

New refrigerant R-1234yf

# Self experiment

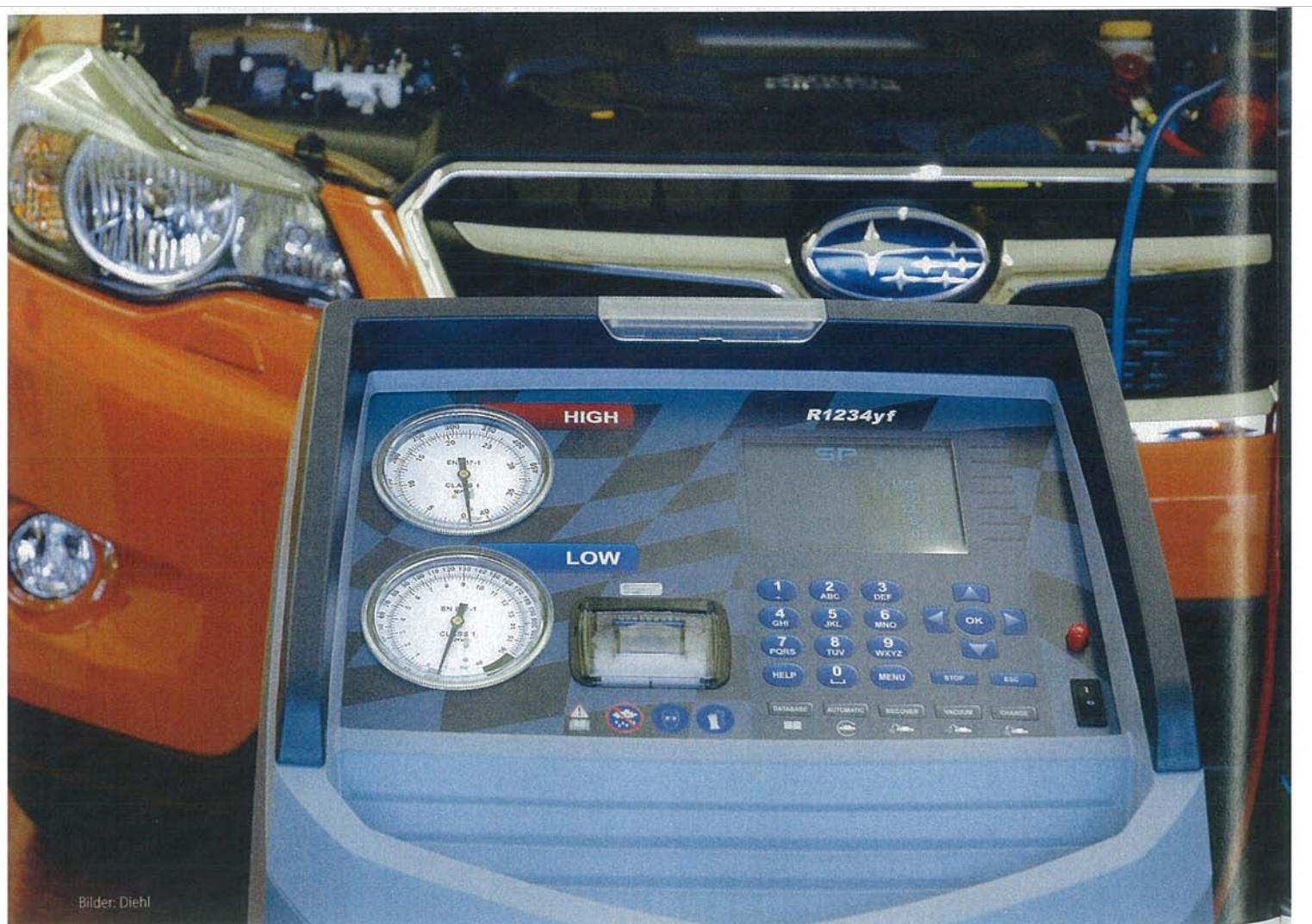
Premiere in the Hessian town of Friedberg: together with Subaru, Robinair and Honeywell, the asp editorial team performed what is supposedly the first genuine air conditioning system service on a vehicle with R-1234yf filling at the end of October.

**The** discussion about the new air conditioning system refrigerant was held on an emotional rather than an objective level from the outset. Terms such as fire hazard and hydrofluoric acid formation provide proof that it has not been a question of environmental compatibility for a long time. It was high time that the level was changed and the discussion objectified. To this end, the asp editorial team undertook

an obvious experiment for workshop professionals with three cooperation partners at the end of October. Together with car importer and host Subaru Germany, workshop equipment supplier SPX and refrigerant manufacturer Honeywell, what was supposedly the first genuine and complete air conditioning system service on a car with an air conditioning system filled with R-1234yf

was performed. A total of nine people took part:

- ✓ the Customer Service Trainers Volker Bomba and Kay Hottner from Subaru
- ✓ OE Sales Director Raphael Disler, AC Product Manager Paolo Ricci and Customer Service Technician Ralf Halach from SPX Service Solutions Germany/Europe (Robinair air conditioning service devices)



