



A summary of FACTS about hydrocarbon refrigerants and why they should never be contemplated for use in a vehicle air conditioning system.

Kill the flame before it kills you

** PIC ABOVE: A demonstration in a VASA member workshop, releasing refrigerant through a hose connected to the compressor in a customer's car. Fortunately, the technician was told it contained a flammable refrigerant, otherwise, one spark during evacuation and his face, if not the workshop, might have disappeared.*

It is difficult to reconcile the overwhelming world evidence against the use of flammable refrigerants in automotive systems, against the efforts being put into the selling of flammables to a/c technicians.

Reports from workshop owners approached by the hydrocarbon sales force, consistently refer to lack of accurate information, avoidance of the flammability issue, and total misunderstanding of the new environmental legislation.

Claims made by the hydrocarbon lobby are usually easily challenged. At a Licensing seminar in Sydney in mid 2006, called by the IAME (Institute of Automotive Mechanical Engineers), a senior VASA member and others in the small audience challenged key statements made by an invited hydrocarbon presenter, but responses were unsatisfying. Our representative was frustrated but asked to receive more information to support claims of product safety and acceptance in automotive applications. None has been forthcoming.

It amazes VASA that, in the face of one simple fact that best practice established by every car manufacturer in the world, does NOT condone the use of flammable refrigerant in any a/c system, thinking technicians and workshop owners would waste time talking to a HC salesperson.

Being well informed may help to stem this tide of misinformation and provide members with a firm basis for reaching their own conclusions.

All statements in this document have been gathered from legitimate sources over a number of years and all can be supported by written evidence. Quotes of OEMs are

taken from signed letters from the hierarchy of the companies in Australia.

Please note that there is not one single statement in this document which originates from VASA.

As we keep telling the flammables lobby when they attack us, "VASA does not determine which gas should be used. As a professional organisation, it can only recommend manufacturer's specifications." Put it another way – if a HC system is ever designed for use in automotive, VASA would be the first to conduct training sessions on this technology.

VASA technical experts, all of whom are totally opposed to the use of flammable refrigerants in vehicles, believe that the more that technicians fall for the flammable sales pitch, the greater will be the risk of a real explosion in a real life situation - not 'if', but 'when'.

Those who ignore the warnings of State Workplace Health and Safety regulations pertaining to 'dangerous goods' – flammable refrigerant - do so at their own peril. All it needs is a vehicle without a label, a full charge of hydrocarbon refrigerant and one tiny spark in a workshop full of sparks and ignition sources, and the result could be catastrophic.

More than that, because of the warnings issued through OH & S Regulations in most states and territories, the workshop owner should not rely on any recompense from insurers, and if a death of a technician occurs, this one event could quite possibly mean the end of the business and a compensation bill which will need the sale of the family home and all assets to meet. Think about it.

VASA Board of Directors
October 2006

Introduction: Air conditioning systems require that part of the system is inside the passenger compartment, usually under the dash and as such it is industry policy, world-wide, that refrigerants used in vehicle air conditioning systems be non-flammable.

Hydrocarbon is used in a number of vehicles as a replacement for petrol. When conversions are carried out, LPG is stored in an approved container and LPG lines do not enter the passenger compartment. This is not a problem and is fully supported by vehicle manufacturers.

The evidence:

Mid 1990s

“Customer advised the system was full of LPG, done at home via a BBQ bottle. Ford vehicles have alternator mounted above the compressor with a live terminal on the back. My technician ended up with a shirt full of LPG and a spark from a live terminal resulted in a ball of flame and a fire. The radiator test tank was less than five feet away and the technician was in it in three seconds flat with no major problems.” – *Open letter, undated, from Noosa Radiator Services and Car Air Conditioning, signed by the Proprietor.*

January 1996

“HC is not safe to be used in MVAC systems – it is explosive and flammable. HC is heavier than air and can settle in pools on the floor of the passenger compartment. Electrical components inside the passenger compartment create sparks sufficient to produce an explosion with HC”. - *Briefing Paper, Motor Vehicle Repair Industry Council, NSW.*

22 August 1996

“Nissan, in line with FCAI member companies’ policy on this matter, would not support the use of hydrocarbons in motor vehicle air conditioning.” - *Nissan Motor Co (Australia) Pty Ltd.*

5 September 1996

“In respect of the use of HC type refrigerant...totally opposed to such practice, and as such will not be a party to any activity or any body promoting its use in automotive air conditioning systems.” - *Toyota.*

