet by Eastman offers recommended piping system specifications to design engineers. Based on our global experience, these guidelines have been tested and proven over many years.

But even with careful selection of pipes, fittings, valves, and other components, improper installation can cause leaks or other problems—especially with systems that experience wide variations in temperature. Therminol experts can provide insights on proper system assembly and identify problems before they occur, saving clients valuable time and money.

Maintenance and operability

Pipe installation can sometimes be considered a 'no-brainer'. But our experts know it is a critical point of system success or failure. A good example is the slope of the piping.

New systems should be hydrostatically tested for leak tightness. The test fluid, typically water, should be drained before the system is filled with HTF. For new start-ups, properly sloped piping with strategically placed low-point drains accommodate complete water removal. This configuration allows for a faster start-up thanks to less time spent purging or boiling off the residual water.

For existing systems, properly sloped piping supports complete removal of aged HTF before filling with new fluid. This provision helps protect the investment in new fluid by minimizing the "heel" of old fluid that may be left behind. When time is money, properly sloped piping can help save both.

Pipe insulation is another common concern. Therminol experts can recommend which areas should be insulated with cellular glass (closed-cell structure) for premium protection. They can also recommend more cost-effective insulation, such as fiberglass or mineral wool for less critical areas, and fire-resistant design features that can improve operational safety.

Mechanical integrity

Therminol expert design reviews can also be helpful for existing systems that are experiencing problems. One such review involved a system that required replacement of its thermal expansion tank—twice—in a very short time frame. Both failures were the result of internal corrosion of the vessel bottom. Our team of experts identified the cause as the open-to-atmosphere tank combined with salt water ingress.

The fluid's acidity had increased due to its exposure to oxygen in the air, while the excessive moisture content permitted the fluid

in the expansion tank to exceed its water solubility and create a free-water layer that had settled to the bottom of the tank. With acids concentrating in the water layer, corrosion resulted.

Therminol experts recommended closing the vapor space of the vessel and providing inert gas blanketing. This two-pronged solution prevents both organic acid formation and water entry. To head off future concerns, the team also suggested making minor vessel modifications to permit water-layer removal from the vessel bottom.

Conclusion

Keeping operational costs down is an achievable goal. From expert design reviews to existing system design evaluations, Therminol engineers are ready to help you.

With knowledge gained from thousands of diverse projects around the globe, our team has proven its value to designers and engineers at countless companies. Leveraging our experience could be the easiest decision you and your company could make. Your job is complicated enough. Let Therminol help.

ENERGY STAR

For more information, visit our website, **Therminol.com.**

North America
Solutia Inc.
A subsidiary of Eastman Chemical Company
575 Maryville Centre Drive
St. Louis, MO 63141 U.S.A.

Telephone:
Customer Service, 800-426-2463
Technical Service, 800-433-6997

Latin America
Solutia Brasil Ltda.
A subsidiary of Eastman Chemical Company
Rua Alexandre Dumas, 1711—Birmann 12—
7º Andar 04717-004
São Paulo, SP, Brazil

Telephone:
Brazil, 0800 55 9989
Other Locations, +55 11 3579 1800

Europe/Middle East/Africa
Eastman Chemical B.V.
Watermanweg 70
3067 GG Rotterdam
The Netherlands

Telephone: +31 10 2402 111

Asia Pacific
Eastman (Shanghai) Chemical Commercial Company Ltd.
Building 3, Yaxin Science & Technology Park
Lane 399 Shengxia Road
Pudong New District
201210, Shanghai, P.R. China

Telephone: +86 21 6120 8700

EASTMAN
The results of **insight**™

Eastman Corporate Headquarters
P.O. Box 431
Kingsport, TN 37662-5280 U.S.A.

U.S.A. and Canada, 800-EASTMAN (800-327-8626)
Other Locations, +(1) 423-229-2000

www.eastman.com/locations

TF-6581 5/19