Bilder: Diehl

- ✓ Chief Executive Dr. Björn Jackisch and Communications Director Sabine Chmielewski from Honeywell Specialty Chemicals Seelze
- ✓ the editors Bernd Reich and Peter Diehl from asp Auto Service Praxis. The experiment subjects were the new Subaru XV and the also new air conditioning system service device Robinair AC 1234-8. A refrigerant analytical device is already integrated into the latter in contrast to the Robinair AC 1234-7 service device already approved by Subaru manufacturer Fuji Heavy Industries. First of all, the vehicle and automatic service device worked together perfectly. No problems whatsoever arose.

The air conditioning system service began with the previously unfamiliar working step of refrigerant analysis. In future, it will presumably play a much greater role than in conjunction with R-134a. This



The Robinair air conditioning service device has two containers for different compressor oils.

procedure appears to be a necessary precautionary measure due to the new refrigerant (cf. Info box “refrigerant analysis sensible” on page 14). The refrigerant analysis only took a few minutes and ended in this positive case with the display message “refrigerant

- purity acceptable” (cf. images on pages 12 and 13). The Robinair service device has a disposal connection on the rear side for negative cases.

Before the suction and evacuation steps started, the service device hoses were emptied. Anyway



## Commentary

### Lobby against lobby

On closer examination, the discussion which is still continuing on the sense or absurdity of the new synthetic refrigerant R-1234yf can be reduced to this simple formula: the lobbies are battling against each other. And the R-1234yf lobby has already attained a crucial victory: Its refrigerant will soon be used in mass-produced vehicles. But the counterlobby (carbon dioxide, CO<sub>2</sub> in short) is continually chalking up many small successes: Motorists and even specialists have been greatly unnerved after the publication of the so-called German Environmental Aid (DUH) and the reports in a consumer publication.

It has been reported to the asp editorial team from different sides that this discussion is predominantly a German phenomenon. Only the Italian media have also been asking questions, but the tone of voice has been quieter.

It may be that in a fire involving R-1234yf, more hydrofluoric acid develops than from R-134a in theory, as no laboratory conditions predominate during a fire. The five ppm concentration measured by Honeywell (cf. asp 10/2011, pages 10/11) would have to behave in a cumulative and stable manner to do damage. But hydrofluoric acid is a readily reactive chemical and the thermodynamics would happen very fast in the case of fire.

Practically, vehicle occupants have other worries anyway in such an event. The keywords are heat generation (according to Honeywell hydrofluoric acid is only formed at temperatures of above 700 degrees Celsius, and also from R-134a), oxygen deficiency and carbon monoxide concentration. In other words: people who come into contact with hydrofluoric acid are long dead.

**Pd**

A question for...

## Hermann Heigl

The air conditioning system refrigerant is only one of several fuels in the car. Which is the most dangerous?

In my view and related to normal handling, propellants, especially petrol, LPG and CNG pose a greater risk to the motorist than air conditioning system refrigerants. Who uses the necessary protective equipment prescribed in the commercial sector with regard to risk assessment, threat evaluation and operating instructions when handling these hazardous substances? In other words: which private users are aware of the risks posed by propellants and which could endanger them if they handle these hazardous substances incorrectly?

*Hermann Heigl, vehicle foreman and retired senior technical civil servant at the Munich-State trade supervisory board is an adviser at Heigl Consulting.*

considerably greater value is placed on the accuracy of service devices today. The steps which follow immediately afterwards of suction, evacuation and pressure increase-monitoring are no different from the previous procedure.

### Suction via the low-pressure side

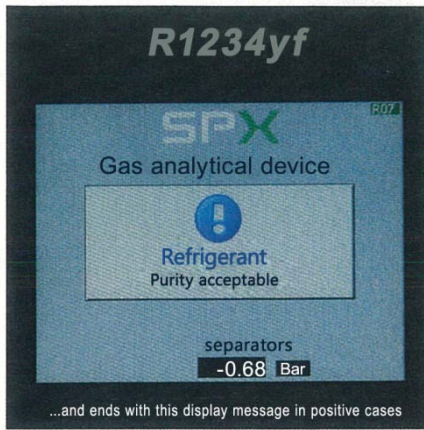
That is nothing new either: the refrigerant was suctioned exclusively via the low-pressure side of the air conditioning system circuit as the appropriate compressor oil was not available. The service device has a second oil container for hybrid drive vehicles, whose electrical air conditioning compressors require a non-conducting oil. The hoses of the device are rinsed before changing from one oil type to another. Before refilling the air conditioning system of the Subaru XV, the service device required a leak test of the system to which, of course,

there was no objection - the car was an exhibit at the International Motor Show in Frankfurt and is brand new. Incidentally, SPX recommends a maximum temperature difference of five Kelvin (degrees Celsius) between the vehicle and the service device "so that the leak test does not fail" (original tone of the operating instructions) which appears significant for vehicles parked outdoors on winter nights and summer days.