10 September 1996

“The Chamber (Federal Chamber of Automotive Industries), adopted the view that use of hydrocarbons in airconditioners would be strongly opposed. We remain wholly aligned with that view.” - *Daewoo Automotive Australia.*

September 1996

“...strongly objects to the use of HC refrigerant in motor vehicle air conditioning and cannot support any attempt to justify its use. Any dealer ignoring MMAL’s recommendation should consider their own Product Liability risks.” - *Mitsubishi Motors Australia Ltd.*

1 February 2000

“Melbourne Auto Air will not stock refrigerants containing hydrocarbons. We will put VASA principles, which are for the long term good, above short term profit.” – *John Blanchard CEO CoolDrive (formerly Melbourne Auto Air).*

6 November 2000

“As a manufacturer we can only recommend repairs as set out in the workshop manuals.” - *Ford Motor Company of Australia Limited.*

24 November 2000

“...under no circumstances does Holden endorse the use of hydrocarbons in the air conditioning systems of our vehicles.” - *Holden Ltd.*

December 2000

“Flammable refrigerants must only be used with the approval of the relevant equipment manufacturer. Any retrofit using flammable refrigerant should only be undertaken if the equipment components are designed or modified for such use.” - *Reprinted with the kind permission of Motor Trade Association of South Australia Inc.*

12 January 2001

“MMAL strongly objects to the use of HC refrigerant in motor vehicle air conditioning and cannot support any attempt to justify its use by the referenced (Hydrocarbon) Code of Practice. This statement was issued to our Dealers in 1996 and is still current.” - *Mitsubishi Motors Australia Ltd.*

24 September 2002

“Even the mixing of small quantities of flammable gas with non-flammable gas is all you need to turn the recovery of refrigerant into a hazardous operation.” - *Media Statement, Michael Bennett, General Manager, Refrigerant Reclaim Australia.*

10-11 February 2003

At the Mobile Air Conditioners World Summit in Brussels, a presentation by the Hydrocarbon refrigerant industry was challenged by an Australian government representative on their claim that the hydrocarbon industry had received an OEM approval to charge a/c systems with a hydrocarbon refrigerant. In front of the most influential international audience of this industry in the world, the hydrocarbon representative withdrew the claim, saying that he could not produce any such approval. – *Report of Australian industry representative Mark Mitchell (then president of VASA)*

4 March 2003

Qld Government issues Safety Alert, reinforcing that use of flammable gas refrigerants in automotive applications is not permitted in Queensland, and recommending recall of any vehicle converted in this state to use LP gas as a refrigerant. Names HR12 from HyChill as the product which “can lead to fire or explosion.” - *Chief Inspector Petroleum and Gas, Bureau of Mining and Petroleum.*

14 July 2004

“The defendant was employed by the University of New South Wales as a senior lecturer in the University School of Mechanical and Manufacturing Engineering, and on 12 July 2001, the defendant conducted an experiment at the premises involving the ignition, within a closed motor vehicle, of a hydrocarbon gas which was a mixture of propane, isobutene and air. The experiment was requested by Dr Michael Belsted, the managing director of a company described as Minus-Forty Pty Limited.

“The defendant discharged into the air two aerosol containers containing approximately 343 grams of the gas. The defendant proceeded to light a match that ignited the gas and thus caused a burst of flame. The tops of the four passenger doors were bent outwards by up to 28 millimetres, part of the interior lining of the roof and doors were melted or softened and the passenger side front window of the vehicle fractured into hundreds of thousands of shards. Four onlookers suffered first degree burns.

“Mr Belsted’s clients were seeking information on a concentration of hydrocarbon refrigerant in the passenger cabin of a motor vehicle, which, if ignited, would cause no significant bodily injury or property damage.” - *Transcript of the judgement in the successful prosecution of Ian MacLaine-Cross by Work Cover NSW, in the Chief Industrial Magistrate’s Court, Sydney.*

Flashback to 12 July 2001

“Well, you live and you learn. At least we have proved that the product can’t kill you at least.” – *Interview to camera by Brett Hoare, hydrocarbon promoter, at the hospital which treated the injured in the above explosion.*

3 March 2003

“I have visited the outlet and advised the manager of the matters regarding the sale of HR12 refrigerants. He said he would push it to the back of the shop. Our Chief inspector is currently writing a safety alert which will be issued and sent to Automotive regas/agents. He has also alerted the Office of Fair Trading of the issue regarding the sale of a restricted/banned refrigerant.” - *Petroleum and Gas Inspector, Queensland Govt., reporting on VASA’s complaint that an auto wholesaler was selling hydrocarbon refrigerant over the counter.*

21 October 2004

"At this stage Proton are using refrigerant gas R134a until further notice. All manufacturers are using this and are all working together to develop any other alternatives." - *Proton Australia*.

