



# THE ALLIANCE FOR CO<sub>2</sub> SOLUTIONS

## TESTIMONIALS

### **About CO<sub>2</sub> Mobile Air Conditioning**

"R744 (carbon dioxide) is a very well understood substance. It has no ODP and a GWP of 1. The efficiency results of some major international market players have shown that R744 MAC systems can reduce the fuel consumption of the AC system also under Chinese climatic conditions. We, at Shanghai Jiantong University, encourage Chinese companies to work with R744, and have completed several development projects"

**Professor Chen, lecturer at Shanghai Jiantong University and adviser to the Chinese Government, 2008, on [www.R744.com](http://www.R744.com)**

<http://www.r744.com/article.view.php?Id=660&latest=1>

"Compared to R134a systems, R744 MAC reduce direct greenhouse effect by a factor of more than 1000, offer improved AC Performance at equal package space, show higher overall efficiency. Furthermore, human's exposure to R744 is scientifically well researched, R744 is non flammable, R744 follows all present and future legal demands, R744 MAC is the right decision and the only known alternative refrigerant to meet 2011 SOP."

**Stefan Morgenstern, VDA, at Alternative Refrigerants Winter Meeting 2008, Saalfelden, Austria**

[http://vda.srv03.ideefix.net/fileadmin/downloads2008/presentations/Stefan\\_Morgenstern\\_VDA\\_OEM.pdf](http://vda.srv03.ideefix.net/fileadmin/downloads2008/presentations/Stefan_Morgenstern_VDA_OEM.pdf)

"Mobile Air Conditioning with refrigerants based on CO<sub>2</sub> are by far less harmful [than current systems]."

**Ronald Scheithauer, ADAC (3<sup>rd</sup> largest automobile club worldwide), 2007, Press release**

"R744 is an environmentally safe option worldwide. As an example, using R744 MAC in only 1 million cars in New Delhi, India, could already save 58,000 m<sup>3</sup> of petrol and 300,000 metric tons of greenhouse gases (GHG) each year."

**Dr. Armin Hafner, SINTEF, 2007, on [www.R744.com](http://www.R744.com)**

<http://www.r744.com/article.view.php?Id=630>

"The recent announcement of the adoption of this technology by our largest customers reinforces our decision in 1997 to begin development of R744 air conditioning components and systems to meet the need for better performing and more environmentally friendly vehicles."

**David B. Rayburn, President and Chief Executive Officer, Modine, 2007, Company Press release.**

"Today we can offer a production-ready and complete R744 climate system, which not only meets upcoming European legislation on greenhouse gases, but also helps our customers improve fuel economy."

**Nurdal Kucukkaya, Vice President Visteon, 2007, Company Press release**

<http://news.thomasnet.com/fullstory/530457>

"CO2 has excellent cooling and heating properties. CO2 is widely used today in mass production and can be handled safely. Natural refrigerant CO2 is the best alternative refrigerant to reduce greenhouse gas emissions. It also has the best heat pump capability of all refrigerants considered for automotive applications"

**BMW, Audi, Toyota, Behr, Denso, Delphi, Visteon, etc, 2005 Alternative Refrigerants Meeting, Saalfelden, Austria**

### **About Flammable refrigerants<sup>1</sup>**

"Test showed that HFO-1234yf in combination with PAG oil burns significantly. Such an initial fire from HFO-1234yf and oil can lead to a bigger fire involving other components in the engine compartment. A test with a butan lighter also showed that HFO-1234yf is flammable. On the other hand, tests showed that R744/oil mixture cannot be ignited. We therefore conclude that R744 is the safest solution for our future".

**Martin Graz, Technical Director, OBRIST Engineering, 2008, in [www.htsn.com](http://www.htsn.com)**

[http://www.gohtsn.com/article\\_976.shtml](http://www.gohtsn.com/article_976.shtml)

"There have been a lot of spurious arguments put forward attempting to convince people of the safety of flammable refrigerants. Let's be quite clear: HC contamination of existing MAC systems does not prove they are safe, HC use in other applications such as domestic refrigeration does not prove they are safe in MACs"

**David Godwin, U.S. EPA, 2005, at Mobile Air Conditioning sumit 2005, Sacramento, US.**

<http://www.vasa.org.au/pdf/hotair/2005-May.pdf>

"Vehicle manufacturers, automotive parts suppliers, the United States Environmental Protection Agency (EPA), and other organizations are warning car and truck owners to avoid the use of flammable hydrocarbon refrigerants, which are being marketed on the Internet, at flea markets and swap meets, and in some service shops, but are not authorized for this use."

**Joint Statement by EPA, Society of Automotive Engineers, and Mobile Air Conditioning Society, April 2005.**

<http://www.epa.gov/Ozone/title6/609/saeepawarning.html>

"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".

**Hans Fernqvist, Volvo Car Corporation, 2005, Gothenburg, Sweden**

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<sup>1</sup> Past comments about flammable refrigerants refer to Hydrocarbons (HC), previously considered as an alternative for mobile air conditioning. According to DuPont and Honeywell, HFO-1234yf is less flammable than Hydrocarbons. However, independent tests have proved how this substance decreases the safety level compared to current systems.

"[...] best practice established by every car manufacturer in the world, does NOT condone the use of flammable refrigerant in any a/c system".

**Board of Directors, VASA (Vehicle Airconditioning Specialists of Australasia), 2005**

"Existing mobile air conditioning systems are not designed to use a hydrocarbon refrigerant that is highly flammable and similar to what supplies the fire in your backyard barbeque."

**Ward Atkinson, Chair of the SAE Interior Climate Control Standards Committee (Joint Statement by EPA, Society of Automotive Engineers, and Mobile Air Conditioning Society), April 2005.**

<http://www.epa.gov/Ozone/title6/609/saeepawarning.html>

### **About decomposition of chemical refrigerants**

"Trifluoroacetic acid (TFA), a decomposition product of R134a and other synthetic refrigerants, will thus be leached out from the atmosphere by the rain, developing a herbicide effect capable of posing an incalculable risk to plants and other organisms. A negligent use of highly specialized stable gases, whose composition products have not been thoroughly investigated yet, would play at the expense of the very basis of human existence".

**Dr. Ernst Furrer, Swiss Environmental Agency, 2008, on Friscaldo (industry magazine)**