The first air conditioning service on a vehicle filled with the new refrigerant took approximately one hour to complete. The system which is intended for 420 to 480 grams of refrigerant was filled with exactly as much



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refrigerant as was previously extracted:  
450 grams, the average value

Special device, protective equipment

The conclusion: servicing an air conditioning system filled with R-1234yf is no act of witchcraft, but a procedure which is tailored to the options offered by workshops and car dealerships and which can be easily carried out there. A special

Internet

## Archive function

“The refrigerant manufacturers have surely been well advised due to the numerous fears, to further clarify what R-1234yf shows in the specific case of application of a car air-conditioning system for its behavior in the case of fire and other malfunctions and which consequences need to be drawn from this,” explained Prof. Dr. Dr. Alex Lechleuthner, Director of the Institute for Emergency Medicine of the Fire Service of Cologne and Professor at the Institute for Rescue Engineering and Danger Aversion at the University of Applied Sciences of Cologne, in conversation with the online service of asp Auto Service Praxis. All contributions published by asp online relating to the new air conditioning system refrigerant have been summarized in a dossier which can be accessed via this direct link:

[www.autoservicepraxis.de/klima-kaeltemittel](http://www.autoservicepraxis.de/klima-kaeltemittel)

service device is necessary, where not only the refrigerant is new, but also the accuracy. Workshop professionals must adapt to this. Neither does it cause any harm to possess and wear personal protective equipment (protective gloves and goggles which comply with standards). It prevents accidents caused by leaking refrigerant which has nothing to do with the properties of the new refrigerant, but with its temperature in general in the event of expansion (R-1234yf and R-134a). Thus, neither the technology nor the changed resources are problematic, but a completely different point: not all players have been honest with one another in the past and this remains

the case. The German Association of the Automotive Industry (VDA) procrastinated for much too long in publicizing the long-accomplished conversion of R-744 (carbon dioxide, CO<sub>2</sub>) to R-1234yf. This procrastination only increased the target provided to German Environmental Aid (DUH). The VDA has evidently learned nothing from this. The so-called catalog of guidelines, designated by many workshop equipment suppliers as the basis of their service device evolution, has been treated as classified information by the association. Press Officer Eckehart Rotter



450 grams of refrigerant removed, 450 grams of refrigerant added: the report for the first R-1234yf air conditioning system service

gave the following reply to an asp inquiry: "The document you requested is not at my disposal." How do you answer that? Thank you for the information.

### Price speculation and rumors

The ability to learn seems to be restricted at Honeywell too. The group, which refused any communication after the well-known DUH fire test, but which confessed that it was an error in the meantime, has still not issued any information on the price of the new refrigerant which opens the floodgates to speculation and rumors. *Peter Diehl*

### Daimler and Opel

## Certificates of exemption?

Rumors in the sector imply that two German car manufacturers have received certificates of exemption for a new range and can still continue to use the previous refrigerant R-134a after 1 January 2011 despite the type test:

- ✓ Daimler for the new Mercedes-Benz B class and
- ✓ Opel for the Astra GTC

### We have consulted both manufacturers and received the following answers:

"The fact is that there was a temporary supply shortage on the part of the relevant suppliers due to the earthquake in Japan. Daimler therefore informed the KBA that the B-class could temporarily only be produced with the previously used refrigerant R-134a, but that a changeover to the new refrigerant would occur as soon as it was available from the supplier. An exemption request was not made."

*Matthias Brock, Daimler AG*

"...The Astra GTC is based on the current Astra architecture which was type tested before 2011. The Astra GTC therefore possesses a type test with R-134a."

*Manfred Daun, Adam Opel AG*

### Service device

## Refrigerant analysis reasonable

The first cars with R-1234yf refrigerant will be launched onto the market in the spring or summer of 2012: Mazda CX-5, Subaru XV and Toyota Prius+. Workshops and car dealerships require a separate service device for these and all other vehicles filled with the new refrigerant, as already



carried by the workshop equipment supplier SPX. An approval by Subaru manufacturer Fuji Heavy Industries already exists for the service device Robinair AC 1234-7 (without refrigerant analysis). However, for the first air conditioning system service on the Subaru XV, SPX used the Robinair AC 1234-8 service device (with refrigerant analysis); both are automatic devices. The integration of the refrigerant analysis into the service device appears reasonable, in particular during the transition to a new refrigerant. Ultimately, you do not know which refrigerant is circulating in the air conditioning systems of vehicles which may be repaired or serviced outside of Germany whilst on holiday, for example. The availability and price of R-1234yf will decide how often the "alternative filling" occurs. In such a case, the costs of refrigerant disposal and cleaning of the service device should not exceed the additional costs of a combined service and analytical device.

SPX/Robinair on the Internet: [www.acl1234yf.com](http://www.acl1234yf.com), [www.spxeurope.com](http://www.spxeurope.com)