25 April 2005

"The U.S. Army operates fleets of armored tactical vehicles equipped with air- conditioning," said John Manzione, Chief of the Environmental Technology R&D Team at Fort Belvoir, "But we would never jeopardize soldier safety by putting hydrocarbon refrigerants in our vehicles."

"The Environmental Protection Agency (EPA), the Society of Automotive Engineers 6 April 2005 (SAE), the Mobile Air Conditioning Society Worldwide (MACS), and the vehicle manufacturers, automotive organizations and suppliers listed below agree that hydrocarbons are unsafe as refrigerants in vehicle mobile air conditioning systems designed for CFC-12 and HFC-134a."

"No vehicle manufacturer has endorsed or authorized the use of hydrocarbon refrigerants in current production mobile air conditioning systems and no professional or technical association has approved the use of hydrocarbon refrigerants. Vehicle warranties are voided for any air conditioning system that has been charged with hydrocarbons. Vehicle manufacturers only recognize HFC-134a as acceptable for use in their current mobile air conditioning systems."

"Off highway and large commercial vehicles require substantially more refrigerant than a passenger car. Use the refrigerant designed for the system--stay away from hydrocarbon refrigerants." states Gary Hansen, Vice President of Engineering for Red Dot Corporation. - *A Warning to Consumers about Hydrocarbon Refrigerants Safety and Health issued by MACS Worldwide*.

The service announcement containing the above quotes was endorsed by the United States Environmental Protection Agency, the Society of Automotive Engineers, the Mobile Air Conditioning Society and supported by ACC Climate Control, AGRAMKOW, AirSept, Association of International Automobile Manufacturers (Aston Martin, Ferrari, Honda, Hyundai, Isuzu, Kia, Maserati, Mitsubishi, Nissan, Peugeot, Renault, Subaru, Suzuki and Toyota), Audi, Australian Fluorocarbon Council, Behr, BMW, CalsonicKansei, DaimlerChrysler, Delphi, Federation of Automotive Products Manufacturers (Australia), Eaton Corporation, Ford, General Motors, Goodyear, Institute for Governance & Sustainable Development, Manuli Automotive, Modine, Neutronics, Red Dot Corporation, RTI Technologies, Sanden, Spectronics Corporation Tracer Products Division, Transpro, U.S. Army, UView Ultraviolet Systems, Valeo, Vehicle Airconditioning Specialists of Australasia, and Volvo Car Corporation.

6 April 2005

"Despite a concerted lobbying effort by the sellers of flammable hydrocarbon refrigerants, the US government has again rejected these refrigerants on safety grounds." *Mr Dave Godwin of the US EPA speaking at the MACS Summit in Sacramento, California in March, 2005.*

25 April 2005

"Manufacturers, owners and fleet managers of heavy trucks, buses, rescue and other specialty vehicles will want to take extra efforts to avoid hydrocarbon refrigerants that can endanger drivers and passengers," said Dr. Alex Moulthanovsky, Vice President of ACC Climate Control. *A Warning to Consumers about Hydrocarbon Refrigerants Safety and Health issued by MACS Worldwide.*

25 April 2005

"There is no evidence to prove that hydrocarbons are safe to use in mobile air conditioning systems designed for either CFC-12 or HFC-134a." *A Warning to Consumers about Hydrocarbon Refrigerants Safety and Health issued by MACS Worldwide.*

26 April 2005

"The LPG/butane refrigerant groups have been successful in not having to explain that a hydrocarbon refrigerant actual comprises LPG and butane." - *Chris Lindeman MIAME, Fluoroclain and technical expert.*

May 2005

"The Victorian Occupational Health and Safety Act 2004, clarifies and brings Victoria's safety laws up to date to reflect modern workplaces and arrangements. The manufacturer must establish, through testing and examination for each substance they produce, the health and safety requirements for the intended use of each substance. Suppliers must supply substances in a condition that is safe to use and does not create risks to the health of the people who might use it or be exposed to it. This applies when the goods are used in a workplace for a purpose for which they were designed, manufactured or supplied." - *Information for manufacturers and suppliers of substances, Occupational Health and Safety Act 2004 (Victoria)*

