



## DOWTHERM™ and DOWFROST™ Heat Transfer Fluids

### Don't Swing and Miss with Your Heat Transfer Fluid

In baseball, going 1-for-3 at the plate is a pretty good day. In fact, if you do that at every level from Little League all the way to the Majors, you'll probably end up in the Hall of Fame. But when it comes to choosing the right glycol-based heat transfer fluid for your HVAC system, just a 0-for-1 is enough to take you out of the game.

The Maryland Stadium Authority, operators of the Camden Yards Sports Complex, found that out the hard way. The heating system at the complex controls the heat levels at Oriole Park – home of the Baltimore Orioles – and at the former Baltimore & Ohio Warehouse, a 500,000 square foot complex that houses the Orioles' offices as well as a cafeteria, sports bar, gift shop and more than 1,000 commercial tenants.

To operate the system, the Maryland Stadium Authority buys primary steam from a local company, Trigen Industries, reduces the pressure and then forces it through several heat exchangers. A glycol- and water-based heat transfer fluid then carries the heat through roughly two miles of pipe. The 19,000-gallon system is a dynamic system, using a return loop to keep the fluid continuously moving through the pipes. It has been in operation since Oriole Park at Camden Yards was completed in the spring of 1992.

But it was only a year after the park opened that the heating system's uninhibited glycol-based fluid threw Camden Yards a curve.

#### The Wrong Glycol-based Fluid Just Isn't Ready for the Big Leagues

The mechanical engineer working on the project specified an inhibited glycol-based fluid for the heating system. As Camden Yards was nearing completion during the winter of 1991-2, however, a decision was made to switch to an

uninhibited glycol-based fluid to save money.

"Someone assumed that inhibitors could be field-added to the fluid, producing the same results as an inhibited fluid purchased from a factory," says Sherman Kerbel, Director of Facilities Management for the Maryland Stadium Authority, Camden Yards Sports Complex. "They researched what quantity of inhibitors should be added for a 19,000-gallon system, and then put them in. The idea was to reduce costs."

The decision did reduce the Maryland Stadium Authority's first cost, and worked out rather well – for one year. Then Kerbel and his staff began noticing something unusual.

"We started finding this black gunk that was clogging the smaller orifices. Our heating system's lines become smaller as they get closer to the actual radiator. The black gunk was present throughout the entire system, but was doing the most damage in the thinner lines. It was literally plugging up the system."

Unsure why the black gunk was there, the Maryland Stadium Authority asked for some help. They called in the plumbing contractor to look at the problem, and it wasn't long before he identified the culprit: iron oxide. Iron from the pipes was being eaten and carried through the system, eventually clogging the lines. The "homebrew fluid," despite the added inhibitors, wasn't doing enough to prevent corrosion.

The contractor determined that the inhibitors originally put into the system weren't the same inhibitors found in a Dow-branded inhibited glycol-based fluid. The field-added inhibitors prevented rust, but did nothing to prevent the fluid from eating the pipes – something a branded glycol-based fluid would have been able to do.

#### The Call to the Bullpen

At the contractor's recommendation, the Maryland Stadium Authority brought in a chemist from Union Carbide to analyze the problem and recommend a solution. After a few weeks and much research, she told them the solution was simple: they would need a factory-produced inhibited glycol-based fluid to prevent the problem from happening again.

Kerbel and his staff went with the recommendation for an inhibited fluid, and opted to use branded UCARTHERM™ Inhibited Glycol-based Fluid for their heating system.

"We went with UCARTHERM™ in part because it was what we needed, but also because Union Carbide and Dow have excellent reputations," Kerbel explains. "They said they would always be available to answer any questions we had and perform annual tests on the fluid, and we knew those companies are going to be around for a while. It was an easy decision."

Before Camden Yards could replace its homebrew glycol-based fluid with UCARTHERM™, it needed to clean out the iron oxide in the system. Kerbel and his staff spent two-and-a-half to three weeks flushing the system, running water through it and disposing of the iron oxide.

"The contractor stepped up to the plate with the warranty," Kerbel adds. "He brought in several mechanics to open up every small pipe and brush it out or replace it. The process took between a year and 18 months."

Kerbel figures the system flush cost Camden Yards in the range of \$20,000. They were fortunate, he says, that the contractor stuck by his warranty. The labor and parts associated with cleaning out the smaller pipe sections would have

run in the hundreds of thousands.

Kerbel also found out that the initial savings from using an uninhibited fluid were far from substantial. Using a Dow-branded inhibited glycol-based fluid would have cost 10-15 percent more than purchasing a “bargain” fluid and field-adding the inhibitors separately. For that small extra expense, Kerbel would have been glad to bypass the cleanup associated with the iron oxide deposits. Finally, with the iron oxide cleaned out, Kerbel’s crew added UCARTHERM™ Inhibited Glycol-based Fluid to the system. That was 1992. Today the black gunk has yet to return.

### UCARTHERM™ Provides Hall of Fame Credentials

As the Maryland Stadium Authority learned, UCARTHERM™ provides corrosion protection that other “bargain” fluids don’t. The patented, proprietary inhibitor package found in UCARTHERM™ and other Dow inhibited glycol-based fluids protects HVAC systems in two ways. First, Dow fluids passivate the surface of metals, reacting with the surface to prevent acids from attacking it. The Dow inhibitors perform this passivation without fouling heat transfer surfaces.

The second way inhibitors work to prevent corrosion is by buffering acids formed as a result of glycol oxidation. In short, Dow fluids neutralize the degradation process that results from the production of organic acids by glycols with its properly formulated inhibitors.

Dow fluids also prevent troublesome bacterial fouling when a solution of 25 percent glycol or more is used. Dow studies have shown that sustained growth of microbial species is not possible in UCARTHERM™ or other Dow inhibited glycol-based fluids with concentrations of 25 percent or higher. Higher concentrations of glycol yield osmotic pressure high enough to

cause dehydration of microorganisms. Even spore-forming organisms cannot germinate in the desiccating conditions associated with a high level of glycol.

Kerbel has seen the protection that UCARTHERM™ gives with his own eyes. “We’ve had zero problems in the last nine years. Occasionally we’ll take out a section of the pipe and examine it. It’s always clean,” he says.

In fact, the Dow branded inhibited glycol-based fluid works so well that Kerbel continues to make small changes that improve the system, knowing he can depend on the fluid to stay effective. Originally, Camden Yards went with 40 percent solution in the 19,000-gallon system; today, they’ve been able to reduce that to 36 percent.

“Ever since we made the switch, we’ve had no problems attributable to the fluid,” Kerbel says. “We’ve added some filters primarily to keep it clean and to remove small particles, but we haven’t had any necessary changes since we started using Dow’s UCARTHERM™. We have a dry, tight system.”

A good hitter always adjusts following a bad at-bat. The Maryland Stadium Authority proved its worth as Camden Yards’ cleanup hitter by hitting a home run with UCARTHERM™ Inhibited Glycol-based Heat Transfer Fluids from Dow.



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