

Is Flushing with Refrigerant the Only Way?

Hecat develops new flushing chemicals and new machines to meet today's needs.

by Karl Matis, Vice President, Hecat Industries

Technicians and shop owners can't afford comebacks and will do what it takes to prevent them. Many often lose a repair job when replacement evaporators, condensers, and extra labor are added to an already expensive repair bill after a customer's compressor failure.

Many shops have found that flushing the contaminants from system components has proven to be an effective and economical alternative to replacement. Even without contamination, technicians know it's only an educated guess as to how much oil to put back into a system if you do not first remove all the old oil from the components.

Some manufacturers are still hesitant to endorse flushing at all unless it is done with the same refrigerant used in the system. This is understandable; manufacturers cannot afford the liability of recommending any product to be used in the system other than what it was designed for. On the other hand, technicians are seeing and touching this contamination every day and knowing something has to be done about it. Shops are seeking any method they can find to clean up the system before putting it back in service and guaranteeing their work.

To Flush or Not?

The problem – contamination – is easy to identify. It may have gotten there via compressor failure, lubrication burnout (the "Black Death"), refrigerant incompatibility, introduction of foreign materials or sealants, and yes, even the accumulation from normal wear. Our engineers have been hearing reports of fine black particles being found in high mileage HFC-134a systems. The systems were still operating properly, and had been opened for reasons other than a



catastrophic compressor failure.

Flushing an air conditioning system or component has many benefits, problems, and opinions. At Hecat we constantly analyze these issues to insure we develop our equipment to meet current industry requirements and provide technicians with tools that have a true value in performance. We follow a simple one-two-three engineering approach to evaluating issues and problems: (1) identify the problem and the need, (2) test and evaluate the solution methods, and (3) implement a solution.

To maintain their product warranties, many compressor manufacturers and remanufacturing suppliers require a vehicle's system to be flushed after a compressor failure, but very few offer a recommended method. Some recommend the installation of screens or filters, a popular alternative to flushing. These are inexpensive and easy to install, but as with any filter they eventually become

clogged with the debris remaining in the system. The restricted flow of refrigerant may starve the compressor of oil.

One recently proposed solution is using a recovery-recycle machine to flush the entire system through the charging ports (or at the compressor manifold) with HFC-134a. But the compressor, filter-dryer, expansion and orifice devices cannot be flushed in-line. The system has to be opened and the specific components must be flushed individually.

From our company's experience in cleaning heat exchangers in multiple industries, we know the only way to clean the small passageways in components is to first backflush them to force out the wedged-in debris. This cannot be accomplished with the majority of the system assembled. And even if the components are isolated, it still cannot be done with a recovery-recycle machine.

Why? HFC-134a is not a cleaner and has a boiling point so low (approx. -20° F) that it will not stay in liquid form long enough to complete a suitable flush. Think about it: if you try to flush liquid HFC-134a through an evaporator, it will just evaporate. The gas will just pass through rather than effectively flushing out contaminants and waste oils.

Additionally, all OEMs are under pressure to develop leak-free and energy efficient systems, and the service industry will have to reduce refrigerant loss through tighter controls on the use of recovery-recycle equipment, accidental releases, and end-of-vehicle-life recovery. It's time we all begin to do our part and police ourselves better.

The European Union is proposing legislation to ban HFC-134a within 12 years, and some restrictions may begin as soon as 2007. Reducing the overall

Is Flushing with Refrigerant the Only Way?

greenhouse-gas emissions of HFC-134a in North America may allow for the refrigerant's continued use for many years.

Chemical Action

Flushing chemicals have to be solvents and cleaners, designed to remove both remaining lubricating oil and particulate matter from components and hoses. The long-accepted use of CFCs and HCFCs as flushing chemicals vanished under environmental regulations, and the manufacturing of HCFC-141b ceased in January of 2003. These products were widely accepted because of their refrigerant-like qualities, system compatibility, and highly evaporative nature. Various quality manufacturers, including Hecat, have developed more environmentally friendly chemicals.

Hecat has developed its proprietary Safe-Flush A/C product for use with most of our product line. However, although Hecat has been very happy with the effectiveness and results of its own product, it is clear that other chemical flushing products on the market may be more readily available and easier to source locally. Not wanting to limit customers by recommending only Safe-Flush A/C, we test and approve many flush products for use with our pulsating flushing equipment, and will continue to do so.

Concerns have been voiced about the recoverability and remaining residue of all flush chemicals due to their somewhat limited evaporative nature. Whether used in the simpler flushing guns or in Hecat's pulsating flushers, the highly evaporative products of the past cannot be duplicated and still meet the current environmental release standards. Chemical manufacturers are recommending increased air purge times and longer vacuum times, primarily to compensate for the evaporative issue.

Although we do not dispute the concerns and theories of compatibility and system chemical stability, these concerns do not seem to be supported by hard data to counter the positive effects found in flushing with these chemicals. Technicians using these products properly every day are not reporting wide

spread problems from their use. What these technicians are reporting is lowered repair costs for their customers, reduced comebacks, and a sense of satisfaction by "doing it right".

Answers and Alternatives

Because we believed proper results could not be achieved when flushing with HFC-134a, Hecat began looking for an alternative answer to refrigerant flushing. In 2003, engineers began research and development on an A/C component flusher for exclusive use with a new non-ozone depleting flushing agent produced by Honeywell. Genesolv SF (HFC-245fa) has a boiling point of approximately 60°F, high

This was going to be an expensive piece of equipment using an expensive flushing agent.

enough to perform an effective liquid flush at moderate pressure and yet still low enough to completely recover all the flushing agent using a light vacuum.

Early design showed this was going to be an expensive piece of equipment using an expensive flushing agent, and we set goals to produce durable automated equipment that would recycle the flushing chemical at the point of use. These goals would make it a very cost effective process for a shop and limit environmental releases.

After completing ETL testing and certification to UL 1963 standards, the Hecat model H1000 has met all these goals. The recycling capability of the flusher has reduced the flush cost to an average of a dollar or less per flushed component. After connecting to the component, the machine automatically completes its cycles of flush, recover, recycle, and air purge in 30 minutes. Field trials with MACS member shops in the summer of 2004 proved its effectiveness.

Additionally, over 300 trouble-free runs on a prototype constantly abused with contaminants at Honeywell's

Research Lab proved the unit's durability. The H1000 has proven to be a highly effective refrigerant flusher and is currently in limited production. It's also under evaluation by some domestic and Asian automobile manufacturers for potential approval.

Hecat equipment, all made in the USA, has a long and successful history. The company produces cart-mounted pulsating flushers powered by compressed air as well as the all-electric H1000. All of the units provide filtering and other features that allow recycling the flushing chemicals. The company also produces a universal flushing adapter kit. Hecat has manufacturing and sales facilities in Suwanee, Georgia and Merced, California.

Hecat is a member of MACS and participates in events that allow us to stay educated on the current issues affecting the A/C service industry. Most recently, the company participated as a manufacturing sponsor of the Mobile Air Conditioning Summit 2005, co-hosted by the California Air Resources Board and the U.S. Environmental Protection Agency. ■



Karl Mate's career started in the early eighties as an ASE-certified technician. He moved to the Fluid Power industry where, with the help of his engineering studies, his career grew from technician to Territory Manager for Field Sales. Over a twenty-year period, he managed accounts including Ford and GM assembly plants and hundreds of automotive sub-tier suppliers. He has been with Hecat, Inc. as VP for four years.

For more information contact Hecat in Georgia at 1-800-380-9501 or Hecat in California at 1-800-706-4414 or visit the company's web site at www.hecat-inc.com.