16 August 2005

"For liquefied flammable gases, any person who proposes to use such a gas as a motor vehicle air conditioning refrigerant...is required to make sure that the gas may safely be used for that purpose. Manufacturers, designers or suppliers are required to provide appropriate information to ensure that the refrigerant may safely be used in their equipment. Further, the a/c system should be operated safely which usually entails regassing it in accordance with the manufacturer's operating instructions. It would be inappropriate to modify the procedures specified in the manufacturer's service instructions or change the product used in the a/c system without the manufacturer's consent or support." – *John Della Bosca MLC, special Minister of State, Minister for Commerce and Industrial Relations, in a letter to HyChill Australia.*

December 2005

"Most people are unaware that refrigerants can be flammable."

"Before using hydrocarbons to re-gas any MVACs, obtain written advice from its designer, manufacturer or supplier that hydrocarbons can be safely used in it."

"To avoid the possibility of voiding a customer's vehicle warranty, check with the motor vehicle manufacturer that they allow hydrocarbons to be used in their systems. This advice should be obtained in writing from each vehicle manufacturer and retained."

"Written approval should be obtained from customers before re-gassing with hydrocarbons. The document should record that the customer was warned of possible safety issues associated with using flammable hydrocarbon gases in their air conditioning systems and that they agree to its use." - *Safety alert prepared jointly by MVRIA and WorkCover NSW to ensure motor vehicle repair businesses are aware of the hazards to their staff and customers in respect to re-gassing Motor Vehicle air-conditioning systems (MVACs) with Flammable Hydrocarbon Gases.*

24 March 2006

"Employers providing air conditioning charging services breach OH&S laws in both states (NSW and Victoria) by electing to use hydrocarbon refrigerants when non flammable refrigerants are available and suitable." - *Effect of OH&S legislation and policy on sale and use of hydrocarbon refrigerants. Legal opinion by leading barrister Tom Brennan of Canberra.*

24 March 2006

"Suppliers of hydrocarbon refrigerants to ... employers probably breach OH&S laws in both states (NSW and Victoria) by providing hydrocarbon refrigerants when they are able to source non flammable refrigerants and those non flammable refrigerants would be suitable for use." - *Effect of OH&S legislation and policy on sale and use of hydrocarbon refrigerants. Legal opinion by leading barrister Tom Brennan of Canberra.*

28 July 2006

"The use of hydrocarbons in motor vehicle air conditioning as a refrigerant has an inherent risk to the user, other road users, technicians handling the material and others. These other groups include technicians repairing other parts of the vehicle, emergency crews who may be cutting people out of wrecked cars and even the greater public when using public transport vehicles including buses, taxis and the like." - *Motor Traders' Association of NSW in submission to the Australian Competition and Consumer Commission.*

28 July 2006

"The Office of Fair Trading alert stated that the product should only be used in vehicles where the manufacturer [of the vehicle] has stated that the use of such products is permitted. The MTA knows of not one vehicle manufacturer that permits the use of flammable refrigerants in its vehicle's air conditioning." - *Motor Traders' Association of NSW in submission to the Australian Competition and Consumer Commission.*

28 July 2006

"I am informed by business proprietors that Hychill is informing people that a certificate is not required to use their products, ignoring the fact that it is needed to remove existing refrigerant." - *Motor Traders' Association of NSW in submission to the Australian Competition and Consumer Commission and corroborated by evidence from VASA and also as revealed at the industry forum of the Australian Refrigeration Council on 5 October 2006.*

12 October 2006

"Factory engineers both here and in China and Japan have confirmed the only approved refrigerant for use in our compressors is HFC134a. Any use of alternatives, including the flammable HCs on promotion in Australia will null and void any warranty or support offered to our product." - *SCA Australia (representing Unicla at OEM level in SE Asian markets)*

October 2006

"Sanden recommends R134A as the refrigerant to be used in our range of compressors. The compressors have been designed to use PAG oil and R134A, the use of any other refrigerant/oil combination may void your warranty." - *Technical Bulletin Sanden International (Australia) Pty Ltd*

31 October 2006

"The policy at Caterpillar Institute Vic-Tas, is to fill AC systems with R134a ONLY. If it is (was) an R12 system when it leaves us it is retrofitted to R134a. We believe that if all in the trade were to simply retrofit to R134a then there is NO fear of contamination problems.

