

Hecat's Response to SAE Standard J2670: It's not a correct Standard for A/C system flushes

By John R. Hess

The following comments on SAE J2670 are the opinion of Karl Matis, the V.P. of HECAT, Inc. HECAT, Inc. is a Flushing Equipment and Flushing Chemical Manufacturer and is the only manufacturer with a 100% focus on developing processes and producing products to clean automotive heat exchangers. Not a new company to this industry, HECAT has produced many well-known private branded products for over 24 years. Four years ago, with new ownership, the decision was made to step out from behind the curtain of a private brand manufacturer and begin to promote and brand the HECAT name.

There are a lot of different A/C service chemicals and additives, previously referred to as "snake oil," being sold today. The manufacturers of these products must be held accountable that their products will **do no harm** to the A/C system. This is the true need and intent of the SAE J2670 specification.

Flushing chemicals, products designed to clean the internals but not intended to remain in the system, have also been required to meet this specification. There is no argument that the potential for some flushing chemicals to be incompatible with component materials, plus the fact that they could leave residual material in the system, is why they have been included.

The J2670 specification states: "No means exist to identify and/or specify the amount of residual solvent that either can, or will, remain in any given system after the procedure(s) have been followed. This standard does not address the flushing solvent procedure or its effectiveness at removing residual flushing agent."

Residue: some flushes leave more than others

In our facility and at independent laboratories, we have conducted many system flushing tests using many different commercial flushing chemicals. Each time the control components were weighed before and after testing. And of course, we always used the identical flushing process and purge.

These tests have identified products that leave little or no residue, and products that leave large amounts of residue.

New J-Spec needed?

It would be helpful to shop owners and technicians if, as with the J2297, Specification for Leak Detection Dyes, flushing chemicals had their own specification that included a test to determine the potential amount of residue remaining. Such a test would determine what percentage, based upon each flushing chemicals performance, should be used for other tests. It is clear that some of the best flushing chemicals available today, based upon the large fixed percentage specified for testing in the J2670 Standard will have little chance of passing that Standard.

The J-Spec creates the problem

There are four tests required to meet J2670; the first two tests, covering stability and compatibility with metallic and nonmetallic materials, are not the issue. The next two tests, which are the Falex Wear and Viscosity Effect, are to be performed with 20% flushing chemical combined with 80% PAG oil. These percentages represent a volume of flush solvent remaining in the system that is **NOT** acceptable. Any type of flush leaving this much solvent in a system **IS** the problem!

The best flushing chemicals on the market today are the solvents with the highest evaporative nature that are not currently government regulated and do not harm or react negatively with commonly used materials. These solvents not only clean very well, but they evaporate well, too. They provide the most desirable results by leaving little or no residue.

Why they fail

The Viscosity Effect test requires the viscosity not to change by more than 5%. The Falex Wear test requires microscopic analysis to confirm that there is practically no wear difference if the same test were performed using "neat" PAG oil only. Because these flushes are not lubricants, when combined with refrigerant oil in the percentages required to meet J2670, they will surely dilute the oil and fail the tests.

High residue flushes

On the other hand, there are flushing chemicals on the market today that are primarily oil-based. Because of their limited evaporative nature, they leave a larger amount of residue than those that are solvent-based. Leaving a larger residue is clearly not a desirable result. The manufacturers of these products, however, claim that the residue is compatible with system oil.

Wait a minute, if the job of flushing is to remove all the old stuff, everything, and not leave anything behind, how can this product be producing the desired result?

And, with oil-based flushes, unless you know all the old has been removed, there is no true way of determining how much oil to return to a system.

Another question that arises is that if PAG oil must be added just to run a wear test isn't it obvious that oil-based flushes have a better chance of passing those portions of the test? After all, you're adding extra oil. So what good are those tests?

The J2670 Specification also states: *"R134a is commonly used as a flushing solvent in conjunction with equipment capable of handling the refrigerant in such a manner. Because R134a can act as both the refrigerant and a flushing solvent, R134a is deemed to meet all the requirements set forth in the J2670 specification."*

What!? R134a is **NOT** commonly used as a flushing solvent!

Try this one: "By its chemical nature, R134a is not a solvent and will not work as an effective flush." This statement has been given to us from two primary R134a manufacturers.

We have seen no commercially available flusher that effectively uses R134a. Flushing features of an R&R machine are very effective marketing tools, but have not proven to be effective flushing. The "Push-Pull" method, through the charging ports, is considered to be ludicrous, and not only by us but from comments made by many technicians. Even when isolating a heat exchanger for flushing, which is the only effective way to flush, R134a has produced very poor results in the lab tests we have seen.

Flushing with a refrigerant yields the most desirable results, but not with R134a. Why? Because of its minus 20°F boiling point! R134a will evaporate in the components it is designed to do so in, and therefore as a gas it will not remove the waste oils and contaminants.

Refrigerant flushing is not a new concept or idea; it has been done for a long time with good results with little or no concern of residuals. Why? Because due to their low (not too low) boiling points. It has been done regularly with refrigerants such as R11, R113, & R141b. But all of these HCFCs have essentially been eliminated by environmental regulations. EPA approved HFC replacements for R141b are the "next generation" of effective refrigerant flushes.

New HFC flush material

While HECAT is committed to its effective and proven air operated, patented "Pulsating" flushers (that are economical, durable, and capable of using many of the commercial flushes available today), we knew we had to evaluate these HFC refrigerant solvents when the opportunity presented itself. Starting in late 2003, HECAT began working with Honeywell Specialty Chemicals to take their process patent, prototype, and Genesolv SF (HFC-245fa) to the next level.

After developing the list of project goals, HECAT set out on a rigorous R&D project to develop new flushing processes and refine existing ones developed in the prototype. We successfully produced; ETL tested and field-tested what is now the first of its kind, a commercially available "refrigerant" flusher that uses an HFC solvent: "Genesolv SF" (HFC-245fa). This product has an approximate 60°F boiling point, and, combined with the HECAT model H1000; it stays liquid and flushes extremely effectively. With automated operation (one button start), the unattended flusher goes through the high flow flush, recovery, recycle, vacuum and purge process in 30 minutes. Components are left clean and **DRY**.

The solvent is filtered and recycled while waste oils are expelled on every run. The solvent is returned to the storage tank for reuse in a like-virgin form; there are no environmental releases. This means you can flush PAG, POE and even the new non-conductive oils for the Hybrids without fear of cross contamination.

Although the equipment and solvent are not cheap, the recycling capability provides the value of this process. It yields a solvent cost of less than \$1.00 per component flushed. This can be shown in an ROI analysis to pay for itself in less than 24 months, and be cheaper to operate, when compared to the somewhat ineffective \$50.00 flush gun with its one time use of \$30 to \$40 per gallon solvents. \$\$\$