"It has been brought to my attention that some AC repairers are using LPG to "top up" AC systems. If they get caught, or an accident, or leak results in death or injury, they will feel the full force of the law." - *Gregory K. Young, Training Facilitator, Caterpillar Institute Vic-Tas*

16 October 2006

"I can confirm that there is not one single car manufacturer in the world that in any way has authorized the use of hydrocarbons (HC) in any type of vehicle air conditioning systems.

"All engineers in this business are in full agreement that if HC, or any other flammable refrigerant, is to be used in a MAC, it has to be in what is called an indirect system or 'Secondary Loop' system. This means that the systems need to be fundamentally redesigned in order to be safe in both safety and reliability aspects.

"During recent years different rubber materials were introduced into the R-134a/PAG-oil systems that are not compatible with HCs. These materials work perfectly well with the original refrigerant and oil but are definitely questionable with HCs or any refrigerant mix that contains HC. Due to the simple fact that HCs from a flammability/safety standpoint are out of the question, independent of the circumstances, the exact impact of HCs on these materials has not [needed to be] established. The above is based on normal, generic material compatibility facts and experiences.

"Any use of a HC or mix containing HC in the air conditioning system refrigerant loop will void all warranty obligations for the climate system given by our company.

"For the moment, there is no development work whatsoever on HC-Secondary Loop systems in either Europe or USA and I do not know of any plans to do any such work for the near future." - *Hans Fernqvist, Technical Expert, Climate AC System Strength & Endurance Testing, Volvo Car Corporation, Gothenburg, Sweden*

12 December 2006

DENSO, Australia's largest supplier of air conditioning products, does not support the use of hydrocarbons as a replacement refrigerant in current automotive applications. Automotive air conditioning systems have been designed for fluorocarbon refrigerants (HFC-134a) since 1995. The use of hydrocarbon refrigerant will affect the air conditioning system in the following ways:

Safety and serviceability

Hydrocarbons are flammable and in the event of a leak, place the safety of both the occupants and service technician at risk of an explosion. As a result, licensed Service Dealers may refuse to service your system.

Durability

Hydrocarbons charge amount is typically 1/3 of normal refrigerant levels resulting in a reduced amount of oil returned to the compressor. Hence the durability of the compressor can be adversely affected by a lack of oil returned.

Only HFC-134a refrigerant is approved by DENSO as the system supplier and also by the Vehicle Manufacturer for replacement use in their vehicles. This refrigerant will allow your system to operate as it was designed. It will ensure reliability of operation, durability of components and a safe environment for all concerned. - *Robert Burns Service Manager, Denso International Australia Pty Ltd*

THE LAST WORD

For those who believe that by switching to the use of a flammable refrigerant, they can avoid the licensing provision of the Ozone Protection and Synthetic Greenhouse Gas Management Act.

5 April 2006

"A National Refrigerant Handling Licence is not required for natural refrigerants such as hydrocarbons. However, regulation 111(1) of the Regulations provides that it is an offence for a person to handle a fluorocarbon refrigerant without a relevant licence. For the purposes of this offence, 'handle a refrigerant' means 'to do anything with the refrigerant that carries the risk of its emission', including decanting the refrigerant or decommissioning or disposing of refrigeration and air condition equipment. This offence applies to all handling of fluorocarbon refrigerants, including evacuating systems prior to decommissioning or retrofitting so that it will be operate on an alternative refrigerant. Technicians working with natural refrigerants will therefore contravene Regulation III if they do not hold a Refrigerant Handling Licence when they convert refrigeration or air conditioning equipment with a fluorocarbon refrigerant, such as R134a, to an alternative refrigerant. It will be necessary for technicians to engage a licensed technician in these circumstances.

"In addition to contravening the Regulations, the discharge of a fluorocarbon refrigerant to the atmosphere will also be a strict liability offence under section 45B of the Act. Section 45B provides that a person is guilty of an offence if they:

- engage in conduct that results in the discharge of a schedule substance (fluorocarbons)
- it is likely that the schedule substance will enter the atmosphere
- and the discharge of the substance is not in accordance with the Regulations.

This offence will carry a penalty of up to \$11,000." - *Patrick McLnerney, Director, Ozone and Synthetic Gas Team, Australian Government*